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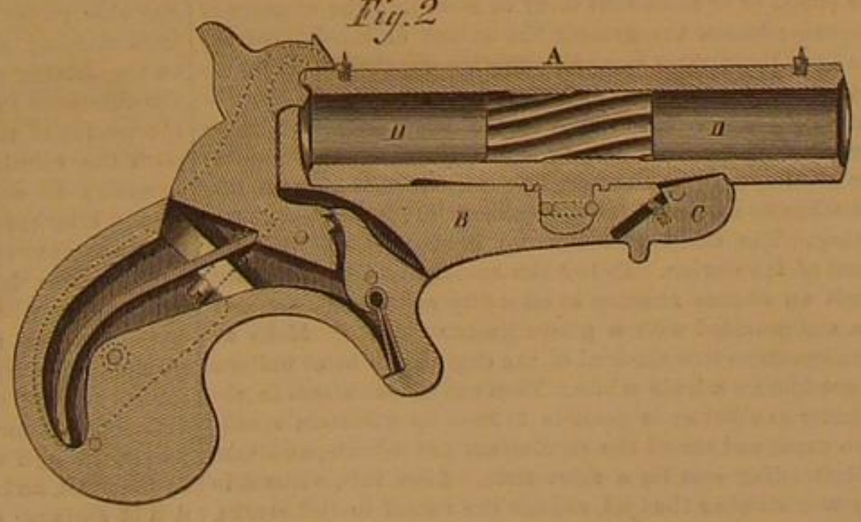
Patent Copper Cartridge Revolving Derringer.

The pistol represented in the accompanying engravings is a cartridge Derringer, loading with the ordinary copper shell cartridge, and discharging a ball weighing half an ounce, or of the same size and weight as a carbine ball. Fig. 1 represents a side view of the pistol, and fig. 2 a longitudinal section of it.

The leading ideas in this pistol are the mode of loading the cartridges, and the mode of expelling the shell of the cartridge after firing. In cartridge Derringers of the usual construction, the barrel, after firing, is opened at the breech, then the cartridge shell is extracted by a cartridge extracter, operated mechanically, after which the new cartridge is inserted into the breech, and the barrel is closed. In the new pistol here represented all this is changed; the barrel, A, is pivoted to the lock frame, B, at the exact center of its length, and is retained in the line of fire by a catch, C, of peculiar construction and arrangement. Each end of the barrel is chambered out, as at D, to receive a cartridge. (See sectional drawing.) When the pistol has been fired, the breech is not opened, nor is the empty shell extracted before loading (although it may be if desired); but the empty shell is left in the breech, while the new cartridge is inserted, ball foremost, into the muzzle, after which the barrel is turned half round on its pivot, so as to place the new cartridge in front of the hammer, while the empty shell is brought to the muzzle. Then the pistol is cocked and fired; whereupon the discharge expels the empty cartridge shell from the muzzle, in advance of the ball. By this system of loading and firing, the number of operations required are less than in any pistol hitherto produced; and, as a natural consequence, the pistol can be loaded and fired more rapidly than any other single barreled fire-arm, and more rapidly than any revolver, if more than six shots are to be made at a time. Experience has proved that at least twenty shots per minute can be readily fired; while the number can be increased to thirty or more per minute, by practice. The pistol can, also, be readily carried in the pocket. The advantages claimed are, that it is conveniently carried in the pocket, being less bulky than the ordinary pocket revolver; it carries a half ounce ball, or if desired, it will discharge two balls at a shot, thus firing an ounce of lead at a discharge; it can be loaded and fired from twenty to forty times per minute; its penetration is greater than that of any pistol of the class which has ever been produced; is superior in style or form, finish and workmanship, to any pistol of its class; is extremely simple in its construction, and can be manufactured at a low cost; may be kept in the pocket, or under a pillow, without danger of going off accidentally, as the loaded shell may be retained at the muzzle until the pistol is to be fired, when it is transferred to the breech while the pistol is being cocked. The simplicity of operation of the new pistol is so great, and its efficiency so marked as to render it peculiarly adapted for naval warfare.

Fig. 1

Fig. 2



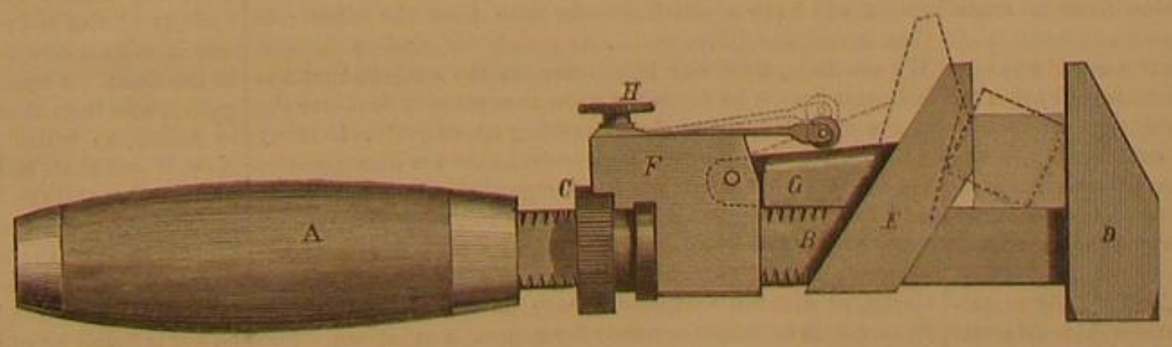
The pistol embodies may novel features, which are covered by several patents, full information respecting which may be had from E. S. Renwick, 34 Beach street, New York, who may be addressed for the purchase of the entire right, or for an exclusive license to manufacture under the patents.

Improved Screw Wrench.

No hand implement used by mechanics has a greater number of applications than the screw, or monkey wrench. It is almost indispensable in the machine shop and the engine room, and of the greatest service otherwheres. The necessity, however, of removing it from the nut or bolt head at every partial revolution and again replacing it, renders it a less perfect instrument than it otherwise would be. To avoid this annoyance and waste of time is the object of the invention herewith illustrated.

The handle, A, shank, B, nut, C, and jaw, D, are of the usual construction. The jaw, E, however, instead of encompassing the shank and being thereby compelled to move along upon it, is hinged to the saddle, F, by an arm, G, and its base is slotted to embrace the sides of the shank and slide along upon it, being held in place by a spring and roller fixed to the saddle by a set screw, H.

By this device the jaw, E, is thrown up from the nut, when it is being unscrewed, by simply turning the wrench on the nut as a center, by which the jaw is lifted from the shank, as shown by the dotted lines. When the wrench is turned in the contrary direction the jaw is actuated by the spring and moves back to take a firm hold on the nut. Thus, using the nut or bolt head as a center, the necessity of removing the wrench at each turn is avoided. It is evident the same arrangement is applicable to the pipe wrench. Every mechanic who uses the screw wrench in his business must see the superiority of one that can be used either for screwing or unscrewing without the trouble of removing and replacing the implement several times at each revolution over those in ordinary use. Patented June 30, 1868. Address, for the whole right or for rights to manufacture, Bradshaw & Lyon, Delphi, Ind.



THE PERRY & GODDARD "DOUBLE HEADER," OR "PERPETUAL REVOLVER."

BRADSHAW & LYON'S SPRING-JAW WRENCH.

THE taxes in England, for 1868, amount to £68,000,000.

ELECTRO-DEPOSITION OF IRON.

Means whereby the electro-deposition of iron could be accomplished have long been sought, although with but very partial success. Some recent experiments by M. Klein, St. Petersburg, as given in a letter by him to M. Jacobi, of Paris, having met with a larger measure of success than has hitherto been obtained, are worthy of attention. M. Klein has produced by electro-deposition casts, as follows:—1st, a tablet of iron, 150 centimeters square, and 2 millimeters thick; 2d, of several medals; 3d, of a medallion composed of thirty-four cameos, and 13 centimeters in diameter; 4th, of a page of movable type stereotyped in iron, 84 centimeters square, and the block of a drawing, guillocheed with the most delicate strokes, both destined for the typographic press. The first plate and the first medals prepared by him, present on the reverse sides, sundry porosities and cavities, penetrating even in some places the entire thickness of the deposit. He attributes these cavities to bubbles of gas, but he has recently been able to avoid them. His starting point was the known process of covering engraved copper plates with a coating of steel, which is quite successful in a bath composed of the chlorides of ammonium and iron, to which he added a minimum quantity of glycerin. Nevertheless, all who have attempted coating with steel must have observed, when endeavoring to give greater thickness to a very thin and brilliant layer of steel, that the surface cracks, and the deposit detaches itself from the cathode in very brittle spangles. Other baths, composed in a uniform manner, and capable of being employed under the same conditions, must therefore be used. They may be classed under two categories, comprising baths composed of sulphate of iron, and sulphate or chloride of ammonium. The first bath consisted of a solution of the double salt sulphate of iron and sulphate of ammonium; the second was composed of an admixture of the concentrated solutions of each of these two salts, in the proportions of their equivalents; the third bath, which distinguished itself meritoriously from the others, was obtained by taking a solution of sulphate of iron, precipitating the iron by carbonate of ammonium, and dissolving the precipitate in sulphuric acid, thus avoiding all excess of acid. For the preparation of the baths in the second category, he either mixed solutions of chloride of ammonium and sulphate of iron in the proportions of their equivalents, or dissolved in a solution of sulphate of iron, at a temperature of about 15° Reaumur, as much chloride of ammonium as it would take. All these baths were as highly concentrated and as neutral as possible. For an anode, plates of sheet iron were used, presenting a surface nearly eight times as large as that of the copper cathode. Upon the employment for decomposition of one of Daniel's cells, there were formed upon all the cathodes, in the course of twenty-four hours, irregular deposits full of cracks, which, on the slightest attempt to remove them, broke into a thousand pieces.

A continuation of the experiments, for several days, produced no better results, the solution not improving by use, as is often the case with copper solutions used in electrotyping. An employment of a weaker battery improved the results, but still left much to be desired. An examination of the bath showed an increasing acid reaction, owing to the deposition of iron upon the cathode more rapidly than it was dissolved from the anode. To augment the solubility of the anode, a plate of copper was plunged in the bath, and combined with the iron.

The result of this combination was most surprising; not only did the baths in the first category become re-neutralized in a few hours, but the deposits became much smoother, their color a dull gray, and adhered perfectly to the cathode without forming bubbles, or cracking in any part. Their surfaces remained quite smooth during the first twenty-four hours, after which there began to form, in several places, the characteristic cavities, corresponding, so to speak, with those mam-

miliary bubbles so often seen in the electro-deposition of copper. By reducing the energy of the current, either by reducing the strength of the solution or increasing the resistance in the solid parts of the circuit, so as to render the evolution of gas imperceptible, the formation of these bubbles ceased entirely. M. Klein found the strength of the solution should vary with the material of which the cathode was made. In all cases the cathode was required to be perfectly clean and smooth.

Galvanic iron, when first taken out of the bath, is as hard as cast steel, and very brittle, but when annealed at a temperture of dull redness, it loses much of its harshness and hardness; when further annealed to red heat, it is malleable, and may be engraved as easily as soft steel.

When made under favorable conditions, and annealed uniformly, and with the proper precautions, electro-deposits are not subject to twist, bend, or blister. There is no contraction, but, on the contrary, an almost imperceptible dilatation; this is of importance where the complete similarity of blocks is required, as their dimensions should receive no sensible alteration on being annealed. The specific gravity of this iron before and after annealing, has not been yet determined.

It appears that galvanic iron has no permanent magnetism, but will receive magnetism like soft steel.

ON THE DURABILITY OF METALS.

At a recent meeting of the institution of Civil Engineers, London, a paper was read on the durability of materials, by Mr. Edwin Clark, C. E., in which was the following:

The durability of metals, like that of organized substances, depended, mainly, on the resistance they offered to combination with oxygen; and thus their decay might also be regarded as a slow combustion. But their durability further depended on the character of the oxides formed on their surface. Iron exposed to moisture was soon coated with rust, in the form of hydrated peroxides; and as these oxides did not adhere to the surface, additional flakes constantly formed and fell away, until the whole mass was destroyed. Wrought iron in a pure, dry atmosphere suffered, practically speaking, no deterioration in any lapse of time. It was extremely durable in distilled water free from air; but it was slowly oxidized in a moist atmosphere, and with fatal rapidity in air or water containing free acids or other corrosive agents. It was, however, efficiently protected from such agents by paint, which adhered to clean iron with great tenacity. It was also a fact, not hitherto satisfactorily accounted for, that oxidation was to a great extent arrested by vibration. The painting of wrought iron girders and roofs, more especially in the neighborhood of smoky towns, was a precaution of the utmost importance. Every care should be taken to expose the iron as freely as possibly to the air, to leave no hollows where water could collect, to avoid the contact of damp earth, and especially of vegetation, and to throw the material in the form of heavy bars rather than thin plates. Painting was more economically performed, and was more effectual, when constantly attended to, than under the vicious practice of laying on three or four coats and then leaving the work for years, till the paint all peeled off, with a layer of rust attached to it. The Britannia bridge furnished a striking illustration of the value of this system. The maintenance had been effected by two or three men, constantly on the work, who attended to the slightest symptom of local discoloration. As a consequence, the author did not hesitate to express his firm belief, that the total loss from rust of the 10,540 tuns of which the tubes consisted, did not in twenty years amount to a single pound weight.

Cast iron when exposed to the action of sea water slowly decomposes, the iron being dissolved, leaving behind a graphite or plumbago. The action was, however, superficial, and very slow. It could be preserved by painting, where accessible for that purpose, and by any protection which prevented continual renewing of the surrounding medium, as when enclosed by brickwork or masonry. In fresh water it suffered no such deterioration, and under ordinary circumstances its durability in a pure atmosphere appeared unlimited. In the case of zinc, although the bright metal oxidized even more rapidly than iron, yet the oxide adhered with such tenacity to the metal, that it afforded an efficient protection against the continuation of the process. To this property the metal owed its great durability. More especially as its oxide was insoluble in water. In the presence of any solvent of the oxide, this metal was so speedily destroyed as to be practically useless, unless protected by paint. The destruction of zinc in smoky districts was, however, principally due to galvanic action. A similar action produced the rusting away at the base of iron railings, when fixed in stonework, as was usually the case, by being run in with lead. The contact of copper with the iron plates of a vessel was also a source of great danger and there were numberless other instances in which the contact of metals of different conducting powers was equally destructive. In all such cases the use of paint furnished, at any rate, a temporary remedy.

It was difficult to over-estimate the value of the introduction of the process of coating iron plates with zinc, by simply cleaning and immersing them in the molten metal. All that had been said on the subject of zinc applied equally to galvanized iron, as it was called. In a clear atmosphere its great durability, its stiffness, its freedom from expansion, and its economy, were all qualities of the highest value; while on the other hand, without constant painting, it was wholly unfitted for the atmosphere of smoky towns, or manufactories, or even stations where it was exposed to the fumes from locomotives. Both the corrosive and galvanic actions, which in such cases were so destructive, did not cease with the destruction of the zinc, which was soon effected, but continued also to act, with fatal effect, upon the iron itself, as might be seen in many railway stations and sheds near manufacturing towns. The corrosive tendency in zinc and iron obliged the use of the less oxidizable metals copper and lead. Lead slowly absorbed oxygen and carbonic acid in moist air. It was acted upon by certain waters, and was occasionally riddled with holes by the larva of an insect; and its expansion and contraction required to be carefully allowed for in its use. Its ductility rendered it a valuable material. Copper might, however, in many instances, be used with great advantage in its stead.

The action of sea water on copper was so important, that it was particularly alluded to. The object of covering a vessel with copper was solely to prevent the adhesion of barnacles and other molluscs. This property was not due to the poisonous quality of its salts, as was sometimes asserted, nor was copper used on account of its durable qualities; on the contrary, its value depends on its slow destruction. The chloride of copper formed beneath the attachment of the barnacle being a soluble salt, the creature no sooner effected a lodgement than it was at once set free by the solution of the salt; while the salts which were formed on zinc or iron being insoluble, the plate was rather protected than otherwise by the tenacious parasite. Hence the difficulty of divising an efficient paint for iron ships; for while, on the one hand, it must be slowly soluble in water to prevent this adhesion, it must on the other hand, be sufficiently insoluble to be durable.

Ordinary oil paint was the most efficient material for protecting either metals or wood from the effects of moisture and air, but all oils, resins, and gums exposed to air, and especially to the light of the sun, oxidized and burnt away with more or less rapidity, leaving a powdery residue behind. As a preservative of paint against the heat of the sun and light, attention was directed to the virtue of a coating of silicious sand, dredged on the paint while wet. The durability of matter was a subject of the highest philosophical interest. The universal law on this planet appeared to be, that no form should be permanent. Never ceasing destruction and re-construction were characteristic, within the range of the atmosphere, of everything that existed, whether as regarded organic life or inorganic matter; and it was probable that even the atmosphere itself was subject to the same decree.

THE BEST MODES OF TESTING THE POWER AND ECONOMY OF STEAM ENGINES.

BY CHARLES E. EMERY, LATE OF THE U. S NAVY AND U. S. STEAM EXPANSION EXPERIMENTS.

Read before the Polytechnic branch of the American Institute, Oct. 22, 1868.

(*Continued from page* 308.)

The Richard's, or "parallel motion" indicator, is undoubtedly a great improvement upon the old style; but using one of the best of the first named instruments, made by Elliott Brothers, of London, and carefully adjusted so as to move freely, but without shake in the joints, we have found inaccuracies in the diagrams of from ten to twenty-five per cent. The results were so remarkable and unexpected, that we propose to point out ready means whereby anybody may repeat the experiment. As has been previously explained, the weight and friction of the moving parts of the indicator cause the pencil to be somewhat tardy in recording the changes of pressure; hence, the greater the extent or rapidity of the changes, the greater should be the discrepancies. If an engine be working full stroke, the steam and exhaust lines of the diagram will change so little that there will be time for the piston of the indicator to adjust itself to the pressure; the contrary will be the case, however, when the steam line is broken by expansion, or the exhaust line by extreme cushioning. The discrepancies would increase, also, with the speed of the engine. To test the amount of the variations, select an engine running at least fifty revolutions per minute, and provided with a good adjustable cut-off. Make arrangements so that the load of the engine will be as uniform as possible for a little while. Then cut off the steam in the cylinder as short as is possible to keep up a certain speed; then count and record the revolutions per minute, and take indicator diagrams for a short time. After this, without in any way altering the load, change the cut-off to full stroke, as nearly as possible, and adjust the throttle so that the engine will make exactly the same speed as before, and again take indicator diagrams. The operations may be repeated several times, to allow for inequalities in the load. The indicator diagrams, taken under such circumstances, though of different shapes, should of course show the same mean pressure, for the engine was developing the same power in all cases. In practice, however, the cards taken with a short cut-off will have a much greater area than the others; so that, in fact, the difference can be readily detected by the eye. We conclude, from our experience on the subject, that the indicator cannot be depended upon to accurately measure the power of high speed engines, working expansively. In many cases, in practice, we suppose however that the discrepancies are so small that they may be disregarded. In marine practice, for instance, the paddle engines run very slowly, and screw engines do not generally work at a high degree of expansion; and, in general, the power of all engines running slowly, or with little expansion, may be measured by the indicator with sufficient accuracy for general comparison. The difficulty occurs in cases like the locomotive or stationary engines working very expansively, at a speed of from fifty to two hundred revolutions per minute. In these cases, the indicator should be depended upon only in comparative tests where the engines run at about the same speed, with about the same pressure of steam and degree of expansion. The stiffer the spring of the indicator, the lighter the moving parts; and the smaller the range of the motion, the smaller will be the variations. Gooch's locomotive indicator seems to fulfill these requisites the best of any yet designed. The indicator is often applied to both steam and pump cylinders of pumping engines, when the difference in the power thus obtained shows the friction of the machinery.

The measurement of the power in the steam cylinder, by the indicator, is defective, also, because it takes no account of the friction of the engine. If all engines of the same power worked with substantially the same friction, this consideration would be of little or no consequence. But a multiplicity of parts, awkward proportions, improper fittings, weak framing, etc., may cause some engines to have far greater friction than others. Again, questions as to the proper size and speed of an engine are influenced by friction. For instance, if a large engine is more economical than a small one, will not the gain be balanced by increased friction? The only way of settling these questions is by measuring the net power of the engine or that which is available for useful work. This can be done by the dynamometer. This instrument is made in many different forms The friction dynamometer consists substantially of half clamps or boxes fitted to a revolving shaft, and kept from turning therewith by a lever held in position by weights, and a spring balance. When in use, the clamps are tightened, until they create sufficient friction to absorb the power; the weights are then adjusted, till they nearly balance. The amount of weight, the tension of the spring, and the speed of the shaft, are then noted, when the power transmitted through the shaft may be easily calculated; for the force of the weight and spring is multiplied by the lever in proportion to its length, divided by the radius of the shaft, and this multiplied by the velocity of the bearing surface in feet, per minute, gives the foot pounds. This form of dynamometer is little used, because it absorbs instead of transmitting the power. Beside, it is difficult, on a large scale, to maintain a constant friction for any length of time.

The dynamometers of greatest practical value transmit, and at the same time indicate the power, without in any way interfering with the regular duty of the engine. For instance, if the power be transmitted by means of a belt, and we can in any way measure the tension of the two parts, their difference represents a force, moving with a given velocity, which may easily be reduced to units of power.

A dynamometer on this principle has been used abroad, which was re-invented by Horatio Allen, Esq., President of the Novelty Iron Works, in this city, and by him applied to the engines used in the United States Steam Expansion Experiments. In this case the driving and driven shaft were separate, but lay in the same horizontal line. Near the contiguous ends large wheels were placed, with a V-groove in the circumference of each. An endless rope passed in both directions, over the top of one wheel, then under side pulleys, over the top of the other wheel. The side pulleys were below the center of the large wheels, and were of such size that the four parts of the rope leading to them hung vertically. These pulleys ran in bearings, free to slide vertically, and were connected to platforms carrying adjustable weights. The motion of the wheel, on the engine shaft, turned the other shaft in the opposite direction by means of the rope, but tended, at the same time, to lift one side pulley. The opposite side pulley was weighted sufficiently to keep the rope from slipping, and weights and a small spring were adjusted on the driving side to balance the lifting force. Then half the difference in weight, on the two side wheels, equaled the tension of the cord, or the driving force, which, together with the velocity of the cord, furnished the only elements necessary to calculate the power. This instrument had means attached to automatically record the strain on the cord, and answered its purpose very perfectly and satisfactorily. It was, however, too expensive and cumbersome for every day use. Three beveled wheels, on the above principle, have been used as a governor, and would doubtless make a good dynamometer also.

Steel springs, properly arranged, form, we believe, the best dynamometer for practical use. As commonly constructed, a pulley, through which the power is transmitted, is made loose on the shaft, and then is driven from it through the intervention of springs; or one shaft is driven from another in the same manner. It is necessary, then, in order to calculate the power, to ascertain the tension of the springs and their velocity where the force is applied. Neer's dynamometer, on this principle, may be taken as a type of its kind, and has given general satisfaction. The instrument must be attached in two places—one part to the driving shaft, and the other to the pulley or shaft to be driven; and the latter must not receive any motion except what is transmitted through the springs of the instrument. Secured to the instrument are two or more coiled steel springs, lying in the same direction as the shaft. A chain passes through each spring, around a pulley, and from thence to a circular hub on the other shaft or pulley, to which hub the end of each chain is secured. Now, if one shaft be moved, it tightens the chains and compresses the springs sufficiently to overcome the resistance, and put the driving shaft or pulley in motion. The longitudinal motion of the springs moves a hand on a suitable dial, which is graduated so as to show the horse power when the shaft makes one hundred revolutions per minute. The exact power is found by counting the speed of the shaft, and correcting the reading accordingly. The minor details of construction can best be explained by the manufacturers. The accuracy of an instrument of this kind can easily be tested by weighing the springs, measuring the distance from the center at which they act, and correcting the dials accordingly.

A good dynamometer is the only instrument that can be depended upon to accurately measure the useful work which

an engine is capable of performing; still the best instruments of this kind have many disadvantages for every day practical use.

In the first place, especially when great power is to be measured, the dynamometer must needs be a large, heavy, and expensive measuring machine, rather than an instrument; consequently, but few can afford to purchase it The dynamometers, at present in the market, are sold chiefly to establishments that rent rooms with power, where a small machine can be shifted about the building in the night, and attached so as next day to indicate the power used by any one of the tenants.

The steam indicator, on the contrary, is neat and compact, and can easily be applied to nearly every kind of steam engine. Its use has, therefore, become so general, that it is acknowledged throughout the world as the standard measure of the power of the steam engine. We have shown the instrument defective, still we cannot point out another, fit in every respect to take its place. We do say that the dynamometer should always be used to measure the power; but we acknowledge that, in a majority of cases, it is impracticable to apply it. Then, as we have proposed two methods of investigation, one for careful scientific experiment, and the other for practical and tolerably accurate comparison, we conclude that the first would always require the use of the dynamometer, and the latter whenever it is practicable to employ it. Generally, however, until a new instrument is perfected, we must use the indicator alone in ordinary practical trials. It should only be trusted, however, under the circumstances, and subject to the precautions we have before expressed.

(To be continued.)

VELOCITY OF NERVE FORCE.

The *Journal of Mental Science* contains an interesting article on the velocity of nerve force, comprising a description of the methods which have been employed to determine it. It says:

"The nerve current which transmits sensations to the brain, and the orders of the will to the extremities of the body, requires a certain time to travel in. Impressions coming from without are not perceived at the instant they are produced, they travel along the nerves at the rate of 20 to 30 meters (21·87 to 32 81 yards) in a second, which is the same as that of the carrier pigeon, of a hurricane, or of a locomotive engine at its quickest, but very much less than that of a cannon ball. For instance, we can only be conscious of an injury to one of our feet about one-twentieth of a second after it has actually occurred, and the commands of the will proceed equally slowly from the center to the peripheries of the nervous system. In the human body the time thus occupied is unimportant, but let us take the case of a whale, where the telegraphic network of the nervous system is far more extensive. A boat attacks the whale, and a harpoon is driven into its tail. The impression thus produced has to travel over some forty yards before reaching the headquarters of the will; a second is thus lost. How long a time is then required for reflection? That must depend upon circumstances; but at any rate it is certain that the will has need of some definite amount of time for its decision. The order to capsize the boat is dispatched to the tail, but another second must elapse before the telegram reaches its destination, and in the time thus employed the whaling boat has pulled off and escaped the danger.

"Several methods have been devised by physiologists for measuring the velocity with which nerve force travels. Thus, a physician of the middle ages, mentioned by Haller, fancied that this might be calculated by comparing the supposed diameter of the nerve tubes with that of the aorta, as he supposed the velocities of the blood and 'animal spirits' to be in the inverse ratio of the vessels containing them, from which data he calculated that nervous influence travels 600 times more quickly than light.

"Haller's own mode of procedure was scarcely more rational. He counted the greatest number of letters he could articulate in a given time, which he found to be 1,500 per minute. Now, the letter *r* requires, according to him, ten successive contractions of the muscle which makes the tongue vibrate, whence he concluded that this muscle can contract and relax 15,000 times, that is, can move 30,000 times in one minute. From the brain to the muscle the distance is one decimeter; if, therefore, the nerve force passes over that space 30,000 times in a minute, it must travel at the rate of three kilometers per minute, or fifty meters per second. We need not point out that this process is a mere series of mistakes, but it is strange that the result should happen to be so near the truth.

"No attempt was made until 1830 to study this question in a satisfactory manner, when one of the most distinguished of modern observers, M. Helmholtz, undertook its investigation. He at first employed Pouillet's 'chronoscope,' a machine in which a galvanic current of very short duration makes a magnetic needle deviate, the duration of the current being measured by the amount of deviation; by this means as short a time as some thousandths of a second can be measured. M. Helmholtz fixes one end of a muscle from the leg of a frog, and attaches the other to a small lever which forms part of a galvanic circuit, so that at the moment of contraction the circuit is broken and the time registered by the chronoscope. The current is first sent directly through the muscle, and then through a given length of nerve which has been left adherent: the difference in time between the two cases gives the velocity of the nerve force, which, by this process, is found to be 26 meters (85 feet 4 inches) in a second.

"In a second method, also, employed by M. Helmholtz, the lever raised by the contraction of the muscle has a point which traces a line upon a sheet of blackened paper, which is kept moving from the moment of excitation, and the curve produced by the movement of the lever registers all the phenomena of the muscular contraction. This apparatus, called the 'myograph,' gives the velocity of nerve force as equal to 27 meters (88 feet 7 inches) per second; several modifications of the instrument by different physiologists have given very closely agreeing results, and have also shown that the velocity is diminished by sending an electric current through the nerve, or by a low temperature.

"Experiments with the same object have been made upon man in the following manner: An electric current is suddenly applied to the skin, the moment of application being registered by the turning cylinder of a chronoscope, and as soon as the person experimented on perceives the slight prick produced by the current, he touches an electric lever by which a second mark is made upon the cylinder. The interval between the two, which can be thus measured, is made up of the following elements, viz., transmission of the impression to the brain, the mental process there gone through, the transmission of the voluntary impulse to the fingers, and the consequent muscular contraction. But if this experiment be performed on two different parts of the body, as for instance, at the groin and at the great toe, all the other elements of the delay will remain the same except the time occupied by the transmission of the impression upward, and the velocity of nerve in man can be thence calculated. M. Hirsch, the director of the Neufchatel Observatory, was the first person to make these experiments, in 1861, and from them he concluded that nerve force in man passes over 34 meters (111 ft. 6 in.) in a second. Dr. Schelske has repeated the same experiments, and deduces from them a slightly less velocity, 29½ meters (96 ft. 9 in.) per second. By similar means it has been shown that the rate of transmission through the spinal cord is the same as through the nerve trunks, and that a reflex action requires from one tenth to one thirtieth of a second more than the mere direct conduction of excitement to the muscles.

"The time required for certain cerebral operations has been measured by Dr. De Jaager in the following manner: it was preconcerted that the person on whom the experiment was made should touch the lever with his right hand when he received an electric shock on the right side, and with the left hand when he received a shock on that side. The interval between the shock and the signal was found to be 0·20 of a second when the subject of the experiment had been told beforehand on which side the shock would be given, and 0·27 of a second when he had not been told; 0·07 had therefore been employed in reflection.

"M. Hirsch, again, has found that on an average two tenths of a second must elapse before an observer can mark by a signal his perception of a sudden noise or flash of light, and MM Donders and De Jaager have varied their experiments thus—one of them pronounced a syllable, the other repeated it as soon as heard; when the syllable had been agreed upon beforehand, there was an average delay of two tenths of a second; when it had not been so agreed upon, of three tenths of a second. These are, however, only average results, and subject to considerable individual variations, of which the 'personal equation' of different observers of a transit is an example well known to astronomers."

Locomotive Engines.

Engineering says that although locomotive engineers are plain, practical "bodies," as would be said of them north of the border—and "muckle bodies" some of them are, too—they have nevertheless so idealized the locomotive engine that it has become with them a mechanical Apollo, and they would no sooner listen to any proposal to give it new forms than would the genius of sculpture, or its chosen disciples, to transform the *chef d'œuvre* of the Belvidere gallery into the traditional tripedal aboriginal of Manx, or, in other words, the three-legged *quocunque jeceris stabit* of the Isle of Man. The marine engineer may cut and carve his engines in a hundred ways, standing them on their heads or their heels, or lying them on their backs or their bellies (!), for they are neither fish, flesh, nor fowl, or, as sailors would say, "hog, dog, nor devil," but animated masses of ironmongry, and nothing better. But the locomotive engine is a horse of another color, and more than half of all the locomotive engineers in the world would, we are sure, were they to open their hearts, pronounce their favorite—rolling as it must, because it cannot fly—a heaven pacing Pegasus, and they would dwell upon his "points," albeit that he has neither mane nor tail, with the affection of a jockey caressing the favorite for the two thousand guineas.

Now, without exactly translating this iron horse into a gelding, it is requisite that he should be materially altered. Good looking as he may be, he is nevertheless the greatest beast that paweth the valley, and his pawing is really more than the valley can withstand. In plain English, the locomotive of 1868 is a monster which all good engineers should unite to destroy. He is the stalking horse of railway bankruptcy, the gaunt steed of railway ruin. It is time he was off to the knackers, and his carcass sold for what it will fetch in gun metal (precious little) and old iron. There are several counts of the indictment against this beast. But chiefly he will perform his plunging, racing, backing, gibbing, and shying only upon an iron railway. And of his sextupedal or octupedal hoofs there is generally one pair on which from ten to fourteen tuns of his carcass are supported. With these he will often "let out" in a manner to grind fire from the rails beneath him. Harnessed at his best, the train of traps at his heels has nowhere a wheel loaded to more than three or four tuns—the latter very, very seldom indeed, although the load is doubtless growing with the force of bad example. Now, to draw the line somewhere, no railway ought ever to be strained with a load of more than four tuns to a wheel. We can remember the locomotive shortly after he was foaled, and when, as a colt, he beat the devil's tattoo with his little wheels—heels we mean—weighing not more than five tuns on the hind pair; and he was a four-footed locomotive then, and not a six or eight footed nondescript as now. Bless his little boiler! He could, as he was then, ride on the footplate of the hard-mouthed stallions that tear over the rails now, and *they* would never feel it, although the racecourse, 'yclept "permanent way," might. But he has grown altogether too big, and he must either have more legs put under him or else be knocked on the head. There is a main pair of legs to every engine, through which it must exert all its strength on a pull. For a strong pull all the legs must pull together, and all must keep exact step with each other. This can only be secured by means of certain harness known as coupling rods, but when more than six legs at most are coupled, there is fretting and chafing. What with the difference in shoeing, and in the weight on each pair of legs, there is a constant tendency to get out of step, which only the coupling rods can restrain. When the beast has eight, ten, or twelve legs, as some of them have, coupling rods may be carried altogether too far. The weight is well distributed, no doubt—say to four, or at most, five tuns on a hoof—but the coupling rods do almost more harm than good, and in turning Tattenham Corner, or, in other words, a sharp curve, the off heels are playing mischief with everything on that side. The fact is, very long bellied horses, of the breed we are now dealing with, will never ride well in the ring. Dropping the metaphor, eight, ten, or twelve-coupled engines, having, therefore, necessarily long wheel bases, tear the way to pieces and themselves too.

And yet larger engines than almost any now in use are required to work heavy goods traffic with economy—say forty-five to eighty trucks, in a train on reasonably good lines. We see no solution of the problem of fifty-tun or sixty-tun engines, except in double bogies, like an American passenger carriage, each having its own pair of cylinders and working gear, but fed from a single long boiler with the firebox at the middle. This plan unites all the advantages of a single engine with those of twin engines, and avoids the disadvantages of both. Many of the American passenger carriages have each two six-wheel bogies, some of them two eight-wheel bogies. The sixteen-wheel carriage need not yet be repeated in the locomotive, but the twelve wheels, in two independent groups, may be and should be as soon as possible.

The system of engine building which requires a permanent way twice as strong as is necessary for the paying load, including wagons, to be drawn, is, on its face, wholly wrong, and nothing but habit and an almost pagan veneration for the outward form of the locomotive as George Stephenson left it, can account for the long continuance of a practice so palpably vicious. With properly constructed engines the permanent way need not be made nearly so strong as now, or, if the present strength were retained, the wear and tear, upon the plainest principles of action and reaction, would be very sensibly diminished.

The Phenomena of Supersaturation.

For a very long period the phenomena of supersaturation in saline solutions have perplexed chemists. Mr. Charles Tomlinson, F. R. S., has been experimenting and theorizing upon the subject, and has communicated to the Royal Society his conclusions and the grounds upon which they are based. We have only room to give the conclusions which, if substantiated, are important and interesting to chemists.

The conclusions arrived at by Mr. Tomlinson are: (1) That a number of hydrated salts form supersaturated solutions and remain so even at low temperatures simply from the absence of a nucleus to start the crystallization. (2) That a nucleus is a body that has a stronger adhesion for the salt than for the water which holds the salt in solution, a state of things brought about by the absence of chemical purity. (3) That three or four salts form supersaturated solutions which in cooling down deposit a modified salt or one of a lower degree of hydration than the normal salts. (4) That this modified salt is formed first by the deposit, in small quantity, of the anhydrous salt, which entering into solution, forms a dense lower stratum containing less water than the rest of the solution, in which lower stratum the modified salt is formed. (5) That salts of a low degree of hydration form supersaturated solutions, which on reduction of temperature, or by the action of a nucleus, deposit the excess of salt that held the solutions supersaturated, leaving them merely saturated.

Test of a Fire-proof Building in Chicago.

A test of a fire-proof building erected specially to prove the relative merits of wooden beams and floors covered with a preparation for rendering wood fire-proof, and iron beams and brick arches, was made in Chicago on the 26th October. The upper floor of the building was composed in part of iron and brick, and in part of the prepared wood. Wood was heaped up below and set on fire. The fire was allowed to continue 35 minutes, when it was, with much trouble, extinguished with an engine. The test was very severe, but the wooden flooring stood it very well. Several merchants, insurance men, and others were present, and expressed themselves highly satisfied. The comparative cost of wood thus prepared is only about one third that of iron and brick, hitherto used in fire-proof structures, and should future tests confirm the results of the one we have described, it will no doubt take the place of the more costly material to a great extent.

IN Durham, Maine, there is a family of six brothers, aged respectively, 80, 77, 75, 70, 66 and 64 years. The father of these brothers lived to the age of 80 years, and their mother 99 years.

Improvement in Steam Engine Valves.

The object of the improvement, shown in detail in the accompanying engravings, is to furnish a self-acting main valve to a steam engine or steam pump, actuated only by the pressure of the steam, the inlet valve alone being operated by the machinery of the engine; and to give absolute control of the inlet of steam, so that the engine, or pump, shall work equally well at high or low rates of speed and at differing pressures.

The inventor says the simplicity of the whole valve arrangement should recommend it, as it is a plain slide valve; any packing may be used on the valve piston and cylinder, and the cylinder may be constructed to suit the purpose; the valve piston is not subject to blowing, as steam is freely admitted from the steam chest on each side, except at the moment of action.

Fig. 1 is a longitudinal section of the valves, steam chest, and valve seat; Fig. 2 is a similar section of the same, leaving out the valve seat; the sections being taken in line with the steam passages on either side of the center of the main valve. Fig. 3 is an end view of the main valve cylinder, showing the means of seating it and adjusting it to the valve face of the steam cylinder. Fig. 4 is the rocker arrangement for moving the inlet and main valves.

A is the valve face, or seat, of a cylinder of common three-port construction; B, the steam chest; C, the valve cylinder bolted to the steam chest in such a manner as to allow shifting toward the main valve face; D is a stuffing box for the valve rod; E is the main valve bearing on the valve seat, A, of the main cylinder; F is a valve plate seated on the valve face, E, and held in position by the steam chest; G is the inlet valve worked by the main piston by the rocker, Fig. 4. The main valve, or piston, has its packing so fitted as to allow for its permitting the valve to always be seated on its face, as seen at H, Fig. 1, in combination with the arrangement for moving the entire valve cylinder, as in Fig. 3. The rocker, Fig. 4, consists of a quadrant, arm, and pins pivoted to the stud, I; the arm, J, pivoted also to the same center, has its other end connected to the piston rod, K. The bracket holding the center pin or stud of the rocker shaft is bolted to the frame of the engine.

Fig. 1

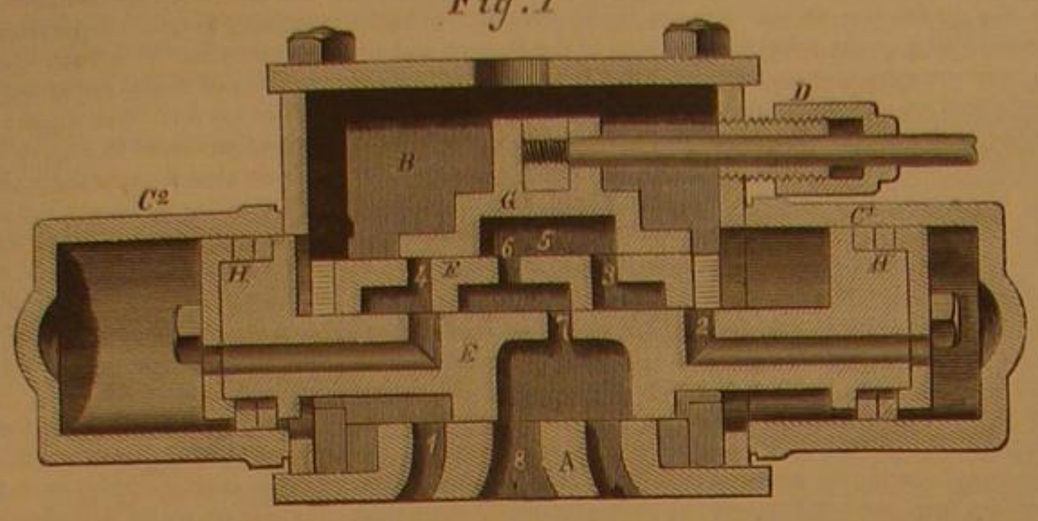
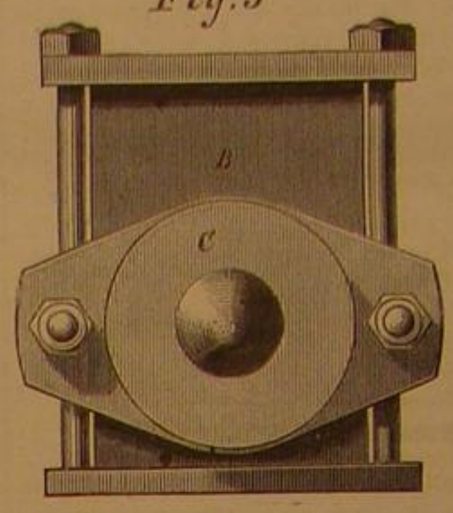


Fig. 3



THE REICHMANN'S PATENT VALVE FOR THE STEAM ENGINE.

Fig. 2

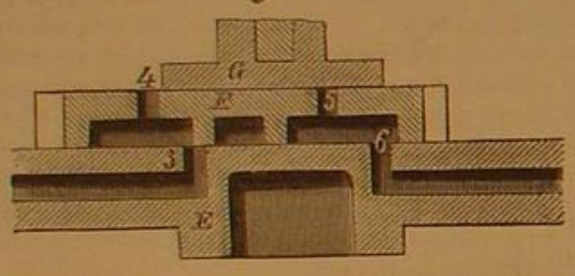
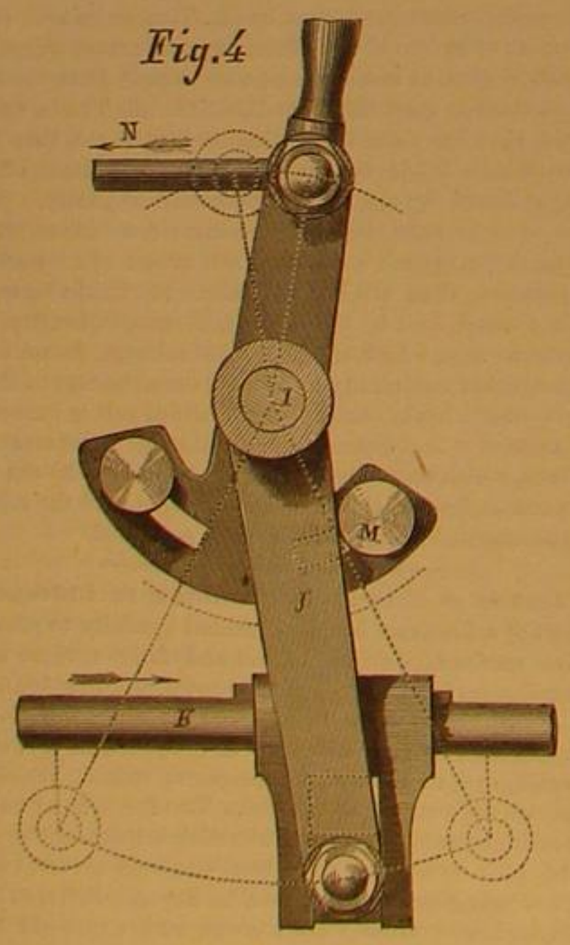


Fig. 4



The parts being thus described, it only remains to note their operation. Steam is admitted, as usual, through the opening, Fig. 1, and it enters the steam port, 1, and the port, 2, into the chamber, C1, of the valve cylinder, and also port, 3, Fig. 2, into chamber, C2, in consequence of which the main valve will remain in position; but, steam entering port, 1, the main piston will be moved in the direction of the arrow in Fig. 4, and on reaching the proper point will move the pin, M, and the rocker arm, and with it the valve rod in the direction indicated by the arrow, N, and dotted lines. This will close the exhaust port, 3, Fig. 1, and steam port, 4, Fig. 2, and open the corresponding ports, in consequence of which steam will exhaust out of chamber, C2, and from 4, into 5, and from that into 6 and 7, and thence to the main exhaust, 8.

Steam will enter into 5 (Fig. 2), into 6 to chamber, C1, in consequence of which the piston and valve will move in the direction from C2 to C1.

By a careful examination of the sections it will be seen that the arrangement of the combined valves is such that the motion of the main valve, caused by the inlet of the steam, will be governed by the force of the steam, whether the pressure be high or low, or the motion rapid or slow. In short, the device is a balanced slide valve, governed in its action simply and only by the force of the steam admitted to the steam chest. By making the inlet valve in the form seen in Fig. 2, the valve is considerably simplified, the ports, 4, 3, and 6, Fig. 1, being rendered superfluous.

Patented through the Scientific American Patent Agency Feb. 18, 1868, by Joseph Reichmann, who may be addressed for the purchase of the whole or a portion of the right, at P. O. box 1,408, Dubuque, Iowa.

Archeology-Discoveries in Tennessee.

Dr. Joseph Jones, of Nashville, Tenn., has been making extensive researches among the artificial mounds of Tennessee, and has been rewarded by a large number of interesting and important discoveries. Excavations made during the war at Chattanooga, Knoxville, Murfreesboro, and Nashville, brought to light many curious remains which were taken away by northern soldiers. Enough was revealed, however, to show that these relics were of a remarkable character and that they would repay a systematic examination. Dr. Jones has latterly been prosecuting his researches with great zeal, and has succeeded in securing a very large and valuable collection of relics. The result of his labors were made the subject of an interesting lecture by Dr. Jones to the citizens of Nashville on the evening of Oct. 21st, an abstract of which we copy from the *Nashville Press*:

"The Doctor gave an account of his researches into a large mound in Giles county. Here, in the center of the pyramid, he discovered the remains of a great chief buried with numerous relics, and around him the skeletons of some of his subjects. Drifting into the sides of the artificial mounds, ashes, bits of pottery, and bones of both human beings and animals were found, mixed up in one incongruous conglomeration, often with beautiful specimens of vases and shell ornaments. Specimens of the burned crust of these mounds, beneath the present soil, were exhibited. Two large stone idols were shown, carved out of a dark iron colored rock, the largest some thirteen inches in hight, and the other perhaps four inches less in stature. One represented a female, and has the hair gathered up behind under a diminutive sort of a waterfall, while in the longer specimens, that of a male, the hair was represented twisted into a sort of cue, not unlike the style of our forefathers in the revolutionary times.

"The lecturer, to please the lady hearers, gave a short description of the *tout ensemble* of one of the female mound builders. With hair gathered in a graceful knot behind ears pierced and filled with huge rings of shell or bone, nose likewise ornamented with an enormous balancing weight, she must have been an enchanting creature. Two copper crosses were exhibited, together with three vases, the outsides of which were divided into the three regular compartments, having three crosses and three crowns, symbolic, the Doctor claimed, of the Christian religion, the Trinity, and the Virgin Mary. The signs of the Catholic religion, he stated, were wonderfully prominent in a great many of the relics thus far brought to light. On the great mound near Franklin, two hundred and thirty feet in diameter, evidently stood a gigantic temple of the sun. Religious symbols were plentiful there.

"Two remarkable vases were exhumed, one not unlike a child's foot, with the opening at the heel, and the other surmounted with a carved head with a helmet, having a remarkable resemblance to that of a Spanish cavalier. The speaker inferred from this that the extinct people were not unfamiliar with the haughty râce whose conquests in Mexico and Peru read almost like romance of the wildest character. Here he found, too, the skeleton of a child, the face of which was covered with a curious shell bearing occult hieroglyphics, among which could be distinguished perfect triangles. This mound was graced with the stump of a tree, which, when cut down twenty years ago, could not have been less than two centuries old.

"An idol exhumed from the mouth of Lick Branch, Nashville, was also displayed, and a small female effigy in white clay, with the marks of the cross upon the shoulders. The Doctor everywhere found traces that the aborigines of this country may have come in contact with civilized nations long before the discovery of America by Columbus.

"He gave a short sketch of some of the explorations of the Scandinavians, Danes, and Icelanders, and the colonies they founded in the New World. But to these fearless navigators could not be ascribed the knowledge the mound builders of Tennessee had of the cross and the symbols of religion. It was rather to be referred to a late period, when the early Catholic missions were founded upon the shores of the New World some three hundred years ago. In 1564 the Catholic sovereign of Spain was attacked with a terrible religious zeal, and he sent one Francisco, with a large body of co-workers, to convert and evangelize the Indians.—They planted themselves at St. Augustine, on the shores of Florida, and for twenty-five years the missionary was very successful. He founded a great many missions, and partially Christianized a great many of the savages. Delegates were sent to the parent society of St. Augustine and to the convent of St. Helena. The Spaniards appear to have encouraged marriages between the young people of their own race and those of the Indians, and to have lived with them on terms of greatest intimacy.

"The mound builders of Tennessee, the Doctor thought, must certainly have belonged to the great Natchez tribe, who coming from the South, spread themselves throughout the valley of the Mississippi and its larger branches. When in the hight of their empire, they probably number 500,000. The lecturer thought it extremely curious, the mixture of Christianity and idolatry found among those people. While the great fundamental principles of the true religion were so familiar to them, they worshipped stone effigies and adored the sun, they were probably guilty of human sacrifices. The Doctor exhibited a great number of implements of warfare, such as stone axes, arrow heads, knives, spears, etc. Also, culinary utensils, mortars used in grinding Indian corn, and paint. The lecture was listened to throughout with the greatest interest, but time fails us for more than a passing sketch of its riches."

Polishing Wheels for Dental and Other Small Steel Instruments.

A correspondent of the *Dental Cosmos* describes a method of making polishing wheels for small steel instruments as follows:

"Take a piece of sole leather of a size suitable for the desired wheel, make a hole through the center and attach it to the lathe in the same manner as a corundum or cotton-polishing wheel; then with a sharp chisel turn it down to the size desired; coat the face of it with glue, and apply as much coarse emery as the glue can be made to take; put it aside to dry, and you have polishing wheel No. 1. Make another in the same way, only using flour of emery instead of the coarse, for No. 2. Form a third wheel in the same manner, but instead of the glue and emery, apply crocus with water, for No. 3. The wheels I use are about an inch and a half in diameter, but may be of any size convenient to the lathe, and by fastening several of these together with common shoe pegs will give any thickness desired.

"The labor of polishing is diminished by turning little grooves into the face of my wheel before applying the emery.

"An excellent wheel for carrying the pumice, in polishing vulcanite can be formed by fastening together two of these leather wheels with brass screws (common wood screws), between which are three or four thicknesses of woolen cloth cut somewhat larger than the leathers. This woolen cloth carries the pumice better than anything I have yet found. When it becomes worn down to the leather, it can be removed by taking out the screws, and new cloth substituted. The leather keeps the wheel stiff and firm, and, as the cloth becomes worn down, will not scratch the plate, even though it should touch it."

Castor Oil for Leather.

A correspondent in our last number recommends the use of castor oil for harness. The Wisconsin *Farmer* says: "We notice in our exchanges numerous recipes for making shoe leather water proof, most of them compounds, involving considerable trouble in preparation and more or less expense, and none of them half so good as the simple article castor oil, which can be bought at the drug stores for twenty-five or fifty cents a pint, according to your locality. Apply it to the boot when dry, and soak it by the fire till the leather is saturated. Treat the soles in the same way, being careful to dry in well so that they will not grease the carpets. We once treated a pair of calf boots in this way, and a few days after we walked five miles in saturated snow and water from six to ten inches deep at every step, and came out with feet perfectly dry. Castor oil will keep the leather soft, pliable, and black, though not glossy, and quite impervious to water."

THE BLOOD OF PLANTS.

Plants like animals depend for subsistence and growth upon external matter. Animals, havingthe power of locomotion, can go to their food. Not so with plants; the food must come to them. Animals are possessed of a mouth for the comminution of food and a stomach to digest it. Plants on the contrary, have neither, and their food is taken entirely unmodified by the performance on their part of the operations of mastication or digestion. We say food is taken, for food cannot properly be said to be taken until it has passed into the circulatory system. Stop up the vessels that convey the digested food of an animal into the blood, and the animal would die of hunger though the stomach were crammed. The mouth is a mill which grinds; the stomach and other organs of digestion form a chemical laboratory which dissolves and converts all food into a fluid capable of becoming blood by the absorption of oxygen. It gets its supply of oxygen from the lungs during its first arterial trip, and the blood thus formed is drawn upon by the tissues to supply waste.

Plants are nourished also directly from their sap which we have by analogy called their blood; and though they have no mouths or stomachs to digest their food they can no more take undigested food into their circulation than can animals. The food must be comminuted and dissolved before it can become a constituent of plant blood. As an illustration of this fact let us experiment with a plant requiring, to form its tissues, silica, lime, magnesia, phosphoric acid,carbon, etc. Take the most thrifty specimen you can find, and place about its roots lumps of limestone, flints, soapstone, gypsum, charcoal and potash. Of course you will not be surprised to see it droop and die in a short time. But subject now these same substances to the action of heat and cold until the earthy matters are pulverized, mix them mechanically, pour upon them the fluid that is to plants what the gastric juice is to animals, and if the proper proportions are observed your plant will shoot at once into vigorous growth.

Nature provides for all this. She heats and freezes and grinds rocks into powder, enriches the mass by droppings of animals; pours water over beds of mineral salts and leaches it through the soil thus manufactured. The substances are now soluble and the plant sucks in the nutritious fluid prepared for it through its roots directly into its blood. This blood must, however, be aerated, that is, it must come into contact with the air. This is accomplished by the leaves of the plant which both inhale and exhale, as do the lungs of an animal, only there is no mechanical action required to bring the air into contact with the plant's lungs as are they are situated upon the outside,their work being supplemented by the twigs and roots which also have an absorbent power and help to supply the plant with the necessary oxygen. A large part of the carbon which constitutes the great bulk of the solid portions of plants is also obtained through the leaves in the form of carbonic acid, which is a chemical compound of six parts by weight of carbon with sixteen of oxygen.

Now let us look a little into the manner in which circulation takes place in plants. Cut a piece of grapevine as thick as your thumb straight across the grain. Do the same with a piece of hickory, and compare the two sections. You will perceive a striking difference in the internal structure of the two woods. The hickory is made up of concentric rings of woody fiber, the grapevine is full of small holes scattered all over the surface of the section. There are no signs of growth by successive layers in the vine section. The hickory has a thick bark, the grape vine has none, if we may except a thin cuticle scarcely thicker than paper. The difference in the two sections are characteristic of the two great divisions of plants—Exogens, those which grow by successive layers upon the outside, like the hickory; and Endogens, those which grow throughout their entire structure, like the grapevine. If we examine more closely the section of the hickory we can see that between each grain is a layer of spongy tissue. The minute holes seen in either the hickory or the vine, are the severed veins of the plant through which the blood flows. They cannot be perhaps called arteries, for as a plant has no organ corresponding to the heart of an animal, no division can be made of these vessels into arterial and venous systems, as in the circulatory system of animals.

Let us trace the course of the circulation of the sap through these vessels. If we cut off the stem of a young tree close to the root and place it in a solution of certain dyes innocuous to the plant, the coloring matter will pass into its circulation. After a little we shall find it has ascended to a considerable hight; a little longer and it can be detected in the leaves. The motion most obvious, then, is an ascending one, but this motion could not continue unless there was either a return flow somewhere, or an outlet for the ascended sap. There are both. The leaves reduce the volume of the sap greatly by evaporation of the aqueous portions, and the modified remainder returns through the bark to the roots of the plant, and there receiving an accession of newly absorbed food, travels over the same route again; supplying in its entire passage the material of growth to the plant.

The heart is a force pump which, in the animal economy, gives the primary and controlling impulse to the blood. Plants being destitute of a heart, the force which gives impulse to their blood, is an interesting subject of inquiry. The law of capillary attraction has been supposed to account for it, but it is not sufficient to account for all the phenomena of sap circulation. It is probable that another law of attraction by which membranes force fluids to pass through them with great force, comes into play here. We refer to what the learned call *exosmose* and *endosmose*, for want of any simpler terms. If a piece of bladder be tied tightly over the mouth of an empty bottle, and the whole immersed in a proper fluid, the fluid will pass through the bladder with such force as finally to burst the bladder from the internal pressure thus generated. The fluid passes through the bladder by virtue of a peculiar force not yet thoroughly understood, to which we have just referred. If the bottle were filled with the same fluid, the bladder tied over it, and then laid on its side so that the fluid should come in contact with the membrane, the fluid would be passed out through it, leaving a partial vacuum in the bottle. The evidence of the vaccum would be the depression of the bladder by the external pressure of the atmosphere, which, if the membrane were not too strong, would burst it inwards. The terms *endosmose* and *exosmose* are merely relative, and express the opposite directions in which this force acts. The same force has much to do with the circulation of the blood in animals, as well as plants.

The power exerted by this force is very great, and the circulation, especially in vines having small stems at the root and very large tops loaded with dense foliage, is very rapid. We once experimented with a flowering vine in our garden, which running up over an outbuilding must have covered with dense foliage a space of at least one hundred square feet. The main stem near the root was not more than three eights of an inch in diameter. When this plant was drooping for water, watering it at the root would revive it in twenty seconds. In that short space the water was absorbed by the roots into the circulation, and carried to the remotest twigs and leaves as was shown by their changing from a drooping to an erect position.

We have thus shown that the method by which plants are nourished is strikingly similar to the way in which plants are supplied with nutriment. A proper application of the analogies we have pointed out, and their relation to the growth of seeds or fruit, is the basis of all intelligent horti culture and agriculture.

PROPOSED METHOD OF SINKING THE PIERS FOR THE ST. LOUIS BRIDGE.

Extract From Report on Illinois and St. Louis Bridge. By JAS. B. EADS, C.E.

A number of designs and estimates were made by me to determine the most practicable, economical,and reliable method of constructing the parts of the channel piers below low-water mark. These designs and estimates included the use of cast-iron cylinders, of diameters varying in the different plans from three to fifteen feet, which were to be sunk to the rock and filled with concrete. The danger of scour, and the difficulty of binding these cylinders together beneath the surface of the sand, so as to insure stability under the strains produced by the thrust of the arches, induced me to increase their diameters in subsequent designs, until they became so great that wrought iron was substituted, and finally two cylinders, each of a diameter equal to the width of the pier, were tried with smaller ones about them, to complete the entire dimensions of the foundation. The same difficulty of binding these together in a manner to insure safety to the superincumbent masonry, in the event of deep scour, as well as to give promise of any great durability, still remained.

Cast-iron cylinders may be used with great advantage in forming subaqueous foundations in situations where there is no scour, but the dangers to be guarded against in this location would render them, I think, less reliable and more expensive than other methods.

My experience of the effects of fresh water upon wrought and cast iron, submerged for many years in the Mississippi, assures me that the latter can be relied upon as almost indestructible, but that wrought iron will oxidize or rust out so rapidly that in twenty years the strength of a bolt an inch and a half would probably be reduced one-half. To bind these cylinders together, beneath the sand, would greatly increase the cost of adopting them, and to use wrought iron to secure them above the sand would fail to insure durability. To undertake to do it with cast iron would be more expensive, and the slighest unequal settlement of the different ones composing the mass would be likely to fracture a material so brittle. To sink these cylinders either by the pneumatic process, or by any of the methods known, to the requisite depth, would be exceedingly expensive. The great quantity of iron required in them, and the fact that they must be filled with masonry, would render a foundation of the necessary dimensions, if composed of them, much more expensive than if made of stone alone.

Having arrived at this point in the solution of the most important problem connected with the design and erection of your bridge, I determined to construct the base of the pier entirely of solid masonry, within a water-tight floating coffer-dam, whose sides should be extended above water from time to time, as it sunk deeper and deeper, with its increasing burden of stone and cement.

Piers of smaller dimensions have been constructed in a similar manner, and placed upon foundations favorable to their permanent reception. When sand or mud has been interposed, and its removal rendered necessary, the sides of the floating vessel have been extended downward below its bottom, to form a chamber or kind of diving-bell beneath the masonry. Through the masonry, tubes were provided by which workmen and materials could descendinto the chamber; and through these tubes, air was forced to expel the water from the chamber, and enable the workmen to remove the sand or mud beneath the pier. These tubes required to have two or more air-locks or valves in them, that were closed behind the workmen or materials in their passage, to prevent the escapment of the compressed air in the chamber. This, of course, retarded the rapid progress of the work. To facilitate the excavation of the deposit an extra tube was introduced in the middle of the pier, and extended to the level of of the bottom of the air chamber. The water stood within this tube at the level of the surface of the river, and through it an endless chain, carrying scoops or excavators, was made to rotate around a pulley at the bottom of the tube, and another at the top, in this way the sand was rapidly exavated without permitting the escapement of air from the chamber, and without passing the deposit up through the air-locks. The workmen in the chamber were enabled to shovel it to the bottom of the tube, where it was taken by the excavator, and discharged in vessels above.

The gradual descent of the pier was managed by screws, supported upon false works, erected around and over the site of the pier. As the sand was removed below, the pier was allowed to settle by slacking the screws, as it was only partially water-borne. When it had passed through a considerable depth of sand, the friction of the latter upon the sides of the pier held it to such a degree as to take all the strain off the screws, and when it moved downward, it was sometimes so suddenly that the supports were strained severely.

The shortness of the season in which each one of the piers for this bridge must be put in position, because of the floods of summer and the ice of winter, and the great amount of deposit to be removed, renders the pneumatic process just described too slow for this case, as well as too expensive. For the safety of the workmen beneath the pier, it is absolutely necessary to regulate its descent by screws or similar means, and to do this with piers of such magnitude would not be advisable.

The removal of the sand will be accomplished by sinking an elliptical-shaped caisson or curb of plate-iron through the deposit to the rock. The caisson will be open at the top and bottom, and will be strongly braced on the inside with heavy angle irons placed horizontally around it. It will be larger at the bottom than top, to facilitate its passage through the sand and relieve it of the friction. The caisson will be suspended by false works erected around the site of the pier, and will be regulated in its descent by screws supported on the false works. As it is lowered into the sand, that which is inclosed by it will be excavated by steam machinery, until the caisson is finally sunk to the rock. It is not intended at any time to remove the water within the caisson, but only the sand it encloses; the object of the caisson being only to exclude the sand outside of it until that which it incloses has been removed, the rock leveled off with concrete, the floating coffer-dam placed in position within the caisson, and the pier so far built up in the latter as to sink it down to the concrete bed prepared for it.

The bottom of the coffer-dam will be formed of squared timbers, thoroughly caulked, and will be about two feet in thickness. Its sides will also be of timber,and so constructed as to admit of being disengaged from the bottom when the latter has reached the bed formed to receive it, The interior of the coffer-dam will be larger than the pier, and the latter will be constructed with certain cavities in it to be filled with masonry after the pier reaches the bottom, so that the weight of the pier will bear such proportion to the displacement of water as to insure the top of the masonry being kept but little below the surface of the river while the pier is being built within it. This will enable the side of the vessel to be thoroughly braced against the pier, so as to resist the pressure of the water.

It is known that timber is indistructible when completely submerged in fresh water. Piles placed in the Rhine by the Romans, nearly 2,000 years ago, have been found to be entirely sound when removed within the present century. There are many other similar instances on record establishing the fact of its durability, whilst the soundness of the timber found in the bogs of Ireland and elsewhere indicates that it is unlimited by time.

When the bed rock has been prepared to receive the pier, the coffer-dam will be floated within the caisson, and will be guided by the latter as it descends with its load. It will be understood that the pier is completely water-borne by the coffer-dam until the quantity of masonry in it has become so great as to cause the dam to touch the bed on which its bottom, with the pier, is to rest permanently. When the pier has been completed above water, the dam is permitted to fill, and its sides will then be disengaged from the bottom and removed, to be used in putting down the next pier. The caisson for the smaller pier can be withdrawn and used for the other one; and the larger one may possibly be saved also.

As before stated, the floating coffer-dam is not an untried experiment, but has been frequently used to place piers in position where the bed rock or other substratum was favorable for their reception. The caisson has also been frequently used to exclude the sand or mud, and enable that within it to be removed sufficiently to facilitate the driving of piles to a greater depth and in firmer soil than would be otherwise practicable.

The estimates made for the cost of this work prove that it will be much less expensive than any other method yet devised; while the superiority of the foundations thus made will be beyond all question.

A Good Family Paper.

One of the best family papers published south of this city is the New Jersey *Enterprise*, Burlington, N. J. Among its many good features, is its Scientific Department, to make up which it draws largely from the stores of information presented weekly in the SCIENTIFIC AMERICAN, and shows its honesty by giving us credit for the same.

POWER and force, pressure and weight, are too often used as interchangable terms, if not as synonyms. Power implies force, but not always force, power; weight is pressure in one certain direction but pressure may act in an opposite direction.

THE OBSERVATIONS OF THE GREAT SOLAR ECLIPSE. WHAT HAS COME OF THEM.

Few expeditions for scientific research have ever been more carefully organized than those sent to observe the recent solar eclipse. The results are important as they confirm previous theories in regard to the nature of the luminous matter which surrounds the sun, and the frequent changes observable in its appearance. The remarkable protuberances pictured by the camera and tested by the spectroscope are no longer mysterious.

A self-luminous object is determinable with the greatest ease by the spectroscope. The sun has by this means been determined to be self-luminous. The peculiar parti-colored streak which indicates this, had been noticed in the solar spectrum previously to the occurence of the eclipse. The absence of the dark lines in the spectrum, fixed the nature of the luminous matter so far as to show it to be gaseous. Photography has shown us the irregular forms of the masses of gaseous matter as they float about and are upheaved. The prominences are now attributed to a sort of condensation going on among the vapors and gases formed by the intense heat of the sun. The heat which exists upon the surface of the sun is intense beyond all human conception, and doubtless those substances which are to all artificial means within our reach so refractory that they cannot even be fused would be vaporized by it.

So science goes on prying deeper into the mysteries of nature its powers gradually enlarging only to discover that the field is infinite.

A Remarkable Case—Artificial Replacement of Lower Jaw and Tongue, and Restoration of Articulation.

In an article entitled "Progress of Dentistry," published on page 233, current volume of the SCIENTIFIC AMERICAN, we called attention to the fact that the art of dentistry was no longer confined to plugging, extraction, and restoration of teeth; but that restoration of portions of the jaw, facial bones, etc., was now often accomplished by the resources of dental art. An extraordinary confirmation of the statement we then made has occurred in the practice of Dr. George H. Perrine, a dentist of this city, a full description of which he has communicated to the *Medical Gazette*.

A gentleman aged forty eight, of a bilious nervous temperament, had, several years previously to his calling upon Dr. Perrine, submitted to an operation for a disease of the lower jaw bone, which extended to and involved the left lateral portion of the tongue. Upon examination, a large portion of the left side of the tongue was found to be removed. The breath was offensive and the saliva ropy. The surface of the tongue where a portion had been cut away had healed imperfectly, and a generally unhealthy state of the gums and soft parts of the mouth prevailed. As might be expected, the health of the patient had suffered, and he seemed anxious and worn.

The morbid condition of the mouth having been corrected by proper treatment, casts were taken, from which and previous examinations the following state of things was found to exist:

The entire alveolar process between the first bicuspid and the wisdom tooth had been removed, together with a part of the body of the bone; and a large portion of the tongue had also been amputated. The action of the muscles upon the remaining portion had drawn it back, so that speech was nearly impossible, and deglutition difficult. Nature had made some feeble attempts at restoration, but so far as could be determined the cavity left by the removal of the process had been only very partially filled by a semi-cartilaginous tissue. It was decided to repair this extended damage by a single denture, made of hard and soft rubber; the vulcanized rubber to sustain the artificial teeth and form a basis for the attachment of the soft rubber, with which it was designed to reconstruct the tongue.

The hard rubber portion filled the cavity in the jaw, and passing around and resting against the inside of the remaining alveolar process, to the right side, rested upon the gums and formed a support for the artificial teeth to be supplied on that side; the portion fitting into the cavity on the left also forming a support for the artificial teeth on that side. A piece of soft rubber was molded into the shape of the part of the tongue which had been cut away, and from its borders on the right, a thin rubber membrane was extended, forming a sack which could be slipped over and closely fitted to the remaining portion of the tongue, like a glove finger. To the posterior lower border of this portion a ligament of soft rubber was attached, extended and also attached to the arch or plate of hard rubber above described, so that it drew equally in all directions, and covered the soft parts beneath the tongue. Finally, the hard rubber plate was attached by clasps to the dens sapientis and the first bicuspid on the left, and the second molar and first bicuspid on the right.

This denture far more than exceeded the most sanguine expectations. The patient was enabled to speak with ease, and masticate almost any kind of food. The distortion of his face previous to its introduction was remedied, and his general health much improved.

Chilian Agricultural Exhibition.

The Executive Committee of this exhibition has issued the following notice:

"As the exhibition will certainly open on the 1st of April 1869, it is deemed very essential that all contributions of machinery be sent in time, to place and try them before the day of opening. To this end all the contributors should notify the committee at the earliest possible date, of the character of their proposed contribution or contributions, and as near as may be, the number of superficial feet they will require for their exhibition. This notice may be sent to the nearest Consul, to the Chilian Minister at Washington, or to the *Comision Nacional de Agriculture, Santiago, Chili, S. A., Via. Panama.* The Government will also allow to all contributors of articles, $40 00, Chilian gold, for payment of the expenses of passage to the country, of each person deemed necessary by the contributor, to properly work or exhibit his contribution; a large allowance towards the payment of the freight on such articles, as well as their importation free of duties; and will provide the labor necessary to remove them from the vessel, and to assist the artisan sent with them to place them in the position destined for them in the Exhibition, as well as for their exhibition."

The recent South American earthquakes have not extended their ravages to Chili and it is hoped that they will not retard contributions to the Exhibition. Manufacturers who desire to secure a South American trade ought surely to be represented.

Registration of Earth Currents at Greenwich.

In a darkened room, says the *Telegrapher*, in the meteorological department of the Royal Observatory at Greenwich, the Astronomer Royal fixed, some two or three years ago, a sensitive little galvanometer, with reflecting mirror, to register earth currents by photography. One end of the wire of this galvanometer is connected with the earth, and the other end with a telegraphic wire, which, after running several miles along a neighboring railway, is again connected with the earth. Now, currents of electricity are constantly running to and fro in the earth, and sometimes these currents enter the telegraph wires; also, when they are strong enough, they overpower the ordinary working batteries, and send unreadable messages on their own account. Such disturbances sometimes stop for a time all messages and news, and, on one exceptional occasion, caused a panic on the stock exchange, by delaying news of importance. Being a source of great occasional loss to the telegraph companies, the endeavor of electricians has always been to neutralize and get rid of the currents as soon as possible. The object of the apparatus in Mr. Glaisher's department at Greenwich is, on the contrary, to watch and examine all the movements of these earth currents. From the description already given it will readily be seen that, as currents from the earth flow through the wire erected from Greenwich Observatory, the needle of the galvanometer shows the direction, and approximately the strength of the current. On the little magnetic needle a mirror is mounted, and a ray of light from a steady flame, after falling upon the mirror, is reflected upon a sheet of photograph paper. Hence, as the needle moves, the ray of light moves to and fro upon the paper. This sheet of sensitized paper is fixed round a cylinder of ebonite, which, by clockwork, makes one revolution every twenty-four hours. At the end of the twenty four hours the paper is taken off the cylinder and a fresh sheet substituted, the record on the first is then developed in the usual way, and a zig-zag dark line, passing across it from end to end, shows the movements of the galvanometer needle and spot of light during the past twenty-four hours.

Death of an Eminent Mechanic.

The English papers announce the recent death of Thomas Cooke, of York, who was the most celebrated manufacturer of astronomical instruments in Great Britain, and was beside a man of large scientific attainments. An early acquaintance with, and love for mathematics led Mr. Cooke to the study of optics, and his success as an optician is due to this combination. After commencing the construction of object glasses, he was soon dissatisfied with the method of hand polishing, and in his perfected arrangements the hand is scarcely called into play. The introduction of steam power, as arranged by him, not only insured perfect accuracy of figure, but it has enabled a number of object glasses to be made which seems almost fabulous, if we compare it with what was formerly considered the maximum rate of manufacture. At the time of his death a 25-inch telescope, a triumph of skill, required only a few touches to make it complete; and we believe that other glasses, varying from ten to fifteen inches, are also in hand.

Mr. Cooke was a Fellow of the Royal Astronomical Society. It is certain that, had he lived, the rewards for which scientific men generally care would have been bestowed upon him, although with his modesty and retiring disposition he would never have expected them.

A New Voltaic Combination.

The *Telegrapher* says a new voltaic combination of great power has just been exhibited to some of the learned societies of England. It is the invention of Messrs. De La Rue and Hugo Muller, and has been designed for Mr. Gassiott. The elements consist of small cylinders of pure zinc and chloride of silver. The latter is cast upon a thin silver wire, which forms the conductor. The exciting liquid is merely a dilute solution of common salt.

In the battery shown the cylinders were only three inches long, and about the size of a goose quill, arranged in two ounce phials cut down to two-thirds of their length, but a series of ten such couples decomposed water with great rapidity By the chemical action taking place in the cell, the chloride of silver is reduced and chloride of zinc formed. The action proceeds so long as any chloride remains, for the reduced silver adheres to the wire as a spongy mass, which allows the liquid to permeate to any unreduced chloride.

The first cost of such a battery will be considerable, but as the only loss will be a little zinc, it will be very economical in working. Mr. Gassiott, it is said, is having a battery of one thousand pairs constructed, of which, no doubt, the scientific world will, in good time, here of and learn much.

The German Arctic Expedition.

European papers announce the unexpected return of the *Germania* and the failure in one aspect of the expedition. While unsuccessful in their attempts to penetrate to an open polar sea, or to make the coast of Greenland, on account of the solid masses of ice which they found in their way, they reached, however, the highest degree of northern latitude ever attained by any ship, namely, 81° 5', their longitude being at the time 16° east. They sighted the coast of Greenland several times, but were never able to reach it. The expedition has made important corrections in previous charts, and has secured some other not unimportant results. The interest manifested by scientific men and by shipowners in the matter of arctic exploration renders it not improbable that the experiment will be repeated.

Editorial Summary.

THE first line of electric telegraph in British India was built in 1851–52. Little progress was made during the two succeeding years, but in 1855 an aggregate length of 3,255 miles was in working order. When the mutiny broke out in 1857, there were 4,162 miles of serviceable wires provided with sixty-two signal offices in the hands of the Government. At the close of 1867 India was furnished with 13,390 miles of telegraph lines, and 172 signal stations. The whole system is in the hands of the Government; but between 1855 and 1861 eight railway companies had licenses to construct lines of telegraph.

A SCIENTIFIC discovery is reported from Turin, where Professor Casturani, the celebrated oculist, has found a way of killing animals by forcing air into their eyes a few seconds, and almost without causing them pain. Experiments were recently made at the Royal Veterinary School, and it is said that they have fully proved the truth of the professor's invention. Within the space of a few minutes four rabbits, three dogs, and a goat were killed in this manner. The most remarkable fact is that the operation leaves absolutely no outward trace.

NATURAL MATCH SCRATCHER.—A correspondent residing in New Jersey sends us a piece of the skin of a blue shark, very common on the Jersey coast, which he says he has used for a long time to ignite matches. It has the appearance and feeling of very fine sand paper, and possesses the rare advantage that, when the surface gets filled up with phosphorus and sulphur, it can be washed out; beside it is not at all affected by damp weather. Let us have a supply of shark skin match scratchers.

THE first vessel ever built in Scotland carrying guns working on a turntable in a fixed tower is now in process of construction at the Govan Yard, Glasgow. She is to be called the Hotspur, and is intended to be an iron ram, her length being 235 feet, and her breadth of beam 50 feet. Her armor plating along her broadsides will be 11 inches in thickness, with a backing of teak of 10 inches, and the usual iron plating. The tunnage will be 2,637 tuns.

ESPARTO grass is rapidly growing in use for making paper It is stated that a large proportion of British paper is now made from it. The London *Times* is printed on paper made of this material, as is also the fine thin paper on which the circular conveying this information is printed. Already fifty thousand tuns are annually exported from Spain and Portugal to England, at a cost of about $35 a tun.

ADVERTISING.—A correspondent who has been one of our most steady advertisers writes to us that the initial letter had been dropped for a few weeks, and adds: "Though a small matter, it is rather vexatious to have letters so addressed; *but at the same time it illustrates the value of the* SCIENTIFIC AMERICAN *as an advertising medium.*"

THE New York Young Men's Christian Association are building a magnificent edifice on the corner of Fourth avenue and Twenty-third street, which is to cost $300,000. The corner stone was recently laid with appropriate ceremonies.

IT is said that the oldest wooden building in Boston is situated in Dock Square, opposite the west end of Faneuil Hall. It was erected in 1709, is framed of oak timber, and in its early days was the "Sun Tavern."

BELTS to run smoothly should have a certain amount of elasticity. A perfectly unyielding belt will not embrace the face of the pulley. For this reason leather belts should be kept soft by occasional oiling.

THE ELECTION has taken place. Gen. U. S. Grant is chosen President for four years from March 4th, 1869, and Schuyler Colfax is chosen Vice-President. "Let us have Peace."

A VALUABLE box of machinery has been recovered by divers from a depth of sixty feet, near the Portsmouth, Va., Navy Yard, after three unsuccessful attempts.

THE Ivy Paper Mill still in operation in Delaware Co., Pa., was erected in 1773. It manufactured paper used by Benjamin Franklin in the days of "Poor Richard."

A VESSEL is said to be building in this city, for the China trade, larger than any other in the world except the Great Eastern. She is to be called the *America*.

BRANDY has been made by a Swedish chemist from the common reindeer moss.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

Manufacturing has been brisk in Maine during the last three months as the following returns from a single revenue district will show. The sales of cotton goods by the mills at Lewiston, in the quarter ending September 30th last, amounted to $1,142,679, divided as follows: Androscoggin $343,508; Bates $251,726; Continental $103,997; Franklin $29,169; Hill $289,523; Lewiston $124,756. The sales of woolen goods in the revenue district, including mills in Lewiston, Wilton, Webster, and Turner, amounted to about $700,000. The sales of shoes in the District reached $302,665, to which must be added the product of manufacturers who have made no returns, about $60,000. A. C. Dennison & Co., of Mechanic Falls, sold $90,000 worth of paper in the quarter. The aggregate sales of manufactured goods in the District for the three months of July, August, and September, were nearly $3,000,000.

A single sewing machine factory in New York turns out 1,800 machines per week. This being totally inadequate to supply the demand the company propose to shortly double their works.

The Morgan, Etna, and Neptune Iron Work, at New York, have been recently consolidated. They now employ about 800 hands, only half the full working force.

The largest casting ever made in Indiana was turned out at the foundery of Greenleaf & Co., in Indianapolis, a few days ago. It was a blowing cylinder for the Lafayette Iron Works, was eleven feet long, and weighed 16,000 pounds. The firm have recently begun work in their new buildings, and this cylinder was one of the products of their first "melt" of 22,000 pounds, which was run in two hours.

An establishment at St. Louis, Mo., has turned out during the past year a quarter of a million well buckets. It also makes four hundred nail kegs per day.

The aggregate weight of the seven bells in the chime of Cornell University is 5,858 pounds. They were molded, cast, transported 28 miles, and set up within a period of eighteen days.

Australia is going largely into the meat-preserving business. Several patents for improved methods of keeping meats have been recently taken out, and the export trade is largely increasing.

The Boston and Maine Railroad have been indicted by the Grand Jury of Rockingham Co., N. H., for carelessly killing Hiram Wetherill, at Plaistow, on the 18th of February last.

The Grand Trunk Railway have ordered from the Portland, Me., Rolling Mills, 1,000 tuns of rails to be delivered and laid the present season.

The weavers in the Richmond cotton mill, at Newport, R. I., have struck and the mill is stopped.

The zinc mine at Potosi, Mo., is now producing 1,400 pounds of pure zinc daily.

The Black and Baltic seas will be united by rail before January 1869.

The largest flax mills in this country are located at Passaic, New Jersey.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

RAILROAD CAR BRAKE.—Stephen Randall, Centerville, R. I.—This invention relates to a new railroad car brake, which is so arranged that the engineer of a train can have full control over all the brakes, so as to be able to apply all brakes and to stop the whole train by operating one lever on the engine or tender; at the same time the brakes on all the cars can be separately acted upon by means of levers on their platforms or near their ends. The device will operate satisfactorily while the cars move in either direction.

WOODEN BOXES.—M. Fitzgibbon, New York city.—This invention consists in a material composed of a strip of paper having on each side, firmly glued to it, a thin strip or sheet of wood; by which construction the material is made strong, elastic, and impervious to water.

COMBINED CULTIVATOR, PLOW, HARROW, AND ROLLER.—Sterling C. Thornton, Macomb, Texas.—The object of this invention is to combine and arrange a cultivator, plow, harrow, and roller, with draft wheels, axle, draft pole, and an adjustable supporting frame, in such a manner that the several parts can be used together or independently, in a more convenient manner than heretofore, and so as to save time, expense, and labor. Beside the general purpose of the invention, there are several improvements designed to effect specific purposes, such as the adjusting of the plows and the draft pole, and the clearing of the harrow.

FOLDING CHAIR.—E. W. Vaill, Worcester, Mass.—This invention is an improvement upon the chair patented by David Howarth, April 16, 1867, No. 63,897, and consists in attaching to his chair a flexible back and an upholstered seat, and in a slightly different arrangement of the short legs and seat, whereby a more beautiful and salable chair is produced than that heretofore manufactured under said patent.

HORSE HAY FORK.—W. M. Gillan, Mount Parnell, Pa.—In this invention the lower end of the fork is provided with two opening and shutting blades, which are capable of being locked in position or unlocked, by means of a novel and very simple, strong, and durable device at the upper end of the fork.

COMPOSITION.—Geo. W. Spots, Jacksonville, Ill.—This invention has for its object to furnish a substance for preventing the ravages of curculio and other insects destructive to fruit trees, vines, and vegetables. To this end, the invention consists in a compound, formed in a simple manner, of ingredients which are cheap and abundant in every part of the country.

CLOCK MOVEMENT.—Michael Tromly, Mount Vernon, Ill.—This invention consists, first, in a novel apparatus whereby the use of the winged fly wheel for regulating the striking movement is dispensed with; and, secondly, in an improvement upon the escapement apparatus, whereby a smoother and easier action is obtained than in the clock movement heretofore in use.

CHURN.—E. P. Russell, Manlius, N. Y.—This invention relates to a new and improved churn of that class which have an up and-down or a reciprocating dash.

HORSE HOE.—Don Carlos Matteson and T. P. Williamson, Stockton, Cal.—This invention relates to a new and improved horse hoe designed for cultivating crops grown in hills or drills, by loosening up the earth and cutting weeds below the surface of the same.

COMBINED SEED SOWER AND HARROW.—W. E. Phelps, Elmwood, Ill.—This invention relates to a new and improved combined seed sower and harrow, whereby seed may be sown and harrowed in or covered with earth simultaneously or at one operation.

CARPET STRETCHER.—S. Stevenson, Dansville, N. Y.—This invention relates to a new and improved device to facilitate the stretching of carpets and the tacking of the same to the floor, and admit of the work being done by a single person without any trouble or difficulty whatever.

RECEPTACLE FOR WATCH KEYS AND OTHER ARTICLES.—M. Z. Crane, New York city.—This invention relates to a new box for retaining different kinds and sizes of watch keys or watch crystals, or other articles, and consists of a stationary circular or polygonal box, divided by radial partitions into a series of compartments, and provided with a rotating cover which has an aperture as large as one of the compartments.

BURRING MACHINE.—John Nichols, Paterson, N. J.—The object of this invention is to construct a machine for burring wool, which will not tear nor injure the wool, and which will operate with great rapidity and effectiveness. The invention consists chiefly of a toothed grooved cylinder, which is constructed of a toothed triangular band wound around a cylindrical roller. The invention also consists of a fixed finger bar for removing the burrs from the cylinder, and in the use of a revolving reel for rapidly liberating the burrs from the cylinder.

GUIDE BLOCK FOR WINDOW SASH CORDS.—Alfred Bickwell, South Reading (Greenwood P. O.), Mass.—This invention has for its object to furnish an improved anti-friction grooved guide block for window sash cords, which shall be simple in construction, inexpensive in manufacture, and effective in operation, and which is designed to take the place of the ordinary guide pulleys.

ENGRAVING MACHINE.—J. C. Guerrant and B. J. Field, Leaksville, N. C.—This invention relates to improvements on the engraving machine patented Dec. 18th, 1866, No. 60,506, and Nov. 5th, 1867, No. 70,553. It also consists in improvements in the construction and arrangement of several material parts of the said machine, and in the addition thereto of an improved apparatus to facilitate and control the operation of the graving tools; whereby the field of usefulness of the said machine is materially extended, and whereby also the care and skill required to operate the said machine is materially lessened.

RAILROAD CARS.—E. T. Ligon, Demopolis, Ala.—This invention relates to a new and useful improvement in the construction of railroad cars, and has for its object, first, the prevention of accidents now caused by the cars being thrown from the track, and also to avoid the danger to which passengers are now exposed in getting in and out of cars as well as to avoid the danger attending the breaking of axles which not unfrequently occurs.

PLOW.—Levi Fosdick, Tiskilwa, Ill.—This invention relates to a new and improved plan of that class which are more especially designed for breaking up new ground, and are commonly termed "breaking plows."

FIREPLACE.—John Erwin, Sr., Princeton, Ind.—This invention relates to an improvement in the fireplace and chimney dwellings, and other buildings, whereby the fire is supplied with air from beneath the fire grate or hearth.

INVALID CHAIR.—L. M. Whitman, Sterling, Ill.—This invention relates to chairs which are made convertable into various forms, and so constructed that the position of the occupant may be changed at will, and the chair be made to work or not as may be desired.

COOK STOVE.—Harvey Brown, Harlem, N. Y.—This invention relates to a new and improved cook stove, and has for its object simplicity of construction, facility in adjusting the several parts together and taking them apart, the obtaining of an oven of large capacity in proportion to the dimensions of the stove, economy in fuel, the preservation of the fire chamber from heat, and general adaptability for household use.

MACHINE FOR PASTING AND TRIMMING WALL PAPER.—Warren H. Guthrie, Brooklyn, N. Y.—This invention relates to a new and improved method of constructing machines for pasting and trimming wall paper or paper hangings, whereby the same are automatic in their operation, and whereby much time and labor are saved in hanging wall papers. It consists of two feed rollers, the under of which said rollers rotates in a paste box which distributes paste upon the paper while the same is passing through the rollers; and it consists, also, of a circular knife or cutter, rotating on the shaft of the upper roller driven at any desired speed by gearing from the lower roller, by means of which the edge of the paper is trimmed while the same is passing through the rollers.

STRAW CUTTER.—Julius Ambrun, Leavenworth city, Kansas.—This invention consists in the arrangement and use of reciprocating cutters, and in a new mechanism for operating them, and also in a new device for feeding the straw, and in a new manner of transmitting motion to such driving mechanism.

MANGER.—Wilbur F. Stanley, Cazenovia, N. Y.—This invention has for its object to furnish an improved manger for cattle, which shall be constructed and arranged that each animal may eat by itself, and can lie down and get up easily, which shall prevent the animals from reaching after and taking the feed from each other, and which shall be perfectly easy, safe, and secure.

PREPARING ROSIN SIZE.—Thos. Gray, London, Eng.—This invention consists in preparing rosin size, by first bleaching the rosin in a solution of warm water and salt of soda, or the alkaline salt, and mixing the same with a solution of chloride of sodium, by which a size especially adapted for use in paper-making is provided.

FOLDING CHAIR.—Geo. McAleer, Worcester, Mass.—This invention has for its object the construction of a simple and strong chair, which can be folded into an exceedingly compact form for convenience in packing and transportation, and which, when open, shall be ornamental in appearance and adapted for use in the parlor.

MILK CAN.—O. J. Nutting, Warwick, N. Y.—The present invention relates to a new and useful improvement in milk cans, which are so constructed with double walls, the outer wall of which being perforated at or near its top so as to admit a current of fresh air or water to pass freely around the outside of the inner can which contains the milk, and thus keep the same cool and sweet.

DRYING APPARATUS FOR CLOTH AND OTHER SUBSTANCES.—Andrew Chambers, Providence, R. I.—This invention consists in a series of two or more cylinders parallel to each other on a suitable frame, having for their covering wire cloth or other similar material and a series of guiding rollers for carrying the articles to be dried around the same, while a series of rotating fans within the said cylinders are made to force a continuous blast of air outwardly through the meshes of the said covering material and also through the article being conveyed around the same.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

C. E. S., of Ill.—Postage stamps are cut by machinery. The precise composition of the gum used we do not know.

R. C., of N. Y.—Is common soft rubber affected by crude and rectified petroleum? Ans. The benzines and naphthas contained in petroleum dissolve rubber. Any substance which contains these substances will affect it in proportion to the amount they contain.

J. B., Jr., of Ohio.—The planet Jupiter is now visible in the east immediately after sunset. That is what you probably ask about. If it is that planet a glass of small power will enable you to detect his moons which will determine the matter fully. It takes a pretty good glass to show the rings of Saturn, and a powerful one to show his satellites.

G. B., of Mass.—Good malleable iron can be brazed. Your failure is owing either to defects in the iron or your process. The reason that steel appears to file harder when hot, than when cold is probably owing to the effect of the heat upon the file and the clogging of the teeth by the heated metal.

S. S., of Va.—We think the foul smell and taste in the water from your spring is not attributable to the pipe or the planking, we of course cannot explain the fact at this distance, but we advise you to open the spring, and instead of closing it tightly place over it a covering of loose stones and earth.

J. B., of Pa.—"Will a six inch horseshoe magnet attract a four ounce weight, at a distance of four inches if the weight is suspended from a pivot twelve inches above it." Ans. Yes. "Will the attraction be stronger if the weight is itself a magnet." Ans. Yes. Such magnets can be obtained of Dexter & Nellegar, Albany, N. Y. We cannot give the probable cost.

A. J., of N. Y.—We cannot see any advantage in providing mail reception boxes on our street lamp posts for newspapers, pamphlets, etc., as the orifice would have to be so large that the hand could be easily inserted. A better plan would be the extension of the system of sub-post stations now in use for the convenience of the people in our principal cities.

J. E. F., of Ohio.—"I have been informed that by attaching a galvanic battery to steam boilers the scale formed by using hard water, can be entirely removed. I learn from reliable parties that in a week's time boilers which have been scaled to a great extent have been freed from scale effectually by passing a current of electricity through. I would be pleased to hear your opinion on the subject." Opinions are useless unless based on sufficient data. This we lack on the above subject. That a galvanic current may prevent the deposition of scale does not appear impossible, but that a deposition already formed can be removed by the same agency seems to demand something more than assertion to subsubstantiate it. Will our correspondent give us the circumstances of the cases to which he refers and the *modus operandi?*

J. H. R., of Ind.—"Will you tell me the best, simple way of putting a polish on small, uneven steel articles?" Nothing better than the tumbling barrel; the articles being placed in the barrel with dry saw dust, plumbago, fine emery and bits of wash leather or chamois skin.

W. W. B., of Conn.—"Will you be so kind as to inform me the process of tinning malleable iron?" The usual process, as employed in tinning tacks and rivets is to cleanse the articles from grease and other impurities by a bath of diluted muriatic acid, then dry them in sawdust and place them in a bath of the melted metal. Remove them with a skimmer and throw them against a sheet iron shield to clean the superfluous metal from them, after which, when cool, they may be finished in a tumbling barrel.

B. P. S., of Pa.—Paint skins boiled with linseed oil and having, while hot, a quantity of sand and lime stirred in until the requisite thickness is obtained, makes a durable cement for leaky roofs.

NEW PUBLICATIONS.

THE AMERICAN BUILDER.

We have received the first number of the above-named journal, devoted to the interests of architecture. It is well printed and well edited, and is altogether a very creditable journal. It is published by J. C. Adams, box 1,250, Chicago, Ill. Terms $3 per annum. We wish the *Builder* success.

D. Van Nostrand, the well-known publisher, 192 Broadway, proposes to issue on the first of January next, an Engineering Magazine to consist of selected matter from the engineering publications of Europe and America. Each number will contain from 80 to 90 pages. Price $5 per annum.

Business and Personal.

The charge for insertion under this head is one dollar a line. If the Notices exceed four lines, an extra charge will be made.

Improvement in Safety Valves.

Nothing is of greater importance to any man using steam than a good reliable safety valve on his boiler; and yet, although this is generally admitted, it is but too well known how many appalling accidents have occurred from the absence of this most necessary appliance. We present, herewith, an illustrated description of the "Metropolitan Double Seated Lock Safety Valve," which, from all we can learn, is superior to anything of the kind now before the public. The highest authorities in the country indorse and recommend it; and, recently, the Secretary of the Treasury instructed Mr. Joseph Cragg, Inspector of Steamboats, to examine and test it. As will be seen from that part of the report of the latter gentleman to Mr. McCulloch, which we quote, this valve is much more reliable, and more desirable for owners of steam boilers to have than any other. Mr. Cragg says:

"In the ordinary safety valve of 3 inches diameter, raised ¼ of an inch, there are 2·262 square inches of space for the escape of steam. In the Metropolitan Double Seated Valve of the same diameter, raised ¼ of an inch, there are 3·634 square inches of space, being an addition of 1·372 square inches, nearly 61 per cent over the ordinary valve.

"The ordinary value would require a weight of 70 lbs., the Metropolitan Double Seated Valve 15 lbs.

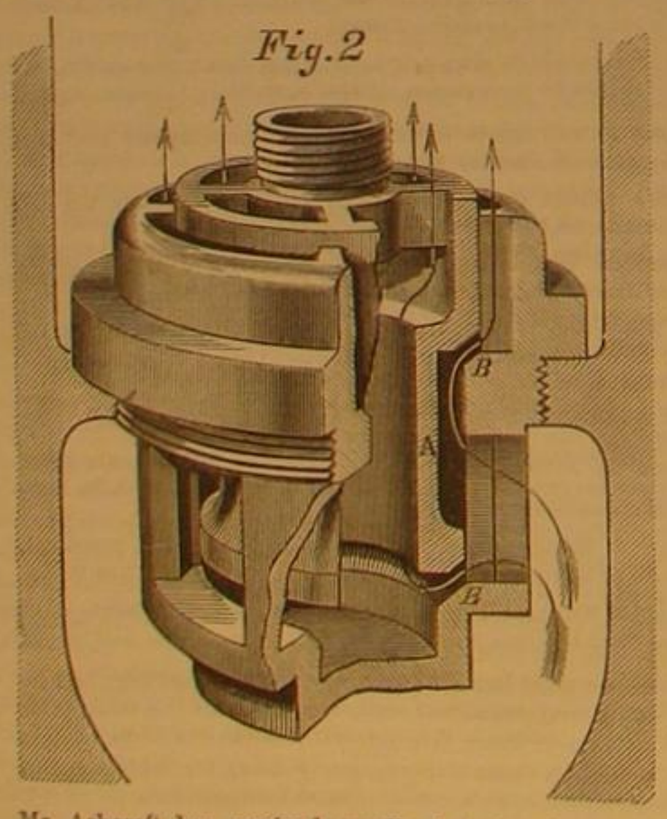
"If direct weights are used, the ordinary valve of three inches diameter, carrying steam of 100 lbs. per square inch, would require a weight of 706·86 lbs., the Metropolitan Double Seated Valve 150 lbs., being a saving in weight of 556·86 lbs., or 78 per cent.

"After a careful examination and test of the Metropolitan Double Seated Valve, I am of the opinion that it is superior to any of the valves approved by the Commission of April, 1867; that by its introduction many of the objections to Lock Safety Valves now before the public would be overcome; and that it would add to the safety of boilers on board of steam vessels."

Mr. George Morris, the Supervising Inspector of the third District, also highly approves of it, as will be seen from the following extract from his letter to Mr. John Ashcroft:

"I have made a complete examination of the Metropolitan Double Seated Valve, and I am pleased to say that it more than possesses all the merit necessary to meet the requirements of our rules governing the use of lock safety valves, and shall apprise the several local boards of this district of my approval of its use."

Fig. 2

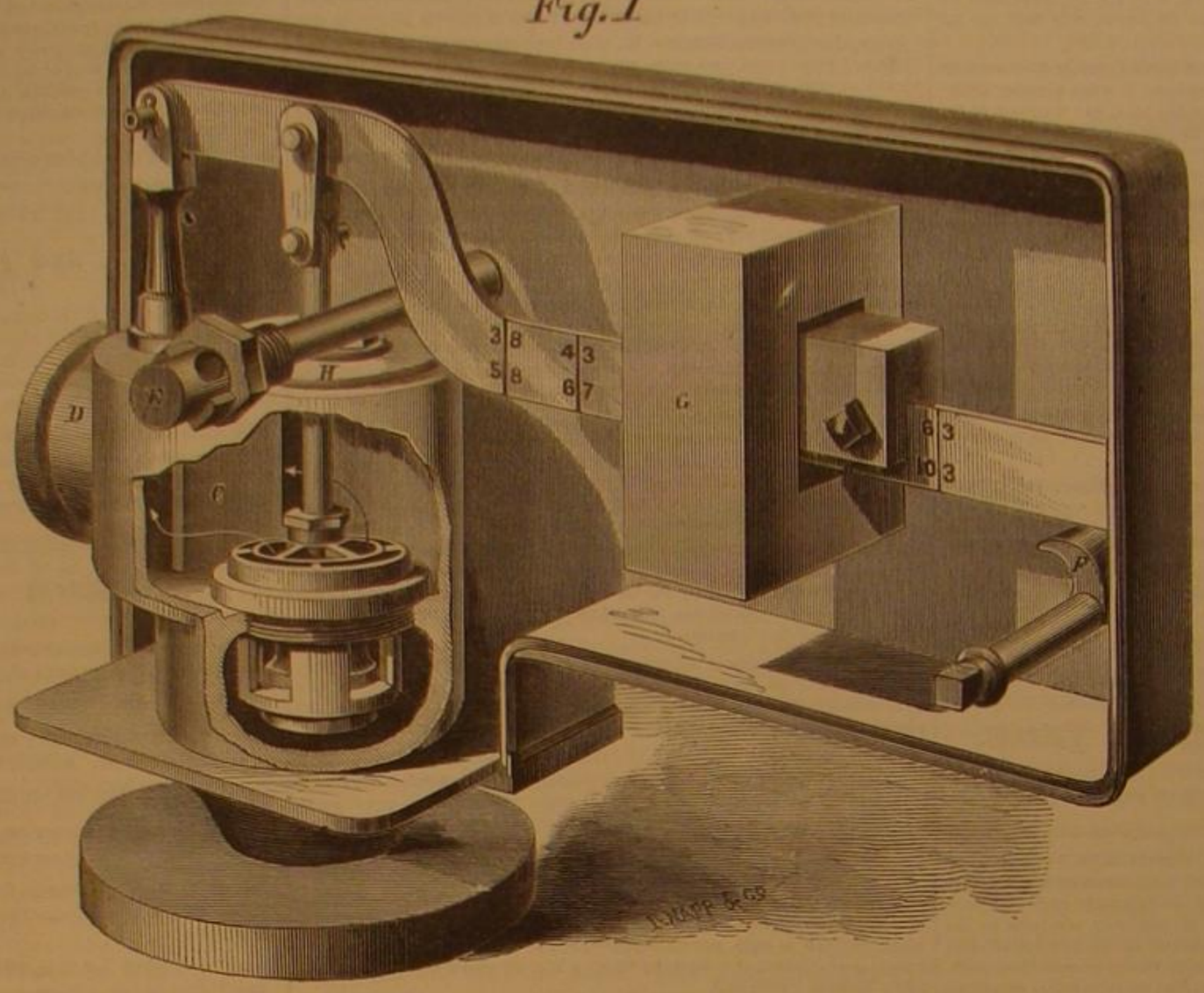


Mr. Ashcroft has received equally flattering letters from Mr. William Bradford, Supervising Inspector of the second District, Mr. E. J. Wilber, Inspector-in-Chief of Steam Boilers, State of New York, and other prominent engineers.

It will be observed that this valve has a capacity for the escape of steam but little less than twice that of the ordinary single disk valve, and that the weight required is but one fifth of that necessary for the latter; consequently, a much smaller one can be used, which makes a great saving in the cost. It is light, simple, and durable, and will, we think, at once commend itself to every engineer. If so desired, it can be locked up and weighted for any specified pressure; and the moment that is reached the valve is lifted from its seats, and the boiler instantly relieved of all undue pressure; carelessness, inattention, or incompetency, on the part of the engineer, being thus in a great measure provided against. This subject is now attracting a good deal of attention, especially in this State and New Jersey. The public in these States are forcibly reminded of the need of greater protection by the recent wise and necessary enactments of their legislatures, which require an approved lock-up valve to be placed on every steam boiler. We will proceed to describe the operation of the Ashcroft Valve:

Fig. 1 is a perspective view of the valve and its parts, with one side of the case removed, and a portion of the covering of the valve seats broken away, to show the internal construction. Fig. 2 is an enlarged view of the valve and its seats. The main peculiarities of this valve are in its having a double seat, and offering a much freer egress to the steam than the

Fig. 1



DOUBLE SEATED LOCK SAFETY VALVE.

single disk valve. By reference more particularly to Fig. 2, these peculiarities will be noticed. The valve itself is hollow, and has an annular space between the two seats, into which, as well as into its central cavity, the steam may pass. The shell that incloses it, and forms its seats, has radial projections, between which are spaces serving as passages for the escaping steam. Fig. 2 shows the valve lifted from its seat, the arrows showing the direction taken by the escaping steam. A is the valve, and B the seats.

Fig. 1 shows a guard plate, C, placed in front of the escape pipe, D, to prevent tampering with the valve. E is a bolt securing the halves of the case together, and having a hole through it for the reception of the staple of the lock. F is a cam for lifting the lever and the weight, G. The cap, H, over the valve, serves as a guide to the valve stem, and prevents the steam from escaping into the lock box. With these references to the engravings, the construction and action of the valve are plain to every engineer.

Patented March 10, 1868. All communications should be addressed to John Ashcroft, 50 and 52 John street, New York city, Superintendent and Treasurer of the Metropolitan Lock Valve Company.

Relics of the Middle Ages.

In digging out the foundations for some new buildings in the Place de la Bastille, situated at the entrance of the Rue Saint Antoine, some interesting discoveries have been made. Massive blocks of solid masonry have been come upon, which, no doubt, belonged to the ancient fortress that stood on this site, the first stone of which was laid by Hugues Ambriot, prévôt of Paris, on the 22d of April, 1370. Originally the Bastille Saint Antoine had but two towers, but two others were soon afterwards added; and the edifice was still further enlarged in the reigns of Charles VI. and Henry II. This bastile, which was raised for the purpose of protecting the capital from the attacks of the Bourguignons and the English, afterward served the purpose of a state prison. Henry IV. deposited there for safety the royal treasure; and Sully tells us, in his "Memoirs," that about the year 1610 the King had stowed away in the vaults of the building £15,878,000 in coin, beside £10,000,000 put aside as a saving fund. Some passages, steps and cells almost perfect, have been met with; and among other remains of past ages a rifled cannon has turned up, which shows that the boasted invention of modern times is not new, but dates some five hundred years back. The progress of the excavations, which are constantly bringing some interesting object to light, is watched with great curiosity by the Parisians, who daily surround the place in large numbers.

Motion is a constant quantity. The sum of all the motions throughout the universe is always the same.

Fire-proof Bronze Color for Copper and Brass.

A German journal gives the following method for imparting a fire-proof bronze color to copper and brass. We cannot speak from any personal test as to the value of the method, but have generally found such formulas, coming from German sources to be correct. Should any of our readers try the method we should be glad to learn the result:

"One sixteenth of an ounce of crystallized verdigris, and the same quantity of finely powdered muriate of ammonia, are to be dissolved in five-sixths of a pint of rain water, the solution left standing, covered, for three to four hours, and then one and a half pints more water poured into it. The copper vessel, which must be perfectly clean is now to be held over a charcoal fire until it is equally heated throughout, and becomes uniformly tarnished. The copper is now to be rubbed over with the mixture and then carefully dried.

"After five or six repetitions of this treatment, the copper receives a brass color; after from six to ten repetitions it acquires a fine yellow. If the copper is now to be changed from yellow to brown, it must no more be wetted while hot; if, however, it be desired to have it very pale brown the process must be repeated twenty or twenty-five times. When the desired color is attained, the copper is to be laid in clean water, taking care to clean it or dry it rapidly after taking it out. This must be done carefully. The copper is then held over a weak charcoal fire, when the bronze becomes permanent and fireproof. To give a fireproof brown bronze color to brass, the following is the process:

"Three thirty-seconds of an ounce of crystallized verdigris and the same quantity of sal ammoniac are mixed with five sixths of a pint of rain water, and left to stand from two to three hours. The brass is then to be rubbed over with it from two to three minutes, when it becomes green. One pint and a quarter of rain water is now to be added to the solution. The metal is now held over a charcoal fire, which must not be too strong, until it acquires a copper color. It is then again wetted, and left to dry by evaporation. When it has been treated in this manner four or five times, it becomes olive colored. The heat may now be somewhat increased, but it is necessary to be very careful that the metal does not become too hot. When it has been treated nine or ten times in this manner, it becomes brown. As long as any greenish places are to be seen, however, this treatment must be continued, in many cases twenty to twenty-five times before the required color is obtained.

"If, however, the metal be strong, the materials are to be dissolved in hot rain water, and the metal rubbed with it immediately until it acquires a fine dark green color; it is then to be held over a strong charcoal fire, by which means it acquires a fine brown color after ten to twelve repetitions of the treatment. It is necessary to be careful that the metal is equally heated throughout. If spots appear they must be bitten out during the work and polished with brickdust."

Wood Gas.

A correspondent of the *Engineer*, London, makes the following statement and inquiry. If the assertion of the writer is correct it is important, and worthy of further experiment by manufacturers and persons residing in sections of our country where wood is plenty and coal for illuminating purposes scarce:

"I reside in the country, and manufacture coal gas for my use—say for fifty lights, and being fond of experiment I tried oak timber instead of coal in the iron retort. I found that gas was produced very rapidly, at least ten times faster than from coal. It was passed through the lime purifier, thence to the gasholder. On burning this gas I found the flame very blue, though strong, and producing an atmosphere not bearable for any great length of time. On opening the retort I discovered that the oak had become very first-rate charcoal, and of three times the value of the timber made use of. It is therefore quite clear that good gas can be produced from timber, and if properly purified, its use in country districts where coal is dear would be of very great importance, and I may say of benefit also. But the question is, how can it be purified to give good illuminating light, and not leave injurious results after use?

"I think it likely that some of your numerous readers may be able to answer the question. It is one well worthy of consideration, as important in many respects. I shall feel greatly obliged by information on the subject."

A Geological map of France is to be prepared at the expense of the Government. The map is intended to comprise the minutest details relating to the geological formations of the Empire.

Scientific American.

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VOL. XIX., No. 21...[NEW SERIES.]....*Twenty-third Year.*

NEW YORK, WEDNESDAY, NOVEMBER 18, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

"LET US HAVE PEACE."

Let not the reader imagine as his eye catches the above heading, that the SCIENTIFIC AMERICAN is about to depart from its time-honored course of neutrality in politics. During the past months of scramble and partizan jostle, we have been silent although not uninterested spectators of the contest. During the months that will intervene between the election and the inauguration of General Grant, there will, in all probability, be more or less of unprofitable recrimination, between the victorious and the vanquished, upon which we shall also look silently yet regretfully.

The spirit of our institutions demands that the results of a popular election should be accepted as cordially and gracefully by the defeated party, as though the winning candidate were unanimously chosen. It is only by the adoption of such a course, that a popular government is rendered tolerable. It is only by such a course that it can hope for permanency and prosperity. We feel ourselves justified, then, in putting forth a plea to our countrymen, North and South, East and West, to join in the attempt to restore now the old feeling of brotherhood that once formed the most beautiful element in American citizenship.

The signs of the times encourage us to believe, that the dangerous rule of extremists will be rejected by the people. No matter to what party they belong, their counsels are to shunned. Although many of our Southern people may regard the election of General Grant as a misfortune, we greatly mistake if events do not prove it a blessing. We have grossly erred in our estimate of the man, and have greatly misinterpreted the motives which governed him at the time of General Lee's surrender, and still govern him, if he does not mean when he says, "Let us have Peace," peace, not for one section only, but for all sections; and we believe further, that if the extremists of the dominant party seek to use him as a pliant tool to force the adoption of an oppressive policy, rather than one of justice and magnanimity, they will be disappointed.

We believe the surest way to the proper political reconstruction of the South, is the reconstruction of her industries. Possibly some of these cannot be restored; if not, others can be substituted. There are plenty of capitalists, who, once convinced that the situation is accepted, and that the shape affairs have assumed is regarded by the people of the South as inevitable, would not only be willing, but anxious to aid in developing the vast resources of that bruised, but, by no means, utterly destroyed section. People of the South, you owe it to yourselves, to show that you can be as energetic in peace, as you were brave in war. Cultivate your lands. Induce Northern capital to come to your help, by discouraging lawlessness, and by securing the peaceful possession of property. Let us bury the past, and look forward with courage and hope to the future; a future big with blessings and prosperity if you will; prosperity and strength such as in your palmiest days you never realized in the past. We speak what we do know, when we assure you that the masses at the North will never consent to see you systematically oppressed, and that they eagerly hope for the coming time, when, with resuscitated vitality, your industries shall shoot into a vigorous growth, and you shall be richer, more peaceful, happier, than you ever could have been under the old dispensation.

But we do not plead with the South alone. We exhort all sections to put aside feelings of self-interest, and to work together for peace; peace from party bickerings, from sectional wranglings; peace, not merely in name, but in verity.

When we consider the possibilities of development possessed by our common country, when we picture to ourselves the results of another half-century of peace with the rest of the world, and absence of internal dissention, we feel as though we could not too strongly entreat our fellow-citizens to consider whether it is not far better to submit to temporary wrongs, until such time as they may be peacefully righted, rather than in the heat of passion to endanger the safety of the entire nation.

A spirit of moderation cultivated by such considerations, mutual concessions, rather than arbitrary and unyielding demand, on the part of those portions of our common country, whose interests may sometimes appear to conflict, will secure the united prosperity of all. The absorbing questions to which the thinking minds of the country ought to be directed, are those of political economy. The vitality of the country is so great, that the wounds received in the late disastrous contest will soon close, if they are not irritated by the revival of old issues.

We implore all sections, then, to strike hands and join in an effort to advance the interests of the entire conntry. Do this, and our fertile valleys shall blossom; our streams blend their music with the hum of machinery; our lakes, rivers, and railroads be laden with commerce, and present business tagnation give place to universal and healthy activity.

SOME SUGGESTIONS ON THE BURNING OF COAL.

The season when closed windows and doors and glowing coal fires have superseded well-aired apartments has arrived, and as the price of fuel has increased, any methods of preventing the waste of so necessary and valuable a commodity must be useful. We give, therefore, a few brief suggestions, drawn from experience, in regard to the care of ranges, heaters, cooking and parlor stoves, and grates.

It is a false economy to be chary of the use of kindling for anthracite fires. Charcoal is probably the best kindler, but is not always to be obtained, and then, is costly. In this and other cities, kindling wood, of pine, sawed short—five or six inches in length—and split fine, is sold in convenient little bundles, one or two of which is sufficient to start an anthracite fire for any household purpose. It may be obtained also in barrels or boxes, or in quantity. In the country these conveniencies do not exist, but every householder prepares his own kindling. One great mistake in its preparation is in not cutting it short enough, or splitting it fine enough. More heat can be obtained by using fine than coarse kindling. This preparation is to the stove, what mastication is to the stomach, an assistant to combustion or digestion, in this case convertible terms.

After the kindling is lighted, it should be allowed to burn until it is all enveloped in a light blaze and portions have become live coals before a particle of coal is put on. If the coal is heaped upon the unignited wood the process of combustion is delayed by choking, and much of the carbon that would otherwise produce heat is carried off in the form of dense smoke or is deposited or held as carbonic acid gas, the greatest enemy to inflammability. Most persons have seen this when an apparently well-kindled fire has been extinguished and had to be re-made.

The coal put on the kindlings should be new coal, not the screenings of a former fire; and it should be carefully spread in a thin layer. The practice of filling the fire-pot or furnace will materially delay the process of combustion. In such cases we have seen an hour elapse before a bed of incandescent coal could be formed sufficient to broil a steak or a fish, or to emit any sensible heat, while with a decent draft a good coal fire, with judicious management, may be obtained in fifteen minutes.

Where a fire is kept all night, or for days and weeks together, as is now so frequently the case with base burning stoves, and even the common cylinder stove, the first thing to do in the morning is to put on fresh coal, without disturbing that in the stove, open the draft and the damper, and do no raking until the new coal is well ignited. Then the ashes may be rattled down until sparks drop through the grate. Soon as these are seen the raking should cease. Never poke a coal fire—anthracite—at the top. This rule, as military men say, is "general."

But a greater fault than any other and a very common one is choking a fire by piling on a grate or filling up a stove with coal when the fire is low. In all cases the coal should be added in moderate, even small, quantities, and it should be placed or spread evenly. In some cases it is well to deposit the lumps piece by piece by hand. When dumped on in masses the coal wastes rapidly without giving out heat, a large proportion of the carbon escaping up the chimney in the form of visible soot or as thick smoke. No anthracite fire should ever be allowed to emit a visible smoke. The gases in the form of a bluish flame carry off enough of the heat producing products. It would be well if all this could be retained and consumed; but we almost despair that this will ever be an accomplished fact.

Drafts and dampers are too frequently used without intelligent reference to their respective offices. Many leave the stove doors open, and close the chimney damper. The effect is, to be sure, to retard combustion, but at the same time the gases evolved, finding no escape by the natural draft, are forced out into the room, poisoning the atmosphere and rendering the apartments unhealthy, inducing languor and headache. If the chimney damper is closed, or the passage to the chimney, the door or aperture above the fire should also be closed, while the draft at the bottom of the fire, or under the grate, may be opened; for if the gases escape through this opening, they will have been neutralized by passing through the fire.

In open grates the draft is frequently found to be insufficient. This is because too large a portion of the fire is exposed. A sheet of boiler plate covering a portion of the grate bottom will in many cases improve the draft, reduce the consumption of coal, and, at the same time, increase the available heat.

Some persons, especially inexperienced help, do not know how to distinguish between unconsumed or coked coal and valueless clinkers, as the former may be coated with white ashes. It may be accepted as a general truth that in a grate, or stove furnace, or fire box, the clinkers, being of a semi-metallic nature, sink and the unconsumed coal be left on the top. We have found it to be economical to gather the top lumps by hand before disturbing the mass. Thus, most of the unconsumed portions will be recovered, and can be used again. In many cases this will prevent the necessity of sifting the ashes and picking out the scoria.

In sifting it is a good practice to drench the ashes in the sieve with water. Much that would otherwise be rejected will be found to be pure coal, the water washing off the coating of ashes, and exposing the "black diamonds," which are frequently in fine particles. These savings are valuable to be used when the requirements of cooking or of particularly sharp airs do not demand a brisk fire. Even the ashes that escape through the sifter, when made into a mortar with water, are serviceable. They may be used advantageously in preserving the fire in a grate, and it is surprising how much of what might be otherwise condemned as waste can be made thus to yield available heat.

Coal should be kept under cover, exposed neither to the sun, the rain, or the frost. Insensible combustion and waste by the action of the elements rapidly diminish the heat producing qualities of even the hardest anthracite coal. By some this possible waste is estimated as high as fifty per cent. This may be an exaggerated estimate, but that it is considerable the observation and experience of twenty years warrant us in confidently affirming. Even the fine dust left in the coal bin is valuable. Mixed into a mortar, as we advise with the ashes, it gives out an intense heat, greater than that of lump coal because of the more readiness with which the oxygen of the atmosphere can permeate the mass; and here we may give a few words of advice. Small sized coal is more economical than large coal, especially for household purposes, if the grate is adapted to the size, for the reason just stated. To prove this let one take a lump of anthracite as large as a man's fist, "all alive," and crack it so as to expose the interior, it will be found to be entirely black inside and undisturbed by the heat.

These practical suggestions and facts, unaccompanied by scientific reasons are submitted for the consideration of our readers. We might have given the philosophy of combustion as applied to anthracite coal, but preferred to make a few simple statements, leaving our readers to trace the truths back to their source. We are confident, however, that an observance of these rules will result in a valuable saving of coal.

THE PROPOSED DARIEN SHIP CANAL.

One of the most important meetings held in this city for years, took place on the 20th October, the object being to initiate measures for furthering the project of a ship canal across the isthmus of Darien. It was attended by a large number of gentlemen prominent in the great enterprises of the age. Peter Cooper was appointed chairman and the Hon. A. F. Conklin secretary. Among those who took a prominent part in the proceedings were the Hon. Wm. H. Seward, Secretary of State of the United States, and the Hon. Wm. M. Evarts, Attorney General. An estimate of the cost of the canal was made as being $100,000,000. A committee to obtain subscriptions was appointed, consisting of Messrs. Wm. T. Coleman, Marshall O. Roberts, C. K. Garrison, William B. Duncan, and Richard Schell. Surveys of the proposed route were submitted by several eminent engineers, and an assurance of the final success seemed to prevail in the minds of all the gentlemen present.

Mr. Seward addressed the meeting, setting forth the advantages that must accrue to the commerce of the world, and the United States especially, from the completion of this great work. We have room for only the following extract from his able address:

"Commerce can no longer afford to use the circuitous and perilous navigation around the Capes. It must and will have shorter channels of transport, and of these there can be but two—the one across the Isthmus of Suez, the other across the Isthmus of Darien. A canal across the Isthmus of Suez already approaches its completion. If that channel is to secure the patronage of universal commerce, it will be fully enlarged and completely adapted to the interests of modern commerce. In that case the commerce of even the Atlantic American coast, from the St. Lawrence to Cape Horn, will be turned eastward across the Atlantic and through the Mediterranean and the Red Seas and the Indian Ocean to India and China. It would be a reproach to American enterprise and statesmanship to suppose that we are thus to become tributaries to ancient and effete Egypt, when by piercing the Isthmus of Darien we can bring the trade of even the Mediterranean and of the European Atlantic coasts through a channel of our own, so palpably indicated by nature that all the world has accepted it as feasible and necessary."

Truly this is an age of great enterprises, and civilization marches onward with gigantic strides.

AN IMPORTANT MOVEMENT.

The recent International Workingmen's Congress held in Brussels was an important movement, and deserves careful attention and consideration. Diversity of opinion as to its effects upon the interests of labor is to be expected. The adverse action of the French and Prussian Governments, having for their purpose the defeat of the movement, will, as all such action must, react upon the working classes in those countries, and tend to foster a spirit of discontent and to stimulate emigration.

For ourselves we can see how such an association could be made the instrument of good, but the history of similar movements does not encourage the hope that much good is to be expected from the action taken. The fact that in this congress the policy of maintaining large standing armies by any government, as opposed to the interests of labor, was discussed, shows the tendency of all such organizations to run into politics, and thus defeat any good that might otherwise be derived from them.

The question of strikes seemed to be one which such an assemblage might have discussed satisfactorily and intelligently; but we are sorry to say that any reports that have reached us fail to show that the real gist of the question was comprehended. The most diverse opinions prevailed, some regarding strikes as an unmitigated evil, others esteeming them an unqualified blessing, while a minority seemed to think them only admissible in extreme cases. On the whole, we fail to see that any result commensurate with the importance of the movement has been derived from the International Congress.

INVENTORS AND THE PATENT OFFICE.

The excitement incident to a Presidential Election always deranges trade and paralyzes business in a greater or less degree. It seems even to be a bar to the progress of science and an obstacle in the development of genius. The decrease in the business of the Patent Office for the last few weeks indicates this effect. The election of Grant and Colfax to the two highest offices in the gift of the people, insures peace, and we trust, harmony and prosperity to the whole country. Inventors and the men of genius will, we trust, receive their share of the good things hoped for by others under a new administration.

Inventors, as a class, have been greatly prospered during the past few years, and the demand for good improvement in all departments of manufacture is constantly increasing. The condition of the Patent Office under the new Commissioner is favorable for early examination of cases, and we advise those who contemplate applying for patents and are prepared, to have their business proceeded with and not to defer it. In the same reverse degree as the days shorten, evenings lengthen, and cold strengthens—all favorable to working out inventions—the hours of work at the Patent Office decrease, and before next spring it is likely that the office will be overcrowded with cases, and examinations greatly delayed.

Such has been the workings of the Patent Office in past years. We believe Commissioner Foote will try to guard against a recurrence of such a condition of affairs, but the difficulty of obtaining competent assistants may render it beyond his ability to keep the work of the office up. All persons who are prepared should not delay in making application if they wish careful examination and early decision. A more favorable time will not occur.

ADVANTAGE GAINED WITHOUT COST.

Applicants for patents should remember that all patents taken by us are specially noticed in the reading columns of the SCIENTIFIC AMERICAN at the time the claims are officially published. A description of a new invention just patented, in a paper of as large circulation as this, although brief, is often the means of selling a patent, and putting the patentee in possession of a handsome sum of money before he has scarcely received his document from the Patent Office. If no other advantage were gained in applying for patents through the Scientific American Patent Agency, this alone is a good reason why every inventor who wishes to realize, immediately, by the sale of his patent, should do his business through this office.

CAREFULNESS IN THE MANAGEMENT OF FIRE-ARMS.

In this country almost every boy, before arriving at his majority, has opportunities for becoming acquainted with the use of fire-arms. This is proper, as one of the rights of American citizens is that to bear arms, and the republic depends upon her citizen soldiery to repel invasion, or to quell internal troubles. But some plain directions in regard to the proper care of fire-arms, and especially rifles or rifled pistols, seem to be demanded by the increasing use of these arms. We do not allude, in our heading, to absolute carelessness in the handling and use of fire-arms, but simply to the means of keeping them in order for use. Too many words of caution have been wasted, and too many serious and fatal accidents have occurred by the careless handling of guns and pistols, without ending, and possibly without abating this carelessness, for us to hope that anything we may add in the way of caution would be of benefit. If people will not be convinced that a loaded fire-arm is more dangerous to handle than a poker or broomstick, we wash our hands of any blood guiltiness that may accrue from their carelessness, and leave them and their victims to the result of their folly.

But, as it is the fact that our people have already become accustomed to the handling of these instruments, and their use has become general, it may not be amiss to give a few simple and plain directions as to their care. The smooth bore may be used with impunity until it becomes so foul as to clog the passage of the flame from the nipple to the charge. The only difficulty will be this obstruction, except in case the barrel becomes so foul near the breech that a deposit of the unconsumed powder may take fire. We have known two or three such cases, and the result was a bursting of the barrel in one case loaded with ball, and in others with bird shot. In each case the deposition of the unconsumed portions of the charge of powder on the walls of the barrel had been allowed to dry. But the smooth bore can be relied upon much longer when foul than can the rifled barrel, as it affords less chances for a deposition of the unburned powder; still, the generation of moisture produced by the combustion of gunpowder and the failure of burning the whole charge at each explosion will result in a deposition of gunpowder paste on the walls of the tube, which, when moderately dry, is, to all intents and purposes, true gunpowder, and as such will surely explode. Bursting of barrels from this cause is not uncommon, although frequently attributed to some mysterious cause. The cure for this is, first, a proper proportioning of the charge of the powder to the weight and resistance of the shot or of the bullet, and second, the frequent cleansing of the gun tube. All excess of powder beyond that which is consumed at the discharge is worse than waste. This for smooth bore firearms, as fowling pieces, etc.

Now, as to the treating of rifled arms. None are now made except with a "gain twist;" and if a deposition of unburned powder is made, it will be near the muzzle, rather than near the breech. Of course the danger of explosion from this deposition is thus greatly lessened, as the course of the ball, impelled by the combustion of the powder, extends through a longer, although an inappreciable period, than that in the smooth bore. Yet, accidents happen even with these arms. Our experience may have been peculiar, but we believe it correct; and we have noticed the bursting of heavy rifled barrels which could have occurred only by want of care of cleanliness where too large charges of powder were used. The unconsumed powder was deposited in the "lands" or grooves, and remained to be ignited by the first discharge, after it had become sufficiently dry; and here we may remark that the popular idea that gunpowder cannot explode except when perfectly dry, is not borne out by the facts. The intense heat generated in a confined tube, as a gun barrel, bears very little analogy to the heat of a flame in the open air. The spire of flame from the percussion of a common gun cap will project itself with a rapidity and force to be likened to nothing but a stroke of lightning, and will throw its stream of fire in a direct line, from the diminutive lozenge of fulminate, at least twenty-four inches. Such a force, accompanied as it is with intense heat, is sufficient to ignite even more resistant material than damp gunpowder.

Almost all these rifled pieces are now built by firms who have made their construction a study, and calculated, to the minutest fraction of a grain, the amount and quality of the powder necessary to the propulsion of the projectile. Most of them furnish their cartridges so that no mistake may be made between the relations of powder and ball. Yet, even here mistakes may occur, except when the cartridge is inclosed in a metallic case. For instance, the Colt's revolver, so favorably and deservedly appreciated, was formerly, if not now, furnished with paper cartridges, or it might be loaded with open powder and ball. In the latter case, possibly not all of the powder might be placed in the chamber, especially if there was a stiff breeze blowing, or the operator was careless, and in consequence the ball would not be propelled through the barrel. This fact might not be known to the marksman, and he would continue to fire the round, each ball lodging just behind its predecessor, until he had filled his barrel with undischarged bullets. Such a case we knew where a pistol of six inches barrel burst and contained no less than seven bullets wedged one upon the other.

It is evident from these statements that the proper use of fire-arms demands care, not only to prevent accidents, but to make them effective in their legitimate use.

RISE AND FALL OF THE NORTH AMERICAN LAKES.

The theory, put forth some few years since, by Prof. Mather, of West Point, to account for the rise and fall of water in the North American Lakes, it again being discussed. Most of those who write upon the subject seem to coincide with the theory mentioned, but we must dissent from it, and propose to show cause for our dissent.

The waters of Lake Superior rise often from eighteen to twenty-four inches. The rising of the water is sudden and without apparent cause, and the subsidence is the same. The other lakes exhibit similar phenomena to a greater or less degree. No uniformity is observable in the times at which the water rises, hence they are not tidal phenomena. The cause or causes of these occurrences have hitherto eluded investigation. We say, have eluded investigation, because we believe that any of the theories which have been thought by their authors to account for them, will not bear scientific scrutiny. Especially we regard the theory of Prof. Mather as one which has not a leg to stand upon, and as we find this theory circulating not only among popular journals, but those claiming to be scientific we propose to show up its faulty character.

The theory may be thus fairly stated:—The water in any of these lakes, extending over a wide area, the air over their surfaces, is subject to considerable variations in density from different causes; as variations in temperature, hygrometric condition, etc. These changes of density produce differences in pressure upon different parts of the surface, therefore, the water will rise in those portions sustaining the lightest pressure. Thus the lakes are considered as huge barometers which indicate by their rise and fall, variations in the weight of the atmosphere at different locations on their surface.

This is wholly faulty. If the water rises at a distance from the point of greatest pressure, it does so by virtue of pressure transmitted through the mass; but the air is also a fluid of much greater mobility than water, and will, at least, transmit the pressure as quickly over the surface as it can be transmitted beneath it. The pressure being thus transmitted through the air would become equalized upon the surface and under it; how then could this pressure tend to raise the water above its usual level? It could not.

A barometer indicates differences in the weight of the atmosphere, because a portion of the mercurial surface is excluded from the pressure of the atmosphere. This is its essential feature. Open the end of the tube so that air may rest upon the upper end of the column, and the mercury sinks to a common level, and will remain there in spite of all variations in atmospheric density. For these reasons we maintain that the theory cannot be true, and that the rising and subsidence of the waters in the North American lakes yet remain unaccounted for.

IMPROVEMENT IN PAINT.

The hydro-carbonate of lead or white lead, and the oxide of zinc, known as zinc white, are the two principal bases now generally used throughout the civilized world for the manufacture of paints. By their use our houses are preserved from decay and adorned with cheerful colors to gladden the eye. The majority of all articles produced by the industry of mankind depend for preservation, and, to some extent for beauty, upon the protecting and coloring qualities of paint. It ranks next to food, raiment, and shelter, among the necessaries of life, while the labors connected with its numberless applications give daily employment to thousands of people.

We are led to these remarks from an examination lately made by us in the quiet old elm-shaded town of Stratford, Conn., of some of the work done by a young practical painter of that place, by name Frederick Lillingston. He has made a discovery in connection with paints which appears to be of great value and ought, we think, to be made public. It is the result of long study and experience. The improvement consists in taking any of the ordinary paints of market, whether having the lead or zinc base, and subjecting them to a chemical treatment by which their tendency to chalk or to scale off or to change color, is prevented, and an increased body is imparted; the practical result being that the cost of paint is reduced, about 33 per cent, while the painter finds himself supplied with a greatly improved article, reliable and durable in its nature. It flows with more ease than the ordinary paints, has a good body, dries readily with a fine gloss, endures the tests of time and weather, and gives satisfaction under all circumstances. It is well adapted for use in connection with the various pigments: capable of a peculiar transparency, coupled with excellent body, it is well suited for fine effects in graining and other ornamental work. For blind painting it is of unusual value, as it covers well, gives a superior finish, and the color will not run. For the lack of this quality many a painter of blinds loses his labor and is compelled to go over his work.

Any mere trick of adulteration by which the quality of paint is impaired, or its value diminished, should be frowned upon and ignored by all who love honest dealing. On the other hand, any discovery whereby an article of such universal consumption can be really improved in quality, and cheapened in price, is a matter of the first importance, deserving every encouragement.

The Lillingston paint is no new experiment, but has been in actual use for a long time. It qualities have been ascertained by experience. Some of the painting which we examined had been exposed to the weather for three years; but, we found it hard, fresh looking, and entirely free from chalkiness.

THE DEVICES ON OUR COINS AND STAMPS.

Many of the papers have contained notices of the new devices for our postal stamps, almost always accompanied with laudatory remarks. Among these devices are pictures of a mail carrier on horseback, a railroad train, a steamer at sea, a copy of Trumbull's "Signing of the Declaration of Independence," and of his "Burgoyne's Surrender." No doubt all these are very fine specimens of the engraver's art, but we would ask, why attempt to reproduce a large historical picture on a space of seven-eighths of an inch by three-quarters? Are we all to carry microscopes, or is there such a fear of vignettes of heads of patriotic men as to prevent us from using these representations as insignia of our national coins and stamps? It is evident that the devices on our coins and stamps would subserve their purpose better if simple and suggestive than if complex and without significance. No style of stamps can be imagined more appropriate and useful in teaching lessons of patriotism than our old-fashioned postage stamps bearing the effigies of Washington, Jackson, and Franklin. The symbolical bird of the republic, or the national shield, are also appropriate emblems, and we can see no reason why the likenesses of our great statesmen and soldiers should not be employed as decorations to our coins and stamps. "Hero worship" is not to be deprecated if it excites emulation to copy their examples, and reminds us of our duty to the country by keeping alive the memory of the great and good whose lives and public services are a portion of our nation's history. Microscopic copies of the painter's art, which can never approach the original, appear to us to be entirely out of place on our national coins and stamps.

The Consumption of Sugar.

According to the *Trade Journal* the amount of sugar annually consumed by the civilized nations of the earth is truly enormous, and will surprise those not familiar with the extent of that trade. The *Produce Markets Review* has some figures in this connection, from which we learn that Great Britain, including her colonies, and the United States, are the most important consumers, as they use 1,420,000 tuns per annum, or 41·40 lbs. per head. France, Italy, Spain, Belgium, Portugal, and Switzerland use 506,000 lbs. per annum, or 12·34 lbs. per head. The third on the list is the great Teutonic race, but with the great impetus given to its national life, and the much better scope for enterprise and commerce, Germany, with its domestic social life, will soon rise in the sugar scale. The Zollverein, Austria, Holland, the Hanseatic League, and Denmark consume 262,000 tuns per annum, or 7·30 lbs. per head. Last come Russia, Poland, Turkey, and Greece, and the deliveries in these countries amount to only 125,000 tuns, or 3·80 lbs. per head.

The quantity of sugar used in the rich countries depends upon its price, and the low rates of the last few years give an extraordinary stimulus to the deliveries. The sources of supply at present worked are so numerous, the cultivation of sugar can be so indefinitely extended, and even at the late and present low rates is so remunerative, that all possible demands can be met; and, as the wealth of civilized communities increases, we anticipate a progressive increase in the use of sugar. In fact, the figures that we consider so large at present will, if the late rates of progress be maintained, soon be utterly insignificant. In round numbers, the British consumption for 1866 may be estimated at 625,000 tuns. On the scale of New South Wales it would amount to 250,000 tuns per annum. The total consumption of the 313,000,000 souls, from which returns can be obtained, is 1,035,000 tuns per annum, or 15 lbs. per head. On the British scale of consumption it would amount to 6,150,000 tuns; on the New South Wales scale to 12,000,000. The growers of sugar, therefore, need have no fear of extending cultivation too far.

Certain Diseases Common to Men and Animals.

Prof. A. Large, in the introductory lecture delivered by him before the New York College of Veterinary Surgeons, made some interesting remarks upon diseases common to both men animals. The animals, the similarity of whose diseases to those of the human race was considered, are the horse, ox, pig, sheep, and dog. The similarity of the diseases of the horse and ox to those of mankind was observed as early as the time of Aristotle. Beside being liable to the same accidents as wounds, bruises, etc., the lecturer pointed out the fact that they were liable to disease from atmospheric changes, improper food, overwork, and other fruitful causes of disease among men. Among the diseases common to men and animals, he enumerated small-pox, and various other eruptive diseases. He stated that a great many sheep were destroyed by small-pox in England, during the year 1857, and urged that sheep imported to this country should be subjected to quarantine. He believed, contrary to the generally received opinion, that cows are subject to scarlatina, and attributed many cases of sore mouth to the drinking of milk drawn from cows affected by this disease. He asserted that what has lately been considered as the cattle plague was not identical with the cattle plague in Europe, and pointed out marked differences in the manifestations of the plague from the European plague, to sustain his position.

After discussing, to some extent, the subject of hydrophobia, he advised, in cases where people were bitten by dogs, that the animals should be confined rather than killed, as, in case they should not prove to be rabid, the assurance thus obtained would do away with the anxiety that would otherwise be experienced.

The lecturer closed his remarks by urging the importance of establishing veterinary colleges in various parts of the country, as the dissemination of veterinary science is of the highest importance, both from a sanitary and commercial point of view.

Prof. Silliman and the Mines of Colorado.

The correctness of Prof Silliman's statement in regard to the mines of Colorado is disputed. He says: "The veins are, in general, copper veins, the minerals being copper and iron pyrites. In all the veins except the galena and blende (black jack of the miners) the gold is uniformly associated with the iron, never with the copper pyrites. It is found most abundantly in the fine granular varieties, large pyrites crystals being generally destitute of it. The "tenor" or content of the veins in gold averages for second class ores 1 oz. to the tun, and ranges for first class from 3 to 12 oz., averaging 8 oz. to the tun."

The *Weekly Register*, of Central City, Colorado, says that the "statement that the copper ores contain no gold is the very farthest possible from true, as no copper ore in Colorado is so rich in gold as copper pyrites. That ore contains three fourths of all the gold; indeed nearly all the gold is taken from copper ores. His estimate of the total production of Colorado for the year is less than one half what the yield of Clear Creek and Gilpin counties alone will be. In many respects he speaks disparagingly of our county, and especially of the mills and machinery which he found idle, greatly exaggerating facts, but at the same time he fails to charge the transportation of useless machinery here on Eastern people, where it belongs, for it was the managers of companies, who, sitting in their Wall street and Broadway offices, arranged for these failures. In his report he ignores Summit, Lake, Park, and other counties. His trip was quite too short to enable him to take more than a birdseye view of a small portion of the country, and hence it is not wonderful that he should make errors."

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING NOVEMBER 3, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

83,583.—KNITTING MACHINE.—William H. Abel, Greenville, R. I.

I claim, 1st, The knocking over points, constructed substantially as described, for the purpose specified.

2d, The combination of the separately removable knocking over points, substantially such as described, with the bar, B, having the notched lip, g, clamp, A, and screws, a, or equivalent.

83,584.—KNITTING MACHINE.—William H. Abel, Greenville, R. I. Antedated October 22, 1868.

I claim 1st, The sinkers, c6 and c7, constructed as described, combined with the jacks, c, and operating in combination with the needles, in the manner and for the purpose set forth.

2d, In combination with the jacks, c, which have sinkers, c6 and c7, constructed, combined, and operating as set forth, the springs, g6, arranged to operate as and for the purpose set forth.

3d, The plate, f f, applied to the face of the knocking over bar, in the manner and for the purpose substantially as specified.

4th, The combination of the vertical shaft, 19, operating as set forth, the crank arm, 17, connecting rod, 15, the segment, with its arm, A', cords, 24 pulleys, 27 and 28, and the top bracket, the whole arranged to operate substantially in the manner and for the purpose specified.

5th, The combination of the friction slide and slide box with the parts last above claimed, as and for the purpose set forth.

6th, The lever, M, for operating the presser bar, when provided with a pin or stud, m, and a rotary sliding roller, n, and with a shipping device, substantially as and for the purpose specified.

7th, The combination of all the operative parts herein described, arranged substantially in the manner and for the purpose set forth.

83,585.—BLIND HINGE.—Max Adler (assignor to himself and Henry Breitwieser), Buffalo, N. Y.

I claim the combination of the interposed bearing cushion, k l, with the geared hinge leaves, a d, arranged as described, and operating in the manner and for the purpose specified.

83,586.—DIE AND PUNCH.—T. G. Arnold, New York city. Antedated October 24, 1868.

I claim, 1st, The combination of the die plate, A, series of removable dies, C, and spring die clearer, L, arranged substantially as described.

2d, Also, the combination of the plate, H, series of punch-supporting tubes, K, and punches, E, arranged substantially as described.

83,587.—STEAM ENGINE OIL CUP.—E. H. Ashcroft, Lynn, Mass.

I claim the combination and arrangement of the outer cup, G, inner open mouthed cup, A, stem, B and valve, C, operated in the manner as shown and described and for the purpose set forth.

83,588.—STEAM AND WATER CHECK VALVE.—E. H. Ashcroft, Lynn, Mass.

I claim the construction of the piece, E, and its arrangement in relation to the valve piece, c, piece, C, and union joint piece, D, substantially as shown and described.

83,589.—EXTRACTING SACCHARINE MATTERS FROM MALT.—William Anneuser, St Louis, Mo. Antedated October 28, 1868.

I claim, 1st, The process of forcing a direct current of steam, water, or compressed air into a tight compartment containing the malt, for the purpose of pressing the saccharine juice from the malt.

2d, The application of a suction apparatus to secure a ready issue of the saccharine liquid, either separate or in combination with the device specified in the first claim.

83,590.—MACHINE FOR BLOCKING HATS.—James A. Ball and Peter B. Lawson, Cold Spring, N. Y.

We claim, 1st, The perforated cone, H, having a recessed surface, f, in combination with the hollow chamber mold or former, C, arranged so as to pinch and hold fast the hat body, substantially in the manner set forth.

2d, In combination therewith, the conical ribs, e e e e, applied to and forming part of the horizontal upper surface of the chamber, d, of the box-mold or former, C, substantially in the manner and for the purpose specified.

3d, The combination of the recessed perforated cone, H, flexible covering, I, plate, B, and steam pipes, K and L, with the box mold, C, arranged and operating substantially as specified, so as to force a felt hat body into the said mold, C, by applying the pressure of steam internally.

83,591.—CAR COUPLING.—Robert M. Barthelmess and Charles C. Millar, Savannah, Ga.

We claim the application, within a longitudinal slot, b, through a buffer head, B, of a slotted segmental latch, D, of described construction, guided and kept in place by means of a pin, g, and carved abutment, h, substantially as described, and for the purpose set forth.

83,592.—GATHERING ATTACHMENT FOR SEWING MACHINES.—Walter B. Bartram, Danbury, Conn.

I claim the within described gathering attachment for sewing machines, composed of three elastic blades or plates, B b a, all arranged relatively to each other, as shown and constructed to guide and give the required pressure to the strips of material to be gathered, as described and specified.

83,593.—LIGHTGING GAS.—W. W. Batchelder, New York City

I claim, 1st, The friction fuse or cord, saturated and coated with the ingredients and in the manner herein set forth.

2d, The method of effecting the feed of the fuse by means of two racks or pinions constructed and arranged so as to admit of the passage of the fuse between them, the said pinions being operated by a spindle and endless screw, or equivalent device, substantially as set forth.

3d, The combination with the feed pinions or racks and fuse, and the spindle for operating the racks and effecting the combustion of the fuse, of the hollow standard case, in which the said spindle and racks are supported and enclosed, substantially as and for the purposes set forth.

4th, The combination, with the rotary spindle for operating the feed racks of a thumb piece, mounted upon the spindle, substantially as herein described so as to prevent the retraction of the fuse from between the said racks.

5th, The fuse receptacle, constructed as described, in combination with the gas burner, under the arrangement herein shown and specified.

83,594.—CHECK HOOK.—Alma Bedford, Coldwater, Mich.

I claim a harness check hook, B, provided with a vertical pin, C, and ball, D, all constructed and arranged to operate substantially as herein described.

83,595.—CHURN.—George Beisner, Chicago, Ill.

I claim, 1st, The movable paddles, b b, arranged and operating substantially as set forth.

2d, The spring, d, as and for the purpose set forth.

83,596.—SEWING MACHINE.—Charles P. Benedict, Hoboken, N. J.

I claim, 1st, The slotted lever, B C, having one of its jaws so constructed that it shall always hold and keep the pin, g, on the arm, E, in contact with the other jaw by a spring pressure, substantially as set forth and specified.

2d, The frame, A, and vibrating slotted lever, B C, constructed substantially as described, so that it may be readily attached to a four-motion-feed sewing machine, in co-operative relation with the feeder thereof, substantially as and for the purposes set forth and specified.

3d, The combination with a reciprocating feeder, of the vibrating slotted lever, B C, constructed as described, so that said lever shall always be in contact with the ordinary feed cam of a four-motion-feed sewing machine, without making or breaking contact therewith, substantially as described and set forth.

4th, The supplementary presser foot or spring, b, in combination with a reciprocating feeder, H, and vibrating slotted lever, B C, constructed and operating substantially as described and specified.

83,597.—BLOCK AND DIE FOR FORMING HATS.—Lorenz Bommer, New York city.

I claim making porous hat blocks, molds, and dies, substantially as described, as distinguished from molds made porous by perforations or woven meshes.

83,598.—HORSE HAY FORK.—B. S. Burgan, Congress, Ohio.

I claim the links, I, bow, F, lever, G, and cross bar, C, as arranged to operate in combination with the feet, D, and limbs, A, substantially as and for the purpose described.

83,599.—HARVESTER RAKE.—Charles Thomas Burgess, Brentwood, England. Patented in England, September 8, 1866.

I claim, 1st, The combination, as herein described, of the reel shaft, the rake arms, and the cam for carrying the delivery rake or rakes of the reel or fly by the arm or arms which are inclined to the shaft of the reel, and which are caused to vary their angle to the shaft, substantially as described.

2d, The arrangement of mechanism, herein described, for carrying the delivery rake of the reel or fly, as it is moved back over the platform, not only to move endwise towards the draft side of the machine, but also to turn into a position inclined to the line of the knife, substantially as hereinbefore described.

83,600.—LETTER PACKAGE.—J. W. Burns, Medway, Ohio.

I claim the direction papers, E, when attached as described, by the fastenings, c, or the band, x, and combined with the parts, A B, as and for the purpose set forth.

83,601.—PROPELLER SHAFT.—Wm. Burtis, New York city.

I claim the application of the double counter shafts, C C, with their gear wheels, F, in combination with the gear wheel, E, on the crank shaft, and the gear wheel, D, on the wheel shaft, as herein described.

83,602.—NON-FREEZING HYDRANT.—James E. Carter, Portland, Me.

I claim the improved hydrant, having the gas and water pipes combined and arranged within the shell or stock of the same, from their respective mains upward, as and for the purposes set forth.

83,603.—BLIND HINGE.—Charles B. Clark, Buffalo, N. Y.

I claim the angular socket, g, and pin, n, in combination with the inclines, m m', constructed and operating as described.

83,604.—WATER WHEEL.—Mark J. Colbourn, Karthaus, Pa.

I claim, 1st, The hoods or shields, D, constructed of the form substantially as described, upon the backs of radial floats, m, substantially in the manner and for the purposes described.

2d, The shields, D, constructed with interlocking segments, S, and shoulders l, in combination with the float plates, m, flanches, H, and a locking key, K', substantially as described.

3d, The convolute case, inclosing the water wheel of two sections, C C1, constructed and connected together by the devices, as shown, so as to be detachable, substantially as described.

4th, The combination of the sectional frames, A A', the sectional water wheel case, and the tongue and groove and bolt fastenings, all constructed and arranged substantially in the manner and for the purpose described.

5th, The removable box, d, provided with hooked fastening, d, adapted for use with a standard, C3, substantially as and for the purpose described.

83,605.—ANNEALING PIT FOR ANNEALING CAR WHEELS.—W. J. Cochran, Baltimore, Md., assignor to himself and John Cochrane, Farmingdale, N. J.

I claim, 1st, The cooling or annealing pit, herein described, with a top covering and bottom vent, arranged for the purpose set forth.

2d, The arrangement of the cope ring with the top plate, substantially as described.

3d, The cooling or annealing pit, in combination with the guide strips or their equivalents, arranged and operating substantially as described.

83,606.—NOISELESS BELL PULL.—John F. Cory, New York city.

I claim the carrying of the rubber, D, on the slide, B, attached to the wire, C, leading to the bell, so that it is raised and lowered therewith, substantially as and for the purposes herein set forth.

83,607.—BOILER FLUE BRUSH.—Patrick H. Coyle, Newark, N. J.

I claim a boiler-flue brush, the flexible or brush portion of which is composed of strips or pieces of steel, or other metal, inserted in the hub, substantially as set forth.

Also, the combination of a metallic lined tubular hub or base, with a steel or metallic brush, substantially as set forth.

Also, the combination, with a boiler-flue brush, of removable end pieces or heads, and a removable center rod or handle, substantially as set forth.

83,608.—STEAM GENERATOR.—J. A. Davis, Watertown, N. Y.

I claim the combination of the generator, A, and the water supply reservoir, F, whereby to generate low pressure of steam, and to supply heated water to the boiler, substantially as herein set forth.

83,609.—COFFEE HULLER AND POLISHER.—C. de St. Charles, Jalapa, Mexico.

I claim the combination of the cylinder, A, rubber, b, belt, e, and adjustable stretcher, h, when constructed and operating in the manner herein described.

83,610.—HARVESTER RAKE.—Joseph Dick, Jr., of Oshawa, Ontario, assignor to himself and Eugene Glen, Rochester, N. Y. Patented in Canada, June 26, 1868.

I claim, 1st, The bed plate, B, provided with bearings for the driving and crank wheel shafts and rake pivot, and for the adjustable stops and rake latch, arranged substantially as described.

2d, The latch, f, attached to the rake-carrying arm, and operating in connection with the sector arm, substantially as described.

3d, The latch, f, attached to the rake-carrying arm, and operating in connection with the sector arm, substantially as described.

3d, The adjustable roller arm, in combination with the latch, f, for releasing the same, in the manner set forth.

4th, The pivoted latch lever, l, operating in combination with the sector and rake carrying arms, substantially as described.

5th, The pivoted latch lever, l, provided with the adjustable latch or hook, for the purpose set forth.

6th, The pitman, J, and boxes, I and K, in combination with the adjustable washers or jam nuts, k, arranged and operating substantially as described.

7th, The vibrating rake arm, provided with the heel extension or counter arm, D', in combination with the crank-wheel shaft, arranged and operating in relation thereto, substantially as described.

83,611.—POST AUGER.—John B. Draper, Salem, Ill.

I claim the arrangement of the screw shaft, G, with its wheel, I, and the nut, D, with its wheel, F, and restraining plates, E, operating respectively for the rotation and insertion of the auger, and for its upward withdrawal, substantially as described and represented.

83,612.—CORN MARKER.—J. W. Eardly, Grand Rapids, Mich.

I claim, 1st, The adjustable hinged bars, A A, in combination with the arms a a a a, and slotted arms, b b, arranged and operated substantially in the manner shown and described, for the purpose set forth.

2d, The manner of adjusting the marker, a, fig. 2, substantially as and for the purpose described.

83,613.—WASHING MACHINE.—Dexter Estes, Stockholm, N. Y.

I claim the corrugated roller, A, moving in the curved box, B, by means of the lever, d, pivoted to a projection extending from one side of the box, and furnished with the handle, C.

83,614.—WAGON STAKE.—Amos Fassett, Sterling, Ill. Antedated Oct. 17, 1868.

I claim, 1st, The plate, B, when provided with the flange, b', and the enlargements, e e, projecting below said plate, substantially in the manner and for the purposes herein set forth.

2d, In combination with the above, I claim the side plates, C D, arranged and operating in the manner specified.

83,615.—COMPOUND FOR KILLING INSECTS ON TREES.—H. D. Flower, Chicago, Ill.

I claim the ingredients herein named, compounded and applied substantially as and for the purpose set forth.

83,616.—MANUFACTURE OF PAPER.—Elias T. Ford, Stillwater, N. Y.

1 claim, 1st, The perforated cylinder, A, with the interior suction box, B, both constructed and arranged to operate substantially as herein described.

2d, In combination with the perforated cylinder, A, the suction box, B when constructed and arranged to operate substantially as herein described and for the purpose set forth.

3d, The reservoir, D, with a packing roll, G, or its equivalent, for preventing drip, in combination with the forming cylinder, A, when constructed and arranged to operate substantially as herein described.

4th, In combination with the perforated cylinder, A, and sucking box, B, the slice bars, r r, and blades, H H, when constructed and arranged to operate substantially as herein described and for the purpose set forth.

5th, Providing the forming cylinder, A, and its attachment, as herein described, with a reciprocating movement, for the purpose of interweaving the fiber of the pulp, as set forth.

83,617.—MACHINERY FOR THE MANUFACTURE OF PAPER.—Elias T. Ford, Stillwater, N. Y.

I claim, 1st, In the manufacture of paper, the method of sucking the surplus water from the pulp formed into a sheet on the wire cloth as it passes to the couch roll, substantially as herein described.

2d, The perforated cylinder, B, when constructed and arranged to operate substantially as herein described for the purpose of avoiding the wear of the wire cloth in the manufacture of paper.

3d, The water box, A, perforated cylinder, B, circular plungers, C, concave plungers, J Q, packing plates, I, and packing, Z, when constructed and arranged substantially as herein described and for the purpose set forth.

4th, In combination with the perforated cylinder, B, the sucking box, W, with its plungers, C, when constructed and arranged substantially as herein described.

83,618.—WRENCH.—E. T. Ford, Stillwater, N. Y.

I claim the above described wrench for axle nuts of carriages, the whole constructed and operated substantially as and for the purpose specified.

83,619.—FINGER BAR FOR HARVESTERS.—E. T. Ford, Stillwater, N. Y.

I claim the oval plates, A B, provided with apertures, F and r, in combination with the guard fingers, C, provided with shanks, c, screws, a a, and metal plug, J, all constructed and arranged substantially as described.

83,620.—WINDMILL.—John Frazee, St. Louis, Mo.

I claim, 1st, The vanes, G and G', respectively combined with the frame, B, cam plate, B2, cams, f and f', and fan shafts, E, substantially as and for the purposes set forth.

2d, The governor device, h H h1, acting upon the vanes, G and G', to cause them to turn the frame, B, substantially as and for the purpose set forth.

83,621.—LOOM.—John G. Garretson, Cincinnati, Ohio. Antedated Oct. 22, 1868.

I claim, 1st, The combination of the batten, the finger, b the pendants, d, the cord, f, the pulley, e, and the case, c c, for the purpose of operating the harness, as above described.

2d, The cords, w and x, in combination with the lever, y, and finger, b, for the purpose of operating the pendants, as above described.

3d, The combination of the guide pins, n n n with the hand rail, or batten cap, and with the sliding guides, o o, in the manner and for the purpose above set forth.

4th, The endless cord, a a a, arranged with the batten and its guiding pulleys, in combination with the shuttle working or carrying guides, o o, for the purpose above shown and described.

5th, The combination of the pawl, k, the fly, m, the dog, t, and the lever, h, acting on the rag wheel of the cloth beam, and making a take up motion, as above set forth and described.

83,622.—BELL PULL.—James Garvey and M. H. Kimball, San Francisco, Cal.

We claim the application of the lifting wedge, H, combined with the lug, I, which, being attached to the pull bar, G, operates with it directly on the hammer, E, in the manner herein described and for the purposes before mentioned.

83,623.—BELL PULL.—James Garvey and M. H. Kimball, San Francisco, Cal.

We claim, 1st, The lever, D, as constructed, and the attachment of the wedge-piece, G, thereto.

2d, The attachment of the handle or pull bar, H, directly to the lifting wedge, G.

3d, Connecting the lever, D, and hammer, K, by the spiral spring, P, or its

equivalent, the whole constructed in the manner substantially as herein described and for the purposes as set forth.

83,624.—SEEDING MACHINE.—H. A. Gaston, Stockton, Cal.

I claim, 1st, The rotating fingers, d, when constructed to operate between fixed fingers, f, of a grain-sowing machine, substantially as above described.

2d, The combination and arrangement of the rotating shaft, D, and its fingers, d, with the stationary fingers, f, and the further combination and arrangement of the relief board, H, with the remaining internal machinery of a grain-sowing machine, substantially as above described.

3d, The spur, e', in combination with the slide, C', substantially as above described.

83,625.—MACHINE FOR BENDING ELLIPTIC SPRINGS.—Joseph Gatchell, Rahway, N. J.

I claim, 1st, The combination, substantially as described, of the templet, rolls, bending levers, and weight.

2d, The combination of the series of rolls with the bending levers and templet, arranged substantially as described.

83,626.—SASH SUPPORTER.—H. C. Goodspeed, New York city.

I claim the construction and arrangement of the grooved single pulleys or sheaves, a a, double sheave, b, cords, C C, and spring, D, when applied to a window sash and frame, substantially as described, and for the purpose set forth.

83,627.—HARVESTER.—Martin Hallenbeck, Albany, N. Y., assignor to Alfred Blaker, Newtown, Pa.

I claim, 1st, The arrangement, as described, for joint operation, of the tongue, the driver's seat, and the lifting lever on the foot board, pivoted to the main frame behind the main axle, for the purpose specified.

2d, The arrangement, for joint operation, as described, of the main frame, the down hangers, h hl, the lever, H, the socket, I, and the cutting apparatus.

3d, The combination, as described, with the sickle eye and pitman, of the flanged, slotted guard plate, N, for the purpose specified.

83,628.—CUTTING APPARATUS FOR HARVESTERS.—Martin Hallenbeck, Albany, N. Y., assignor to Alfred Blaker, Newtown, Pa.

I claim, 1st, The combination, with the cutting apparatus of a harvester, of a vertically moving divider and a depressing spring for the purpose set forth.

2d, The combination, substantially as set forth, of a vertically yielding divider, a depressing spring, and a stop to limit the vibration of the divider.

3d, In a harvester cutting apparatus, the construction and arrangement, for joint operation, substantially as set forth, of the finger beam, the guard fingers, and their ledges, e, the brackets, and their ledges, b, with the cutter bar and cutters, for the purposes specified.

83,629.—FURNACE FOR HEATING SOLDERING IRONS.—Warner Hatch, Plainfield, Ill.

I claim, 1st, The combination of the fuel chamber, a, with the throat, d, and slide, m, when applied to a furnace for heating soldering irons, all constructed and arranged as and for the purpose set forth.

2d, The throat, d and slide, m, in combination with the fire box, b, when constructed with a circular partition, o and lid, s, all arranged and operating as and for the purposes set forth.

83,630.—GRAIN SEPARATOR.—Dexter Hathaway, Wyoming, Wis.

I claim, 1st, The two short screens, C and D, as described.

2d, Attaching the spout, G, to the lower edge of the shoe, as specified.

3d, The movable tail board, H, as shown and described.

83,631.—SKATE.—George Haveli, Newark, N. J.

I claim the angular sliding bar, G, encased in the box, F, and provided with clamps, H H, and operated by means of the screw rod, I, substantially as and for the purposes herein set forth.

83,632.—WINDOW SASH AND FRAME.—Orion R. Hight, Dowagiac, Mich.

I claim the arrangement of pin, J K, loosely in stop, G, for the purpose of rigidly fastening the sash when desired, substantially as and for the purposes described.

83,633.—ANIMAL TRAP.—Thomas M. Hill, Richmond, Ind.

I claim the arrangement and combination of the vibrating platform, I, with its levers, J J, the door, B, working in guides, i i, the head block, K, spring, H, connecting rod, G, post, E, and trigger, F, with the box, A, when provided with the hinged lid, C, and opening, D, for the purpose and in the manner substantially as herein set forth and described.

83,634.—SLATE CUTTER.—Hatfield Hopper and John G. Hetzell, Newark, N. J.

We claim, 1st, The combination of fixed knife, B, with beveled cutter, A, when the latter is operated by means of an up and down motion, in the manner substantially as described.

2d, The gages, O O, and the center pin, P, substantially as described and for the purposes named.

3d, The frame, B, hinged at C, carrying the beveled cutter, A, when operated by means of the treadle, E, through the media of the connecting rods, F K, and crank shaft, H, carrying fly wheel, L, all constructed and arranged to operate in the manner and for the purpose substantially as described.

83,635.—BOBBIN.—Horace J. Hubbard, Chicopee, Mass.

I claim the combination, with the bobbin, of the fly catch, consisting of the ring, A, with one or more arms, B, with pins, C, constructed and arranged substantially as herein described, and for the purpose specified.

83,636.—TOOL HOLDER FOR GRINDING.—Aaron P. M. Jeffers, Allegan, Mich.

I claim the construction of a tool holder, with the rock shaft, C, standard, D, set screw, E, rest, E", provided with slots, F and H, thumb nut, G, standard, I, pin, J, bolts, K M and O, rest, L, ratchet, N, jaw, P, ball, R, springs, S, screw, M, and nut, U, or their equivalents, when arranged and operating substantially as and for the purposes herein set forth.

83,637.—COMPOSITION FOR THE SOLES AND HEELS OF BOOTS AND SHOES.—Nathaniel Jenkins, Boston, Mass.

I claim, 1st, A combination of caoutchouc, or india-rubber, and raw hide, in suitable proportions, for the purposes before explained.

2d, The addition, to a compound of caoutchouc and raw hide, of a less expensive and heavier substance or substances, to produce results before described.

83,638.—LOW WATER INDICATOR.—Eliza Joyce, New York city.

I claim the arrangement, in connection with the boiler, of the float, C, and alarm, E, directly connected together by the crank spindle, B, substantially as described, so that the ebullition of the water, when at a determined level in the boiler, will effect the vibration of the float, and the consequent sounding of the alarm as set forth.

83,639.—ROTARY SPADING MACHINE.—Edward H. Kent, Portland, Oregon.

I claim the spade bars, E, moving in slots, O, operated by pawls, H, and lever, L; also, fastening the spade bars, E, when extended outward in the slots, O, of the cylinder, B, by the latches, D, falling in and out behind the collars, G, with the groove, M, on the shaft, N, and the concentric segment I, and bars J, and combination of the various parts, as herein described, and for the purposes set forth.

83,640.—PAPER FASTENER.—Albert J. Kletzker, St. Louis, Mo.

I claim the stand, A, lever, B, followers, C, and perforators, D, when arranged and operated as described and set forth.

83,641.—GANG PLOW.—John D. Kneedler, Collinsville, Ill., assignor to himself and Thomas S. Davis

I claim the frame, A, and vibrating frame, A1, the spring, a1, loop, a2, and treadle, a3, all operated and combined substantially as set forth.

83,642.—ANIMAL TRAP.—John A. Lee, Chattanooga, Tenn.

I claim, 1st, The two concentric drums, A and A' one, stationary and the other rotating by means of a coiled spring upon the upright axis, b, when in combination with the platform, c, spring trigger, o, and bait hooks, a, as and for the purposes set forth.

2d, The combination and arrangement of the glass gate, I, and wire grating, J, and pawl, f, with the lugs, f, upon the outside drum, A, as and for the purposes set forth.

83,643.—MANUFACTURE OF OXIDE OF ZINC FROM SULPHURETTED ORES.—David Lees, Blair county, Pa.

I claim the application of a hot blast, substantially in the manner and by the process above described, to the manufacture of oxide of zinc, whereby the oxide is always formed in an oxidizing atmosphere, and at a temperature sufficiently elevated to decompose all injurious products.

83,644.—BARBER AND DENTAL CHAIR.—Michael Leidecker, and Philip Cron, Rochester, N. Y.

We claim the combined arrangement of the screw, D, nuts, b b, and toggles, c c, for producing the backward and forward adjustment of the chair, and the worm, h, nut, g, and screw, f, for producing the vertical adjustment of the seat, independent of the chair, as herein set forth.

83,645.—WRITING SLATE.—Robert F. Leighton, and Solomon Severy, Melrose, Mass.

We claim the improved manufacture of elastic-frame slate or writing tablet, as made with the india-rubber, or material of the frame, not only molded upon the tablet about its edges, but through holes made through the tablet, and near to such edges, as set forth, such extensions of the rubber through the tablet serving to effectually prevent detachment of the frame from the tablet.

83,646.—STOVE-PIPE THIMBLE.—John L. Little, Atkinson, N. H.

I claim a stove-pipe thimble, composed of cylinder, A, having the inward projections, F, removable collar, C, with rim R, and slot, S, all constructed and operating in the manner and for the purpose described.

83,647.—TRUNK HINGE.—Orrin Luce, Cortland, N. Y.

I claim the construction and arrangement, herein described, of the parts, a b i g g p d e and c, for the purpose set forth.

83,648.—PAPER BAG MACHINE.—George H. Mallary, Poughkeepsie, N. Y., assignor to himself, Alex. L. Van Buren, Herbert Reed, Wm. H. Clark, and John A. Standish. Antedated Oct. 17, 1868.

I claim, 1st, The combination of the moving bed, f, and the rollers, d e, and the folders, h h, actuated substantially as set forth, so that the feeding of the sheet of paper and folding the same are effected at the right time, as set forth.

2d, The rollers, k g' and l l', in combination with the moving bed, f, and the folders, h h, for the purposes and as set forth.

3d, The pasting and creasing mechanism applied on the axis of the roller, o, as and for the purposes set forth.

83,649.—BROILER.—John Mallory, Penn Yan, N. Y.

I claim the gridiron, B, when made as specified, and used in combination with the case, A, substantially as set forth.

Also, the opening of the case, when made as and for the purpose herein specified.

83,650.—DOOR STOP.—William May, Binghampton, N. Y.

I claim the cam, F, and spring, D, in combination with the slide, B, and plate, A, as arranged and shown, for the purpose set forth.

83,651.—STUMP EXTRACTOR.—H. E. Mead, Centerville, Mich.

I claim the combination and arrangement of the capstan head, B, provided with recesses, L, clutch plates, M, and the yoke, O, with the cylinder, E, provided with a journal, F, and clutch, G, sills, A, centre plate, B, standard, C, cross tie, D, sweep, I, evener, J, guide yoke, K, lever, N, and cord, P, when constructed and operating substantially as herein described and for the purposes specified.

83,653.—KNOB LATCH.—W. T. Munger, Branford, assignor to P. Corbin and F. Corbin, New Britain, Conn.

I claim the swinging link, i, jointed to the latch, e, in combination with the projections 2 and 3, and lever arm, h, from the spindle hub, k, substantially as and for the purposes specified.

83,653.—VENTILATING ATTACHMENT FOR ASH SIFTERS.—Henry A. Newhall, Providence, R. I.

I claim, 1st, A funnel to connect the inclosing case of a coal sifting apparatus with a flue, constructed substantially in the manner herein described.

2d, The sifting box, t, provided with pipes, w v, constructed in the manner and for the purpose herein set forth.

83,654.—WRENCH.—Frank L. Oliver, Scarborough, Me.

I claim the improved wrench for carriages, made in the manner and combining the parts herein specified.

83,655.—STEAM GOVERNOR.—E. H. Parker, Bucksport, Me.

I claim a steam governor constructed with fan, G, spindle, a, spiral flange, c, truck, e, or other suitable bearing for the fan upon the flange, pulley, f, or its equivalent device, for imparting motion, and the rod, g, or its equivalent, for connecting the governor with the valve, all arranged substantially as described and shown.

83,656.—HARROW TEETH.—Andrew Patterson, Birmingham, Pa.

I claim an angular iron or steel harrow tooth, made substantially as shown and described.

83,657.—COOKING STOVE.—Henry Pease (assignor to himself and H. W. Seymour), Brockport, N. Y.

I claim, 1st, The arrangement of a firepot, E, concentrically within a circular oven space, B, substantially as shown.

2d, In a central independent firepot, E, suspended concentrically within the circular oven space, the air jacket, i i, induction orifices, k k, and ventilating dampers, p p, communicating externally through the top of the stove, combined and arranged substantially as set forth.

3d, The combination of the revolving false bottom, P, and sweeping arms, s s, arranged as described and operating as herein set forth.

83,658.—SMUT MILL.—C. T. Phillips, Jordan, N. Y.

I claim the arrangement herein described of the scouring cylinder, D d e, annular chamber, h, blast wheels, L l, screen, B R r, chambers J K, conduits, k, and spouts, F G, all operated as shown and for the purpose specified.

83,659.—BUT HINGE.—Benj. C. Pole, Richmond, Va.

I claim the bed plate, A, the spring, B, the hinge plate, C, with the slot, D, the hinged lever, E, rod, I, plate, K, hinge plate, F, all constructed, combined, and operating substantially in the manner and for the purpose herein set forth.

83,660.—MANUFACTURE OF METAL CANS.—John Pollock and Theo. J. Diedrick, Philadelphia, Pa.

We claim, 1st, Table, T, levers, L L1 L2 and L3, plates, P P2, lug, l, standards, S and S', rods, r and r1, springs, s s1 s2 s3 and s4, block, B, and its beveled punches, b, saddle, E, and its hammers, h, cylinder, C, flexible tongue, f, flat bar, F F', arm, a, rod, R, vibrating guide, G, and treadle, D, all arranged, constructed, and operating in the manner and for the purpose set forth.

2d, The combination of the sliding plates, P and P', rods, r and r, and springs, s and s1, with the cylinder, C, and flexible tongue, f, for the purpose of interlocking the tongues, and bringing the edges of the can together, as herein set forth.

83,661.—RAILWAY CAR BRAKE.—Warren Portlock and J. R. Dodds, New London, Iowa.

We claim, 1st, The arrangement of the rod, D2, links, S R g, chain, h h', rocking bar, J, brake bars, N, suitable connections and rod, D1, substantially in the manner and for the purpose described.

2d, The arrangement of the chain or cord, b, and brake shaft, a, in combination with the sliding self-retracting frame, D D, in the manner shown and described.

3d, The rods, D1 D2, arranged on opposite ends of a car, and connected to the brake bars as described and shown, in combination with the right and left arms of the sliding self-retracting frame, D D, substantially as and for the purpose described.

83,662.—RAFT.—David Quinn, Chicago, Ill.

I claim a raft or boat having an interior opening, in combination with a house, box, or cabin over it, whereby wind and waves are excluded from the surface of the water in the opening, and light excluded from the interior of the cabin, substantially as herein set forth.

83,663.—GUTTER IN FOOT PAVEMENTS.—Joseph Read, Philadelphia, Pa.

I claim in combination with the foot pavement of a city or town, the iron drain, C, having the side flanges, c''' c''', and the detachable covering plate, c4, constructed and applied substantially as and for the purposes described.

83,664.—CHURN.—E. P. Russell, Manlius, N. Y.

I claim the link, I, pin, J, adjustable sleeve, f, and loose band d, all constructed and arranged as described, for the purpose specified.

83,665.—SKATE.—R. J. Russell, Moundsville, W. Va.

I claim the combination of the slides, A and B, with the bars, C and E, and the washers, H, and nut, F, substantially as described, the whole constructed and operating as herein set forth and shown.

83,666.—TRAP FOR DESTROYING INSECTS.—Thos. C. Silliman, Chester, Conn. Antedated Oct. 24, 1868.

I claim, 1s, The regulator, substantially as described, to insure silence, and to simplify the mechanical combination and movement.

2d, The flat or elliptical form of the driving shaft, S, to economize power.

3d, The placing of the driving shaft, or the arm or arms for driving the sweep, out of the axial line of the sweep, for the purpose specified.

4th, The sweep, P, to convey the insects to the drowning box, or its substitute.

5th, The arch, A, as located relatively to the sweep, to increase the trapping surface.

6th, The strainer, F, to remove the insects from the liquid.

83,667.—DEVICE FOR UNLOADING HAY.—George Smith, Providence, R. I., assignor to himself and John C. De Lany, Detroit, Mich.

I claim the combination and arrangement of the hook, C, latch, D, cords, E and A, pulley, p, for latch cord, E, sling, a c, and rings, b b, all constructed and operating substantially in the manner described.

83,668.—PIPE MOLDING MACHINE.—William Smith, Allegheny City, Pa.

I claim, 1st, A packer shaft, mounted in bearings on a vertically moving carriage, arranged and operating so as to communicate rotation to the packer shaft during its vertical movements, substantially in the manner described.

2d, The carriage, G, and racks, G3 G4, in combination with the pinions, D1 D2, counter shafts, D C, gear wheel, Dd, pinion, Cc, loose pulleys, C1 C2, clutch, Cd, and driving shaft, Ab, arranged and operating substantially as described and for the purpose set forth.

3d, The pivoted clamps, L2 having friction rollers upon their ends, in combination with the car, K, and flask, B, as set forth.

83,669.—INSTRUMENT FOR ATTACHING BUTTONS TO FABRICS.—Daniel M. Somers, and Walter S. Atwood, Brooklyn, N. Y.

We claim, 1st, The bed piece, A, lever, E, friction roller, F, sliding die plate, C, attached to and operated by sliding piece, H, having an inclined face, and a stationary die plate, B, combined and arranged substantially as herein described, and for the purposes set forth.

2d, The die plates, B and C, so constructed, with removed surfaces, t t' and v v', that they may overlap, and their dies provided with inclined sides, i i' and e e', combined and operated substantially as herein described.

83,670.—POTATO-DIGGER.—John Stewart, Jackson, Mich.

I claim, 1st, The extension of the mold boards, B, by means of the curved bars, or wings, C, when the latter are held and rendered yielding by means of braces, D, constructed and operating substantially as herein set forth.

2d, The triangular frame, E, with its attachments, in connection with plow, A, when constructed, arranged, and operating substantially as and for the purposes specified.

83,671.—MORTISING AND TENONING MACHINE.—Henry D. Stover, New York city.

I claim, 1st, The bed plate, A and A', when so constructed that the cutter heads may be worked back and forth, or to and from the work, substantially as described.

2d, Varying the throw or motion of the chisel in mortising machines, by means of the friction disks, C and C', when arranged substantially as described.

3d, The cutter heads, attached to levers, N and N', in combination with cutter head, x, when constructed and arranged as described, for the purpose set forth.

4th, Mounting a cutter head upon the adjustable lever, N, attached to the sliding bed, L, so that the gains or notches may be readily formed in heavy timbers, substantially as described, and for the purpose set forth.

83,672.—SHEEP SHEARING TABLE.—Joseph T. Styer, Richwood, assignor to himself and Eber Bradley, Whitehouse, Ohio.

I claim the construction of a sheep shearing table, A, provided with folding legs or standards, B, and revolving concave disks, E, when operating substantially as and for the purposes herein set forth.

83,673.—AUTOMATIC CAR COUPLING.—Horace Tarbox, Warwick, R. I.

I claim a car coupling, composed of the box, A, with a shaft, b, and spring, c, which has a lever, d, connected to the slotted coupling pin, with a guide plate, e, when combined with a projecting staple, i, and lever, i, all constructed and operated substantially as described, and for the purpose specified.

83,674.—RAILWAY CAR BRAKE.—Bjarne O. Thompson, Chicago, Ill.

I claim, 1st, The combination and arrangement of the arms, B, when connected to the driving wheels of a locomotive, and to disk, C, thereby giving motion to bevel wheel, D, keyed on the same shaft, C', as the disk, C, when the driving wheels are in motion.

2d, The combination of the vertical brake shaft, S', slotted plate, c, pin, e, shaft, h, pinion or serrated flange, d, pawl, f, spring, g, bevel pinions, E and G, cog wheel, H, shaft, I, projection, P', and chain, L, substantially as and for the purpose set forth.

83,675.—COMBINED CULTIVATOR, PLOW, HARROW, AND ROLLER.—Sterling C. Thornton, Macomb, Texas.

I claim, 1st, The combination and arrangement of the fixed frame, C, movable frame, E, parallel ruler joints, d d d d, lever, G, rod, g, rack, H, and spring catch lever, g', the whole being constructed to operate in the manner and for the purposes set forth.

2d, The joint plates, d d, when constructed in the triangular shape described and shown, and provided with notches, v v, in their under edge, and used in connection with the pin, v1, and series of holes, v2 v2 v2, in the fixed frame, for the purpose of adjusting the depth to which the plows, etc., can work.

3d, The pivot, a, in combination with the lugs, a1 a1, and bolts, e and e', passing through the rear end of the draft pole, the whole being constructed to operate in the manner and for the purpose specified.

4th, The use of the standards, L L, in combination with the springs, l l, and middle beams, J J, for the purposes and operating in the manner described.

5th, The rocking frame, M, when pivoted to the drag bars or arms, R R, as described, and provided with the lever, s, and adjusting bar, r2, by which the whole frame can be raised or depressed at pleasure, in combination with the cleaning device, u u, when made to operate substantially as described.

6th, The described method of attaching the tooth or plow, K, to the frame of the machine, namely: the employment of a bifurcated standard, so constructed as to brace the tooth laterally, and, if necessary, provided also with braces, to brace it longitudinally with the machine, substantially as shown and specified.

83,676.—MACHINE FOR CUTTING MEAT AND OTHER ARTICLES.—Peter Vande Sande (assignor to himself and Stephen Coleman), Rochester, N. Y.

I claim, 1st, The combination of the knives, a a, and clearers, i i, having an angular adjustment, and otherwise arranged as described, and operating in the manner and for the purpose specified.

2d, Constructing the rack, H, in such a manner as to have a degree of flexibility, as herein described.

3d, The arrangement of the divided screw threads, q q, upon the collar, I, in such a manner as to alternate in position when combined with the thread plate, K, in the manner and for the purpose specified.

4th, The combination of the cams, r r, with the screw threads, q q, and thread plate, K, operating in the manner and for the purpose specified.

5th, The arrangement of a series of the collars, I I I, upon the same shaft, and having screw threads of different degrees of coarseness, whereby one may be substituted for another, as described.

6th, The arrangement, as a whole, consisting of knives, a a, rack, H, box, C, thread plate, K, and screw collars, I, operating as described.

83,677.—CORN PLANTER.—James F. Walker, Murrayville, Ill.

I claim, 1st, The construction of the tread of each covering and transporting wheel, E, of three tires or rings, a a' a'', so applied to forked ends, b, of the spokes of the wheel as to leave spaces for the escape of earth, substantially as described and shown.

2d, The lifting lever, F, in combination with the looped lever, c, and scrapers, m, when these parts are constructed and arranged so as to operate as herein described.

3d, The looped lever, c, the longitudinally movable and vibrating lever, F, and the vibrating hopper frame, when these parts are arranged, combined, and constructed, substantially in the manner described.

4th, The levers, H J J, connected to the seed slides, s s', and operated by means of one or two hand levers, G2, substantially as described.

5th, Removable perforated cut off plates, d, applied to hoppers above the seed slides, substantially as described.

6th, While not claiming broadly anti-friction castors, I do claim providing the transverse beam, C, with channeled blocks, P, having supporting wheels, P2, and swiveling standards, P1, applied to said blocks, with anti-friction balls, p', interposed between said blocks and standards, as described.

83,678.—FRUIT CARRIER.—James W. Weston, N. Y. city.

I claim a fruit carrier, formed of a perforated cylinder, fitted with heads that are retained in place by the cords that suspend the carrier horizontally, as and for the purposes set forth.

83,679.—COOKING RANGE.—Stephen Wilks, Chicago, Ill.

I claim the arrangement of the several parts constituting my said range, as above specified and shown.

83,680.—CURTAIN FIXTURE.—William H. Young, and L. Young, Boston, Mass.

We claim the slide, C, constructed as described, and for the purpose specified.

83,681.—FISHING JIG.—Sewall Albee, Wiscasset, Me.

I claim the method of forming the body of the jig of three adjustable parts, substantially as described, and especially the method of adjusting, securing and holding the hook, by means of an adjustable tube or cap, in combination, with a center piece, containing a screw, fitting the cap, and an aperture, for the admission of the stem of the hook, all substantially as above described.

83,682.—STRAW CUTTER.—Julius Ambrun, Leavenworth city, Kansas.

I claim, 1st, The frames, C and D, which hold the two cutters, E and F, respectively, when connected with each other by means of a pinion, b, and racks, operated by a lever, G, substantially as herein shown and described.

2d, The reciprocating frames, C D, carrying the cutters, E F, in combination with the pawl, I, ratchet wheel, g, belt, h, feed wheel, K, and presser wheel, L, all arranged on a straw box, A, substantially as herein shown and described.

83,683.—COMPOSITION FOR THE MANUFACTURE OF SAFETY AND OTHER FRICTION MATCHES.—William Austin, London, England.

I claim 1st, The manufacture of match igniting chemicals and ingredients with anti-hydro matter, so as to render the same, and the igniting surfaces and matches prepared therewith, wet and damp proof.

2d, The manufacture of friction igniting chemicals and ingredients for safety matches and their igniting surfaces, with the anti-hydro matter or compound herein mentioned, and applying the same directly to or upon the natural surface of the materials of boxes, match containers, or match igniters, of metal, china, stone, or earthenware, or other similar materials.

3d, The manufacture of other match igniting chemicals, with the anti-hydro matter or compound herein mentioned, and applying the same to matches.

83,684.—PLANK AND TIMBER DRESSER.—Ezra Bailey, Cincinnati, Ohio, assignor to himself and Joseph Parker, Covington, Ky.

I claim the adjustable hinged rails, C D, jaws, I I', carriage, H, and adjustable heads, J J', herein described, arranged to operate for the purposes set forth.

83,685.—SASH GUIDE BLOCK.—Alfred Bicknell, South Reading, Mass.

I claim the anti-friction grooved guide blocks, A, constructed substantially as herein shown and described, that is to say, with grooves upon their semi-circular upper edges, and with shoulders or notches upon either or both their sides and lower edge, or upon their lower edge only, as and for the purpose set forth.

83,686.—COFFEE POT.—E. Blunt, Jr., New York city, assignor to Henry P. Nichols, trustee.

I claim the combination of the vessels, A and C, double partition, c c', valve and rod, G, and whistle, D, all constructed and operating substantially as herein shown and described.

83,687.—PILE DRIVER.—John A. Borgort, Hudson city, N. J.

I claim the combination and arrangement of a grappling hook, H, pulleys, K and L, with the frame, composed of the uprights, B and C, and base, A, substantially as herein shown and described, and for the purposes set forth.

83,688.—COOKING STOVE.—Harvey Brown, Harlem, N. Y.

I claim, 1st, The cleats, a b, attached respectively to the sides, c c, of the body of the stove and the base, A, for the purpose of securing the body of the stove to its base, substantially as shown and described.

2d, The combination of the hooked cleats, f k, with the lugs, g, and bolts, h, for the purpose of securing together the plates, c c, e e, i i, j j, of the stove, substantially as set forth.

3d, The pins, d, or their equivalents, in combination with the cleats, a b, arranged substantially as and for the purpose specified.

4th, The oven, placed upon the top of the stove, consisting of elevated rack, E, covered with the closed box, F, whereby the article to be cooked is raised above the stove, to receive the heat from the plate, D, and that radiated from the top of the box, in about equal proportions, as herein shown and described.

5th, The combination with the upper flaring or inclined plates, i i j j, of the stove, with the upright plates, c c e e, of the lower part of the same, when used in connection with the rack, E, and cover, F, substantially as and for the purpose set forth.

83,689.—GRATE BAR FOR FURNACES.—William Colborne, Cambridge, Bristol, Great Britain, assignor to himself and J. T. Griffin, New York city.

I claim a fire bar, constructed with vertical side ribs, A A, having raised ledges, a a, in combination with the depressed web, B, and oblique opening, c, substantially as and for the purpose set forth.

83,690.—MACHINE FOR DRYING CLOTH.—Andrew Chambers, Providence, R. I.

I claim the arrangement of the perforated cylinders, B B, geared as described, independent fans, C C, guide rollers, L L1 L2 L3 L4, feed and take up rolls, M N, presser roll, O', shaft, H, and belts, G I K, all operating as described for the purpose specified.

83,691.—PUMP.—Thomas Chambers, St. Louis, Mo.

I claim a large forcing cylinder, A or B, a vacuum or air cylinder, D or E, and a small forcing cylinder, F I, when combined substantially in the manner and for the purpose set forth.

83,692.—POST DRIVER.—Angelos McClara, Whitney's Point, N. Y.

I claim the combination of the secondary sliding tongue, m, with the ram, C B F, and wagon, A, as and for the purpose set forth.

83,693.—BOW IRON FOR CARRIAGES.—A. W. Clark and Geo. W. Marble, Charlestown, N. H.

We claim the bow iron, C, constructed as described, with holding points or clasps, for attachment to the bows of a baby cab or other carriage, substantially as and for the purpose herein set forth.

83,694.—TOBACCO DRYER.—Samuel T. Cotterill (assignor to Cotterill, Fenner, and Company), Dayton, Ohio.

I claim, 1st, The drying chamber, consisting of the frame, C, having cleats, E, and an open end, D, provided with slops, L, in combination with the nest or series of gravitating trays, F, for the purpose of allowing the withdrawal of said trays, in the manner described for the purpose specified.

2d, The combination, with the upwardly flaring trunk, B, and drying chamber, C, arranged as described, of the series of branch pipes or groose necks, K K, having downwardly projecting nozzles, for the purpose of distributing the blast of air forced through said drying chamber, as set forth.

3d, The arrangement, substantially as described, of the flaring trunk, B, drying chamber, C, removable and porous-bottomed trays, F G, blast pipe, H, and goose necks, K, for the object stated.

83,695.—RECEIPTACLE FOR WATCH KEYS AND OTHER ARTICLES.—M. Z. Crane, New York city.

I claim the cover, D, provided with an aperture, b, of the same size as one of the compartments in the stationary box, A, and adapted to be rotated around the fixed pin, C, whose enlarged head is marked or numbered to correspond with the number of compartments in the box, all arranged and operating as described, for the purpose specified.

83,696.—VELOCIPEDE.—C. N. Cutter, Worcester, Mass.

I claim, 1st, The combination with a frame, A, cross piece, I, and crank shaft, B, of the elbow connections, G H, or either, and right angle levers, K L, or either, substantially as and for the purpose set forth.

2d, The combination with the crank shaft of a velocipede, and main frame thereof, of one or more sets of elbow connections, G, connected to a right angle lever, K, by means of a swing piece, M, substantially as and for the purpose set forth.

83,697.—SASH SUPPORTER.—Addison Davis, Boston, Mass.

I claim the window sash fastener, consisting of a spring lever, e, having at its top a wedge-shaped bolt, formed and applied as shown, so as to perform the double function of locking the sash securely in position, and also of wedging or pressing back the sash against the bead, d, the lever having a slide rod or other provision for releasing the bolt, substantially as set forth.

83,698.—GANG PLOW.—Jasper N. Davison and Naaman Spencer, Jr., Buffalo, Ill.

We claim, 1st, The combination of the plows, the beams, the adjustable platform, the lever, E, and the tongue, so arranged that the tongue shall be flexible when the plows are at work, and only stiff when used to carry the plows above the ground, the depth of the cut being independently regulated, substantially in the manner set forth.

2d, The combination of the plows, the beams, the platform, and axle, with the braces, N, and sliding seat, E, arranged to operate substantially as and for the purpose set forth.

83,699.—SPIKE WITH SCREW THREADS.—Alpheus C. Dunn and Issac L. Dunn, New York city, assignors to Philip Dunn and James Yates, Trenton, N. J.

We claim the construction of the bolt, to conform to the form shown, and in the manner described.

83,700.—RAILROAD SIGNAL BOX.—John Durand (assignor to Perkins, Livingston, and Post), Cincinnati, Ohio.

I claim the railroad signal box arrangement, consisting of the portable case, provided with a flag on a jointed and folding staff, and with pockets containing torpedoes, substantially as described and represented.

83,701.—FIRE PLACE.—John Ervin, Sen., Princeton, Ind.

I claim the flues, H and J, with the orifices, l m i k and o, arranged substantially as and for the purposes described.

83,702.—BEER COOLER.—James Fallows (assignor to himself and John Edward Insley), Philadelphia, Pa.

I claim a portable cooler, consisting of a vessel, C D, filled with pebbles coarse gravel stones, or their equivalents, in combination with an ice-holding case, A B, the same being constructed and arranged to operate together, substantially as and for the purpose described.

83,703.—PLOW.—Levi Fosdick (assignor to David Reigel), Tiskilwa, Ill.

I claim the securing of the rods, G, to the handle, B, by means of bolts, b, and stirrups, H, substantially as shown and described.

83,704.—HAND STAMP.—L. H. Gano, New York city.

I claim, 1st, The combination of the revolving stamp head, B, with ink pad c', and ratchet, k, substantially as and for the purpose set forth.

2d, Disclaiming the use of an ink ribbon in a postal and canceling stamp, an apparatus for automatically inking the die, substantially as described.

3d, The conical stem valve, d, provided with the spiral spring, e, when said stem is applied to the fountain of self-inking stamp, and used in combination with the perforated pad, c', as and for the purpose set forth.

4th, The standards, a, in combination with arms, h, and springs, h", in the manner and for the purpose described.

5th, The pad holder, c, provided with the cam ears, c" c", in combination with recessed standards, a, and thumb screw, a", in the manner and for the purpose described.

83,705.—HORSE HAY FORK.—Wm. M. Gillan, Mount Parnell, Pa.

I claim the center bar, A, side rods, D D', levers, C C', arm, E, with the notch, e, and blades, B B', all in combination, and arranged as and for the purposes set forth.

83,706.—GAS REGULATOR.—Henry Giroud, Paris, France.

I claim, 1st, The method herein described of regulating the flow of gas, by the employment, in combination with a regulator or regulating apparatus and valves, of a return pipe in which the pressure of the gas supplied to the burner or burners, in excess of combustion, acts upon said regulator so as to control the flow of gas therefrom, in the manner shown and set forth.

2d, The improved regulating or equilibrium valves or regulators herein described, arranged and operating as shown and set forth.

83,707.—PREPARING RESIN SIZE FOR USE IN PAPER MAKING.—Thomas Gray, London, England. Patented in France June 30, 1868.

I claim, 1st, The improved process for making size, by first bleaching the rosin in a solution of warm water and salt of soda, or other alkaline salt, and mixing the same with a solution of chloride of sodium, under the conditions substantially as and for the purpose specified.

2d, Size prepared by the herein described process as a new article of manufacture, substantially as and for the purpose specified.

83,708.—ENGRAVING MACHINE.—John C. Guerrant and Benton J. Field, Leaksville, N. C.

We claim, 1st, The combination with the graving tool of an adjustable presser, substantially as and for the purpose described.

2d, The stock, C5, of the graving tool, provided with a pulley, C6, for communicating rotary motion thereto, substantially as and for the purpose described.

3d, The disk, F2, provided with the recess and set screw, F14, for tightening the belt, F13, substantially as and for the purpose described.

4th, The combination with the slotted holder, G6, and the slotted disk, F5, of the chuck, G7, provided with the shank, G12, substantially as and for the purpose described.

5th, The combination with the holder, G6, of the toothed rack, and the pinion, G8, on the shank of the chuck, or the equivalent thereof, substantially as and for the purpose described.

6th, The chuck, G7, adjustable in a horizontal plane coincident with the vertical axis of the graver support, substantially as and for the purpose described.

7th, The chuck, G7, provided with means for giving it a rotary motion on its own axis, while it is adjusted in the horizontal plane of the vertical support of the graving tool, substantially as and for the purpose described.

8th, The combination with the weighted graver supporting frame, of the yoke, H, and treadle, H5, suitably connected thereto, substantially as and for the purpose described.

9th, The combination with the presser support, C, of the screwed rod, D, and the rod, D3, adjustably connected to the said end, D, substantially as and for the purpose described.

10th, The combination with the rod, D3, of the rollers, L9 and L10, and the frame, L6, or its equivalent, for actuating the said rollers, substantially as and for the purpose described.

11th, The combination with the staff, B, of the slide, L1, provided with a vertical guide connected to the staff, substantially as and for the purpose described.

12th, The combination with a staff, B, of a vertically adjustable rest, I2, substantially as and for the purpose described.

13th, The combination with the staff, B, of a counterpoised frame, I4, substantially as and for the purpose described.

14th, The combination with the staff, B, and adjustable rest, I2, of the adjustable gage, for producing wave lines, substantially as and for the purpose described.

15th, The combination with the staff, B, and slide, L1, of the edjustable gage, O, substantially as and for the purpose described.

16th, The combination with the staff, B, and adjustable rest, I2, of the gage P, substantially as and for the purpose described.

17th, The combination with the staff, B, and adjustable rest, I2, of the mechanism substantially as described, for producing circles and ellipses, as and for the purpose specified.

18th, The combination with a ring, R5, of the ring, R6, yoke, R6, and crank shaft, R12, connected to the screw, R17, by a universal joint, substantially as and for the purpose described.

19th, The combination with the crank shaft, R12, of the rings, R8 and R9, slotted plate, R12, shaft, R13, and pinions, R15 and R16, substantially as and for the purpose described.

20th, The mechanism for actuating the staff, for producing circles, arranged for adjustment in a horizontal plane, substantially as and for the purpose described.

21st, The combination with the rings, R5 and R16, of the spring snap, R20, substantially as and for the purpose described.

22d, The combination with the crank shaft, R12, and yoke, R6, of the adjustable slotted plate, R12, and rings, R8 and R9, for effecting the adjustment of the ring, R16, substantially as and for the purpose described.

23d, The combination of the adjustable copy holding plate with adjustable pointer, and with the graving tool, substantially as and for the purpose described.

24th, The pointer, F3, provided with the presser gage, E4, substantially as and for the purpose described.

25th, The arrangement of the pointer support, for adjusting it axially, with reference to the staff, B, and vertically, substantially as and for the purpose described.

83,709.—MACHINE FOR TRIMMING WALL PAPER.—W. H. Guthrie, Brooklyn, N. Y. Antedated Oct. 24, 1868.

I claim, 1st, An automatic machine for pasting and trimming wall paper, substantially as shown and described.

2d, A circular rotating cutter, a1, in combination with the rollers, A and B, substantially as shown and described and for the purposes set forth.

3d, The pasting roller, B, in combination with the roller, A, and paste cup, C, substantially as shown and described and for the purposes set forth.

4th, The lifting lid, D, in combination with the frame, M, substantially as shown and described.

5th, The roller, e', in combination with the binding roller, R, and frame, M, and rollers, A and B, substantially as shown and described and for the purpose set forth.

83,710.—ATTACHING HANDLES TO PICKS.—P. J. Hogan, Cincinnati, Ohio.

I claim the combination of the handle, A, rectangular eye, B, screw stem, b, ferrule nut, E e', socket, F, pick head, D, and notches, c and f, all constructed, arranged, and employed in the manner and for the purposes described.

83,711.—LAMP.—Thomas A. Hunter and John Blewitt, New York city.

We claim, 1st, The fountain, a, provided with the plug, b, in the bottom, for filling, in combination with the cylinder, c, that is tightly attached at its upper end to the fountain, a, and provided with a foraminous bottom, as and for the purposes specified.

2d, The fountain, a, formed with a depression in its upper surface for receiving the collar of the burner, as and for the purposes specified.

3d, The handle, formed so as to set upon the bracket, b, and support the lamp, or be removable therefrom, as set forth.

83,712.—MACHINE FOR FORMING SHEET-METAL PANS.—S. H. Kennedy, Hydetown, Pa.

I claim, 1st, In combination with the bed plate, A, the detachable end former, a', arranged to operate in connection with the forming-surfaces, c' c', upon the bending bar, substantially as and for the purposes set forth.

2d, In the construction of the bending bar, B, the described arrangement of the forming surfaces, c" c', one or more, as may be required, to operate in connection with the detachable end former, a', upon the bed plate, substantially as and for the purposes set forth.

3d, The general arrangement and combination of the bed plate, A, provided with its detachable end former, a', the bending bar, B, with its channels, d d, and forming surfaces, c' c', skeleton clamp bars C C', and bending lever, D, all arranged to co-operate substantially in the manner and for the purposes set forth.

83,713.—CHAIR SEAT.—H. C. Knowlton, Gardner, Mass.

I claim the arrangement of the bearing faces of the seat frame and each of the confining bars at an acute angle with the upper surface of the seat frame in combination with the arrangement of each of the clamping screws, so as to incline upward at an obtuse angle with the said bearing faces, the screw hole in the confining bar being made so as to admit of the upward movement of the bar while it may be in the act of being forced against the bottoming to confine it to the frame, the same serving to effect not only the fixation of the bottoming to the frame, but the straining or tightening of the said bottoming, and the setting of it up so as to be flush or even with or in its proper position with respect to the upper surface of the seat frame.

83,714.—PHOTOGRAPHIC REST.—Charles Ernest Kruger, New York city.

I claim, 1st, The combination of the foot part, or its equivalent, with the main body of a photographic rest, in the manner as described and for the purpose set forth.

2d, The head part of a photographic rest, consisting of jointed pieces, or their equivalents, in connection with the movable rod of the rest, as herein fully described and for the purpose set forth.

83,715.—CAR COUPLING.—J. K. Landis, Palmyra, Pa.

I claim, 1st, The pin, e, and the rock shaft, f, in combination with the swinging plate, h, all being applied to operate substantially in the manner and for the purpose set forth.

2d, The link, C, constructed as shown, and secured to the drawhead by a screw bolt, D, occupying slots, a, in the drawhead, as and for the purpose set forth.

83,716.—STEAM ENGINE SLIDE VALVE.—E. B. Latch, General Wayne, Pa., assignor to himself and Edmund Lincoln, Cleveland, Ohio.

I claim, 1st, The combination of the valve, E, plate, F, and intervening springs or elastic packing with the packing plate, G, the whole being constructed and arranged substantially as herein set forth.

2d, The thin metal strip, J, adapted to the valve, E, and plate, F, substantially as specified.

83,717.—RAILWAY CAR.—E. T. Ligon, Demopolis, Ala.

I claim the body of a railroad car, having its bottom extended down between the truck, as described, and provided at its bottom side with V-shaped metallic stringers, a, as herein set forth, for the purpose specified.

83,718.—APPARATUS FOR ROLLING METALS.—Robert Marsden, Sheffield, England. Patented in England, March 13, 1865.

I claim the mode described of combining the two shafts by means of the toothed wheels, and rollers, and counter shafts, connected by loops or rods, substantially as specified.

83,719.—HORSE HOE.—Don Carlos Matteson and T. P. Williamson, Stockton, Cal.

We claim the combination of the reversible double-edged cutter, D, the pivoted bars, C C, and adjustable braces, E, with a beam, A, substantially as described.

83,720.—FOLDING CHAIR.—Geo. McAleer (assignor to E. W. Vaill), Worcester, Mass.

I claim a chair, composed essentially of the crossed pivoted legs, A A B B, seat, C, rod, E, connected to the seat, as described, and bearing in slots or sockets, e e, in the legs, B B, back, G, straps, J J, round, H, slat, s, and cross bar, o, the whole being constructed to operate in the manner and for the purpose substantially as set forth.

83,721.—APPARATUS FOR UNLOADING STONE.—J. B. Moore and E. G. Moore, McDonough, N. Y.

We claim the movable platform, A, so attached to a wagon or sled that it may tilt from either side, in combination with frame, F, tackle, C, and windlass, D, all constructed, arranged, and operated, substantially as and for the purpose described.

83,722.—CAR WHEEL.—Gustavus Natrop, New York city.

I claim a compound wheel, in which the wooden and metallic portions are interlocked and bound together, substantially as described.

83,723.—MACHINE FOR BURRING WOOL.—John Nichols, Paterson, N. J.

I claim a burring machine, consisting of the combination with each other of the drum, E, having the toothed triangular band, F, of the notched blade, I, rotating reel, G, and brush, H, all made and operating as herein shown and described.

83,724.—MILK CAN.—O. J. Nutting, Warwick, N. Y.

I claim the described construction of the milk can, consisting of the body, A, provided at top and bottom with internal grooves, b a, for receiving the edges of the top, C, and bottom, the latter being supported by the bruise hoop, B, secured within the body, below the bottom, as herein shown and described.

83,725.—HOISTING APPARATUS.—C. R. Otis and N. P. Otis, Yonkers, N. Y.

We claim the combination, with the hoisting drum, of screws operated through pulleys, by a belt or band coupling the same, said screws gearing with worm wheels arranged at opposite ends of the drum, and connected with the latter by interposed spring and ratchet attachments, or either, substantially as specified.

83,726.—STONE DRAG.—G. N. Palmer, Greene, N. Y.

I claim a low sled, having a boat or body, B, secured to the rear ends of the runners, A A, as described, so that the body, B, may be lifted at the front end for discharging the load by the arrangement of mechanism, constructed and operated substantially in the manner as and for the purposes herein set forth.

83,727.—COMBINED SEEDER AND HARROW.—W. E. Phelps, Elmwood, Ill.

I claim the arrangement, upon the frame, A, of the adjustable harrow, I, and the seed boxes, H H, all operated in the manner described for the purpose specified.

83,728.—RAILWAY CAR BRAKE.—Stephen Randall, Centerville, R. I.

I claim the combination of the grooved eccentric, F', with the sleeve, F, shoulder, G, and brake chain or chains, as herein described, for the purpose specified.

83,729.—WATCH.—G. W. Reed, Brooklyn, N. Y., assignor to himself, Reuben S. Middleton, and Henry Rothfelder.

I claim a winding pin, applied at the arbor of the spring barrel, in combination with the double ratchets, acting in opposite directions, as and for the purposes set forth.

83,730.—APPARATUS FOR CARBURETING AIR.—Joseph Richard (assignor to himself and G. W. Baker), New York city. Antedated Oct. 28, 1868.

I claim, 1st, The arrangement and combination of the inclined shelves, e el e2 e3, and absorbing sheets, i i1 i2 i3, the upper edges of which dip into the troughs, d d1 d2 d3, substantially as and for the purpose described.

2d, The vertically adjustable rods, g g', in combination with the shelves, e el e2 e3, absorbing sheets, i i1 i2 i3, and troughs, d d1 d2 d3, constructed and operating substantially as and for the purpose set forth.

3d, The vertically-adjustable rod, g, in combination with the sheets, i i2, and troughs, d d2, substantially as and for the purpose described.

83,731.—PASSENGER RAILWAY CAR.—E. Y. Robbins, Cincinnati, Ohio.

I claim, 1st, The body of a passenger railway car, made of wrought iron, steel, or other metal, the different parts or sheets being riveted or otherwise firmly fastened together, the whole forming one continuous shell, or a cylindrical or approximately equivalent shape, the shape itself being such, together with the thickness of the metal, as to give the requisite strength and stiffness without the necessity of a general frame work or bars and rods, or hoops, etc.

2d, The yielding platform, X, constructed and employed as and for the purposes herein specified.

3d, The hollow annular ribs, F, extending completely around the interior of the cylindrical shell, in the manner and for the purposes specified.

83,732.—CHURN.—A. Schlingman, D. Glander, and J. Campbell, West Alexandria, Ohio.

We claim the churn dashers, I I, consisting of rollers constructed substantially as herein described and pivoted in a frame, as and for the purposes herein set forth.

83,733.—RECOVERING WASTE ALKALIES FROM STOCK AND OTHER FIBERS.—Carl Dietrich Julius Seutz, Bury, England, assignor to himself and Charles Edmund Bailliere, New York city.

I claim, 1st, The general system or mode of treating waste liquors resulting from the preparation of bamboo, cane, esparto grass, alfa, straw, or other similar fibrous substances, as and for the purposes herein set forth.

2d, The system or mode of mixing the concentrated waste liquors with a certain proportion of soda (caustic soda, soda ash, recovered ash, or sulphate of soda,) and with quicklime, in the manner herein set forth.

83,734.—PIANOFORTE TUNING KEY.—N. B. Sherwood (assignor to himself and W. H. Willson), New York city.

I claim a tuning key, so constructed that the wrench may be applied directly to the pipe, or through the medium of the worm wheel and endless screw, and provided with an adjustable base, substantially as shown and described.

83,735.—DROPPING PLATFORM FOR HARVESTERS.—Andrew H. Shreffler, Joliet, Ill.

I claim, 1st, The combination of the stop, b, with the tilting floor, a, arranged, operating, and constructed substantially as and for the purposes set forth.

2d, The use of the spring, l, to start the dropping device back past the center, after letting go of the lever, e, substantially as described.

3d, The combination of the platform, a, slotted extension, b c, curved slotted plates, d, spring, l, and lever, e, arranged in rear of the finger bar, and operating substantially as described.

4th, The circular slotted plate, d, for the purpose of regulating the stop, b, substantially as and for the purposes set forth.

83,736.—MACHINE FOR SERRATING SICKLE SECTIONS.—Alvan A. Simonds and George F. Simonds, Fitchburg, assignors to The Simonds Manufacturing Company, West Fitchburg, Mass.

We claim the arrangement, with the anvil block, b, upon which the sickle section or blank is supported and clamped, of the two cutter carriages, at an angle to each other corresponding to the angle of the cutting edges of the blank, each carriage having a feed movement imparted to it, and carrying a cutter having blow giving movements imparted to it, in such manner that the two edges of the blank may be simultaneously or alternately serrated, without movement of the blank, the mechanism being arranged to operate substantially as described.

83,737.—COMPOUND FOR DESTROYING INSECTS ON TREES, PLANTS, ETC.—George W. Spots, Jacksonville, Ill.

I claim the composition, substantially as and for the purpose above set forth.

83,738.—MANGER.—Wilbur F. Stanley, Cazenovia, N. Y.

I claim the suspended pivoted neck bars, D, constructed, arranged, and operating substantially in the manner herein shown and described and for the purposes set forth.

83,739.—PISTON VALVE.—M. C. Stebbins, Springfield, Mass.

I claim the combination and arrangement of the piston, D, having the beveled seat or chamber, m', therein, the disk, m, having the chambered projection, d, thereon, with its spring, s, and the bar, a', with the projection, n, thereon, operating within said chambered projection, d, the whole constituting an improved piston valve, and constructed and operating substantially as herein described and set forth.

83,740.—FISHING APPARATUS.—John Stetson, West Harwich, Mass.

I claim the combination of the clamp, thumb screw, guard pin, pivot joint, hand rest, or their equivalents, with the pulley.

83,741.—CARPET STRETCHER.—S. Stevenson, Dansville, N. Y.

I claim, 1st, The head piece, B, having the toothed plate, C, attached and provided with the rack bars, E E, in combination with the pawls, F F, on the framing of the device, all arranged substantially as and for the purpose set forth.

2d, Providing the head piece, B, with a series of holes, e, with or without the clamps, f, for the purpose of facilitating the tacking down of the carpet, as described.

3d, The bar, G, when constructed to be used in combination with the racks, E, pawls, F, and perforated head piece, B, as herein described, for the purpose specified.

83,742.—BINDER FOR SEWING MACHINE.—William M. Stoddard, San Francisco, Cal.

I claim the two pieces, A B, shaped, bent, and otherwise constructed and arranged, substantially in the manner and for the purposes described.

83,743.—MACHINE FOR FULLING AND FELTING HAT BODIES.—William Mont Storm, New York city, and George H. Eonis, Hudson county, N. J.

We claim, 1st, The apron or aprons of netting or sheet rubber, one or both, so arranged that, while moving in contact with the body to be felted, they shall be alternately stretched and relaxed, by means substantially as described, and for the purpose specified.

2d, The hollow double shelled form, E, its outer shell perforated, and its inner shell whole, mounted and operating substantially in the manner and for the purpose described.

3d, In combination with the above, the water cock, c, and conduit standard, d, arranged and operating substantially in the manner and for the purpose described.

4th, In combination with the perforated form, E, the external sprinkler, Q, arranged and operating substantially in the manner and for the purpose described.

5th, The rolls, G G1 G2, mounted upon movable standards, so that they shall be adjustable in position relative to the form, E, substantially as and for the purpose set forth.

6th, In combination with the above, the supplemental roll or rolls, p, located and operating substantially in the manner and for the purpose described.

7th, The latching bar, K, in combination with the swinging standard, d, for the purpose set forth.

83,744.—FOLDING CHAIR.—E. W. Vaill, Worcester, Mass.

I claim, 1st, The improvement in the Howarth chair, consisting essentially in placing the legs, B B, outside of the legs, A A, and pivoting them to the sides of the seat frame, which is provided at its rear end with pins, adapted to slide in grooves in the legs, A A, in closing the chair, substantially as shown and described.

2d, A chair, constructed of the legs, A A B B, pivoted upon short pins or bolts, e e, the stuffed upholstered seat, C, jointed to the legs, B B, by means of short pivots, c c, behind the front edge of the seat, and connected with the legs, A A, by a pin working in a slot or groove, the upholstered back, D, and the flexible arm, O O, the whole being constructed and operating substantially as and for the purpose above set forth.

83,745.—MACHINE FOR MAKING NUTS.—Samuel Vanstone, Providence, R I.

I claim, 1st, The combination of the clamping jaws, D D', pressing jaws, K K, and punches, E E, with the plunger plate, A', and bed plate, B, all constructed and arranged substantially as described.

2d, In combination with the subject matter of the foregoing clause of claim, the jaws, I, studs, G1, and punches, G, arranged substantially as described.

3d, Also, in combination with the bed plate, B, plunger plate, A', and jaws, I I and K K, the tapering studs, N N, arranged and operating substantially as set forth.

83,746.—INVALID CHAIR.—L. M. Whitman (assigner to himself and A. B. Enderton), Sterling, Ill.

I claim, 1st, The combination of the pivoted slotted bar J, cord L, pulleys d n, rocker, E, shaft and crank-wheels, H, and the standards, T U, with the back, A, seat, B, front, C, and foot-piece, D, substantially as described, for the purpose specified.

2d, In combination with an invalid's chair, the adjustable stands T and U arranged substantially as shown and described for the purpose set forth.

3d, In combination with an invalid's chair and the stands, T and U, the track, W, substantially as and for the purposes set forth.

83,747.—MANUFACTURE OF DOUBLE-WALL ICE PITCHERS.—Dennis C. Wilcox, Meridian, assignor to Meriden Britannia Company West Meriden, Conn.

I claim electrotyping the upper end or unprotected surface of a glazed-coated or enameled vessel, substantially as and for the purpose described.

83,748.—CHARGING GASES WITH VAPORS OF HYDROCARBON-LIQUID.—Cyrus M. Williams (assignor to Henri L. Stuart), New York city.

I claim, 1st, A gas-holder, in which is suspended or retained any suitable absorbent or capillary material, saturated with hydrocarbon-liquid, through which air or gases are passed for carbureting.

2d, I claim a carbureting-chamber, placed in the gas-holder tank, arranged to receive and distribute hydrocarbon-liquid, through which air and gases are forced, for the purpose set forth.

83,749.—SELF-LOADING HAY-CART.—Isaiah M. Williams (assigned to himself and Harvey Smith), Blanchester, Ohio.

I claim, 1st, A self-loading hay or grain cart, capable of being depressed for raking and loading, and elevated for conveying, when provided with the ground-wheels, D D', on bent axel, C, and driving-wheels, E E', for operating the board, M N O, or equivalent shifting-mechanism, substantially as herein explained.

2d, The shifting-board, M N O, arranged and operated substantially as set forth.

3d, The arrangement of depressible bed, A, bent axle, C, lever, G, and cross-piece, I, for the purposes designated.

4th, The provision of one or more severing-knives, R, or their equivalent, beneath the figure, B.

83,750.—SEWING-MACHINE.—William C. Wilmarth and C. N. Farr (assignors to B. W. Lacy), Philadelphia, Pa.

We claim, 1st, The combination of the plate, E, its thread-carrier, f, lever P, needle, b, and an adjustable plate, S, the whole being arranged and operating substantially as and for the purpose specified.

2d, The vibrating-needle arm, I, with its needle, b, in combination with the plate, J, and its projection and opening for the passage of the needle, when the said plate is adjustable diagonally on the arm, C, as and for the purpose described.

83,751.—CASTING HOLLOW WARE.—John Ziegler, Dayton, Ohio.

I claim, 1st, The sprue-pattern herein described, constructed with wings, e e e, and downward projections, D D D, so arranged as to correspond in position with the feet of the vessel to be cast, as and for the purposes stated.

2d, The process of casting hollow ware, by introducing the metal through the part or parts of the mold which are to form the feet of the vessel, substantially as and for the purposes set forth.

83,752.—ICE ELEVATOR.—Ruben S. Zilar, Cincinnati, Ohio.

I claim, 1st, An ice elevator, consisting of the frame, A A' a, B b, adjusting devices, D F V W w, toothed wheels, J J, T t, endless chain, N, hooks, R, notched bar, U u u', and inclined plane, E G g H, having one or more flexible upper sections, E E', for the purpose specified.

2d, In combination with the wheels, J T, inclined plane, E, endless chain, N, and hooks, R, the spring bar, X, for the purposes set forth.

83,753.—TREATING AND STORING GRAIN.—Charles Alden, Newburg, N. Y.

I claim the chamber, A, adapted to be closed, and provided with false bottom, a, side walls, b, columns, c, and supply and exhaust pipes, e f, when said bottom, side walls, and column are perforated, and communicate with each other, whereby the contents of the chamber are not exposed to the ordinary action of the atmosphere, but adapted to be subjected to a forced current of hot or cold air, substantially as described.

83,754.—FLEECING CRADLE.—J. K. Alwood, near Dalta, O.

I claim, 1st, The arms, H, lugs, h, and springs, I, constructed and operating substantially as and for the purposes described.

2d, A table for sheep shearing purposes, having pedestal, A, shaft, B, cradle, E, plate, C, arms, H, lugs, C and h, nuts, d, and springs, I, constructed and arranged substantially as specified.

83,755.—MEDICAL COMPOUND.—Sterling Bass, M. D., Savannah, Ga.

I claim the specific for cure of chills, made up of the ingredients or medicines herein named, or their equivalents, in or about the proportions specified.

83,756.—SKATE FASTENING.—Edward Brady, Philadelphia, Pa.

I claim a heel piece of metal, or other hard substance, surrounded at one end by a similar thin plate, which may be enlarged to the size of and to be fastened by screws, &c., to the heel of a boot, having a hollow cylinder sunk into the heel, containing any common spring, operating against a cap covering a stud hole to prevent dirt, &c., from entering the cylinder, and thus to enable the stud of a skate to be adjusted to the heel of a boot, without the stud hole in the cylinder being obstructed by dirt, &c., substantially as set forth.

83,757.—CURRY COMB.—Charles B. Bristol, New Haven, Conn.

I claim, as an article of manufacture, a curry comb, in which the bar, C teeth, a, and shank, B, are formed in one and the same piece, and united to the plate, D, the whole constructed substantially in the manner herein set forth.

83,758.—PROCESS OF PRESERVING TIMBER FROM DECAY.—Charles Brown, Albemarle county, Va.

I claim preserving or "lapidifying" wood, in the manner and with the materials substantially as described.

83,859.—SUBSTITUTE FOR A BILLIARD TABLE.—Albert G. Buzby, Philadelphia, Pa.

I claim, 1st, A substitute for a billiard table, consisting of cushioned strips, connected together and to the floor, substantially as described, for the purpose specified.

2d, The rounded ends of the strips, in combination with the plates, a, for the purpose specified.

83,760.—BUT HINGE.—James H. Carkeet, Montgomery, Ala.

I claim the double acting but-hinge, constructed and arranged as described.

83,761.—CAR COUPLER.—Samuel K. Christy, Noblesville, Ind.

I claim the combination of the hollow sided draw head, B, with its hook, D, pivoted thereto, when said hook has a rounded end, a, and shoulder, and operates on a spring, E, connected to said shoulder, and in a recess in the side of the draw head, all substantially as shown and described.

83,762.—MODE OF CARRYING KNAPSACKS.—Walter Clifford, Holly Springs, Miss.

I claim a device for carrying knapsacks, composed of the padded shoulder springs, A, back brace, e, belt, B, slides, b b, and thongs, d d, when combined, constructed, and applied as herein shown and described.

83,763.—METHOD OF MANUFACTURING SHOW-CARDS, LABELS, &c.—Andrew James Connell, New York city.

I claim the method, substantially as herein described, of preparing ca[rds]

and paper, and printing or otherwise impressing and fixing thereon prepared aniline colors, substantially as set forth.

83,764.—WASHING MACHINE.—William Cooper, Galesburg, Ill.

I claim the arrangement of the box, A, its bottom ribs, a, the board, C, with ribs, b, shaft c, spring, d, cog, H, segment, E, pitman, I plate F, and balance wheel, G, all constructed and operated as herein set forth.

83,765.—TATTING.—C. O. Crosby, New Haven, Conn.

I claim the herein described tatting, fabricated substantially as set forth, as a new article of manufacture.

83,766.—ROTARY STEAM ENGINE.—Daniel Currie, St. Charles, Mo.

I claim, 1st, The arrangement of the steam chest, E, with the chamber, e1 e2, and the cylinders, A A', as herein set forth.

2d, The arrangement of the cylinders, A A', piston wheels, B B', with their periphery curtailed on one side, as shown at x x', together with the sliding heads, D D1, rods, d d1, links, d2 d3, and beam, D2, all constructed as herein shown and described.

83,767.—MOWER AND REAPER KNIFE SHARPENER.—William B. Deuel, Ithaca, N. Y.

I claim, 1st, The arrangement and application, to the sides of an ordinary grindstone of the plate or plates, C, made with holes or mortises, to receive the pins or hooks, E, for the purposes of holding and adjusting the described mower and reaper knife holder to the face of an ordinary grindstone, substantially as set forth.

2d, The arrangement of the arm or projecting piece, F, with the pins or hooks, E, fitted to two or more of the holes in the plate, C, and adjustable anywhere in the series of holes in the same, and sustaining the bolt, G, in its slot in the arm, and the cutter bar holder, as set forth.

3d, The cutter bar holder, I, when made with the deep and hollowed V-shaped bottom cavity, substantially as set forth.

4th, The bolt, G, when held in place in the arm, F, by the set screw, H, and adjustable for the holder, I, by the set screw, J, and the collar or collars, N, bevel or obliquely, as described.

5th, The clamps, L, so arranged as to hold the cutter bar, M, in the cavity of the holder, I, by the edges of the cutter bar, and on the rear of the knives, thereby leaving the face of the knives free, and open to the stone, as described.

6th, The combination of the plates, C, arm, F, bolt, G, and holder, I, with the frame of an ordinary grindstone, constructed and arranged to operate as set forth.

83,768.—PLOW.—John H. Elwood, Polo, Ill.

I claim the combination of the coulter, D, the rounded shank or rod, D', and rollers attached thereto, substantially as and for the purpose set forth.

83,769.—BRICK MACHINE.—Edward Faron, New York city.

I claim, 1st, The combination and arrangement of the toggle bars, e e' and f, pitman, j, crank and plunger, k, with the mold carriage, H, operating substantially as and for the purposes herein specified.

2d, The head block, N, provided with slots, g, in combination with the plate P, provided with perforations, r r, substantially as and for the purposes herein specified.

3d, The combination of the pusher block, O, lever, V, pin, x, cam, R, shaft, D, and mold carriage, H, arranged and operating substantially as and for the purpose herein specified.

4th, The arm, L', in combination with the mold carriage, H, and plungers, J, substantially as and for the purposes herein specified.

83,770.—WOODEN BOX.—Maurice Fitzgibbons, New York city.

I claim, as an article of manufacture, a box, A, constructed of a material consisting of two sheets of wood, with one sheet of paper between them, the sheets of wood and paper being glued together, substantially as herein described.

83,771.—COMPOUND ADJUSTABLE GARDEN HOE.—Mordecai H Fletcher, Richmond, Ind.

I claim the combination of the arms, b and c, shovels, b' and c', and shank, d, when the latter is made adjustable on arm, b, and the whole is constructed in the manner described, and for the purpose set forth.

83,772.—ELEVATED RAILWAY.—Otto Gsantner, East Orange, N. J.

I claim the carriage, K, fitted to move on the transverse bars, J, provided with hangers, L, and rails, M, when adapted to operate as shown, for shifting the suspended cars from one track to the other, as represented and described.

83,773.—CARRIAGE JACK.—Henry L. Hammond, Providence, R. I.

I claim the flange-plates, C and C', in combination with the levers, E and F, and the standard, A, substantially as described, and for the purposes set forth.

83,774.—ADJUSTABLE GEARING FOR LATHES.—John Humphreys, Chicopee, Mass.

I claim, 1st, The combination of the shaft, A, having the gear, x x, arranged upon it, the shaft, E, with traveller, G, and the rack, L, the parts being arranged and constructed substantially in the manner shown and for the purpose set forth.

2d, In combination with the rest of my device, as herein shown, the arrangement of the lever, O, with gear, P and Q, substantially as here described, and for the purpose set forth.

3d, In combination with the gear, x x and traveller, G, the dial plate or index, W, with the different sizes of gear numbered upon it, substantially as herein described.

83,775.—CLOCK ESCAPEMENT.—William C. Kellum, San Francisco, Cal.

I claim, 1st, The detent lever, D, with the locking screws, e e', the adjusting screw, i, and the screw, m, combined and arranged substantially as and for the purpose described.

2d, In combination with the pallets, a a', and the locking screws or heads, e e' the two parallel and symmetrical sets of escape teeth, E E', arranged and operating substantially as described.

83,776.—CLOCK ESCAPEMENT.—William C. Kellum, San Francisco, Cal.

I claim, 1st, The impulse wheel, D', on the same shaft with the escape wheel, D, and having teeth arranged to give an impulse in a direction the reverse of that given by the wheel, D, substantially as described.

2d, In combination with the impulse and escape wheel, D, and the reverse impulse wheel, D', the double headed screw-detent, substantially as described.

83,777.—MACHINE FOR MILKING COWS.—Thomas H. Lindley Taunton, Mass.

I claim, 1st, The stationary and movable frames, I I, provided with rollers, c c, and connected, by means of cords, or their equivalent, to the lever, N, for the purpose of milking cows, substantially as herein set forth.

2d, The funnel shaped vessels, K K, or their equivalent, in combination with the tube, L, for the purpose of receiving and conducting the milk to the milk pail, substantially as herein set forth.

3d, A cow milker, constructed substantially as described, and adjusted and operating in the manner and by the means herein set forth.

83,778.—WAGON JACK.—Henry W. Long, Council Bluffs, Iowa.

I claim the movable clasp, A, with the hooked fulcra upon said clasp, in combination with the jack for raising weights, the whole arranged as described in the accompanying specification.

83,779.—CHURN.—David Lown, Poughkeepsie, N. Y.

I claim the combination of the cross arms, B B, perforated near their outer ends, with the cup, D, secured under the shoulder on the shaft, A, as and for the purposes set forth.

83,780.—SALTING TROUGH FOR STOCK.—George T. Marshall, Unadilla, Mich.

I claim the inclined board, L, in combination with the trough, A, and foot board, C, upon the lever, B, whereby the cattle are prevented from stepping beyond the foot-board, inside the fulcrum of the lever, B, as herein described for the purpose specified.

83,781.—WAGON BRAKE.—George McKenzie, Zanesville, Ohio.

I claim, 1st, The adjustable connecting parts, c c, in combination with the rack bar, G, and pinion J, of a wagon brake, substantially as described.

2d, The scrapers, O, applied to the brake bar, F, substantially as and for the purposes herein set forth and shown.

3d, The plate, E, provided with guides, a, and secured to the reach, when used in connection with the parts set forth in the first clause of claim, substantially as shown and described, and forming a surface on which the brake bar, F, moves, as set forth.

4th, The casing, H, bolted to the reach, when enclosing the pinion, J, and forming, at the same time, a bearing for the rock shaft, I, and a space in which the rack bar, G, may be moved back and forth, as set forth.

83,782.—WIND ELEVATORS OF GRAIN.—Gerry Morgan, Newport, N. H.

I claim the deflected lip, C, and the wind guide, I, with its regulating pin, E, in combination with the spetture, B, in the elevating tube, A as and for the purposes herein described.

83,783.—COTTON COMPRESS.—Edmund L. Morse, St. Louis, Mo.

I claim the combination of the sector, A, with the vertical screw, E, and its step upon the upper platten, b, thereby counterbalancing in whole or in part, by the thrust of said screw, the upward pressure of the compressed bales, substantially as set forth.

83,784.—BOG CUTTER AND DRAG.—John W. Newton, Geneva, Wis.

I claim, 1st, The cutting blade, A, removably secured to the L-shaped straps, C, attached to the stock, B, and adapted for use either with or without the drag tee h, substantially as and for the purpose herein set forth.

2d, The plate, E, provided with removable teeth, and detachably secured to the hangers depending from stock, B, when used either with or without the cutter, A, for which it can be substituted, substantially as herein described, for the purposes specified.

3d, The L shaped hangers, C, secured to the stock, B, and adapted for the attachment of the toothed bar, E, and cutter, A, either separately or combined, substantially as described.

4th, The combined bog cutter and drag, consisting of the cutter, A, tooth ed bar, I, hangers, C, and a stock, all operating substantially as herein described.

83,785.—POTATO DIGGER AND VINE PULLER.—John W. Newton, Geneva, Wis.

I claim, 1st, The frame, A, handles, D, and draft pole, B, in combination with the teeth, G or B, substantially as and for the purpose described.

2d, The series of curved tapering teeth, G, arranged upon the adjustable plates, F, as described, for the purposes of a potato digger, substantially as described.

83,786.—PROCESS OF RECOVERING THE MATERIALS OF WORN OUT PRINTERS' ROLLERS.—Joseph H. Osgood, Peabody, Mass.

I claim the process for utilizing the ingredients of discarded roller composition, substantially as described and specified.

83,787.—GAG SWIVEL.—Charles B. Payne, Clinton, Ill.

I claim the gag swivel, formed of one piece of metal, and composed of the two bars, a a, and outwardly curved bar, b, with a buckle at one end and with a rivet plate at the other, all substantially as herein set forth.

83,788.—WATCH WINDING CLICK.—Eugene Paulus, Philadelphia, Pa.

I claim, 1st, The improved watch winding click, made in a round shape, cut so as to catch the teeth of the ratchet wheel, and adjusted in a recess of the top plate, to resist, by its full size, the power of the main spring, in the manner substantially as described.

2d, The combination of the winding click, E, bridge, L, spring, M, and pin screw, P, arranged and operating substantially as described.

83,789.—BLIND FASTENER.—William Phelps, Jr., Salem, Mass.

I claim the combination and arrangement of the plates, E and F, with the spring, s, all constructed and applied substantially in the manner and for the purpose specified.

83,790.—RESERVOIR COOKING STOVE.—George H. Phillips, Troy, N. Y.

I claim, 1st, Extending the rear end vertical flues of a cooking stove, upward above the horizontal plane of the boiler hole top plate, A, and the top edge of the rear end plate, C, thereof, which is in the same horizontal plane, by curving or raising upward and backward, above its horizontal plane, the rear end part of the said top plate, thereby extending said flues upward, so as to form, at and above their upper ends, and above the horizontal plane of the stove top, A, hot air or heating chambers, H H H, open at their rear side, in manner substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the upward extension of the rear flues of a cooking stove, over the horizontal plane of the top plate, and the elevation of the rear part of the top plate, whereby hot air chambers, H, are formed, with the shell, F, and boiler, E, substantially as and for the purposes described.

83,791.—MOLDING SCREW.—William Potts, Handsworth, England.

I claim the method of producing molds for casting screws, by first making a plain cylindrical mold, and afterward molding the thread by screwing a pattern screw through the said cylindrical mold, substantially in the manner and by the means herein shown and set forth.

83,792.—SAW SET.—John J. Reichard, Canton, Ill.

I claim a saw set, composed of jaws, a b, anvil, b, punch, f, spring, g, and set screws, c o, constructed and arranged as described, and for the purposes set forth.

83,793.—SAW SET.—John J. Reichard, Canton, Ill.

I claim, as an improvement in a saw set, the adjustable gage, D, with its tenon, E set screw, G, hammers, B and C, when constructed and arranged as described.

83,794.—HORSE HAY FORK.—Elias Rhodes, Jr, Clyde, Ohio.

I claim the lever, B, formed with the shoulder, b, in combination with the central sliding shaft, c, formed with the shoulder, b1, shank or body, A, consisting of two bars, connected together at their upper ends, and supplied with prongs, a' a', passing through shaft, c, and cords, b2, g, and g', all constructed and operated substantially as and for the purpose set forth.

83,795.—STEP LADDER.—Constant S. Rouse, Dowagiac, Mich.

I claim the guide blocks, D D, the pin, H, and rounds, E E, when combined with the platform braces and ladders, as and for the purposes set forth.

83,796.—WATER HEATER.—Hibbard Sabin, Philadelphia, Pa.

I claim the arrangement of chambers or passages, B B', E E', F, and f, in respect to internal and external tubes, b and f, so that the steam shall pass first within and then around the tubes, as described.

83,797.—PICTURE FRAME.—Joseph Theodor Schmitt, Brooklyn, N. Y.

I claim the hollow continuous shell, A, made of glass or other transparent material, and leaving a hollow space, c, for the reception of flowers or other ornaments, substantially as described.

83,798.—COOKING STOVE.—David Stuart, and Lewis Bridge (assignors to Stuart, Peterson & Company), Philadelphia, Pa.

We claim the arrangement of the ovens, D E, fire place, A, plates, h and p, flues, e f j k m, and the damper, x, as herein described.

83,799.—LANTERN.—Nathan Thompson, Brooklyn, E.D., N.Y.

I claim, 1st, The combination of the hinged portion, G' F', with the fixed or stationary portion, G, arranged to connect the middle rim, B, with the head piece, F, substantially as shown and described.

2d, The middle rim, B, formed or provided with a raised interior upper surface or platform, H, and back, I, substantially as and for the purposes herein set forth.

3d, The sectional rim or flange, K, to the lower end of the portion, G', of the guard, peovided with a raised front rim or check, L, to the glass.

83,800.—MITTENS.—George Topping, Chicago, Ill.

I claim cutting the whole of a mitten, back, front, and thumb, out of one and the same piece of material, substantially as described and shown.

83,801.—MUSIC STOOL AND RACK.—A. N. Towne, Chicago, Ill.

I claim the arrangement of the seat, D, in combination with the base or music rack, A, substantially as and for the purpose set forth.

83,802.—CLOCK MOVEMENT.—Michael Tromly, Mount Vernon, Ill.

I claim, 1st, The arrangement of the escapement wheel, D, the pallet, I, with its rollers, i i, oscillating on the rod, P, and connected by the link, H, with the pendulum rod, substantially as shown and described.

2d, The combination of the balance wheel, W, spring, v, rack bar, u', rod, u, pallet, T, and scape wheel, C, when employed to regulate and control the action of a striking apparatus for clocks, substantially as described.

3d, The arrangement of the dogs, x' x', arms, S'' T', rock shafts, X t, stop, S', and pallet, T, substantially as set forth.

83,803.—STREET RAILWAY SWITCH.—William Tuttle, Boston, Mass.

I claim as my invention the combination of the shoe with the car body, by means of the links or rods, a and b, when these links are connected to the said shoe and body in such a manner as to permit of the shoe oscillating or moving laterally as well as vertically, so as to accommodate itself to the surfaces over, on, or against which it may pass, substantially as described.

Also, the combination of the steadying tube, m, with the car body, and the shoe applied thereto, substantially as described.

Also, the arrangement and combination of the inclined planes or chutes, p and q, with the rails, S T T', the flange groove, n, and the deflector, r'.

Also, the combination and arrangement of the inclined plane, o, the groove n, the inclined planes or chutes, p q, the rails, S T T', and the deflector, r'.

83,804.—PAPER BOAT.—P. Shelton Tyler, Boston, Mass.

I claim, 1st, The combination with a paper boat of the sheets or strips, c1 c2, etc., as and for the purpose specified.

2d, In combination with the strips, c1 c2, etc., the pieces, d1 d2, as and for the purpose set forth.

83,805.—SAW SET.—Richard W. Tyler, Wayne, Mich.

I claim, 1st, The pinion G, provided with concentric series of notches in its upper face, when arranged as described with relation to the toothed bar F, and operated simultaneously with the die by means of the adjustable pawl H, applied to lever D, substantially as herein set forth, for the purpose of feeding the saw along automatically and with a regular graduated motion.

2d, The arrangement of the frame A, die B, lever D, adjustable pawl H, pinion, G, and toothed bar F, substantially as herein shown and described.

3d, The adjustable sliding clamps J, consisting of jaws w w', and the hinged slotted block y, arranged as described.

83,806.—COMBINED MOP HEAD AND SCRUBBING BRUSH.—Wm. S. Van Hoesen, Saugerties, N. Y.

I claim the combination of the scrubbing brush A, held by the clamping plate and set screw handle C, mop head D, and lamp E, all constructed substantially as described, and operating as and for the purposes herein set forth.

83,807.—TICKET CASE.—T. Van Kannel, Cincinnati, Ohio.

I claim the card or ticket case A, provided with the projection h, in the slot g, and constructed in the manner as and for the purposes described.

83,808.—RAIN WATER CUT-OFF.—Jacob Van Norman and William Young, Easton, Pa.

We claim the drum A, provided with exit pipes B B', and induction pipe C, in combination with the cut off e, and semicircular plate d, the drum A being provided with holes i i, and one of the plates d, being stained on its outer surface, a different color from the drum, as and for the purpose set forth.

83,809.—BED BOTTOM.—Andrew West, Burlington, Iowa.

I claim the Z-shaped springs D D, braces I I, upright G G, and slats E E, all constructed and arranged substantially as herein set forth.

83,810.—CARRIAGE SPRING.—Wm. F. Whitney, Milton, N. Y.

I claim the combination of the torsion springs B, and their attached arms g, arranged for operation in connection with the body and running gear of a wagon or other vehicle, substantially as described and for the purpose herein set forth.

83,811.—STEAM GENERATOR.—Charles Whittier (assignor to himself and Benj. F. Campbell), Boston, Mass.

I claim, 1st, A bridge piece having water and steam connections with a double shell, in combination with such double shell and water tubes, constructed and arranged substantially as herein described.

2d, The arrangement of the flues with reference to the double shell and bridge piece, substantially as described.

3d, The bridge piece d, when constructed substantially as described and placed in the rear of the fire box, to increase the heating surface of the generator.

83,812.—BOX.—John W. Wilcox, New York city.

I claim, 1st, The supplemental lappets 1, in connection with the lappet D, and strengthened folds h, substantially as described and set forth.

2d, The above in combination with the pocket E, as and for the purposes specified and set forth.

83,813.—RAILWAY RAIL SPLICE.—James Wixted, Port Carbon, Pa.

I claim the steelbar, D, adapted to the rails, and to the splicing bar, B', substantially in the manner and for the purpose herein set forth.

83,814.—COLLAR MACHINE.—J. T. Walker, Albany, N. Y.

I claim, 1st, A collar or cuff die, whose face is inclined downwards from its longitudinal center, or point corresponding with the folding line, substantially as herein specified.

2d, The female die, or its movable bed, constructed to conform to the face of the male die, by being inclined downwards from the folding line, substantially as set forth.

3d, The female or counter die, B2, constructed as described, and arranged upon the bed, A, with one end elevated above the other, presenting an inclined face, substantially as described.

4th, In combination with the slotted follower, C2, the knife, Y, so arranged that it shall indent the collar upon its folding line at each descent of the male die, substantially as and for the purposes set forth.

5th, The slotted folder, Z, in combination with the vertically-reciprocating knife, substantially as herein set forth.

6th, Forming or bending the collar in the line of the fold, as it is cut, in contradistinction to creasing the same, substantially as and for the purposes herein set forth.

7th, A flat guide tube, n, made adjustable to suit the width of the paper, and arranged with the feeding rollers, q and r, for the purposes set forth.

8th, The arrangement of the levers, B and W, and cams, R and A, all constructed as shown, and operating to alternately cause the upward and downward motion of the knife, Y, substantially as shown and described.

9th, A movable collar shaped bed, C2, in combination with the dies, B2 and A2, substantially as and for the purpose set forth.

83,815.—CHURN.—Schuyler S. Case, Marion, N. Y.

I claim, 1st, The false bottom, B, constructed substantially as described, and provided with a valve, f, when used in connection with a plunger, F, also provided with a valve, m, all constructed and arranged to operate substantially as herein set forth and shown.

2d, The removable stock, C, to which the barrel, E, and false bottom, B, are attached, when constructed and arranged as herein shown and described so as to form part of the sides of the churn, A, as set forth, for the purpose specified.

83,816.—MACHINE FOR SPREADING PLASTER, LIME, ETC.—George U. Relyea, Watkins, N. Y.

I claim, 1st, The comb nation, in the same machine, of two independent sets of mechanism for sifting plaster etc., situated end to end, the said sets consisting of revolving sifts, D D', with the inner ends fixed, but the outer ones resting in slide boxes, g g', to throw out of gears, by means of connections, f f G G', and the axle of the driving wheels, and the shaft of the sifters, made in halves, the whole arranged as described, and operating in the manner and for the purpose specified.

2d, The combination, with the perforated sifters, D D', of the angular bars, i i, and division plates, h h, the whole arranged as described, and operating in the manner and for the purpose specified.

REISSUES.

63,240.—MELTING AND SMELTING FURNACE.—Jacob Green, Norristown, Thomas H. Wilson, Hiram Willson, and Charles R. Adams, Philadelphia, Pa., and Samuel Munn, Hackensack, N. J., assignees of Jacob Green. Dated March 26, 1867; reissue 3,177. Division A.

We claim, 1st, A furnace, in which currents of air are introduced above the fire, and a mixture of air and steam is passed upward through the fire, substantially as and for the purpose described.

2d, A furnace, in which the gases produced by the passage of mixed air and steam through, and of the air above, the fire, are maintained under a pressure greater than that of the external air.

3d, A furnace in which the gases are maintained under pressure, and in which openings are arranged at the points to which the heat is to be directed, substantially as and for the purpose described.

4th, The combination, with a furnace, of blast pipes, so arranged above the fuel, as to direct the heated products of combustion to any desired part or parts of the furnace, substantially as set forth.

63,240.—FURNACE FOR TREATING IRON, AND FOR OTHER PURPOSES.—Dated March 26, 1867; reissue 3,178.—Division B.—Jacob Green, Norristown, Thomas H. Wilson, Hiram Willson, and Charles R. Adams, Philadelphia, Pa., and Samuel Munn, Hackensack, N. J., assignees of Jacob Green.

We claim, 1st, The combination in a smelting furnace of pipes through which a mixture of steam and air can be introduced below the fire, and currents of air among the products of combustion, previous to the latter being brought into contact with the ore, for the purpose specified.

2d, A chamber or chambers H, through which the ore is admitted to the furnace, when the said chambers are arranged in respect to the bed and to the fireplace substantially as specified.

3d, The fireplace D, bed F, stack G, inclined passage H, with its openings c c, and reservoir E, all constructed and arranged substantially as and for the purpose set forth.

4th, The combination of the two fireplaces D D, stacks G G, passages H H, beds F F, and the basin E, the whole being constructed and arranged substantially as specified.

62,766.—PLOW.—Dated March 12, 1867; reissue 3,179.—Don Carlos Matteson and Truman P. Williamson, Stockton, Cal.

We claim the curved standard A, with the lug B, and the offsets D and E, substantially as and for the purpose described.

12,395.—MACHINE FOR SLAUGHTERING HOGS.—Dated Feb. 13, 1855, reissue 3,180.—Jefferson Parker, Louisville, Ky.

I claim the combination of the shaft K, elevating fingers d d, scalding vessel A, and scraping bench B, for the purpose set forth.

52,338.—GLASS MOLD.—Dated Jan 30, 1866: reissue 3,281.—Michael Sweeney, James E. Mathews, and Thomas Hartley, Wheeling, W. Va.

We claim, 1st, Molds in which glass is to pressed, made of hot-blast iron, and cast upon metallic chills substantially as shown and described.

2d, Also an enlargement formed around the middle of the mold, in order to obtain the equalization of the heat in the mold while glass is being pressed therein, substantially as set forth.

3d, The manner substantially as above shown of attaching handles to molds for glass.

81,794.—MACHINE FOR SEPARATING ORES.—Dated Sept. 1, 1868; antedated Aug. 5, 1868: reissue 3,182.—Stephen R. Krom, New York city.

I claim, 1st, Introducing the material upon the bed I, in a thin stratum, close to the surface of the bed, substantially in the manner and for the purpose herein set forth.

2d, Traversing the material across the perforated bed I, transversely to the length of the machine, that is to say, extending the bed I, longitudinally of the length of the frame work A, and causing the material to traverse across its narrowest dimensions, substantially as and for the purpose herein set forth.

3d, In combination with a perforated separating bed, and a device for producing intermittent puffs to effect separation of the granular substance on the bed, a rotating or travelling delivery device, arranged to regulate the discharge from the passage which carries off the heavier grades of particles passed through the sifting or separating bed, substantially as specified.

4th, So gearing or operating the device which effects separation by intermittent puffs, and the rotating or traveling device which regulates the discharge of sifted material, as that said devices are made to work at fixed relative velocities to each other during all variations in the general speed of the machine, essentially as and for the purpose or purposes herein set forth.

5th, The roller, L, arranged and operating as represented, relatively to the discharge passage, J, for the purposes herein set forth.

6th, The trip wheel, C, and lever, F G, or their respective equivalents, arranged relatively to the bellows, D, and to the perforated bed, I, and its connections, as and for the purposes herein set forth.

7th, In combination with the perforated bed, I, and with means for introducing and removing the material, as specified, mounting the bellows, D, on a rocking shaft, S, and operating it by an adjustable vibrating motion, substantially as and for the purposes herein specified.

8th, The gates, N and K, so arranged as to allow the separate or simultaneous changes in the thickness and velocity of the strata on the ore bed, I, substantially as and for the purposes herein set forth.

9th, In combination, the ore bed, I, with its feeding and discharging devices, the adjustable oscillating bellows, D, the trip wheel, C, and its connections, and the means, H H1 H2, or their equivalents, for varying the rate of discharge through the passage, J, all arranged for joint operation, substantially as and for the purposes herein set forth.

10th, The within described arrangement of the operating parts, C F, and their connections, at the end of the main frame work, A, so that they may operate by a direct connection, through the rocking shaft, S, with the bellows, D, and that the closed end of the frame, A, shall form one entire side of an inclosing case to protect the working mechanism, all as and for the purposes herein set forth.

DESIGN.

3,213.—GLASS BOTTLE.—John B. Bartlett, New York city.

3,214.—TOBACCO PIPE.—Fred. W. Burrows, New York city.

3,215.—FLOOR OIL CLOTH PATTERN.—Hugh Christie, New York, assignor to D. Powers & Sons, Lansingburg, N. Y.

3,216.—FLOOR OIL CLOTH PATTERN.—Hugh Christie, Morrisania, assignor to William M. Brasher & Company, Brooklyn, N. Y.

3,217.—STAIR OIL CLOTH.—Elihu Dwight, New York city.

3,218.—ORNAMENTS OF A STOVE.—Jeremiah Dwyer (assignor to Detroit Stove Works Company), Detroit, Mich.

3,219.—PENCIL TRADE MARK.—Eberhard Faber, N.Y.city.

3,220.—CARPET PATTERN.—Israel Foster, Philadelphia, Pa.

3,221.—ORNAMENTATION OF GLASS WARE.—Henry C. Fry, Pittsburg, Pa., assignor to himself, Frank Semple, and John D. Reynolds.

3,222.—PLATES OF A COOK'S STOVE.—Luther W. Harwood (assignor to Fuller, Warren & Co.), Harwood, Troy, N. Y.

3,223.—COOK'S STOVE.—Charles S. Lord, and William N. Walker, Otter River, Mass.

3,224.—CLOCK CASE.—George B. Owen, Winste[illegible] C

3,225.—TRADE MARK.—William I. Peake, New York city.

3,226.—SHOVEL-AND-TONGS STAND.—Charles Zeuner (assignor to M. Greenwood & Co.), Cincinnati, Ohio.

3,227.—STOVE.—Conrad Harris, and Paul William Zoiner, Cincinnati, Ohio.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

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2,898.—APPARATUS FOR LIGHTING AND REGULATING THE FLOW OF ILLUMINATING GAS.—Arthur Barbarin, New Orleans, La. Sept. 19, 1868.

2,979.—LAMP AND LANTERN.—John H. Irwin, Chicago, Ill. Sept. 29, 1868.

2,997.—SCISSORS SHARPENER.—G. P. Bergen and C. T. Bainbridge, Brooklyn, N. Y. Sept. 30, 1868.

3,017.—DOOR FRAMES OF FURNACES FOR STEAM GENERATORS.—A. J. Ambler, C. E. Rittenhouse, and R. E. Preston, Washington, D. C. Oct. 1, 1868.

3,031.—MODE OF REVIVING BONE BLACK EXHAUSTED BY MANUFACTURING OPERATIONS.—John Rogers, Brooklyn, N. Y., and L. Reid, New York city. Oct. 3, 1868.

3,063.—KNITTING APPARATUS AND MACHINERY.—Thomas Crane, Fort Atkinson, Wis. Oct. 7, 1868.

3,075.—GAMES.—John M. Fletcher, New York city. Oct. 8, 1868.

3,079.—SAW HANDLE.—C. White Hubbard, Pittsburg, Pa. Oct. 8, 1868.

3,083.—PAPER BOAT.—Frank W. Sargeant and John Tyler, Boston, Mass. Oct. 8, 1868.

3,117.—PROCESS FOR ELECTRO-PLATING WITH NICKEL.—Wm. H. Remington Boston, Mass. Oct. 10, 1868.

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Warren Holden, of Philadelphia, Pa., having petitioned for the extension of the patent granted him on the 1st day of May, 1855, for an improvement in "Boot and Shoe Stretchers," it is ordered that said petition be heard at this office on the 5th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Oct. 16, 1868.

Jotham S. Conant, Hackensack, N. J., having petitioned for an extension of the patent granted him on the 16th day of January, 1855, for an improvement in "Sewing Machines," it is ordered that the said petition be heard at this office on the 28th day of December next.

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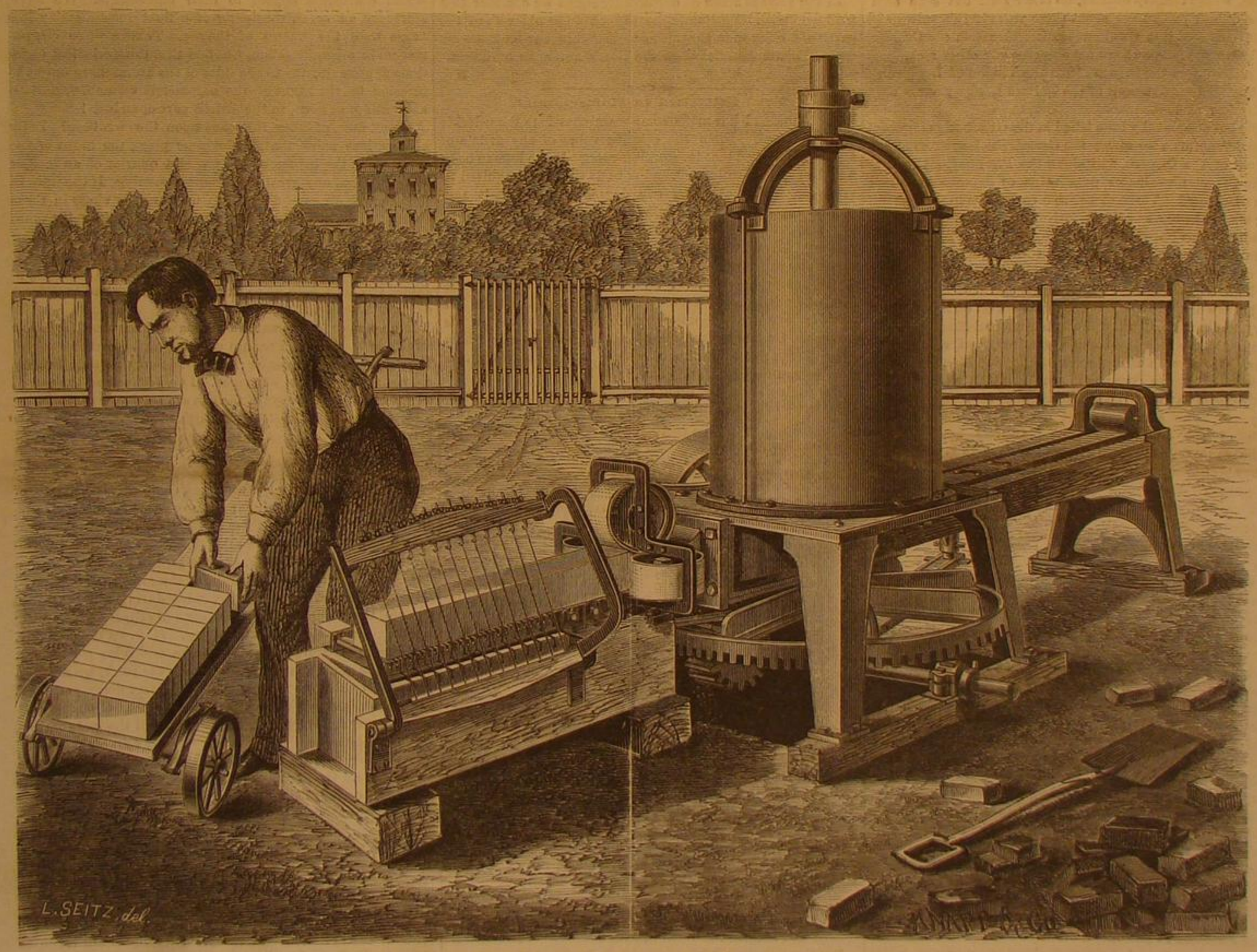
Improved Brick Machine.

The first notable event after the flood, narrated in sacred history, involves the manufacture of bricks. In that early stage of the world people understood the art of making bricks, even to "burning them thoroughly." Later we learn that the Israelites in Egypt had their lives made bitter with "hard bondage in mortar, and in brick, and in all manner of service in the field;" their annoyance at being deprived of the straw, and trouble of substituting stubble, we, in this age, do not practically understand, as we employ neither straw nor stubble in the manufacture of our bricks, unless "bricks in the hat," which are sometimes manufactured by the aid of straws in punches, juleps, etc.



THE HOTCHKISS AND BUSS' BRICK AND TILE MACHINE.

But brick making is one of the most ancient and always one of the most important of the industrial branches of mechanics. The convenience of handling in building, the wide distribution of the material, the durability of fabrics composed of them, make bricks a manufactured product always in demand and never out of fashion. There is probably no branch of manufacture on which more inventive talent and mechanical skill has been expended than on this.

The work of brick making by hand is very laborious. In the first place the material is heavy, difficult to detach from its bed; it is hard to form into shape until tempered with water, and every process from the digging of the clay to the production of the finished brick is unpleasant and monotonous. Here if anywhere it would seem that machinery might be usefully employed, as every step in the process of converting the crude clay into symmetrical bricks is purely mechanical. Yet few of the machines for this purpose have really fulfilled their design. The material, although apparently plastic and yielding, presents a powerful resistance to mechanical agencies. It contains not only water but air, and while a modicum of one is necessary to the production of the finished article, a very small amount of the other will render futile any attempt at a satisfactory result.

There are objections to the molding of bricks by machinery. One is the immense strain caused by the elasticity of the material; another the great power required in pressing to overcome the resistance of the air and fill the corners perfectly; and another that in consequence of this elasticity those portions first relieved from pressure spring, and the brick does not preserve a perfect form.

These objections are believed, by the inventors of the machine shown in the engraving to have been entirely overcome. The machine has no molds whatever. The clay is pressed through a die, or rather a matrix, in a continuous rectangular prism, the cross section corresponding in width and length with the bricks. The corners of the matrix are rounded, as it has been found by experiment that clay if forced into a perfect angular corner tends to "check" or crack. To insure, however, perfect corners the prism of clay as it comes from the lips of the matrix passes between rollers pressing on its top, bottom, and edges, and thus the corners are made sharp and well defined. From these rollers the mass is delivered to an endless apron or belt and carried forward under a hinged frame having wires stretched across from one side to the other, which, when the frame is brought down by the hand of the workman, cut the clay prism into bricks that may then be removed by attendants and hacked preparatory to burning.

The machine consists of an ordinary pug mill for the reception of the clay in which is an upright shaft, having curved radial arms and a spiral blade at the bottom, for mixing the clay and delivering it to a receptacle under the mill. This upright shaft and its blades are driven by a gear and pinion in the usual manner. The receptacle under the mill into which the prepared clay is passed is of rectangular form and is fitted with a plunger like the piston of a steam engine cylinder. This is operated by a pitman, one end of which connects with a wrist pin on the large gear under the mill and the other end to the end of the plunger, which is a long beam of wood traveling on friction rollers in a guiding frame. By this plunger the clay is forced through the matrix intermittently, its backward movement allowing time for cutting and removing the bricks. The air contained in the clay is forced out in the act of compression through minute apertures just in rear of the opening of the matrix.

By a change in the dies of the matrix the machine can be made to produce hollow bricks or drain tile of any form or size: and of either tile or brick, the machine, when worked by two horses, will make from 20,000 to 30,000 per day; and when worked by steam or water power its capacity is limited only by the limit of the work of feeding the mill and removing and hacking the bricks. Bricks made by this machine may be at once hacked eight or ten courses high without injury, thus saving the expense of an extensive yard and the danger of loss by storms, etc. The inventors say:

"This machine is so arranged that no obstruction of stone, gravel, or roots can possibly break or injure it; and from the rough clay, of whatever kind, shoveled into the hopper, it mixes and delivers the material in a better and more convenient shape to handle than any other machine. The clay is not cut or formed into brick until all pressure has been removed and it is at rest, ensuring a perfectly true brick, that will not warp or get out of shape in drying or burning, and come out of the kiln square and handsome. As a tile machine, this stands unrivaled in the market, for the rapidity and ease with which it works, the avoiding of all side pressure and friction, the longer length of stroke, and the freedom from grain or layers. The piston or plunger being worked by a crank or long pitman, entirely overcomes the side pressure and friction which all machines which use a cam to move the piston must have."

Patented April 30, 1867, and September 27, 1867. For further particulars address Geo. Herrick & Co., Room 1, No 335 Broadway, New York city, who will furnish any further information desired, and exhibit specimens.

OBSERVATIONS ON THE GOLD FIELDS OF VENEZUELA AND GEOLOGY OF THE STATE OF GUAYANA, READ BEFORE THE LYCEUM OF NATURAL HISTORY OF N. Y., BY R. P. STEVENS, NOV. 2D, 1868.

Reported for the Scientific American.

Venezuela is divisible into three grand hydrographical basins, each of which represents distinct geological eras and holds its respective gold field.

The first, and oldest known, is the hydrographical basin of the Caribbean sea, and is separated from the Orinoco basin by the Coast Range of mountains. This range is the prolongation eastwards of the Cordillera Occidental, and geologically, is of the same age as that of the main Andes; viz., miocene tertiary—that is to say, these mountains are understood to be of several ages in their uplifts, the later being as late as the beginning of the tertiary. Fossils indicating this position have been found at Carupano, Maturin, and other points on the main land and on the Island of Trinidad, according to R. L. Guppy. The central axes of these mountains are metamorphic, and probably metamorphose palaeozoic. Gold, silver, copper, lead, and other ores are found in their rocks.

In the absence of positive data, and reasoning by analogy from other portions of this range, the auriferous veins are as late in time as the Silurian, according to Prof. Forbes.

The hydrographical basin of the Orinoco is filled with much older rocks; viz., crystalline mainly, so far as known to our party, they are gneiss and gneissoid, save in the vicinity of Ciacoa, where tertiary obtains, no other rock has been seen. Some of our party have spent three years in this valley and we have crossed it in six different directions from the Orinoco, and below the falls we have not observed any other rock.

A section from the Orinoco, from the Village of Las Tablas southwards to the summit of the Imitaca Range reveals only gneissoid rocks.

Gold has occasionally been found in the streams flowing from these mountains, also along the Caroni, the largest southern affluent of the Orinoco, and along the Piraguay, a tributary of the Caroni, no valuable gold veins or deposits have ever been discovered. These rocks seem to conform to the general law; viz., to be barren of productive gold veins. (The West Canadian veins have not yet disproved this law). The Essequibo hydrographical basin is the true gold-bearing portion of the rocks of Guayana. So far as known the rocks of this basin are as follows: Gneiss on its northern rim (Imitaca Mts.); a few leagues south are low ranges of quartz and porphyry, Santa Cruz, Charapa, and Chagunemul Mountains. On their flanks are seen homblendic, silicious, and argillaceous slates. Gneiss with domes, or vast expansion of quartz veins succeeds. As we progress southward these domes of quartz form a very striking feature of the landscape. They are more abundant east of the Caroni river and south of the Imita mountains than any other portion of the country visited. They are always in sight. One is constantly winding around them or crossing some low portion of them. Sometimes their out-cropping rocks remind one of a distant cemetery with its slabs and monuments of white marble. One dome we have named "The Cemetery." The gneiss decomposes and then presents a mottled appearance, red, purple, greyish, and white in color. Dykes of granite, or more properly, syenite, appear at intervals. Approaching the valley of the Yuruary river—the northern affluent of the Essequibo—bands of white and light drab limestone are seen with the gneiss, and near Guasipati a band of itacolumite appears.

After crossing the Yuruary river, hills and low mountains of metamorphosed or semi-crystalline hills rise a thousand or fifteen hundred feet above the valley.

These mountains trend N. N.E. or S. S.W. They are composed of the following rocks: Brecciated schists, altered sandstones, quartz, and porphyry, a local rock of the aluminous family known as blue stone, and talcose schists. The porphyry in many instances is but a highly metamorphosed condition of the more silicious portions of talcose rocks. Talc and blue stone is the country rock of the gold veins of this portion of the Essequibo basin. Beside the rocks already described, there lie between the sources of the Yuruary and the Caroni a low range of hills running north and south which are composed of very black gneissoid schists and more solid rock dissimilar to the grayish gneiss of the Imitaca. These are older in geological time than the Imitaca, for the latter trend east and west and about upon them, while these trend north and south.

In order of time the following I suppose from present observations to be correct:

First, The black gneiss mentioned.

Second, Gray gneiss, quartzite, homblendic, and other slates, limestone and itacolumite, and all rocks trending east and west.

Third, The metamorphic rocks of the Morcupio, Ignan, and all rocks trending northeast and southwest south of the Yuruary river.

To return to the Essequibo basin. I have said that this is the true gold field of Guayana. As yet but very little is known of it. This basin is ninety leagues long, north and south, and eighty east and west, and for the most part densely covered with tropical forests and destitute of inhabitants, save a few uncivilized aboriginals who live along the banks of its streams.

Gold has long been known to be found along the head waters of its streams, in the Parima, Tucumacare, and other mountains. An English company commenced operations upon the Essequibo, above the junction of the Cuzuni, penetrating from Georgetown, British Guiana. Carlos Seigert, a German mining engineer, has descended the Yuruary to the Cuzuni, and descended this stream to the Pueblo of Arecbica, und reports gold quartz along both streams. The Mocupio valley has been worked since 1854 and has been only penetrated four miles. The Iguana has been touched only in a still smaller portion. Only this and no more do we know of this gold field.

In the Mocupio valley gold is found under the following modes or conditions.

First, In the sands and gravel beds of the streams of the valley.

Second, In paydirt beds on bed rock in the alluvial of the valley, and in the clays derived from the breaking down and and decomposition of the country rock of the veins.

Third, In quartz veins under different conditions as follows: *a*, in pure white quartz in granules and nuggets; *b*, in rusty and ochraceous quartz invisible to the naked eye; *c*, in thin bluish and greyish threads and films of talc in the quartz; *d*, in crystals of sulphide of iron mechanically mixed with the pyrites; *e*, attached to the walls of decomposed and removed crystals of pyrites; *f*, in the ochre resultant of such decomposition; *g*, in thin, film-like scales on the face of fissure walls; *h*, in masses cementing fragments of gangue rock together.

Fourth, in the foot and hanging walls of veins the "cacasjo" of the country.

There are two systems of veins, one running northeast and southwest, the other east and west. In both of these there is a variation of from ten to thirty degrees. Which of these systems is the oldest we have not yet determined.

In the present stage of our investigations we consider this gold field with its metamorphosed rocks to be older than the palaeozic, older than the talconic, older than any on the west coast of South America or on the North American continent.

S.

Food Estimated in Horse-powers.

Dr. Frankland has made some researches into the calorific values of food. From the calorific value of any article of food it is assumed that its working energy in the human body may be correctly estimated, on the basis that heat required to raise one pound of water one degree of Fahrenheit represents a mechanical force sufficient to raise 772. lbs to the hight of one foot. This can readily be reduced to horse-powers. Who knows but that articles of food may be estimated by the coming grocer upon this method. Imagine a farmer taking his butter to market, and being asked by the would-be purchaser, how many horse-powers of butter he has to sell; how many horse-powers of cheese he has in his wagons. Or fancy Mrs. Malone asking said grocer "how chape he can sell a quarther of a horse-power o' whishky to a poor woman that hasn't any cow?"

But joking aside, Dr. Frankland's computations are valuable. The following table embodies some of their results:

ACTUAL ENERGY *of Ten Grains of the Material in its Natural Condition, when completely Burnt in Oxygen, and when Oxidized into Carbonic Acid, Water, and Urea, in the Animal Body.*

	Per cent of water in material.	LBS. LIFTED 1 FT. HIGH — When burnt in oxygen.	When oxidized in the body.
Butter	15	14,357	14,357
Cheshire cheese	24	9,187	8,613
Oatmeal	15	7,923	7,769
Wheat flour	15	7,788	7,591
Pea meal	15	7,778	7,456
Arrowroot	18	7,761	7,731
Ground rice	13	7,535	7,424
Yolk of egg	47	6,761	6,582
Lump sugar	19	6,616	6,616
Grape sugar	20	6,476	6,476
Entire egg	62	4,708	4,507
Bread crumb	44	4,409	4,246
Ham	54	3,915	3,317
Mackerel	71	3,537	3,187
Lean Beef	71	3,098	2,818
Lean veal	71	2,594	2,314
Guinness' stout	88	2,123	2,123
Potatoes	73	2,002	1,969
Whiting	80	1,787	1,563
Bass's ale	88	1,530	1,530
White of egg	86	1,325	1,138
Milk	87	1,303	1,241
Carrots	86	1,046	1,026
Cabbage	89	858	830

It will be understood, of course, that to obtain these results in the animal body the materials must be completely absorbed, and fully oxidized into carbonic acid, urea, etc.

Estimated in this manner, it may be said that a daily subsistence diet of 2 ozs. of dry nitrogenous food, and 13·2 ozs. of dry carbonaceous, calculated as starch, and a daily working diet of 6 ozs. of nitrogenous matter, and 26 ozs. of dry carbonaceous, have the following mechanical energies:

	LBS. LIFTED 1 FT. HIGH — When burnt in oxygen.	When oxidized in the body.
Subsistence diet	6,319,783	6,307,078
Working diet	13,949,405	13,541,290

But the actual working power of the human body does not approach this. In fact, although a man's daily labor has a very large range, as from 300,000 foot-pounds when lifting dung into a cart to 1 500,000 foot-pounds when pushing or pulling horizontally, yet the average is not above 1,000,000 foot-pounds, as will be seen from this diagram:

KIND OF LABOR.	AM'T OF WORK in foot-pounds.	AUTHORITY.
Bricklayer's laborer carrying bricks	1,677,200	Mayhew.
Coal whipping	1,393,600	"
Ascending Faulhorn	1,074,931	Wislicenus.
"	936,746	Fick.
Treadmill	1,008,000	Mayhew.
"	861,156	Ed. Smith.
Turning a winch	837,760	Coulomb.
Pedestrians (20 miles a day)	792,000	Haughton.
Paving and pile driving	788,480	Coulomb.
Porters carrying loads	737,490	"
Shot drill punishment	694,400	Haughton.
Average	967,614	

And even when we add the calculated internal work of a man's body, as the beating of the heart and the movements of respiration, the total of it does not much exceed 1,500,000 foot pounds a day:

	FOOT-POUNDS.
External work or actual labor	967,614
Work of circulation (75 beats a minute)	497,280
Work of respiration (15 a minute)	98,064
Total ascertainable work per day	1,562,958

It is evident, therefore, that a large portion of our food must escape digestion and absorption; indeed, the thermotic power of the food actually consumed daily, as estimated by the carbonic acid exhaled and the urea secreted, is not more than sufficient to raise the temperature of 10,000 pounds of water 1° of Fahrenheit. This is equal to a force of 7,720,000 pounds lifted a foot high; so that the ascertainable work of the food is about one fifth of its actual energy, the rest of the power being consumed in molecular movements within the animal body. Helmholtz asserts that the external work should be a fifth part of the mechanical force of the digested food; but labor must be well applied to develop this proportion of its energy.

LUNAR ASSISTANCE.

Suppose for a moment, that we are all transported to the bottom of the sea, there to occupy a position analogous, in respect to the waters of the ocean, to the position we hold in the lowest portion of the atmosphere. How can we form any idea of the tides that ebb and flow above us? Our only way of obtaining cognizance of the fact would be to measure the thickness of the mass of water over head, by means of some instrument analogous to the barometer.

Let us now go up again to the surface of the earth—to the bottom of the aerial ocean which covers the whole earth. The same observations, made with the barometer, acquaint us with the existence of tides in the atmosphere. But here we have a continuous ocean, whose oscillations, restrained by no barrier, are not amplified by confinement in a narrow channel, as happens in the oceans of waters, through the resistance which continents oppose to their movements. We have, moreover, an ocean consisting of a fluid incomparably less dense than the waters of the sea. Taking these circumstances into consideration, we find that the periodical variations of pressure, due to the tides of the atmosphere, ought to occasion, in the hight of the barometric column, variations amounting, at most, to the fiftieth part of an inch!

What, now, of lunar influence upon the weather? Daily observations show that, in the same place, the hight of the mercury in the barometer may vary a quarter of an inch or more, without any great disturbances ensuing. If the tides in the atmosphere, caused by the moon, have any share in these variations, it must be so very small that certainly it cannot authorize weather prophets to found their predictions upon changes of the moon.

But if the moon will not enable us to foretell rain or sunshine, she does help us to fix historical dates and to correct our ancient chronology.

In an eclipse of the sun, the moon screens the sun, either totally or in part, from certain portions of the earth's surface. Here it is total or annular; there, it is only partial; further on, not a trace of it is witnessed. In an eclipse of the moon, on the contrary, the rays of the sun are totally or partially intercepted from the moon by the earth's interposition; and this privation of light is seen in the same way from all points of observation.

The ancients (who had nothing like so precise a knowledge of the moon's movements) were unable to predict eclipses of the sun. They foretold lunar eclipses only; basing their predictions on the fact that these eclipses are reproduced almost periodically, presenting the same characters and the same intervals between each other, every eighteen years and eleven days. It therefore suffices to have observed and registered all the eclipses of the moon happening during that period, to be able to announce with certainty the eclipses which were to occur during the period following. Now, on the contrary, with the much more exact information which we possess, not only of the moon's motions but also of the sun's, we are in a position to calculate and announce a great many years and and even centuries beforehand, both the general circumstances of lunar and solar eclipses, and also all the peculiarities which the latter will present at any given spot on earth. In like manner, by a retrospective examination, we can give an account of all the circumstances accompanying ancient eclipses in this or that locality.

Eclipses of the sun are somewhat more frequent than those of the moon. But as a solar eclipse can never be visible over so large a portion of the earth's surface as a lunar eclipse, it follows that, for any one given spot, solar eclipses are least numerous. And if, instead of noting all solar eclipses, we only reckon those which are total, we shall find that at the same spot, they are very far from numerous. We may even say that, for any determinate locality, total eclipses are veritable rarities. In Paris, for instance, only one was seen during the whole of the eighteenth century—the eclipse of 1724. In the nineteenth century there has not been, nor will there be one. The Londoners were five hundred and seventy-five years without one total eclipse—from the year 1140 to 1715; and since 1715 they have witnessed no similar spectacle.

If history mention a total eclipse of the sun as having been observed at a given spot, without giving the precise date of the observation, that date may still be determined by the exact knowledge we now possess. Recurring to the epoch to which the phenomenon belongs, we successively pass in review the different solar eclipses which occurred during a lapse of years of such extent, that we are certain it must comprise the year in which the eclipse in question was observed. By proceeding in this way we shall generally find that, out of all those eclipses, there is only one corresponding to that recorded in history; because that one only can possibly have been total at the spot where the observation was made. We shall thus get, not merely the year, but the day and even the hour of the observation.

Take an example. Herodotus relates (book i. § 74), "After that, the Lydians and the Medes were at war during five consecutive years. In this war the Medes frequently vanquished the Lydians; the Lydians also often beat the Medes. On one occasion they even fought by night. Now as the

war continued with equal chances on either side, in the sixth year, one day when the contending armies were engaged, it happened that, in the midst of the strife, the day was suddenly changed into night. Thales of Miletus had foretold this phenomenon to the Ionians, indicating the exact year in which it actually did take place. The Lydians and the Medes, beholding night suddenly interrupt the day, put an end to the combat, and thought only of settling the terms of peace."

The eclipse here referred to is known as Thales' eclipse. The various authors who have mentioned it have assigned to it very different dates, from the 1st of October, 583 B. C., by Scaliger, to the 3rd of February, 626 B. C., by Volney. Professor Airy, by proceeding as indicated above, and taking advantage of the most recent data respecting the lunar movements, has decided that this eclipse occurred on the 28th of May, 584 B. C.

Between the earth there exists one grand difference. The earth has an atmosphere; the moon has none. She has no clouds, snows, nor dews—contrary to the theories of the elder astronomers. Kepler and Galileo held the moon to be encompassed with a heavy and elastic atmosphere: alleging, among other proofs, that the moon sometimes disappears in a clear sky, so as not to be discoverable by the best glasses (of that day): little stars of the fifth and sixth magnitude remaining visible all the time.

Kepler says he has observed this phenomenon twice—once in 1580, and once in 1583. Hevelius did the same in 1620. Riccolus and other Jesuits, at Bologna, and many people throughout Holland, observed the like on the 14th of April, 1642. And yet at Venice and Vienna, the moon remained all the while conspicuous. On December 28, 1703, there was a total obscuration of the moon, which must not be confounded with an eclipse. At Arles, in France, she first appeared of a yellowish brown; at Avignon, ruddy and transparent, as if the sun were shining through her. At Marseilles, one part was reddish the other very dusky; "and at length, although in a clear sky, she wholly disappeared." Here it is evident, they say, that as the colors appear different at the same time, they do not belong to the moon herself, but are occasioned by an atmosphere around her, variously disposed in this and that place, for refracting these or those colored rays.

Lord Rosse's telescope has stripped the moon of her atmosphere, leaving us still enveloped in ours; and we have only to observe what is daily passing before our eyes to understano the changes which the atmosphere has produced on the solid crust of our globe. The hollows are filled up and smoothed over by sedimentary deposits brought down by rains; the relief of our surface is gradually worn down. The moon is as as a medal fresh from the mint; the earth is as a shilling which has sustained the effects of passing for years and years from pocket to pocket.—*All the Year Round.*

The Loom and the Anvil.

In confirmation of what we urged last week, the Augusta, Geo., *Constitutionalist* very truthfully remarks, that "the best allies of the South are near at home. They are the plow, the loom, and the anvil. They are the implements of industry in all the departments of labor. The strong arms of industrious laborers are the true redeemers of our land from depression and impoverishment. Those who are willing to work and to make labor respectable and respected, are the practical patriots of the emergency.

"Nor need it be feared that Gen. Grant will bring his influence to bear against the material prosperity of the Southern States. As a war measure he aided in desolating the South with fire and sword. But since the war he has expressed no sentiment of vindictiveness against our section. There is reason to believe his sentiments are not hostile to us. At the time of the surrender he manifested a liberal spirit toward the army and people he had conquered. He has at no time since indicated a change of temper."

MANILLA cigars are made by female children and adults. The mode of making the cigars differs materially from that employed in this country. The tobacco passes through a dozen hands. After the filling and wrapers are assorted, one set of girls select the filling and arrange it in proper order, another set trim the wrappers, a third roll the wrappers about the filling, while a fourth stand by with their fingers in a pot containing paste or mucilage manufactured from a plant which grows in luxuriance on the island. At a proper time a girl, with a dexterous wipe, applies the gummy substance to the edge of the leaf, and the operator, by a peculiar twist of the wrist, brings the edge down upon the cigar, and casts it into a basket on the opposite side of the table. There are eight manufactories in Manilla, enploying twenty-five thousand women and girls, whose wages average seven cents per day.

HOW TO TAKE CARE OF TEETH.—We think it safe to say that a majority of people pay too little attention to their teeth; and the result is that dentists find plenty of employment, and numerous are the diseases of the teeth and gums. The teeth should be cleansed at least twice a day with a soft tooth powder (precipitated chalk is the best) and a little soap. Unless this care is taken tartar is liable to form upon them, and if suffered to accumulate it causes inflammation and absorption of the gums and gradual loosening of the teeth, which can only be prevented by observing the above simple practice. When tartar, which is a deposit of salts of lime and organic matter from the saliva, is allowed to accumulate it becomes hard and can only be removed by the scaling instruments of the dentist.

THE Welsh puddlers and other operatives at the Tredegar Iron Works, Richmond, Va., are on a strike in consequence of an attempt to reduce their wages.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Keeping Boilers Clean---Surface Blowing-off.

MESSRS. EDITORS:—Being a subscriber to your paper and enjoying its benefits, I thought I would send you my experience in cleaning boilers. I have charge of a large boiler and engine, and have tried various ingredients to take off the scale but without much success till this summer, when, changing my exhaust pipe, I put a tunnel on the top of the pipe to catch the water, and conveyed it by a half-inch gas pipe to the reservoir from which I fill my boiler after blowing off. The result is that the two last times I blew off I was bothered with the blow-off pipe clogging; especially the last time, when the pipe clogged under forty pounds pressure, so that I had to turn the plug several times before I could get the boiler empty. When empty I opened the mud pipe and found it full of scale from all parts of the boiler, some of the pieces being a quarter of an inch thick.

The boiler is now almost perfectly free from scale, and what little there is is loose and will blow off the next time I empty the boiler.

I have used the same water that has always been used in the boiler, and I attribute the loosening of the scale to the oil that I use in oiling the cylinder, incorporated in the exhaust water, which I use only when filling the boiler after blowing off. I expected when I tried it that the boiler would foam but was disappointed.

I have a surface blow-off. I took some 2-inch pipe and cut it in lengths so that I could get it through the man-hole, and had ¼-inch holes bored in half of its circumference, and laid the pipe lengthwise of the boiler on pieces of iron about two inches above the flues fastening it with wire. I run the end through the front of the boiler with 1-inch pipe and attach a globe valve. I have it blowed off five or six times a day and the amount of dirt that is blown out is incredible. The boiler is five feet in diameter with ninety-four 3-inch flues, and I use Lake Erie water. G. L. B.

Rochester, N. Y.

[The experiment of our correspondent is one which we recommend to all our readers who have to feed their boilers with "hard" water. Save the drippings of the exhaust pipe, the condensation of the safety valve blow-off, and that from the cylinder, and use the water thus obtained to fill the boiler after blowing off. The result will be surprising in its effect in loosening scale. For this reason—the change of quality of water—our Sound boats are seldom troubled with scale, as at each end of the route fresh water is used to fill the boilers.

The idea of a surface blow-off pipe is one we can also highly commend, having employed a similar device with good results several years ago.—EDS.

Old Fashioned Lathes.

MESSRS. EDITORS:—In your issue of October 21st, W.W. T. wants a rule for "old fashioned lathes of four gears." Here is one. Suppose nine threads are to be cut and the leading screw four to the inch. Select any two wheels, say 50 and 60 teeth; then to find the other two, put them in the form of a fraction, thus $\frac{50}{60}$; reduce them to their lowest terms, $\frac{50}{60}=\frac{5}{6}$. The number of threads to be cut and number on the leading screw are to be put in the same way, thus, $\frac{9}{4}$; multiply the first by the last, thus, $\frac{5}{6}\times\frac{9}{4}=\frac{45}{24}$, the product being the two wheels sought, one of which is put on the live spindle and the other one the screw. The live spindle being the denominator, the wheel of 24 teeth is placed on it; the denominator of the other pair, 60 teeth, comes next, working in the 24, the numerator of the first pair; 50 teeth is next, and the numerator of the last, 45 teeth, on the screw. Then we have them this way: Spindle, 24; inside of stud, 60; outside of stud, 50; screw, 45. W. D. YOUNG.

Pittsburg, Pa.

Oiling Harness.

MESSRS. EDITORS:—Having seen numberless processes in your valuable paper for preserving and cleaning harnesses, I would like to add my experience to the list if worthy the space it occupies.

In the first place, I subject the harness to one or two coats (as the leather may need) of lamp black and castor oil, warmed sufficient to make it penetrate the stock readily. Then I make about two quarts of warm soap suds and with a sponge wash the harness. When dry, rub it over with a mixture of oil and tallow, equal parts, with sufficient lamp-black to give it color, or, what is better, prussian blue, which gives it a new and fresh look. This compound should be applied sparingly and well rubbed in, which can be quickly done and will leave a smooth and clean surface.

The advantages I claim for this process are these:

First, By saturating the stock in the first place with oil, the soap and water are prevented from penetrating it in the process of washing. When leather is permitted to absorb water or soap it has an ultimate tendency to harden it.

Second, When the harness is washed *first* (as is generally the case) the water repels the oil; consequently in the one case you have the oil inside of the stock, and in the other you have the soap and water.

Third, By oiling first it softens the dirt, so that it can be washed off in at least one-half the time required when washed before oiling, and also saves the "scraping" process which defaces the grain of the leather.

Fourth, It will remain soft much longer from the fact of its being penetrated with oil.

Fifth, The whole process can be accomplished without the delay of waiting for it to dry.

Consequently the harness can be oiled and cleaned in much less time, will remain soft longer, wear longer, and look better than when cleaned by the old method. And I consider these reasons of sufficient importance for every one having a harness to give this method a fair trial. E. D.

Stoughton, Oct. 23, 1867.

Expansion of Ice.

MESSRS. EDITORS.—In the SCIENTIFIC AMERICAN of the 11th inst., I noticed an article on the Expansion of Ice. Several years ago my attention was called to this subject by Prof. Faraday, who said that water expanded at the freezing point, but said it was still a mystery and it seemed to me to be in contradiction to the laws of nature to make cold expand water when it contracted everything else. Therefore I set to work to see if possible what was the cause. I have felt deeply interested on the subject, and tried experiments, searched philosophy, watched for all that was said or written on the subject, read Dr. Tyndall's lectures to see if he, with all his vast store of knowledge and deep philosophy, gave an explanation of it; but I was disappointed, as I found nothing which appeared to meet the demands of the case. And now as the subject is under discussion in England, I thought I would give you some of my observations on the subject. I had no means of testing the matter, but watched the changes and appearances of water when being frozen; and I always found that there were myriads of little bubbles continually rising to the surface. When the water was in a vessel, these small bubbles would make their appearance on all parts of the vessel, small at first but continually increasing in size as the freezing went on, until they become large enough, or rather I suppose light enough, to rise to the surface; these would come to the top, burst, and disappear if the ice had not formed over the surface, but as soon as the top was covered with ice, they could not escape, but come up and touch the under side of the ice and there remain. The water around them would be frozen in turn leaving these air cells there, which are seen in all ice and give it a honey-comb appearance, leaving it lighter than the same bulk of water before frozen and causing ice to float on the top of the water. The only thing now is to show how these air cells are produced, for it is evident to my mind that the water does not increase in bulk nor yet the ice, but that they are forced apart by the expansion of this air contained in the cells. As a liquid is being changed to a solid it throws off heat, and I incline to think this heat is what enters the air (which all water contains) and thus it becomes expanded and may expand sufficiently to burst the ice.

There is also another agent (electricity) which is excited by the condensation of water or ice. This powerful fluid would itself be sufficient to burst the ice and any vessel which might contain it. Is it not more reasonable to think this air is expanded than that cold the condenser of every thing else should expand water and ice because it gives that appearance? I hope these remarks may be of some interest to some of your readers, and lead to further investigations.

Tarrytown, N. Y. C. D. SUTTON.

[We have given place to our correspondents views; but will add that the question now in dispute is not whether water expands when freezing. It is whether ice *after it is ice* expands or contracts as the temperature is diminished.—EDS.

Solidification of Water by Pressure.

MESSRS. EDITORS:—I noticed in the SCIENTIFIC AMERICAN of October 28, an article on solidifying of water by pressure and sounding of the ocean.

An experiment was made some years ago (by whom I do not recollect) in regard to the pressure of water at a given depth. A large bottle was procured, with a tapering cork so fastened that it was impossible to come out. It was then sunk to a depth of 3,000 feet; and, after a short interval, drawn to the surface, the cork was found to be forced into the bottle, the bottle filled with water, and the cork forced back into the neck of the bottle perfectly tight. And that, with some other events, has given rise to the theory that bodies, after sinking to a certain depth, remained suspended in the water—the pressure of the water on all sides being equal. The principal question is, Is there an equal pressure of water at any given depth? If so, that is if there is an equal pressure at a given depth, the theory of suspension is possible as well as probable.

Waterford, Minn. J. S. NICHOLS.

[Our correspondent seems to be ignorant of the truth that, at any point beneath the surface of a liquid, the pressure is equal in all directions. Bodies do not sink by virtue of the pressure of the medium through which they sink, but by virtue of their superior gravity. The bottle experiment is an interesting one in many points of view, but we cannot see that it bears in any way upon the subject of the solidification of water by pressure.—EDS.

Prime Numbers---A Prize.

MESSRS. EDITORS:—I will give one thousand dollars to the first person who, within one year from date, will give a correct rule for detecting prime numbers. Said rule must apply to all prime numbers to their utmost extent.

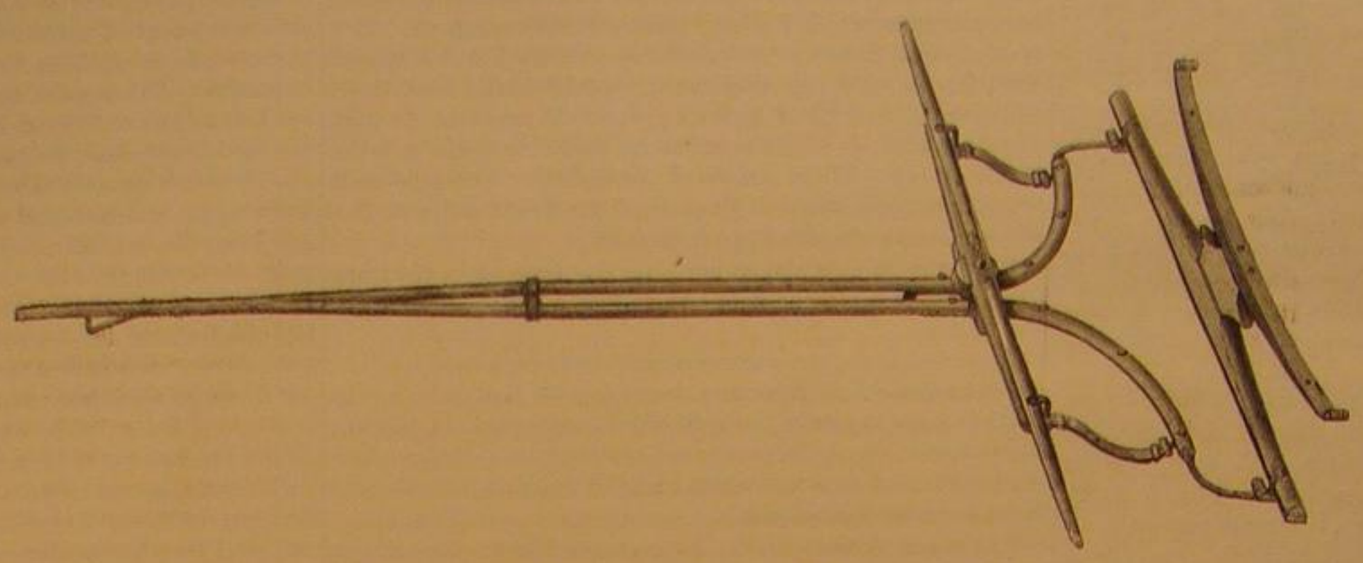
Biddeford, Me., Nov. 9, 1868. GEORGE S. MCINTIRE.

[We can assure our correspondent, in advance, that he may rest perfectly secure in the possession of his thousand dollars—mathematicians, ancient and modern, have worked long and hard at this problem, but, like the perpetual motion, it won't go.—EDS.

IN tempering metals an exact series of experiments has proved that the following colors are produced at the temperatures given: Very pale yellowish by 430°; pale straw, 450°; yellow, 470°; brown, 490°; mottled brown, 510°; purple, 530°; bright blue, 550°; blue, 560°; dark blue, 600°.

Improvement in Carriage Tongues or Poles.

The pole represented in the accompanying engraving is intended as an improvement and a substitute for the heavy carriage poles in ordinary use, the weight of which is galling to the necks of horses without a corresponding advantage in strength. This, it is believed, combines lightness and strength. The pole is formed of two pieces, or two separate poles connected and secured at the forward end by a metallic sheath or other means, and spread apart and thus held, by a block and strap between the front end and the spilnter bar. Here they are fastened to a block and then curved downward and outward, diverging on each side to receive the bolt of the clips on the forward bolster. The downward curve is so calculated as to give the proper elevation to the pole, while the vehicle may be turned short without bringing the back ends of the pole in contact with the elliptic spring. An iron strap, the ends of which form eyes for the reception of the bolts passing through the ears of the clips, serve to strengthen the pole, as it extends beyond the splinter bar in one piece, the two branches being united. The device is recommended to the attention of our carriage makers.



MITCHELL'S PATENT CARRIAGE POLE.

Patented through the Scientific American Patent Agency, April 7, 1868, by V. N. Mitchell, who may be addressed for the purchase of rights, etc., at Concord, Cabarras Co., N. C.

TAMKIN'S AUTOMATIC HEAT DAMPER.

The ingenious device shown in the engraving is designed to control the draft of a fire, or rather the escape of the products of combustion, automatically, by the heat of these products. The principle is the well known one of the variableness in the expansion of different metals by differing degrees of temperature.

The damper is the ordinary disk generally introduced into stovepipes, attached to a stem or axis to one end of which a pointer is attached. The other end may have a thumb piece, if considered necessary, as usual. On the pointer side of the pipe is affixed a dial or a sector with marks to indicate by means of the pointer the position of the damper, and if required, the degrees of heat. This is operated by a composite spring, one end of which is riveted to the funnel or pipe and the other end brought in contact with the plate of the damper. The spring is made of two metals of unequal expanding power, as copper and iron, that of the least expanding quality nearest the damper; one side of the damper, that against which the spring impinges, being slightly weighted.

The operation is thus: When there is little or no heat in the flue or pipe, the damper, from being slightly weighted on one side, will hang vertically, but as the heat increases the copper portion of the spring rapidly expands and the spring is curved, impinging on the damper, until, as the heat is sufficiently increased, the damper will be approximately closed, as it is not intended that no room whatever shall be left for the escape of the products of slow combustion. This invention is designed more particularly for stoves and other household warming apparatus, but may be applied to sugar houses, paper mills, etc., where regulation of the heat and the saving of heat is important.

Patented through the Scientific American Patent Agency, September 29, 1868, by George Tamkin, who may be addressed at 251 Water street, Newburgh, N. Y.

PROF. DOREMUS ON THE CREATION.

On the evening of the 9th instant, R. Ogden Doremus, Professor of Chemistry in the *Bellevue Medical College*, and in the *College of New York City*, gave at Lyric Hall, Sixth avenue, an interesting lecture on the "Creation according to Chemistry, Geology, and Astronomy, as compared with the Mosaic Record."

After referring to the motions of the earth, and the general belief that the earth consists of a hollow crust filled with molten matter, the lecturer reviewed the theory that the matter now composing the earth's mass was originally in a gaseous state and that by gradually cooling it has become first liquefied and subsequently solidified. The planets and the sun were also at the same period gaseous. The lecturer illustrated this part of the subject by some very interesting experiments with gaseous bodies, which were shown to be capable of change from gaseous to fluid states, and from that to solid form.

He claimed that the scriptural account, "the earth was without form and void," was as forcible an expression of the views of scientific men in regard to the chaotic period as could possibly be framed.

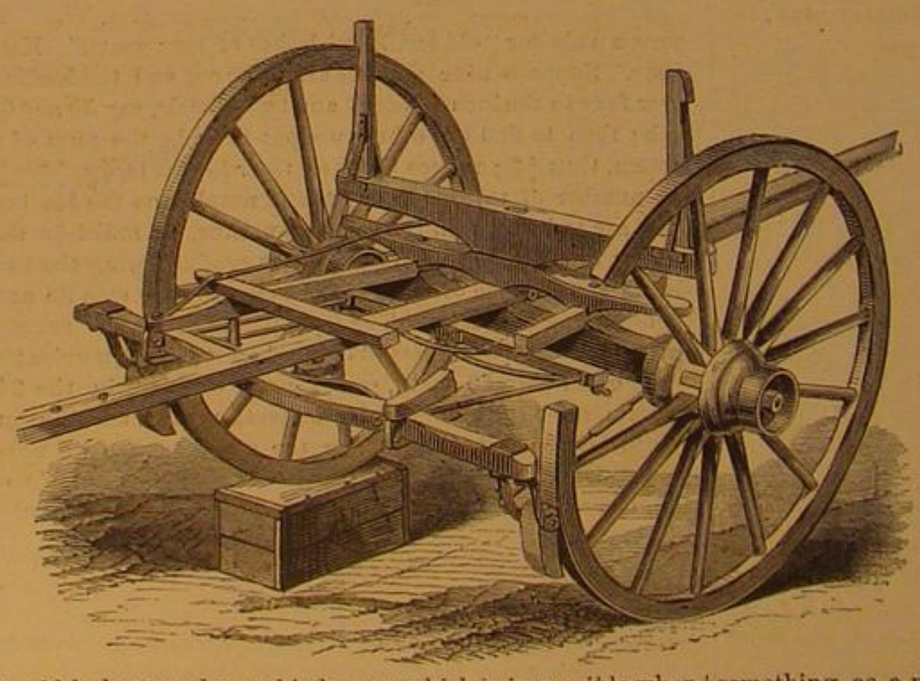
On the subject of the creation of light the lecturer dwelt at length, discussing its nature and the methods of determining the nature of the sources from which we obtain natural light. By the spectroscopic method it has been determined that solar light is produced by the combustion of matters similar to those found upon the surface of the earth. More than this, forty stars have also been examined in the same manner with like results. The lecturer stated that while the earth was in a state of incandescence it was also self-luminous, and that its luminosity diminished with its temperature until now it shines only by reflected light. Professor Doremus also made some remarks upon artificial illumination, among which he stated that the recent experiments in France have established the fact that pure oxygen and hydrogen in their combustion give the strongest light of any yet artificially produced. He then traced the gradual progress of the formation of the earth and living beings up to the present period. On this head he remarked that the whole geological history of the world was a process of gradual preparation for the advent of mankind, and that the Mosaic record, which places man as last in the order of creation, was in exact accordance with the teachings of modern geology.

The present condition of the earth indicates a long duration, and he maintained that science shows our race to be only in its infancy.

The lecture is the first of a series of four to be delivered by Prof. Doremus, and was largely attended and attentively listened to.

LADENBERGER'S PATENT WAGON BRAKE.

For heavily loaded teams a brake for holding the load and relieving the animals is so much a necessity that almost all the conveyances of freight over uneven roads are provided with them. Usually they are operated by the hand or foot of the driver; but in critical positions his undivided attention should be bestowed upon his horses, which is impossible when he must, in addition, govern the brake. Automatic devices have been invented to relieve the driver, but they have not always proved satisfactory in actual use. The engraving accompanying this description represents an improved plan which the inventor believes to be fully competent to meet the objections usual to the ordinary brake.



The doubletree over the front of the hounds is connected by a slotted plate through which a bolt passes in the usual manner, with a plate, also slotted, extending back to receive the king bolt that passes through the forward axle. The connection between the two is made by a pivot or by hinges. This latter plate is fixed to a cross bar and is connected by rods to a sway bar under the reach. To this bar are attached, by slings or stirrups, shoes or brakes, as seen in the engraving. The cross bar and sway bar are connected by rods and are kept back by two semi-circular springs fixed to the axle at their inner ends and to both these movable bars. A friction roller is pivoted to the under side of the reach just in advance of the sway bar, and impinges on a curved strap affixed to the sway bar so that it will be the means of taking up a portion of the strain of the draft and distributing it proportionately upon all the parts.

The bringing forward of the shoes or brakes is accomplished by means of the rods connecting the suspending stirrups and the axle, so that when the draft is released the springs throw the sway bar backward and the rounded heel of the shoe is brought in contact with the tires; the forward motion of the wheels in combination with this rounded portion inevitably bringing the faces of the shoes in contact with the periphery of the wheels. In backing, the shoes will be held away from the tires by the reverse motion, as is obvious. The length of the slots in the plates mentioned are arranged with reference to the position of the friction roller and curved plate that the draft strain must be equally distributed, instead of being sustained wholly by the king bolt or the bolt of the doubletree.

Patented through the Scientific American Patent Agency by F. D. Ladenberger, who may be addressed for additional information at Glenbeulah, Sheboygan Co., Wis.

Sea Sickness.

An abstract of a paper upon the above subject in *The Medical Gazette*, of the 7th November, contains rules for the guidance, of those who are about to undertake sea voyages. The hearty meal system before going aboard, conflicts, to say the least, with the views of those whose opinions, based upon much experience in voyaging, ought to be valuable. We give below the rules, and would ask of our numerous sea-going readers their views of the subject:

"Those liable to be sick should make a hearty meal not more than two or three hours before going on board. They should select a spot as near as possible to the center of the vessel, and lie down before she gets under weigh. The horizontal position should be rigidly kept during the whole passage. The person should be well covered, not only to protect from cold, but to shield from disagreeable sounds, sights, and smells. A stateroom should be selected as near as possible to the center of the ship, but not near the furnaces. In going to Europe, it is better to be on the starboard, and, in returning, on the larboard, which will be the sunny side. The following suggestions for the prevention of sea-sickness had proven efficacious:

"1st. Have every preparation made at least twenty-four hours before starting, so that the system may not be exhausted by overwork and want of sleep. This direction is particularly important for ladies.

"2d. Eat as hearty a meal as possible before going on board.

"3d. Go on board sufficiently early to arrange such things as may be wanted for the first day or two, so that they may be easy of access; then undress and go to bed before the vessel gets under weigh. The neglect of this rule by those who are liable to sea-sickness is sure to be regretted.

"4th. Eat regularly and heartily, but without raising the head, for at least one or two days. In this way the habit of digestion is kept up, the strength is preserved, while the system becomes accustomed to the constant change of equilibrium.

"5th, On the first night out, take some mild laxative pills, as for example, two or three of the compound rhubarb pills. Most persons have a tendency to become constipated at sea, although diarrhœa occurs in a certain per centage. Constipation not only results from sea-sickness, but in turn aggravates it. . . The effervescing laxatives, like the Seidlitz, or the solution of the citrate of magnesia, taken in the morning on an empty stomach, are bad in sea sickness.

"6th. After having become so far habituated to the sea as to be able to take your meals at the table and to go on deck, never think of rising until you have eaten something, as a plate of oatmeal porridge, or a cup of coffee or tea, with seabiscuit or toast.

"7th. If subsequently during the voyage the sea should become unusually rough, go to bed before getting sick. It is foolish to dare anything when there is no glory to be won, and *something* may be lost."

We know from experience that these directions are generally sound, but if "the horizontal position should be rigidly kept during the whole passage" we suggest that the patient be strapped down to an oak plank or an amputating table. This practice would insure a continued rigidity all the way over.

GREEK FIRE.—What is commonly called Greek fire, consists of a solution of phosphorus, or of sulphur and phosphorus, in a very volatile liquid, the bisulphide of carbon, to which some mineral oil is added, to increase its incendiary powers. To extinguish the flame produced by this agent, throw upon the burning surface some wet or damp sand, ashes, sawdust, lime, or wet sacking or carpeting, any material by which the flame can be stifled by exclusion of air. No attempt should be made to remove the covering for some time after the flame has been extinguished. A powerful jet of water should be played upon the place afterwards.

A QUEER case of combustion occurred at Elk Grove, Wisconsin. Mr. Shane Morgan was threshing wheat with a machine, when the wheat ignited from the machine, and stacks, machine and appliances, were all consumed.

ICE MACHINES.

II.—MACHINES ACTING BY THE PREVIOUS APPLICATION OF HEAT.

To understand the working of this apparatus it is necessary previously to explain a few peculiar properties of ammoniacal gas, chemically simply called ammonia. A solution of this gas in water is universally known as spirits of hartshorn or liquid ammonia; the gas is produced by heating an intimate mixture of chloride of ammonium (sal ammoniac) with slaked lime; the chlorine combines with the lime, the ammonia is set free, and being a gaseous substance escapes; when this gas passes through cold water it is readily absorbed, as the affinity of water for ammonia is so very great that it will dissolve of this gas 1,000 times its own volume. It is absorbed with such rapidity that when a bottle, filled with ammoniacal gas, is with its neck plunged in cold water, the water will rush in the bottle as suddenly as if previously a vacuum had been made in it; this demonstration of the rapid solution of the gas by the water, constitutes a common but striking lecture-room experiment. On the contrary, when the water is hot it will not only absorb no gas, but by heating water previously charged with it, the gas absorbed at a low temperature will be almost entirely expelled.

Another property of this gas is, that it also may be liquefied without the intervention of water. When at the common temperature of 70° Fah., a pressure of nine atmospheres, or 135 pounds to the square inch is applied to it, it will take the liquid form, and by relieving the pressure, return at once to the gaseous state. The liquefied gas is thus not to be confounded with its solution in water, having quite different properties.

Now a principle comes into play here, which has been alluded to before, and which is also at the base of the working of different machines operated by ether, water and sulphuric acid, carbonic acid, chymogene or petroleum gas, etc.; namely, when a liquid substance, by removal of pressure, is forced to assume a gaseous condition, it will absorb heat; as a general rule it is necessary to communicate heat to liquids when we wish to change them into a gaseous condition, and the greater portion of the heat will become latent, which means that no thermometer will indicate it, it is, as it were, hidden in the gas or vapor; but when we force liquids to become gaseous without giving them the heat absolutely required to assume the gaseous condition, they will take the heat from he surrounding bodies, and from themselves, that is, from .he liquid remaining, from the vessel containing it, and from the sensible heat of the escaping gas,which then, by the thermometer, will indicate a very low temperature, and communicate this to all bodies they come in contact with, or in other words, absorb their heat after the laws of caloric equilibrium. The more so, when in case of a liquid which owes its condition to pressure, by removal of this pressure, we allow the liquid to resume its natural gaseous condition, it will absorb still more heat than in the previous case, and consequently the degree of cold produced will be in exact proportion to the pressure previously required to keep it in the liquid state.

As a matter of course there are practical limits; where the immense power required to liquefy certain gases would not be compensated for by the greater degree of cold produced, and on the other hand, where the volatile power of the liquid employed is small and consequently affects only a slight degree of cooling, the results cannot be of the most favorable kind.

These are the properties of which use is made in the machine now to be described. It appears to have been first practically applied to the making of ice by Carré, of Paris, who, in 1862, had such a machine on exhibition in London; its construction is so simple that it may be easily understood without figures. It consists of two vertical cylindrical vessels, of different size, at their upper ends connected by a tube; they are made of strong sheet iron; the largest of them has double sides, the space between them being hermetically closed, and at its upper part connected by means of a strong tube, with the upper part of the second smaller vessel, which is a simple upright cylinder and also hermetically closed; the vessel is filled with a strong solution of ammonia in water, or the so called *aqua ammonia fortior*. By the heating of this vessel the ammoniacal gas is driven out of the water, according to the properties explained above, and if the double-sided vessel, at the same time, is placed in cold water, the pressure of the developed gas, will be sufficient to liquefy the gas itself between the double walls of the large vessel. As soon as this is accomplished, the apparatus is ready to commence the freezing operation, the water to be frozen is placed in a proper vessel of a thin well-conducting metal closely fitting in the open space inside the double-walled larger cylinder, between the walls of which the ammoniacal gas has now been liquefied by the pressure produced by heating the smaller vessel. This smaller vessel being hot, is now suddenly plunged in cold water, the water confined inside which first had its ammonia expelled by heat, regains at once by means of the cold applied to it, its most intense affinity for this gas, it will absorb it with great rapidity, the liquefied gas in the larger vessel will be relieved from the pressure which brought and kept it in the liquid state, and it will consequently re adopt the gaseous form, distil over as it were, to be condensed in the water of the smaller vessel, and this forced evaporation in the larger vessel, will be productive of such an absorption of heat from this vessel and the water contained in its center, that this water will rapidly be frozen to a very hard solid cylinder of ice.

Experience has taught the following rules in the manipulation of his apparatus: The heating of the smaller vessel containing the solution of ammonia in water, must be done slowly, till a thermometer connected with it shows a temperature of 260° Fah. above the larger vessel placed in the cold water, which must be kept agitated, or, better, continually renewed by a small stream, in order to keep it cool, much heat being developed or set free during the liquefaction of the gas inside. It is this same heat which is absorbed by the evaporation of the liquefied gas during the consecutive absorption of this gas by the water in the smaller vessel, which produces the freezing temperature; this heat (abstracted from the water to be frozen), will be set free again, and is thus carried to the cooling water into which the smaller vessel is placed. The operation thus amounts to the abstraction of heat from a small portion of water (to be frozen) and the carrying of it to a larger portion of water, by means of the peculiar properties of ammonia, as explained.

It is clear that after this freezing the apparatus is at once ready for another operation, the only precaution being to turn the vessel for a few seconds in such a position that any water carried over accidentally into the double-walled vessel may run back into the smaller one, so as to be sure that the double-walled vessel is entirely empty, when commencing the operation: the heating of the smaller vessel containing the solution of ammonia in water.

THE BEST MODES OF TESTING THE POWER AND ECONOMY OF STEAM ENGINES.

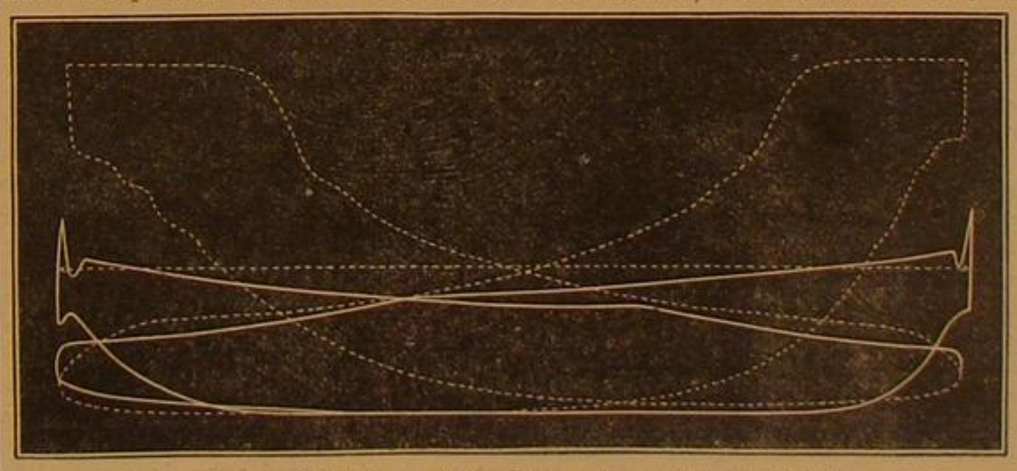
BY CHARLES E. EMERY, LATE OF THE U. S NAVY AND U. S. STEAM EXPANSION EXPERIMENTS.

Read before the Polytechnic branch of the American Institute, Oct. 22, 1868.

(*Continued from page* 323.)

NOTE.—Mr. Emery, when reading that portion of his paper which was published on page 322, exhibited the diagrams above shown in support of his position. "These," he said, "were selected from a number taken in the manner described, for the purpose of testing the accuracy of the indicator when used under different circumstances. The engine was provided with a link motion, which was adjusted first to give a certain speed with a wide throttle, and afterward shifted to full gear, and the throttle closed to give the same speed, without altering the load. The two sets of diagrams should therefore bear the same area. On the contrary, the difference can be seen with the eye. The light diagram shows a mean effective pressure of 8·6 lbs., while that of the dotted diagram is 11·06 lbs., or 28·6 per cent larger. The engine was making fifty-one revolutions per minute, and the scale of the indicator was 16 lbs. to the inch. (N. B.—The diagrams have been reduced to suit our columns.—EDS.) In this case the tardy action of the pencil of the instrument showed itself both on the steam and cushion lines, so the difference is enormous. With an independent exhaust valve, the difference in proportion would have been only about twelve per cent, and by using a stiffer spring would have been still up." Mr. Emery requested others to try the experiment themselves before expressing their views too strenuously, and then proceeded with the reading of his paper.

When the indicated power alone is used, it is important to know the probable friction of the engine, so that the net



power, or that portion available for useful work, may be estimated. A favorite method is to take an indicator friction diagram from the engine, when disconnected from its load, and running at its working speed. The mean friction pressure thus obtained is supposed to be constant at all loads. Hence it is usual to deduct from the indicated working pressure the indicated friction pressure previously obtained, when the remainder represents the force available to produce motion. From this, however, is deducted the friction of the load, usually called seven and a half per cent; and the net power is calculated from the second remainder. For instance, if the mean working pressure be 42 lbs., and the friction pressure 2 lbs., 40 lbs. is available to produce motion without a load; and seven and one half per cent of this, or 3 lbs., represents the friction of the load; so that 5 lbs. pressure is lost in friction, or about twelve per cent of the whole. This mode of calculation cannot always be depended upon. We have known a case where the mean indicated working pressure in the cylinder was only 8 lbs., and the friction pressure two pounds. Consequently, by the above method, about thirty per cent of the power was absorbed by friction; but the dynamometer showed that less than ten per cent was lost in that way. Similar cases, differing only in extent, will be found quite frequent. The reason is that engines are packed for the working, and not for the friction pressure. If the steam pressure be 100 lbs., the packing must embrace the piston and valve rods with sufficient force to prevent leakage, or say 105 lbs. for every square inch of surface packed; and nearly the whole of this will produce friction, when a low pressure is used, but the full pressure will work in between the surfaces, and force back the packing, so that the friction from that source will be least when the engine is doing its regular duty. Spring packed pistons modify the friction in the same way. In very large engines the state of the packing would have little influence on the friction, though it certainly would seem proper to loosen the stuffing boxes before taking friction diagrams. In some cases engines are so weakly constructed, that, though the indicator may show little friction, without a load, there will really be a great loss when the work is being done, due to parts springing out of line, etc. The dynamometer furnishes, therefore, the only true means of obtaining the net power. In well constructed engines we should be able to calculate the friction by regarding the weight of the moving parts as part of the load,which is moving with a certain velocity in bearings of a given material, and having therefore a certain co efficient of friction, say seven to eight per cent. For ordinary purposes, when trial is not convenient, we may assume the friction of small engines, of bad design, or of any engine with weak framing, as being from twenty to twenty-five per cent of the indicated power; while in good engines, of ordinary shape and proportions, it is sufficient to allow fifteen per cent for medium size, and as low as ten per cent, or even eight per cent, in exceptional cases, in large engines of solid construction and good workmanship.

Having described the instruments used in determining the power of the steam engine, we propose to postpone future remarks upon the proper methods of their application and use, until the closing general discussions; and we will now proceed with the next branch of inquiry; namely,

II. THE ECONOMY OR COST OF THE POWER.

Money is the standard unit of value. Hence everything which costs money, that is required in order to obtain the steam power in any case, is a proper charge to the cost of the power. Therefore, strictly speaking, the cost of the fuel, of the oil, and of needed repairs, together with the wages of the attendants, and also, perhaps, a sinking fund for prospective renewals, should all form part of the aggregate cost. Nor should either of these items be neglected. It would be poor economy for a person to purchase an engine designed to save fuel, which, for any reason, was liable to frequent derangement; for it is not alone the cost of the repairs which are to be considered, but the losses which occur from stopping work in the mill or factory. We cannot, however, in our present inquiry, discuss matters of design (though they should always be considered by a purchaser), but must confine ourselves to the methods and means employed to ascertain the economy of fuel.

The combustion of the fuel evolves heat, which uses water as a vehicle, and is carried with it to the engine, and there produces the power. The true measure of the cost, then, is the quantity of heat required to perform a certain quantity of work. Heat being imponderable, can be measured only by its effects on other bodies. The standard unit of heat, or "heat unit," is the heat required to raise the temperature of one pound of distilled water at 39° one degree Fahrenheit. The mechanical equivalent of a unit of heat is 772 foot pounds of work; but the best steam engines obtain only about one tenth of that quantity. Such a result has often been regretted by scientific minds, and many have spoken of it as mysterious. We consider the steam engine of to-day very defective. Some of the defects are inherent; they can be pointed out, but cannot be remedied without changing the general principles of construction. The majority of the practical loss has, however, never been satisfactorily explained. The writer, like others, has his own theories on the subject, but he has no desire to present them publicly till they have been tested; for if they be correct, the principal difficulties can be removed. Few appreciate the extent of the losses in the steam engine. It is only the best examples that utilize even one tenth of the heat. In such cases one tenth is condensed for the work, and about four tenths is wasted in the clearances and the exhausting steam, even when expansion is carried on, until the terminal equals the back pressure. The remaining five tenths are imperfectly accounted for. Cases are not unfrequent where only three to five per cent of the heat taken from the boiler is utilized in work! The discrepancies occur chiefly at the higher grades of expansion. Without expansion, it is easy to understand that most of the heat must go away with the exhaust.

When steam is generated by the application of heat in the boiler, to water only, the water, in becoming steam, always takes up a certain fixed quantity of heat; in other words, becomes saturated with it, and forms saturated steam. Hence, if we can measure the water evaporated, to produce the power of an engine, we can easily estimate the quantity of heat used. The feed water is therefore a perfect measure of the comparative cost of the power, when evaporated in a good boiler, having no superheating surface. The economy of steam machinery is, however, generally measured by the amount of coal or other fuel consumed to perform a certain quantity of work. The conventional standard of comparison between all kinds of engines is, The Number of Pounds of Coal Burned per Indicated Horse Power per Hour. The indicated power can be obtained with comparative ease, as has been explained; so also can the coal per hour. Hence the above standard has the merit of great simplicity, and consequently is used by all nations. We must therefore adopt it, or at least use it, in order to be able to compare our rsults with those of others; still the method is liable to very considerable errors, which we will examine with the view of correcting them.

It has been shown that the indicator cannot always be relied upon to accurately measure the power. The qualities of coal vary so much, also, in different localities, that the amount consumed does not furnish an accurate comparative measure of the cost of the power. When the coal measure alone is used, too, the engines and boilers are both tested together, which gives no opportunity to ascertain which of the two is entitled to the credit of the performance. This standard will not then answer the purpose of a scientific investigation. In such case we must ascertain, in addition to the coal, the amount of water evaporated; we can then estimate the value of the coal, and the separate efficiency of both the engine and boiler. The value of the coal, and the efficiency of the boiler, are shown by The Number of Pounds of Water Evaporated per Pound of Coal, and the economy of the engine as compared with that of others by calculating The Number of Pounds of Steam Used per Horse Power per Hour. The weight of the steam used is, of course, the same as that of the water evaporated.

In all ordinary practical trials, the economy must be determined simply by the quantity of fuel consumed to produce the power. Hence we will first try and find a solution of the difficulties which attend this kind of measurement.

THE FUEL.

The different kinds of fuel vary so much in value that it is impossible to accurately compare them. Coal being most generally used, is the natural standard; but there are so many varieties of this necessary article, varying greatly in quality, that it seems a hopeless task to try and compare the performance of steam engines in different parts of the world, or even of our own country, by the consumption of differing coal, which may vary twenty per cent in heat producing power. The best way is, evidently, in comparative trials, to use selected coal from the same mine. Yet, how rarely can this be done? and even if this precaution be taken, in certain cases, how can a comparison be made with the results obtained by others widely separated, and possessing, possibly, different views? We must say that the problem cannot be solved with scientific accuracy; still we are able to suggest some corrections which will reduce all varieties of good coal to substantially the same standard, and thus enable us to use this measure in simple practical trials.

We cannot examine in this paper, with any minuteness, the chemical constituents of the different varieties of coal. For our purpose we will simply divide them into two portions; namely, the non-combustible and combustible.

The non-combustible portion consists, for the most part, of earthy matters, though oxygen and nitrogen gases are often present; and most coals absorb considerable water. The combustible portion consists of carbon and hydrogen, the first largely predominating. In American anthracite about three per cent of the combustible is hydrogen. The semi-anthracite combustible contains about five per cent; and the bituminous varieties a large proportion, varying with the locality of the mines. It is authoritatively stated, that, in some varieties of Ohio and West Pennsylvania coal, the hydrogen element is often twenty-four per cent of the whole combustible. For the consumption of equal weights of hydrogen and carbon, the first requires three times as much oxygen as the latter; the heat resulting should therefore bear a somewhat similar proportion. Favre, Sieberman, Andrews, and others, have, from experiment, estimated the calorific value of one pound of carbon to be the heating of about 14,000 pounds of water, one degree Fahrenheit. The corresponding value of hydrogen was similarly determined to be about 60,000 heat units. Bituminous coal, containing considerable hydrogen, should therefore produce a very much more heat in combustion than anthracite; but in practice the difference is comparatively small. Mere differences in mechanical structure appear to have a greater influence than chemical constitution. The reason is not evident. The latent heat of the steam resulting from the combustion of hydrogen, which is lost in the atmosphere, will not nearly account for the discrepancy. Without attempting an explanation, except perhaps imperfect combustion, we can, for our purpose, only turn to the records of practical experiments, and find what different kinds of coal have done, and may therefore be expected to do again.

Bourne gives the evaporation efficiency of thirty varieties of coal from different parts of the British Isles, or from 7 to 10·2 pounds of water from a temperature of 212°. The average was 8·7 lbs. These coals are, as is well known, of the soft or bituminous variety. The results of experiments made by the Navy Department, with thirteen varieties of American anthracite, from different parts of the Pennsylvania coal field, gave a mean evaporative efficiency per pound of coal of 8·9 pounds of water, from a temperature of 212° Fah. Three specimens of American bituminous coal gave a mean result of 9·9 pounds, under similar conditions. These figures make it appear that our American coals are superior to those of other nations. Professor Johnson, at an earlier period, made some experiments for our Government, with smaller quantities, but obtained more marked results in the same direction. On the contrary, the engineers of the English and French steamers, out of this port, speak of our Cumberland and kindred varieties of coal as inferior to those procured at home. We are in search of the truth, and cannot therefore cater to national vanity. Our best bituminous and clean, free-burning anthracite coals are undoubtedly better than can be found in large quantities in any other part of the globe. All must admit, however, that some of our American bituminous coals are almost identical with the English in appearance and chemical constitution. Both should therefore give the same results, when tested under the same circumstances. In the experiments above mentioned, the English coals comprised a greater number of kinds, the bad being averaged with the good. The United States Government experiments were tried with the greatest care, and in a boiler better proportioned for economy, probably, than the average in England. On the whole, we think it fair to assume that the English and American bituminous coals, of the qualities ordinarily supplied to the market, are substantially equal in value, though selected varieties, fresh from our mines, would of course give much better results.

The Government experiments above mentioned showed that the evaporative efficiency of the American anthracite, and the American bituminous coals are in the proportion of 8·9 to 9·9.

(To be continued.)

The California Earthquakes—A different System of Building Necessary.

W. Frank Stewart, Esq., published a series of articles in the *San Francisco Alta.*, in 1865, called forth by the earthquake of October of that year, an extract from which will be read with interest at the present time:

"When the solid land trembles and gyrates beneath us, like a disabled ship upon the waves; when the substantial habitations of men come toppling headlong to the ground, and when the startled populace, with blanched lips and whitened visages and smiting knees, rush shrieking and howling into the streets, the appalling phenomenon may be a matter of levity to the learned, but for my part, I have yet to discover 'where the laugh comes in.'

"In this region, together with the visible evidences that, at no very remote period, the country has experienced far more powerful shakings, are warnings which sensible people cannot disregard. There are old settlers still surviving in California who have witnessed convulsions of the earth which would have demolished the most substantial building in San Francisco. Only a few years ago an earthquake occurred which opened a chasm in Salinas Plains, which is yet plainly traceable for a distance of fifty miles. During the shock of the 8th of last month (Oct., 1865), the ground to the north of San Juan was rent into innumerable fissures all along the stage route. Will any sane man contend that if these cracks and chasms had occurred in a similar manner on Montgomery street, the lofty brick shells along that thoroughfare would have remained uninjured? It is utterly beyond the limit of possiblility that a perpendicular brick wall, sixty feet in height and only one foot in thickness, could stand up under such circumstances.

"I know it is dangerous to make predictions, but, guided by the experience of the past and by the deductions of science, I shall hazard the opinion that every brick and stone building now on the coast of California will be thrown down by an earthquake, unless mechanical skill can render them more secure than they now are. Men may smile at my suggestion of 'pyramidal walls,' but the day is not far distant when our present shell walls will not be considered particularly safe."

Mr. Stewart, who is said to have devised a means for determining the time when earthquakes may be expected to return, and who has given so much attention to the subject that he has acquired the title of the *Earthquake Seer of San José*, according to the *Argus*, of that city, made a prediction that an earthquake would be felt of greater force than had ever been witnessed since the settlement of the coast by Americans. His confidence was so great in the truth of his prediction that he backed it with a bet, and of course has won.

Editorial Summary.

EXPLOSION OF A SOAP TANK.—A saponifying tank in a soap and candle factory in Cincinnati exploded on Nov. 4th. Two workmen in the factory were badly scalded by the hot stearine, but a number of others, men and women, employed escaped uninjured. The tank, twelve feet long and six feet in diameter, was projected upward some five hundred feet and alighted a distance of two and a half squares from the point of explosion. The tank had for years borne a pressure of from eighty-five to ninety pounds per square inch, receiving its steam direct from the boiler, the steam being used to separate the glycerin from the tallow.

THE *World* intimates, not without reason, that members of Congress are selling their frank to further private enterprises and personal schemes. We have repeatedly called attention to the abuse of this privilege, and we have now before us a letter from a western correspondent in which he asserts that he received fifty copies of a pamplet of a swindling patent agency at Washington under the frank of John A. Logan, M. C., (Pub. Doc). We prefer to think that Mr. Logan knows nothing about the business, but be that as it may, it is a fraud upon the postal revenues.

ACCORDING to the returns made to the United States Assessors, the total value of the boots and shoes manufactured and sold in Lynn, during the three months ending Oct. 1, was $3,483,477. This does not include goods made by the smaller manufacturers, whose sales do not amount to $5,000 annually, which amount, added to the above, would give a total of at least three and a half million dollars for the past three months. For the corresponding period last year the sales amounted to $3,214,060.

WE see it stated that Liebig, the chemist, complains that people are forever pestering him with letters asking questions of the most extraordinarily silly nature, such as they might answer for themselves by consulting any elementary textbooks. They come at the rate of two or three hundred a day and in eight or ten different languages.

A PARTIAL obscuration of the sun has recently been made the subject of observation and comment in California. Many attributed this to a smoky condition of the air caused by distant fires in the woods. The California Academy of Sciences have taken the subject into consideration and have decided that the extreme heat and dryness had caused the moisture from the fog to disappear, and left the silicious and saline matters contained in it suspended in the air.

MANUFACTURE OF SUGAR.—A German paper mentiones a new process of refining sugar in which the saccharine juice, after being clarified in the usual way by means of lime and carbonic acid, is precipitated at boiling temperature with caustic baryta (60 parts of the latter for every 100 of sugar), the precipitate suspended in water and decomposed with carbonic acid. A pure solution of sugar is obtained, which only requires to be evaporated.

IT is announced that an important discovery of iron ore of a superior quality for the manufacture of steel has been made near Ellenburg, Clinton Co., N. Y. The situation of the vein is said to be very favorable, being in the immediate vicinity of everything necessary to its profitable working. By all accounts the quality and quantity of ore in the new mine bid fair to rival if not excel those of the Peru mine in the same county.

ALONG the lines of the principal railways in England the self-delivery mail bag arrangement is now in use for express trains. The Crane Hook delivery is soon to be put in motion at the several way stations between Boston and Springfield. The mail bag is suspended on a hook at the station, and is taken off by a hook fixed at the same hight on the mail car.

A POWERFUL LENS.—Mr. Parker of London, has just made a lens, three feet in diameter, three inches thick in the center, and weighing two hundred and twelve pounds. In the focus of this powerful lens the most refractory metals are almost instantly fused and dissipated in vapor, while unyielding stony substances are as readily vitrified.

OLE BULL, after charming for years the musical world by his skillful performances upon the violin, has at last, it is said, turned inventor. He has invented an improvement in sounding boards for pianos, by which the sound can be prolonged. This has been a long sought desideratum.

THE *Rural New Yorker*, advertised in this number is one of the very best agricultural and family journals in this country. It is to be enlarged to sixteen double quarto pages, and otherwise improved.

CHASSEPOT has commenced a suit against the French Minister of war for $200,000 due him on a rifle contract. His rifles are pronounced worthless, hence payment has been refused.

THE fossil remains of an immense crocodile have been found at the end of the Kansas Pacific Railroad. The entire length of the skeleton is 125 feet.

THE heart softened by the fire of affliction is like the iron when heated in the furnace; capable of receiving impressions and being fashoned at will.

LEATHER belts are frequently ruined by too much oil. It permeates and rots the leather, or burns it by the heat generated by friction.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

BEAVER DAMS.—One of the agents in the construction department of the Union Pacific Railroad says, that in floating ties down the Laramie river, it becomes necessary to build dams to produce a flood in consequence of the low stage of the water, as is frequently done in the Oil Regions of Pennsylvania, to float the flat boats loaded with oil, and which saved our fleet on the Red River during the late war. After the men left their work at night beavers begun where they left off and carried it on in a very satisfactory manner. In two or three instances where breaks occurred, these industrious animals have repaired them in a single night, to the saving of hundreds of dollars to the contractor.

An armor has been made at Brown's Atlas Works, Sheffield, England which was, before rolling, 29 feet long, 4 feet broad, and 21 inches thick, weighing 420 cwt. The final rolling reduced the thickness to 15 inches. Two hundred and fifty tuns of coal were consumed, and the labor of 220 men required for its production.

Chicago is to have some new gas works to cost $400,000 and consume 15,000 tuns of coal per annum. The gas holder's capacity is 600,000.

The Boston and Maine Eastern Railroads have made arrangements with the Montreal Ocean Steamship Company, to transport merchandize brought from Europe in the steamers of that line, and landed at Portland, to Boston and any part of New England.

A vessel arrived at Cleveland, Ohio, last week bringing with her 871 tuns of iron ore from Marquette, Mich., the largest cargo of iron ever yet received at that port.

A new line of steamers is to be established between Italy and New York. The vessels will run from Naples to New York, and vice versa, touching at Messina and Palermo.

The latest attempt to establish communication between passengers and guard, and guard and driver on English railroads, appears, from the *Engineer*, to be a series of tubes for whistling, speaking, and displaying signals. Its value is yet an unsolved problem.

The Bessemer Steel Works, at Troy, N. Y., burned on the 29th of October, are to be im[illegible] The original cost of the mill was $250,000 di[illegible]

lars, but the loss sustained from the fire will not exceed $75,000. The engine and engine house are uninjured. Two of the converters are also uninjured.

The gold product of Nova Scotia for the last eight year amounts to nearly $3,000,000.

Improvements amounting to $1,200,000 are being made upon the Chicago docks.

The Scotch iron works produced in 1867 over a million of tuns of pig iron.

English capitalists have $90,000,000 invested in East India Railways.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

HAY AND COTTON PRESS.—Stephen Q. Carey, Waxahatchie, Texas.—The object of this invention is to provide a press which shall be simple and neat in construction and appearance, which can be conveniently and rapidly worked, and the operation of which shall be such that the platen in starting moves quickly, but as it approaches the end of its movement its velocity decreases and its power proportionately increases.

HYDRANT.—Robert Reilly, Baltimore, Md.—This invention is a durable but simply and easily operated hydrant, which can be detached and removed from the water pipe by means of its own handle, and without the use of a wrench. It is constructed in a peculiar manner for convenience in taking it apart for repairs; and it is provided with an apparatus by which it indicates any leak within, and at the same time protects the working parts from dust and dirt.

APPARATUS FOR MANUFACTURING MEDICAL EXTRACTS.—Edward E. Burrough, Baltimore, Md.—This invention has for its object the construction of a simple, cheap, and convenient apparatus, with which, by the application of hot water to the walls and bottom of the vessel that contains the materials to be heated, essences, medical extracts, etc., may be rapidly, conveniently, and thoroughly extracted from either liquid or solid substances.

ANIMAL TRAP.—W. A. Stack, Hillsborough, Md.—This invention relates to the class of self-setting traps, and consists in a new and improved arrangement of the bait box with the trap door and passage way for the animals, by which they can be enticed more readily to the middle of the trap door, before it falls and precipitates them into the receptacle below.

FEED CUTTER.—Norman McLeod, Clio, S. C.—This invention contains several important improvements in feed cutters, among which may be mentioned the following, viz.: first, the knives can be sharpened on the machine; secondly, it does not waste the straw or grain; thirdly, it can be operated equally well by hand or horse power, in doors or out; fourthly, it is simple, light, portable, and cheap; fifthly, the sheaf box or feed table can be easily removed for convenience in transporting the instrument and in carrying it through small doors.

DERRICK FOR STACKING HAY.—J. B. Drake and W. H. Hutson, Montoursville, Pa.—The object of this invention is to provide a light, cheap, and convenient portable derrick for elevating and stacking hay, which when used in combination with a horse hay fork or other equivalent device, will raise the hay from the load, convey it to the proper position, and drop it upon the stack, and will then automatically return the hay fork to the load to receive another burden.

TOOL HOLDER FOR LATHES.—Wm. O. Hickok and Geo. W. Reisinger, Harrisburg, Pa.—This invention consists in a novel construction of the holder, whereby the tools may be fitted or applied to the holder with far greater facility than usual, and adjusted in proper position to suit the work required of them, with any trouble or difficulty whatever.

SLED BRAKE.—Jacob Latta and Lewis Snyder, Bethlehem Center, N. Y.—This invention consists in constructing a sled brake in such a manner that it may be rendered operative and inoperative when desired, and when applied or rendered operative admit of the sled being readily turned without subjecting the draft pole or thills to any undue strain.

SUSPENDER FASTENING.—Wendell Wright, Bloomfield, N. J.—This invention relates to a new and improved suspender fastening, and is designed to supersede the ordinary flexible straps provided with button holes to fit over buttons on the pantaloons and retain the latter in a proper elevated state ont the wearer.

KITCHEN UTENSIL.—Warren Cook, Arsenal, Pa.—This invention consists in so constructing a rolling pin as to render it available in several differen culinary operations.

METALLIC BRIDGE.—James B. Eads, St. Louis, Mo.—This invention relates to a new and useful improvement in the construction of metallic arch bridges, whereby a strong and substantial bridge is obtained with a comparatively light weight of metal.

PISTON FOR DEEP WELL PUMPS.—Charles Jarecki, Erie, Pa.—This invention relates more particularly to oil wells, which are usually sunk deep and which require the piston and working parts of the pumps to be of the most permanent and durable character.

LUBRICATOR.—Timothy Holland, New York city.—This invention relates to useful improvements in vessels for lubricating journals with oil or other lubricating liquid, whereby the ordinary glass lubricator is rendered more efficient than it has hitherto been.

POCKET TOBACCO CUTTER.—Edward L. Gilman and Theophilus S. Smith, Somerville, Mass.—The object of this invention is to provide a convenient pocket machine for the use of tobacco smokers, whereby they may cut their tobacco without resorting to their pocket knives for that purpose, and in combination a match box.

BAG FASTENER.—Charles H. Nye, Vineland, N. J.—This invention relates to an improvement in the method of fastening the mouths of bags for holding grain, or other products or articles, and it consists in securing to the bags, by a rivet and washer, leather straps containing a buckle of any suitable size and form, whereby the strap is buckled around the bag and the contents secured.

TOY WATCH.—Joseph Laubereau, Paris, France.—This invention relates to a motor obtained by the tension of an elastic string, with variable self acting brake proportionate to the work that the motor is able to yield. This variable self-acting brake motion is applicable to various uses, where little force is required; viz., to regulators, toys, and more especially toy watches.

CAR COUPLING.—D. D. Howe, Beaver Dam, Wis.—This invention consists in constructing the buffer of two parts, one of which, provided with three walls of the opening for the hook, is rigidly secured to the framing of the car; the other, constituting the top half of the said opening, is connected to a yoke which is supported upon the end of a lever, whereby it may be raised when desired; it may also be raised by the hooks when the cars come together for coupling. It is arranged to be held in a downward or closed position by a spring. The said stationary part is provided with a round bolt against which the hook draws, which bolt is arranged so as to be readily removed for the substitution of another when worn, and a sliding rod is connected to the said lever, which serves as a plunger for throwing off the hook for uncoupling the cars.

STAYS FOR PAPER AND LINEN COLLARS.—Simon Kaufman, Fairbury, Ill.—This invention relates to improvement in the method of staying and supporting paper and linen collars whereby their durability is greatly increased.

POTATO AND CORN PLOW.—Charles F. Noltz, Toledo, Ohio.—The object of this invention is to construct a plow for cultivating corn, potatoes, rice, and other plants, which plow shall be of simple construction, cheap, durable, and adjustable to the width of furrows, and hight of rows.

HYDRANT.—James Allison, Cincinnati, Ohio.—The nature of my invention relates to improvements in hydrants, whereby it is designed to simplify and improve the construction of the same, and adapt them for use either as hydrants or fire plugs, and to provide them with detachable caps, whereby when it is designed to use them also for hitching posts, a cap or head indicative of such use may be readily attached to the post or projecting part above the ground.

MACHINE FOR PACKING TEA, COFFEE, ETC.—John Garsed, and Clayton Dunn, Frankford, Pa.—This invention relates to a new and improved machine for packing tea, coffee, etc., in paper bags, with a given weight of the article in each bag. The object of the invention is to obtain a means for the purpose specified, which will admit of the work being performed rapidly and in a perfect manner, and without the employment of skilled labor.

MILK CAN.—T. W. Akin, Patterson, N. Y.—This invention relates to a new milk can, which is made of iron, and provided with an iron bottom that rests upon a hoop riveted to the under side of the lower part of the can.

RAILROAD CHAIR AND SUPPORT.—Aaron Van Guysling, West Albany, N.Y.—This invention has for its object to improve the construction of railroad chairs and their supports, so as to furnish a substantial, reliable, and elastic support for the rails, which will hold said rails securely in place, and at the same time prevent the jar now so universally felt in railroad riding.

SELF-ADJUSTING HOOK.—William Bisbee, and Fleming G. Hearn, Yreka, Cal.—This invention has for object to improve the construction of the improved hook patented by the same inventors December 31, 1867, and numbered 72,784, so as to make it more convenient and effective in operation.

COMBINED LIFTING JACK AND CANT HOOK.—Daniel Fasig, Rowsburg, O.—This invention has for its object to furnish a simple and convenient machine for raising wagons, and for raising and turning, or canting timber, and which shall be so constructed and arranged that it may be easily adjusted to wagons of any hight, or timber of any size.

PROCESS FOR CASTING CAR WHEELS.—Henry M. Woodward, St. Louis, Mo.—This invention relates to improvements in the process of preparing cast iron, whether in the condition of pig or scrap, for making or casting car wheels, the object of which is to provide car wheels of a better and more uniform quality than can be produced by the common mode.

DRIVE WELL.—John S. Armstrong, Delaware, Ohio.—The object of this invention is to furnish an improved drive well. It consists of a conical point, having helical feathers or threads, which are cast on the point when the latter is made. The point is hollow a portion of its length, and the bore or cavity fits with easy contact on the end of the lower joint of the ordinary drive well tube, which is of the size of common gas pipe. The lower end of tube is formed with numerous perforations, which are closed against the entrance of sand, while the point is being forced down into the ground. When, however, it is desired to ascertain if there be water present, at any part of the descent, the tube is raised a few inches to raise several of the holes from out the barrel of the point, and water entering and rising to the surface of the ground will announce its presence.

VENTILATING APPARATUS.—Wilhelm Scharrath, Bielefeld, Prussia.—This invention relates to a new ventilating apparatus to be applied to all temporary or constant habitations of men or animals, and consists in the arrangement of porous walls and ceilings or either to the rooms of houses or cars, or to the cabins of ships, so that fresh air, either in a heated or cooled state, may freely enter the said room or cabin, while the foul air can as freely escape.

MACHINE FOR CUTTING SLATE.—Thomas R. Drummond, Hartford, Conn.—This invention relates to a new and improved method of cutting slates for roofing and other purposes, and consists in forming a box knife corresponding in size to the superficial area of the slate, and in a weighted cushion connected therewith, and also in a cushioned spring bed surrounded by a metallic shell

TICKET AND TAG HOLDER.—James Bramble and Albert H. Nirdlinger.—Fort Wayne, Ind.—The object of this invention is to provide a convenient method for holding railroad and other tickets or fastening tags to goods or packages whereby the same may be exposed to view and still be securely fastened to the dress or package.

MACHINE FOR DRESSING HOP POLES.—C. D. Brown, Bainbridge, N. Y.—The object of this invention is to provide a simple and effective means for sharpening and dressing hop poles. It also consists in the arrangement of three cutter wheels on a shaft in such a manner that the poles to be sharpened or dressed may be passed between the said wheels, and be cut by cutters or knives affixed on the radial arms of the wheels, which latter are formed with reference to bearing the said knives and presenting their cutting edges to the wood in the most effective manner

IRON FENCE POST.—Wm. Merrell, Kent, Ohio.—The object of this invention is to furnish a fence post which is simple, durable, cheap, and efficient. It also consists of a flat, metallic fence post, usually of iron, and provided with groups of studs for receiving and holding the planks or horizontal parts of the fence.

PUNCHES.—Geo. C. Wilder, Lawrence, Kansas.—This invention relates to a new and improved method of constructing punches for the punching of nuts and washers whereby the washers or nuts are more rapidly and economically made. It also consists of a follower forced upwards against the washer or nut after the same has been formed by the force of a spring whereby the washer or nut is freed from the punch. It consists also of a central stationary punch over which the movable outer punch works whereby a center hole is punched in the nut or washer at the same time that the washer or nuts is punched out of the bar.

PUMP.—J. A. Shanner, Plainview, Ill.—This invention consists in a lift pump rod provided with a forked lower termination, wherein a two-lever valve is hinged, the said lever being partly composed of leather and partly of metal, and actuated by springs to open the same for lifting. It also consists in a peculiar arrangement of a toothed rack upon the pump rod and a pair of gear wheels for operating it.

NUT CRACKERS.—Charles Hayden, Collinsville, Conn.—This invention consists in providing one of the pins with a clamp, whereby it may be firmly clamped to a table in a stationary position and in providing two different points of application between the jaws, one for small and one for large nuts.

BRONZE DRESSING FOR LEATHER.—M. S. Cahill, Boston, Mass.—The object of this invention is to provide a fluid which will give a reasonably permanent bronze color to leather, and is more particularly designed as an accessory article in the boot and shoe trade, inasmuch as it will enable dealers to renovate their bronze shoes and boots when the same have become shopworn and tarnished, as in the case when this class of goods have been kept on hand for considerable time or much handled.

OPERATING THE SAILS OF VESSELS.—Frederick B. Dunton, Center Lincolnville, Me.—The object of this invention is to provide a sail, or sails, of a square rigged vessel, so-called, with devices by means of which the said sail or sails may be set, reefed, or furled in a quick and thorough manner from the deck; thereby lessening the labor of handling the sails, and dispensing with a portion of the attendants requisite for handling sails as ordinarily made and rigged.

MACHINE FOR BUNDLING WOOL.—H. F. Leroy, Richmond, Ill.—This invention consists of a table, the top of which is made in sections, the central and corner sections being secured to the table, while the four sections between the corners are hinged to the central sections and connected by levers and a belt to a foot lever, so arranged that, by the application of pressure to the foot levers, the said movable sections will be folded up like a bag, enclosing and compressing the wool or other article which is placed on the table in a compact bundle that may be tied by cords previously laid across the said movable sections.

SPINNING FRAMES.—J. L. Johnson and J. W. Foust, Evansburgh, Pa.—This invention consists in an arrangement of apparatus for moving the spindle carriage and a means of preserving the proper tension on the belt.

MOP WRINGER.—Geo. Wells and S. A. Haynes, Island Pond, Vt.—The object of this invention is to provide a simple and convenient apparatus for wringing mops. It consists of a pail having a bail or handle which acts as a lever to bring together or separate the squeezing rollers when the handle is lowered or raised.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

E. W., of Ohio.—A full description of the two wheeled velocipede with engravings is to be found on page 120, No. 8, of the current volume of the SCIENTIFIC AMERICAN.

G. A. D., of N. Y.—We see no objection to your using spectacles whose glasses are ground to different foci, in order to adapt them to the different conditions of sight in each eye.

J. P. J., of Ohio.—We can give you a recipe for making boots water proof, as, for instance: Beef tallow, 4 oz; rosin, 1 oz; beeswax, 1 oz; melted together. Add, when cold a quantity of neats-foot oil equal to the mass. Apply with a rag, warming the boots before a fire, to the soles as well as uppers, and rub in well with the hand. Two applications will make the boots thoroughly water proof and still keep them soft. We, however, do not approve of such preparations, as the feet generally perspire more than any other portions of the body, and any water proof preparations applied to boots prevent the perspiration from escaping and keep the feet wet and cold.

P. S., of Mass.—Good glue is the best cement for splicing new belts; the best belt makers use it in preference to any other preparations. All cemented joints in belts should be strengthened by a row of rivets on each cross edge. Better buy your belts of some manufacturer than attempt to make them yourself. It is cheaper. Measure the length of your belt by a string or twine and order accordingly. We have before published the plan of laying out belt holes through floors. We can give you the method by mail, if desired.

J. H. T., of Ill.—"What pressure must the feed pipe to a 14-H. P. boiler be able to stand without bursting, the water being forced with a two-inch pump, through a one-inch pipe, the pressure of steam never to be raised higher than 60 lbs.?" It should stand the pressure of 60 lbs. Can it have any greater pressure put upon it than the resistant of that in the boiler? It makes no difference what the capacity of your boiler, and you will find your one-inch pipe able to stand all the pressure per square inch your 14-H. P. boiler will.

E. W. K., of Mass.—On the subject of the use of divining rods, for ascertaining the true source of water supply, we have already published all that we desire to say on the subject. We have very little faith in the theory or practice. We regard it as an amusement rather than a settled science.

Business and Personal.

The charge for insertion under this head is one dollar a line. If the Notices exceed four lines, an extra charge will be made.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,871.—WASHING APPARATUS.—C. H. Hudson, New York city, Sept. 18, 1868.

2,923.—PAINT OR COMPOSITION FOR PROTECTING SHIPS' BOTTOMS, PRESERVING SUBMARINE WOOD WORK, ETC.—Wm. F. Babcock, San Francisco, Cal. Sept. 23, 1868.

2,968.—CONVERTING CAST IRON INTO WROUGHT IRON, AND UNITING OXIDES AND FLUXES WITH MOLTEN CAST IRON.—Thos. S. Blair, Pittsburg, Pa Sept. 28, 1868.

2,989.—GAS BURNER.—Wilbur F. Parker, Meriden, Conn. Sept. 29, 1868.

2,993.—TREATING METALS FOR THE PURPOSE OF SEPARATING FROM IMPURITIES.—Norman Carter, Cincinnati, Ohio. Sept. 30, 1868.

2,998.—MANUFACTURE OF WHITE LEAD, AND THE PRODUCTION OF CARBONIC ACID GAS FROM SAID MANUFACTURE, ETC.—Henry Hannen, B. F. Fine, and Thos. Woods, Philadelphia, Pa. Sept. 30, 1868.

3,000.—IMPROVEMENTS IN SEWING MACHINES, APPLICABLE TO OTHER MACHINES WORKED BY FOOT POWER.—Greenleaf Stackpole, New York city, Sept. 30, 1868.

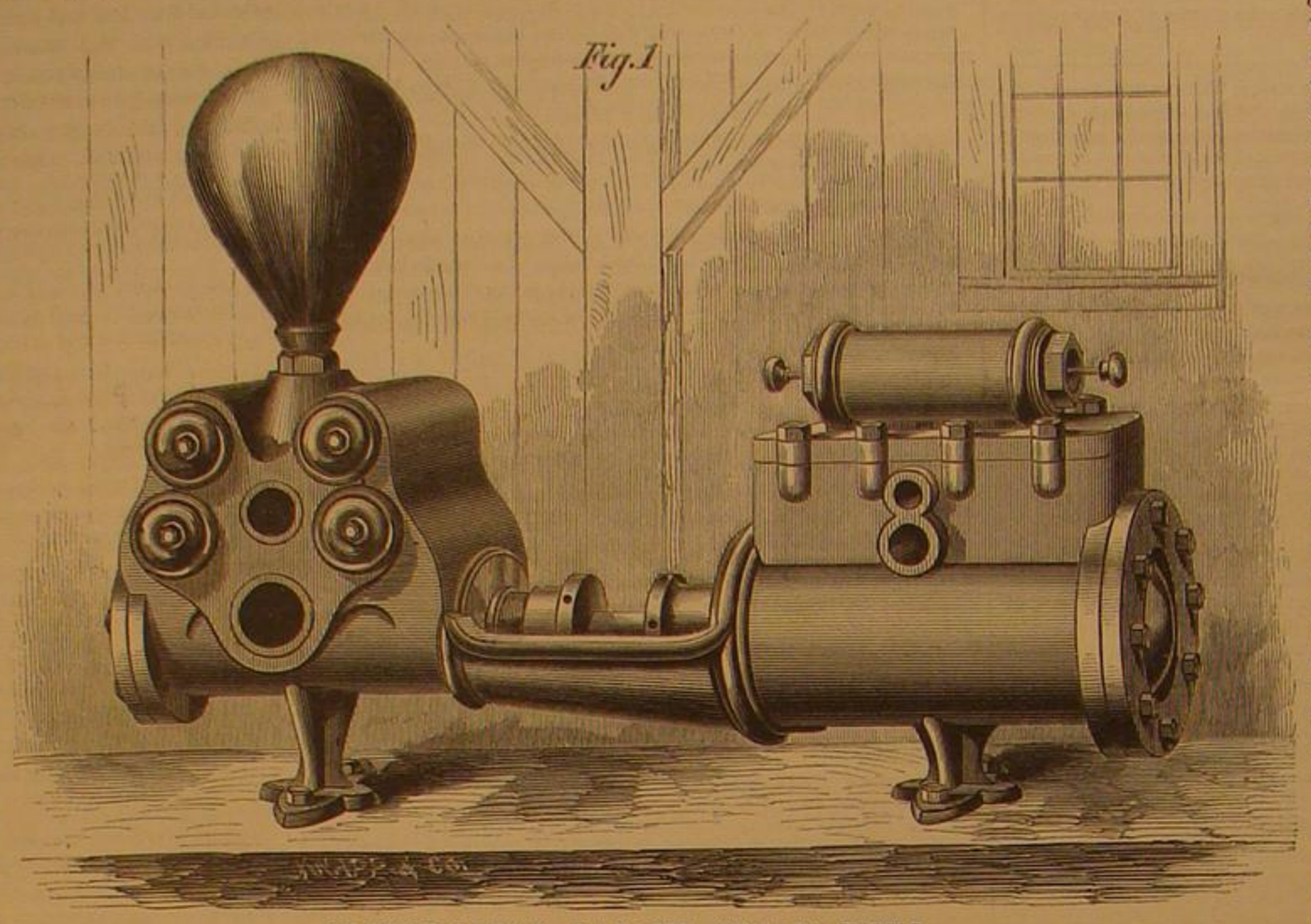
CHANDELIER.—Hiram Tucker, Newton, Mass. Oct. 5, 1868.

Improvement in Steam Pumps.

The unequal action of most of the steam pumps now employed, their liability to get out of order, and the excessive wear of the working parts, constitute objections to their general adoption, and offer opportunities for improvement. Such improvement has been attempted in the construction of the pump herewith illustrated, which is operated by steam alone, without the aid of tappet arms, eccentrics, or any of the complicated contrivances heretofore considered essential.

Fig. 1 is a perspective view, and Fig. 2, a vertical section, with letters of reference showing its internal construction, passages, valves, etc. In construction, the machine consists of an ordinary cylinder, A, and piston, B, the latter operated by steam admitted at either end by means of a cylindrical piston valve, C, which is moved by means of steam let on by the secondary valves, D, they being operated by the main piston, B, so that when the piston arrives near the end of its stroke, it lifts one of these valves and allows steam to pass into the valve chest through small passages connecting the live steam with the ends of the main valve, thus moving it and reversing the motion of the piston. This arrangement of the valves is peculiarly advantageous from the fact that these small valves being very nearly balanced by the pressure above and below, (just sufficient difference being made between the diameter of the stem and the diameter of the valve to make the pressure on the top of the valve slightly greater than below so as to keep the valve on its seat), they are easily lifted from their seats by the movement of the piston, and, being started, the current of steam immediately carries the valve up so that there is no wear between the hardened surface of the piston and the end of the valve stem. The manufacturers say:

Fig. 1



SUTHERLAND'S PATENT STEAM PUMP.

By the peculiar structure of these valves, we are enabled at the same instant, and by the same action, to admit live steam upon one end of the cylindrical valve, and to exhaust from the other end, thus insuring positive, true, and certain motion.

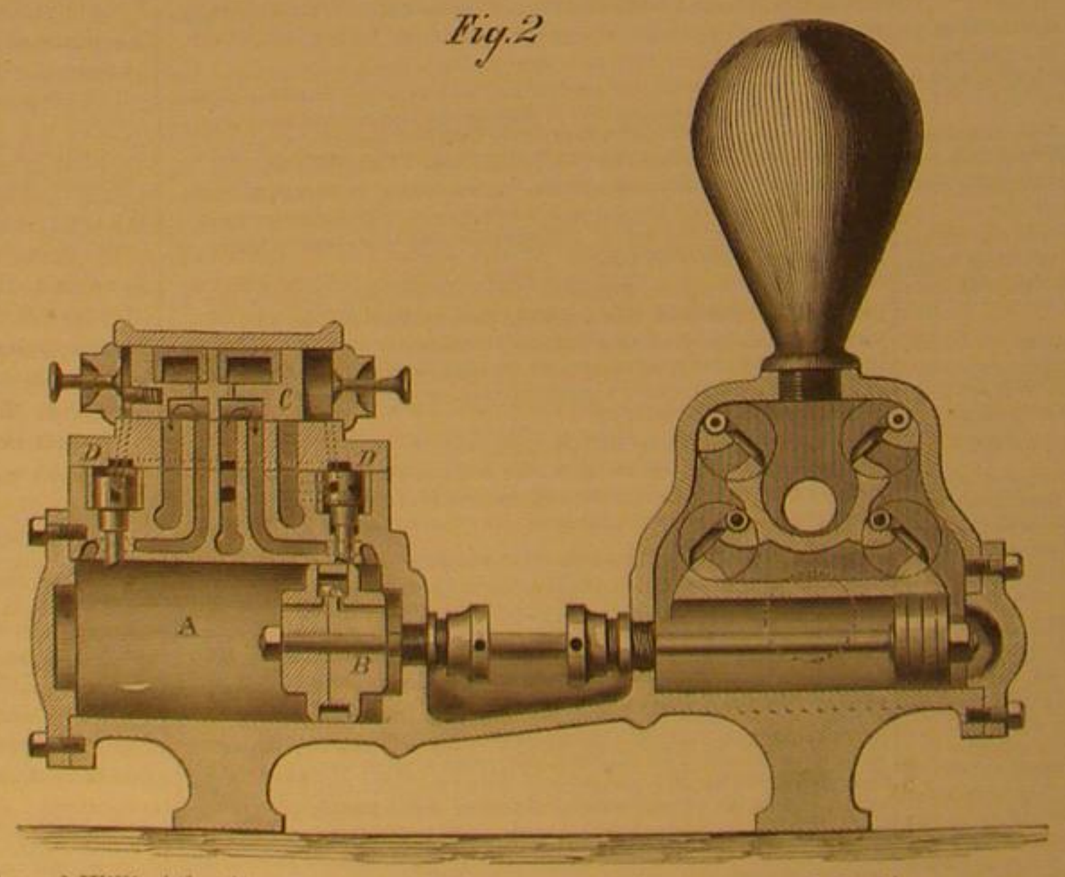
The pump is double-acting, and has two hinge valves communicating with the suction pipe, and two similar valves communicating with the delivery pipe. These valves are hung singly or in pairs, or all together, in a plug or cylinder, which is inserted in an opening made for the purpose, and fastened there. The object being, in such arrangements, to place the valves in such a manner that they may be readily removed and examined.

When these valves are hung in pairs, the arrangement of the lower plug consists merely of a single cavity communicating with the suction pipe, and having an opening on each side which the valves alternately open and close, allowing the water to flow into either end of the cylinder as the piston is moved, and preventing it from being forced out from the other end in the manner of ordinary valves in similar situations.

The upper plug is formed into three compartments by a longitudinal and lateral partition, so that the water may not, when forced, flow through the opposite valve back into the cylinder, but may have a free passage out into the delivery pipe, or up into the air chamber.

By dispensing with so much complicated mechanism, and thus relieving the pump of all unnecessary friction, it has great power, steadiness of motion, and velocity. Perfect surety of operation—it always starts readily. No dead points. Of great durability. Very compact, and from twenty to fifty per cent heavier than other steam pumps. Requires no skill to operate it. Small number of parts. Will pump water of all temperatures, even to boiling; and all other liquids for which other steam pumps are used.

Fig. 2



The pumps are manufactured by the Easthampton (Mass.), Pump and Engine Co., Hon. Samuel Williston, President.

Patented in U. S., Aug. 14, 1866; reissued March 26, 1867. Patented in England, through the Scientific American Patent Agency, Oct. 8, 1868. For further information address Washington Iron Works, office 57 Liberty st., New York city.

Manufacture of Steel from Ore—The Heaton Process.

The Heaton Process, of which we shall shortly give full details, is, according to the *Mining Journal*, attracting much attention. That journal says:

"It will be recollected that the process consists in the use of an improved purifying agent, which appears to exercise a most important influence in the removal of the sole impurities which have prevented the ores of Cleveland and Northamptonshire being used in the production of the best quality iron. The Heaton process has been described by Robert Mallet, F.R.S., as one of those metallurgic advances which, both with respect to economy of production and utilization of inferior pig-iron, leave their mark indellibly on great national industries. The report of Prof. Miller, of King's College, is quite as satisfactory as that of Robert Mallet. It appears that Prof. Miller visited the works in order to be enabled to report upon the process, and certify that the metal analyzed by him was really the result of the process. The "converter" consists of a wrought-iron pot, lined with fire clay; into the bottom of this a suitable quantity of crude nitrate of soda, combined with silicious sand, is introduced, and the whole covered with a cast-iron perforated plate. The molten pig is now poured in, and in about two minutes the reaction commences. At first brown nitrous fumes are evolved, and these are followed by others of a more watery nature. After the lapse of five or six minutes a violent deflagration occurred, attended with a loud roaring noise, and a burst from the top of the chimney of brilliant yellow flame, which, in about a minute and a half, subsided as rapidly as it commenced. When all had become tranquil, the converter was detached from the chimney, and its contents were emptied upon the iron pavement of the foundery. Professor Miller took samples of the various materials used, and carefully analyzed the iron, both before and after it had been submitted to the process; and, as the result of his experiments, he states that it was proved that the reaction of the nitrate of soda had removed a large proportion of the carbon, silicon, and phosphorus, as well as most of the sulphur—the phosphorus retained was not sufficient to injure the quality of the steel produced. Steel made by the Heaton process has been tested, and the results obtained afford strong evidence that uniformity of quality is practically attainable. With regard to the principle of the process, Prof. Miller considers it to be good, and the mode of attaining the result both simple and rapid. The nitric acid in the nitrate, in this operation, imparts oxygen to the impurities always present in cast iron, converting them into compounds, which combine with the sodium, and these are removed with the sodium in the slag. The action of the sodium is one of the peculiar features of Heaton's process, and gives it an advantage over former methods."

The Chemistry of Furniture.

An unknown writer has promulgated the following facts from well known chemical laws, which every housekeeper should remember:

The substances from which furniture is chiefly exposed to injury are water, oils, alcohols, and acids. Acids act on marble. Marble is itself composed of carbonate of lime; that is, it is a compound of carbonic acid and lime. Now, the carbonic acid has a comparatively weak affinity for lime, and most other acids will prevail over it and take its place when brought in contact with it, thus destroying the texture of the stone, liberating the carbonic acid, and leaving nitrate of lime, or muriate of lime, or sulphate or acetate of lime, as the case may be, in the form of a white powder, in its place. But oils, alcohols, and water produce no effect on marble. All varnished or polished surfaces of wood, on the other hand, while not injured by acids, are attacked by alcohol.

Varnishes are composed of different gums and resins, which are generally soluble in alcohol. Many of them are made by dissolving the materials in alcohol so as to liquify them, and then, when they are applied, the alcohol evaporates, leaving the gum or resin a thin even coating over the surface. If now any alcoholic substance comes upon such a surface, whether it be alcohol itself, as used for lamps, or spirits of any kind or even wine, which contains but a small per centage of alcohol, a portion of it is dissolved, and the brilliancy of the surface is destroyed. Oils will not attack either marbles or varnished surfaces, and will do no injury except to naked wood or other porous substances which admit them into the pores, from which they cannot afterward be easily expelled. Water affects no substances except such as have open pores exposed, in which case it enters and causes the substance to swell, or such as are soluble in water, as glue in joints, and mucilage or gum-arabic, used sometimes for attaching superficial ornaments to fancy work.

REMOVAL OF THE BROADWAY BRIDGE.

Ever since its erection the bridge over Broadway, New York city, connecting Fulton street, east and west, has been an outlook for visitors and citizens who desired to get an idea of the crowd and jostle, the jam and tumble, the dangers and excitements of the Broadway passage. It has also served a good and probably profitable purpose to a photographer adjacent, who must have taken thousands of negatives of the bridge and its throngs. The bridge is to be removed in consequence of an injunction prayed for by a Broadway hatter, whose windows were darkened and whose custom was diminished, as he asserts, by its propinquity. Although the court limited the time of its removal to days, if its demolition or removal occupies a tithe of the time spent in its erection, weeks will elapse before the Leow Bridge ceases to be a notable object on Broadway, sharing the admiration of the strangers who visit the city with historic St. Paul's, the elegant Park Bank, and the substantial *Herald* office.

Few who have the least particle of artistic taste will regret its removal. At the time of its erection we spoke of its seeming massiveness, and suggested a much lighter and more graceful structure of iron or steel wire. But if passages for the convenience of foot passengers must be made across our most crowded thoroughfares, we cannot see why a tunnel with a descent of ten or a dozen steps would not serve the same purpose at a much less cost than an elevated bridge, the level of which must be reached by as many steps as the second floor of our most lofty buildings. But better than either would be some system of intercommunication that would relieve the streets now overcrowded, and distribute the mass of vehicles compelled to use only two or three main avenues of traffic.

Cure for Rattlesnake Bite.

The *Sun* says the following receipe is claimed to be an unfailing remedy, and has been tried with success in two instances where soldiers have been bitten by rattlesnakes on the Plains: Ribron's antidote to the poison of the rattlesnake—R. Iodide potassii 4 grains; Hydrarg. Chlor. Corros. 2 grains (corrosive sublimate); Bromine 5 drachms. Ten drops of this mixture diluted with a tablespoonful or two of brandy or wine, or whiskey, constitute a dose, to be repeated if necessary. It must be kept in glass-stoppered vials, well secured, as the air will affect it. This is an invaluable remedy.

DIRT wears out tools by slow oxidation. The attrition of cleanliness preserves them.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

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VOL. XIX., No. 22...[NEW SERIES]....*Twenty-third Year.*

NEW YORK, WEDNESDAY, NOVEMBER 25, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

DURING the past twenty years, in round numbers, fifty thousand alleged new inventions have been submitted to MUNN & Co. for examination, thirty thousand applications for patents have been prepared, and twenty thousand preliminary examinations at the Patent Office have been made into the novelty of alleged new inventions. The value of this Agency is more fully set forth in the announcement in the advertising columns.

OUR STATE CANALS.—ENGINEERING SUGGESTIONS.

From the Annual Report of the State Engineer, recently published, for the year 1867, we make the following deductions:

The total amount of work done under the Engineer Department (Hon. J. P. Goodsell, being late State Engineer), is $1,413,463 60, on which the cost of Engineering is 5.7-10 per cent.

The total length of navigable canals and feeders is 893·70 miles, unnavigable feeders 5·68 miles, Chenango Canal Extension about 97 miles, or 996·38 miles in all.

The usual complaints of deficient supply of water are noted in August and September, on the Syracuse Level of the Erie Canal, and the possible advantage of a pumping supply from Oneida Lake is mentioned; the distance being 3¼ miles and the lift 63 feet. In connection with this question, remedies are discussed as to the restriction of the boat models and their tunnage; the use of steam towing power at certain locks; and the construction of additional locks at Port Byron and Syracuse. A canal telegraph is also recommended, and the gradual substitution of iron for wooden bridges.

The proper appropriations for the Chenango Canal Extension, for which $825,000 have been formerly allotted and $1,671,529 are required, are advised, and the advantages of this route explained.

The Report, among other interesting details, contains the Report in full, with a map, of the surveys made in 1866, by Samuel McElroy, C. E., for the improvement of the Hudson River, for slack water navigation from Troy to Fort Edward, about 40 miles, and a corresponding improvement of the Champlain Canal from Fort Edward to Lake Champlain, about 25 miles, with locks 225 feet by 30½ feet, adapted to 8 feet water way; and also the comparative cost of improving the Champlain Canal from Troy to Whitehall, with locks 225 feet by 25, and 7 feet water way.

This survey was made by triangulation from intermediate base lines, on the entire River Division, and all the hydrographic notes were taken in a similar way. The convenience and accuracy of this method are demonstrated by a resultant error in measurement of distance of about 1½ feet on 40 miles survey, along a winding river, with wooded banks and numerous rifts and islands; by obtaining over 400 lines of soundings, independent of any river fluctuations; by locating the adjacent canal, property lines, streams, buildings, proposed structures, etc., between June and December, with a light field party, and at an aggregate cost of about $7,500 for the entire survey. Notes were also taken to determine the propriety of changes of canal line and level, and a reduction of the locks.

The Report discusses the Topography of the Hudson and Champlain Valley, New York Harbor Improvement, River Improvements below Troy Dam, Sketch of the Upper Hudson, Survey Extension for Flood Relief, Sketch of the Champlain Canal, General argument for Improvement, Plans and Estimates.

From this discussion it appears that a dam at the highlands on the Hudson, 150 feet high, would turn the stream into Lake Champlain and the St. Lawrence; that the remedy which New York Harbor really needs for the difficulties of navigation at Hell Gate from the swift tidal currents, at Fulton Ferry from the winter ice-fields and tides, at the New York slips from immense deposits of silt, at Sandy Hook from a narrow, shifting, and shallow channel, would be found, by connecting New York and Brooklyn with a masonry dyke, about 400 feet wide, with two or more ship locks, and by making a ship canal of the Harlem River, so that the whole volume of the North River could go out to sea, and the present tidal flux and reflux be prevented on the East River, and the facilities of Sound and River Commerce be turned into their legitimate and natural channel at the head of New York Island: this would also solve effectually the problem of connecting New York and Brooklyn.

It is also proposed to examine the gorges of the Hudson River above Fort Edward, to determine the feasibility of a plan for retaining the freshet supplies, so as to prevent the periodical floods which have always proved so destructive below and above Albany.

The details of the Report show that on a comparison of the items of cost, the sum of $4,534, 379 will secure 8 feet water way, by the River Plan, from Troy to Whitehall, while it will cost $5,866,851 to secure 7 feet water-way, by the Canal Plan, and that the "Commercial, Military, and Mechanical advantages are distintly in favor of the River Plan;" the value of the developed mill power alone, being shown to be about $4,334,600.

The suggestions contained in this Report, furnished by an Engineer thoroughly qualified to make them, merit the consideration of all who are interested in the commercial development of our State and our City, and it is to be hoped that at no distant day they will have a practical illustration.

A NATIONAL INVENTION BUREAU.

Although we are taught to look upon Washington as the central and national city, it does not bear to the nation any such relation as London bears to the British Empire, or Paris to France. It is merely, and only, the governmental center of the nation; in no wise its principal or important metropolis. It was destroyed in the war of 1812–15 by an inconsiderable force of English troops, but its destruction did not affect the result of the struggle nor seriously move the minds of the defenders of the country.

In our late war, the danger of the conquest and occupation of Washington, so far as it might be detrimental to the ultimate success of the national government, and give the enemy a *point d' appui*, was not so much a motive for the unexampled rallying to its defence, as a national pride in the preservation of the political capital of the nation; but Washington became, from this cause, the center upon which all patriotic eyes were fixed; for all felt that the reduction and occupation of our nominal capital by the army of the insurrectionary States, would not only belittle us as a nation, in the eyes of the world, but dishearten those who looked upon it as really the political center of the country. Since then it has attained a notoriety to which neither its situation, its value as a commercial or manufacturing center, or even its being the depository of the national archives and the seat of government, entitles it.

The splendid national buildings—the Capitol, the Treasury, the Post Office, and the Patent Office—being costly and beautiful structures, built by the money of the people of the whole country, are its chief titles to respect; and among them all the Patent Office building is the one, the loss of which would be most severely felt by the people. Their national pride might be wounded and their personal purses affected by the destruction of the other public edifices which are used for the transaction of the national business; but the destruction of the Patent Office, with its store of the inventive talent of more than half a century, might be a national disaster, the results of which would be felt for a generation. Its cabinets contain thousands of models of inventions, which are exceedingly valuable as references, not only to the force of the Patent Office Department, but to thousands of our inventors and mechanics, although, in this respect, it may not be instructive to them than a museum of natural history to the "live" student of that science.

What we need is at least one national collection of new inventions, where the machines or devices are not labeled and filed away in glass cabinets, but are exhibited in operation, so that "he who runs may read." This can hardly be done by private enterprise, but should be the result of association; such an association as would demand and secure the confidence of manufacturers, mechanics, inventors, and others interested. The American Institute is the proper body to establish such a bureau in this, the commercial metropolis of the country. That it can be done without governmental aid, National or State, is evident to one who has the means of forming an opinion. That it would be self-sustaining, and even profitable, there can be little doubt. Every exhibitor to this perpetual fair would willingly pay an entrance fee for his invention, and a rent for space allotted to him, and for power employed. He could well afford it, as the action of his machinery, governed by his agent, who should be competent to explain its operation and advantages, would be a perpetual advertisement, more powerful than columns in a daily or weekly journal.

Beside this, the products, or a certain percentage of them, might be claimed by the Association, and thus another source of revenue to the enterprise be opened. Of course, such an establishment would become one of the "lions" of the city. Everybody who visited New York would think their visit to have failed of its intent if they did not see the contents of the Mechanics and Inventors' Museum.

As it is now, the barrooms or offices of some of our hotels are used as show rooms for the devices of inventors, to the annoyance of guests and the inconvenience of proprietor and employés.

Strangers with machines, which require power and material to exhibit their excellences or prove their advantages, are compelled to travel about town and locate their inventions in places hard to find and uncomfortable to visit.

A central and well-known institution such as we have suggested, we are confident, would "pay" in more senses than one, and would be a worthy adjunct to the present attractions of the city, and as popular a place of visitation as some of more than doubtful reputation so much affected by strangers.

FACILITIES FOR INTERNATIONAL COMMUNICATIONS.

At the present time there are in progress three immense works intended to facilitate the communication of the people of one country with those of another, between whom nature has placed barriers deemed by former generations as boundaries erected by the Almighty which it were almost impious to attempt to pass. We refer to the Mont Cenis Tunnel, our trans-continental railroad, and the Suez Canal. A few figures in relation to this latter work may not be out of place. It is intended to connect the Mediterranean and the Red Sea, thus uniting the Atlantic and Indian Oceans, and saving the immense detour around the continent of Africa, now necessary to reach the Indies from any portion of Western Europe. The length of the canal will be about ninety miles, having a depth of from twenty to twenty-six feet, and sufficiently wide to accommodate vessels passing each other on the transit from ocean to ocean. The total cost of this canal with the necessary docks, etc., is estimated at $100,000,000. It is evident to the most superficial observer that those who have the management of this great "cut-off" will be able to control the greater portion of the Indian trade—indeed, nearly all the commerce between Europe and India, China, and perhaps Japan.

Our great Pacific Railroad may divest a portion of this lucrative trade, but it must be considered that breaking bulk, re-shipping on cars, and transportation over railroads are costly in comparison with the conveyance of cargoes in ships which can sail uninterruptedly from port to port. The sea is the great highway of the nations; railroads are but supplementary, and we are glad that a movement has been made to connect the Atlantic and Pacific by means of a ship canal across the Isthmus of Darien, a notice of which appeared in in our last issue. It is believed that a canal can be constructed which will pass vessels of large tunnage from one ocean to the other in twenty-four hours. The suggestion is well worthy the consideration of our statesmen and capitalists.

POISONOUS DRUGS AND COSMETICS.

Our attention has been called to this subject by the reports of accidental poisoning, which for a month or so have been numerous. In this and in other cities such accidents are almost of weekly occurence. We scarcely look through our daily exchanges without seeing an account of something of this sort. The whole of it is attributable to "carelessness," according to the reports. First, a physician has written a prescription so that it can scarcely be read—a very frequent occurrence by the way—or has used ambiguous abbreviations; next a druggist has blundered in making up the preparation; and again, the blunder occurs in the family, the dose desired and its selection from the heterogeneous collection of remnants of previous prescriptions, usually kept in a dark corner with the poison for vermin, being intrusted to the highly intelligent and judicious Biddy who presides in the kitchen.

Another class of poisoning of late becoming more and more common, and for which accidental is too mild an adjective, arises from the use of poisonous cosmetics; several cases of which have been recently reported. The most important of these is one occurring in the practice of Dr. L. A. Sayre—lead poisoning from the use of one of the modern preparations for the complexion. The preparation is one in very common use in this country, and its name forms some of the conspicuous advertisments that adorn fences about vacant lots and the street curbstones.

But it is useless to find fault with an evil unless a remedy for it is possible. We have seen that four classes of individuals are in fault: the doctors who prescribe, apothecaries who put up the prescription, the people who take the medicines, and the manufacturers who make and vend the objectionable compounds. Any system of regulations then that will fully correct the evil must embrace each and all of these classes. Doctors should no longer be permitted to write their prescriptions in abbreviated Latin, in so bad a style of penmanship that it could scarcely be read, if it was an invitation to dinner. People who take medicine have some right to judge for themselves, whether the dose presented to their lips is calculated to heal their infirmities, or to send them into eternity by the run. It was only recently that an important error in the renewal of the prescription was detected by a patient of our acquaintance, who, although urged strongly, obstinately refused to use it until it could be revised by her physician. Beside this, all physicians should be obliged to put full directions as to the administration of prescriptions on the prescription itself, in place of the too ordinary words, "use as directed." This would be a check on the druggist, who would thus often be led to discover errors when they occur by his knowledge of the effects which medicines are intended to pro-

duce, provided that he knows these effects, which, however, is not always the case.

Druggists should be competent to put up prescriptions. We believe there is no department of trade in which, as a rule, retailers know so little that is requisite to the proper conduct of their business,as in the drug trade. We were once told by a druggist doing a large prescription business, the largest in the city where he was located, that vinegar contained no acetic acid. He was only convinced of his error by a reference to the U. S. Dispensatory which lay upon his desk. Now if upon so simple a matter as this, a prominent druggist is found to be ignorant, what confidence can we have that he would be able to detect impurities in his drugs, or that he would, if a physician should order by mistake too large a dose of any powerful remedy, be able to detect the error. We believe that druggists should be made responsible in such cases as well as the physician who prescribes. If a heedless doctor orders him to put up a poisonous dose, he should not be permitted to blindly follow orders. He should do nothing whatever blindly. If he sells cosmetics he should know what they are made of; if not competent to determine this for himself, he is not fit for his business. If people are poisoned by their use, he as well as the manufacturer, should be held responsible. The examination of such articles in druggists shops, very rarely extends beyond the wrappers, if they look well and are likely to sell well, that is all that is requisite.

The habit of putting away remnants of prescriptions for future use is very dangerous, unless the greatest care is taken that they be properly labeled. Dosing should never be eft to ignorant servants.

Finally prescriptions should be written plainly,in plain English for those who speak English, with all directions in full, that the means of checking errors may be in the power of every person through whose hands they pass, and the prescription in full with maximum and minimum dose together with the dose prescribed, and the directions for its use should be fully and plainly written out and pasted upon the bottle box or envelope which contains the medicine. If these precautions cannot otherwise be secured, they should be made the subject of legislation, and laws so stringent with penalties for their violation, so severe, should be enacted, that the reforms we recommend will be thoroughly enforced.

HOW TO HAVE A CHEAP HOT DINNER.

We happened to be present in May last at the Polytechnic Institute of London while Prof. Pepper was conducting some very interesting optical experiments to a crowded and appreciative audience.

This Institute is one of the most valuable and instructive in London, and we trust that in due time we shall have something like it—and even better—in this city.

A large hall in the building is devoted to the exhibition of novel inventions, many of which were remarkable for their ingenuity. At the time of our visit a very voluble little personage was summoning the visitors to examine a small contrivance which he called the Norwegian Cooking Apparatus. It consisted of a tin vessel or stew-pan having a closely fitting cover, and into which a piece of mutton or beef, potatoes, and other vegetables, are placed in water at the boiling point: he vessel is covered so as to be water-tight, and then carefully enclosed in a felted box, and the lid sealed. The apparatus before us had been shut up nearly three and a-half hours, and when opened in our presence, we were invited along with other half-hungry visitors to eat of the viands thus prepared, which we found well cooked and very palatable. The lecturer on the cooking apparatus remarked, that the peasant of Norway, wise in their generation, were great eaters of porridge. They found that, by boiling their mess for only five minutes, and then immediately enclosing the sauce-pan, all hot, in a little felted box, the acquired heat was sufficient to complete the cooking of the porridge and to keep it hot for many hours.

The Norwegian Government it appears took a leaf out of the peasants' book, and adopted the same plan of cooking, which has proved a success.

The lecturer went on to say that two gentlemen—perhaps himself was one of them—started from Paris with one of these little felted sauce-pans full of mutton, and upon reaching London, after eleven hours' ride, the felt covering was removed, the stew opened, and the inner man regaled with as choice a morsel as ever Englishman ate, assisted, of course, by a generous pot of beer, to which it is said English men are somewhat partial.

Now for a workingman there is nothing like a good hot meal. It adds force and power to human muscle. Therefore, in every farm, in every cottage, let the kettle be boiled every morning—let the sauce-pans containing the provisions for the day's dinner be placed to boil for five minutes, and then shut up, piping hot, in a wood box, well fitted inside with cheap felt, and the family need concern themselves no more till the dinner hour arrives. At that time the food will be found nicely cooked, and with the addition of some salt and pepper it will constitute a dish fit to set before a king. The laborer can as easily carry the little Norwegian stew-pan to the field, as he can his little tin pail.

A HINT TO OUR INVENTORS.

In our last number we made some suggestions on the use of coal and the management of coal fires. The subject seems to be worthy of still further notice. The unavoidable waste of coal, either bituminous or anthracite, in handling and transportation is enormous. At the mouths of adits and shafts at the mines the accumulation of "culm," and also at the screening places, is so great as to become an annoyance. It is worthless at the place of production, as the clean lump coal bears merely a nominal value; but if brought to the consumer it would be valuable, especially if it could be put into usable shape.

We are aware that attempts have been made to utilize this coal dust by cementing it with a glutinous hydrocarbon, and forming it into convenient bricks by pressure. For this, however, heavy and costly machinery is required, and the cost of manufacture is greater than the value of the manufactured material. By this process the anthracite coal becomes, to all intents and purposes, bituminous coal, not in much favor with cooks. If a method could be devised for consolidating the fine particles of coal wasted at the mines, at the coal yard, and in the house, an enormous proportion of the coal now utterly wasted could be used to give out the heat it contains. Some vehicle, cheap, and easily mixed with the dust, should be contrived, by which the enormous waste entailed by the crumbling of coal might be avoided. We believe it possible. Who will provide it, and thus, while benefiting himself will minister to the comfort of millions?

ANNUAL RAINFALL IN DIFFERENT PORTIONS OF THE EARTH.

A correspondent asks us to give the amount of water, rain, hail, and snow, falling upon an area of 100 square feet, during a year of twelve months, taking the average from one year to another. The form of this question is so indefinite that no satisfactory answer can be made to it. It suggests, however, some remarks in regard to the subject which may not prove uninstructive to our readers at large, and which will probably contain the information desired by our correspondent.

There are great variations in the quantities of water precipitated upon equal areas situated on different parts of the earth's surface. In some places scarcely a day passes without rain, others exist where rain scarcely ever falls. Striking a mean of all the water precipitated in any form over zones of moderate width, parallel to the equator it will be found that the fall diminishes from the equator, toward the poles. The fact is easily explained by the general principles of rainfall which may be thus stated: Rain, hail, and snow are water frozen or otherwise precipitated from the atmosphere. The amount that can fall at any locality depends, principally, of course upon the amount of water contained over that locality. There are certain places where local influences prevail to such an extent, that the latter proposition does not apply to them, but they are exceptions to a general law, which do not effect the truth of the statement. The amount of water contained in a given amount of air, is, all other things being equal, proportioned to its temperature. The hotter it is the more water it will contain, and *vice versa*. As the average temperature of the atmosphere decreases from the equator toward the poles, its capacity for moisture also decreases; hence the inference that less rain would fall in high latitudes than in lower is perfectly legitimate. It has moreover been confirmed by observation.

At London the fall is 25 inches; at Bordeaux it is 25.8; at Madeira it is 27.7; at Havanna it is 91.2; at St. Domingo, 107.6. It has been estimated that in the northern part of the United States the average number of rainy days in each year is about 134, in the southern part is about 103. The lesser number of rainy days in warmer climates is more than counter-balanced by the amount of water which falls in a given time, the tropical rainstorms being proverbially very heavy. Prof. Silliman gives the following estimate of the mean annual number of rainy days for different latitudes:

N. Latitude	Number of Rainy Days.
From 12° to 43°	78
" 43° to 46°	103
" 46° to 50°	134
" 50° to 60°	161

He also estimates the amount of rain at special points, as follows:

"The greatest annual depth of rain occurs at San Luis Maranham, 280 inches; the next in order are Vera Cruz, 278; Grenada 126; Cape Francois 120; Calcutta 81; Rome 39; London 25; Uttenberg 12.5." The rainfall in New Hampshire is about 38 inches; in New York State 36; Ohio 42; Missouri 38.26. The average for the United States is about 39.23. In the torrid zone the mean fall is 95 inches. In the temperate zones it is 35 inches. The mean fall for the two temperate zones and the torrid zone is 55 inches. An inch of water upon a square foot of surface will weigh about five and one-fifth pounds; on one hundred square feet it would be 520 lbs.; which, multiplied by the mean depth of fall over the surface of the torrid and two temperate zones, 55 inches, gives 14.3 tuns. In round numbers the mean amount of rain falling upon each acre of these zones is 5,500 tuns.

Common Sense Treatment of the Horse.

If a man does not like a horse his head is not level. We believe that the heads of our readers are level, *ergo*, they must like horses. The majority of those who like horses generally manage to own one or more of them, and owning, must be interested in knowing how to keep in good health and vigor this noblest and most serviceable of animals. The following common sense directions from the *London Horse Book* contain the most practical information in the shortest space of anything we have seen upon this subject:

1. All horses must *not* be fed in the same proportions, without due regard to their ages, their constitutions, and their work, because the impropriety of such a practice is self evident, yet it is constantly done, and is the basis of disease of every kind.

2. Never use bad hay on account of its cheapness, because there is not proper nourishment in it.

3. Damaged corn is exceedingly injurious, because it brings on inflammation of the bowels and skin diseases.

4. Chaff is better for old horses than hay, because they can chew and digest it better.

5. Mix chaff with corn or beans, and do not give the latter alone, because it makes the horse chew his food more and digest it better.

6. Hay or grass alone will not support a horse under hard work, because there is not sufficient nutritive body in either.

7. When a horse is worked hard its food should chiefly be oats; if not worked hard its food should chiefly be hay; because oats supply more nourishment and flesh-making material than any other kind of food; hay not so much.

8. For a saddle or a coach horse, half a peck of sound oats and eighteen pounds of good hay is sufficient. If the hay is not good add a quarter of a peck more oats. A horse which works harder may have rather more of each; one that works little should have less.

9. Rack feeding is wasteful. The better plan is to feed with chopped hay from a manger, because the food is not then thrown about and is more easily chewed and digested.

10. Sprinkle the hay with water that has salt dissolved in it, because it is pleasing to the animal's taste and more easily digested. [A teaspoonful of salt in a bucket of water is sufficient.]

11. Oats should be bruised for an old horse but not for a young one, because the former, through age and defective teeth, cannot chew them properly; the young horse can do so, and they are thus properly mixed with the saliva and turned into wholesome nutriment.

12. Vetches and cut grass should always be given in the spring to horses that can not be turned out into the fields, because they are very cool and refreshing and almost medicinal in their effects; but they must be supplied in moderation, as they are liable to ferment in the stomach if given largely.

13. Water your horses from a pond or stream, rather than from a spring or well, because the latter is generally hard and cold while the former is soft and comparatively warm. The horse prefers soft, muddy water to hard water, though ever so clear.

14. A horse should have at least a pail of water morning and evening, or (still better) four half pailfuls at four several times in the day, because this assuages his thirst without bloating him. He should not be made to work directly after he has a full draft of water, for digestion and exertion can never go on together.

15. Do not allow your horse to have warm water to drink, because if he has to drink cold water, after getting accustomed to warm, it will give him colic.

16. When your horse refuses food, after drinking, go no further that day, because the poor creature is thoroughly beaten.

Iron Fortifications and Great Guns.

A letter from Berlin says: "The success which attended the experiments of last summer has induced the Prussian Government to employ large blocks of hard cast metal for the purposes of fortification. A foundery has been established with this object on the artillery experimental ground, by which arrangement it is not necessary to move its ponderous productions any very great distance, whenever it is thought advisable to give Mr. Krupp an opportunity of knocking them to pieces, or endeavoring to do so. A colossal casting, weighing ninety tuns, was made there last Friday, in the presence of the Minister of War, and numerous military and naval officers, and is, unquestionably, by far the greatest that has ever been attempted on the Continent. What is considered still more remarkable than the size of this casting, was the very short time required for the process. The metal was melted in three large furnaces in the short space of three hours, but the actual casting was completed in forty-five seconds.

"The report adds, by way of comparison, that the casting of a steam hammer, weighing one hundred tuns, required in England forty-eight hours.

"An hydraulic crane is used for moving these large masses, and does its work so easily, that a shield weighing forty tuns has been moved several hundred yards and placed on the framework intended to receive it in half an hour. The plates are not fastened together by bolts or screws, but cast in such a shape as to dovetail into each other. It is intended to employ a combination of iron, earthwork, and masonry, in the new forts, and to adopt the improved methods in the coast defences first, as they are exposed to the heaviest fire.

"The Woolwich gun, which has been competing at Berlin with Mr. Krupp's, has shown a deep crack after the two hundred and sixty-fourth round, whereas, Krupp's gun has remained unscathed after four hundred rounds, and his friends are, of course, jubilant. On the other hand, an English seven inch plate, three inches of steel on four inches of iron, from the Cyclops Works, Sheffield, was too much for Krupp's ninety-six pounder—at least, only the point of the shot came through. It has been stated, since, that only a reduced charge of powder was used on this occasion. The same projectile, however, and with a similar reduced charge, had knocked an eight-inch plate of Austrian manufacture all to pieces. Both Krupp and Borsig have offered to establish works for rolling plates in Prussia."

THE losses sustained in Switzerland by the September freshets, caused by the rapid melting of the Alpine ice and snows under the effect of long continued warm south winds, amount to $12,000,000. By this calamity thousands of people have been reduced to want.

OFFICIAL REPORT OF

PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING NOVEMBER 10, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees: —

On filing each Caveat.....$10
On filing each application for a Patent, except for a design.....$15
On issuing each original Patent.....$20
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On application for Reissue.....$30
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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

83,817.—OIL BLACKING FOR LEATHER.—S. S. Allen (assignor to himself and John B. Morris), Richmond, Ind.

I claim the within specified composition as an oil blacking for leather mixed in the proportions substantially as set forth.

83,818.—FIELD ROLLER.—William W. Andrew, Grand Rapids, Mich.

I claim, 1st, The dividing board, B, provided with plates, F F, and grooves, H H, and extended forward of the frame, A, under the pole, J, where it is perforated, e e e, to receive the clevis, all constructed to operate as specified.

2d, The combination of the frame, A, box, D, rollers, C C, rods, G G, and and grooved board, B, when constructed and operating substantially as set forth.

83,819.—PIN CUSHION.—L. J. Atwood, Waterbury, Conn.

I claim a pin cushion formed of a ring or disk of fibrous material, confined between two metallic plates that are connected together by rivets or other metallic connections, as set forth.

83,820.—HAIR RESTORATIVE.—E. J. Balcear, Martinez, Cal.

Antedated Nov. 7, 1868.

I claim the within described ingredient or root, treated and prepared in about the manner herein specified for the purposes set forth.

83,821.—HORSE HAY FORK.—H. J. Beemer, Honesdale, Pa.

Antedated Aug. 21, 1868.

I claim the hay harpoon, constructed as described, and consisting of the shanks, A B, pivoted arm, c, lever, L, made in two parts, m m, and jointed at g, pivots, x x, cross bar, E, and grooved pulleys, P P', all constructed, arranged and operating as set forth and for the purpose specified.

83,822.—STIRRUP.—E. S. Bennett (assignor to himself and J. Smith), New York city. Antedated Oct. 24, 1868.

I claim a stirrup made with one side entirely open, with a device for preventing its slipping, substantially as and for the purpose set forth.

83,823.—MEDICAL COMPOUND.—E. M. Berry and L. M. Berry, Saltillo, Ind.

We claim the compound above described, substantially as and for the purposes herein set forth.

83,824.—SASH FASTENER.—J. V. Bogert, New York city, and M. R. Perkins, Portsmouth, N. H., assignors to themselves and John F. Lowell, Boston, Mass.

We claim the sliding bolt and its spring, when arranged as shown, with the projecting catch spring, substantially as and for the purpose specified.

83,825.—APPARATUS FOR PASTING LABELS.—W. E. Booraem, New York city.

I claim, 1st, Preparing (or pasting) and presenting the labels, ready to be affixed to the bottles, in the manner described, that is to say, by applying the paste to a plane or board, adapted to transfer the paste to the back side of the label, over its entire surface, and pick it up and present it for transfer by hand to the bottle.

2d, Also, an apparatus, composed of a suitable supporting surface, and yielding retaining arms for holding a supply of labels, and provided with a movable pasting board, for applying the paste to and picking up the labels, one at a time, as and for the purpose described.

3d, Also, the adjustable and yielding retaining arms, in combination with the label supporting table, whereby the apparatus may be adapted to the use of labels of different sizes and proportions, as hereinbefore set forth.

83,826.—UTERINE SUPPORTER.—J. T. Boyd, M.D., Indianapolis, Ind. Antedated Oct. 31, 1868.

I claim the curved wires, M M and B, and their corresponding grooves in the pad, A A, with their fastenings and attachments, in the manner and for the purpose substantially as set forth.

Also, the coiled springs or wires on the back of the pads, C C, arranged and attached in the manner and for the purpose substantially as set forth.

83,827.—COMBINED WATER ELEVATOR AND DAIRY.—H. N. Brooks, Bloomington, Ill.

I claim the arrangement of a coiling apartment, C, constructed and furnished substantially as described, and an automatic water-elevating apparatus, substantially as set forth.

83,828.—TYPE-CASTING MACHINE.—David Bruce, Brooklyn, N. Y.

I claim, 1st, The loose pulley, G, having a pawl, F, attached thereto, in combination with the cam wheel, D, having a notch, E, in its periphery, substantially as hereinbefore set forth.

2d, Also, in combination with the driving shaft, C, the cam wheel, D, having a cavity, J, in its face, and planes, K and L, substantially as described, and for the purposes hereinbefore set forth.

3d, Also, The combination of the upright cam lever, I, having the tappet, H, attached thereto, with the said cam wheel, D, when formed as hereinbefore described.

4th, Also, the combination of the said upright cam lever, I, and frame, B, with the horizontal registering lever, P, substantially as hereinbefore described and for the purposes set forth.

5th, Also, in combination with the frame, B, the inclined gutter, N, made and arranged substantially as hereinbefore set forth.

6th, Also, in combination with the horizontal registering lever, P, the registering plates, R1 and R2, substantially as hereinbefore described and for the purposes set forth.

7th, Also, in combination with the inclined gutter, N, and registering plate, R1, the type, M, arranged and operating in the manner described and for the purposes set forth.

83,829.—VEGETABLE CUTTER FOR ANIMAL FOOD.—R. I. Burbank, Boston, Mass.

I claim, 1st, A series of rotating carriers, A or B, constructed as shown and described, and operating in connection with a series of rotating circular saws, in the manner and for the purpose specified.

2d, A series of notched clearers, N, constructed, applied, and arranged for operation as and for the purpose set forth.

3d, The combination of all the operative parts specified, when arranged to operate substantially as and for the purpose set forth.

83,830.—HEAD BLOCK.—C. R. Bushnell, St. Anthony's Falls, Minn.

I claim, 1st, The graduated semicircle, I, resting upon the carriage, and provided with two rows of square holes, the set screw, K, armed lever, H, receding pawls, G, ratchet wheels, F D, and shaft, C, all arranged to operate in the described manner for the purpose specified.

2d, The graduated semicircle, I, when provided with two rows of square holes and the set screw, K, as herein described for the purpose specified.

83,831.—CUTLERY.—W. T. Clement, Northampton, Mass. Antedated Oct. 28, 1868.

I claim the within described method of the manufacture of cutlery, consisting in bending the wrought iron, B, and beveling its ends, as represented, and afterward compressing it together upon the steel, and welding and drawing it, substantially in the manner and for the purposes herein set forth.

83,832.—CORN SHELLER.—D. Codd, Ottawa, Canada.

I claim, 1st, The toothed cylinder, B, and the corrugated or grooved endless belt, F, in combination with each other, the toothed surface of said cylinder moving at right angles to the direction of said endless belt, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the fan blower, S, with the toothed cylinder, B, and endless belt, F, substantially as herein shown and described and for the purpose set forth.

3d, Operating the endless belt, F, and fans, S, from the toothed cylinder, B, substantially in the manner herein shown and described.

83,833.—POTATO DIGGER.—V. P. Corbett, Alexandria county, Va. Antedated Oct. 8, 1868.

I claim the arrangement and combination of the revolving toothed cylinder or bar, C, scoop, A, with pronged front spring bars, s s s, and wings, W W, constructed and operating substantially as and for the purposes set forth.

83,834.—SAFETY SWITCH LOCK.—H. C. Cotter and George G. Greene, Fort Wayne, Ind.

We claim the stop bar, A, carrying stops, a a' a'' a''', and eccentric levers, C C, in combination with the stop bar, H, having recesses, m n, the whole being constructed in the manner and for the purpose substantially as set forth and described.

83,835.—POSING APPARATUS FOR PHOTOGRAPHS.—Gustav Cramer and Julius Gross, St. Louis, Mo.

We claim, 1st, The body rest, A, when provided with flexor joints, m, and extension torsion joints, n, constructed substantially as herein described and set forth.

2d, The leg rests, B, when constructed so as to be able to follow all the movements of the human leg, and be adjustable thereto, as and for the purpose set forth.

3d, The arm rest, C, when constructed so as to be able to follow all the movements of the human arm, substantially in the manner and for the purposes herein shown and described.

83,836.—ARTICLE OF FOOD PREPARED FROM FISH AND POTATOES.—W. D. Cutler, Philadelphia, Pa.

I claim the within described mixture of desiccated potato and fish, as a new commercial article.

83,837.—KEY-HOLE GUARD.—C. B. Davies, Dayton, Ohio.

I claim cap, A, provided with projecting arm, B, and spring, C, when used in connection with bolt, D, perforation as described, and thumb screw, E, substantially as described and for the purposes set forth.

83,838.—CULTIVATOR.—Samuel Day, Delavan, Ohio.

I claim, in a corn cultivator, the mode of guiding the machine and shovels by means of the crank, D, and connections, with the lever, *o*, as and for the purposes above described.

83,839.—HARVESTER.—J. F. Earl, San Francisco, Cal.

I claim, 1st, The vertical adjustment of the cutter frame, relative to the main frame, upon a pivot or shaft, in advance of the main axle, by means and substantially in the manner described.

2d, The arrangement of the driving gear, in combination with the vertically adjustable frame, substantially as described, whereby the hight of said frame may be adjusted without disturbing the working relation of the gear shafts.

3d, The rake-head, constructed as described, in combination with teeth applied thereto, and operating substantially as described.

4th, The manner of actuating the rakes by means of the straps or belts, and drums or rollers, and shifting clutches, operating as described.

5th, Operating the shifting clutches, by means of the rake head acting alternately thereon through the clutch levers, as described.

6th, The slotted plate, to which the middle fingers are attached, forming the box enclosing the springs, and permitting the withdrawal of the lever staple and the removal of the sickle, as described.

7th, The arrangement of the fulcrum of the reel frame in rear of and above the pivot or axis around which the sickle frame is adjusted in combination with means for simultaneously adjusting said frames, whereby the relation of reel and sickle is varied when the hight of cut is varied, as described.

8th, The hollow reel shaft, provided with the end hubs and with the central stiffening sleeve and central hub, as described.

9th, The adjustment of the steering wheel upon a horizontal axis or pivot, for the purpose of maintaining the same in a vertical position, irrespective of the position of the main frame and cutters.

10th, The attachment of the driver's stand or seat and the sickle-adjusting mechanism to the horizontal axis upon which the steering wheel is adjusted, substantially as and for the purpose set forth.

11th, The combination with the grain platform of a reciprocating rake, adapted to deliver the grain at either end of the platform, as set forth.

83,840.—SHEEP RACK.—John Elliott and William Lee, Chippewa, Ohio.

We claim the hinged covers, C D, so arranged and combined with the rack, A, as to form a roof when folded up, and grain trough when turned down in the manner as described.

83,841.—MACHINE FOR MAKING SHEET GLASS.—Samuel S. Ferris (assignor to himself and William O. Robbins), New York city.

I claim, 1st, A pair of rollers, formed hollow, and provided with means, substantially as specified, for regulating their temperature, in combination with the inclined table, g, and movable side pieces, h, for regulating the width of the melted glass passing to said rollers, substantially as set forth.

2d, The platform, k, formed of a series of plates hinged together, in combination with the rollers, b and c, and straightening roller, s, for the purposes and substantially as set forth.

83,842.—QUARTZ CRUSHER.—Edward Ford, San Francisco, Cal.

I claim the horizontally-acting batteries, A and B, when placed one above the other and acting against the vertical dies, E E, with the screen, M, and feeding the ore from one to the other, the whole constructed and operating substantially as and for the purpose herein described.

83,843.—THILL COUPLING.—Norman N. Gordon (assignor to himself and Robert Boyd), Rochester, N. Y.

I claim the combination of the closed eye, d, provided with narrow neck, f, with the jaws, a a, provided with the separated bearings or journals b, b, the whole arranged as described, and operating in the manner and for the purpose specified.

Also, in combination with the above, the sliding pressure plate, h, provided with lugs, i i, which rest upon the jaws, the said plate serving to apply the rubber block to the bearing, through media of screws, k k, as herein described.

83,844.—WINE OR CIDER MILL.—H. B. Goucher, Pecatonica, Ill.

I claim the apron, C, ropes, C', and elastic bands, D, when arranged and employed substantially as and for the purposes set forth and described.

83,845.—DREDGING MACHINE.—Andrew J. Gove, San Francisco, Cal.

I claim, 1st, The beam, E, turning about the axis, c, and the governing chain, G G', moving about the drum, H, together with the excavator, B, and its lever, D, pivoted to the beam, E, at the point, F; also the regulating chain I; the whole constructed and arranged substantially as and for the purpose described.

2d, The beam, E, and the lever, D, with its excavator, B, working in the well or opening, a, substantially as and for the purpose herein described.

83,846.—PRESSURE BLOWER.—William C. Grimes, Philadelphia, Pa.

I claim, 1st, A series of rotative bellows, c c c, in combination with the angled shafts, B B, arranged to operate substantially as hereinbefore described and for the purpose set forth.

2d, The arrangement of a series of valveless bellows between two rotative disks or obtuse cones that revolve in planes inclined, the one to the other, as hereinbefore described, and for the purpose set forth.

3d, The semi-circular air chamber, E, in combination with the disks, D D', and the bellows, C C, arranged to operate as hereinbefore described, and for the purpose set forth.

83,847.—POTATO DIGGER.—Andrew M. Hall, Falmouth, Me.

I claim, 1st, The combination of arms, b, pivoted at i and y, plate, j, clamps, k, band or lever piece, l, to adjust the screener, E, when desired, support the rear end of it, and still to allow of its vibrating motion, as herein set forth.

2d, The bent rods, o, when used to sustain the screen, E, allow of its vibrating motion on the parts, p, and also to aid in supporting the rear end of the plow, D, as herein set forth.

3d, The adjustable wings of the rotating fans, F, as herein set forth.

4th, Moving the fan, F, and imparting a vibratory motion to the screen, E simultaneously, by means of the revolving axle, b, by the devices, and a herein set forth.

83,848.—VALVE AT THE END OF TUBES.—J. R. Hamilton, M. D., Dexter, Me.

I claim, 1st, The valve, C, formed by the partial excision of the closed end of a hollow cylinder, substantially as described and for the purposes herein set forth.

2d, The valve holder, combined and arranged with the foregoing, as and for the purpose set forth.

83,849.—PAINT CAN.—E. B. Hamlin, St. Louis, Mo.

I claim, 1st, The reinforcing band, B, when constructed with a lip, b, at its top edge, and attached to the can, A, in the manner and for the purpose herein described and set forth.

2d, The locking pieces, E, when constructed and employed, as and for the purpose herein shown and described.

83,850.—CORK-CUTTING MACHINE.—George Hammer (assignor to himself and Alfred Butz), Philadelphia, Pa.

I claim, 1st, The sliding spindle frame, D, when its live spindle, J, is actuated by the clutched chain pulley, J2, and clutch lever, k, substantially as and for the purpose specified.

2d, Operating the sliding spindle, J', by means of the double lever, B, spring, 12, and inclined plane, il, substantially in the manner and for the purpose described.

2d, In combination with the cutting disk, C, the sliding saddle, P, when its vibrating head piece, Q, is respectively to the stops, q q, and gauge, O', arranged substantially in the manner and for the purpose set forth.

4th, The described combination of the mechanism for slicing the cork, and for tapered and cylindrical cutting, when the same are so arranged as to be simultaneously operated from one driving shaft, A, substantially as specified.

83,851.—CORN HARVESTER.—E. K. Harvey, Quincy, Ohio.

I claim the belt, F, guides, n n, belts, E E, and saw, D, combined, arranged, and operating as set forth.

83,852.—MACHINE FOR BENDING CARPET BAG FRAMES.—Henry Havell, Newark, N. J. Antedated October 24, 1868.

I claim an improved machine for making traveling bag frames, consisting of its several parts, herein described, combined and arranged substantially as described and for the purposes set forth.

83,853.—CHURN.—Silas Hewit, Seneca Falls, N. Y. Antedated October 31, 1868.

I claim, 1st, The dasher, A A', when constructed substantially in the manner and for the purpose set forth.

2d, The dasher, when constructed as described, in combination with the breakers, a a a a, as specified.

3d, The combination of the body, the frame, B, the dasher, A A', and the breakers, a a a a, as and for the purposes set forth.

83,854.—VAPOR BURNER.—Samuel Holmes, 180 High Holborn, England. Patented in England, March 23, 1868.

I claim, 1st, The combination of the insulating casing, the packed gas tight joint, and the valve constructed to operate substantially as before described.

2d, Also, in combination with the insulating casing, the packed gas tight joint, and the valve, of the lever, ix, and screw, 14, substantially as shown in fig. 2.

83,855.—CAR SPRING.—Edwin J. Horner, Wilmington, Del.

I claim, in combination with a suitable box, A, provided with an overlapping lid, D, with inner pins, I the arrangement of the concentric springs, a b and d, the three being graduated and extending one above the other, as shown, and held in position by the pins, I, for the purpose of suiting the light, medium, and heavy weight of a railroad car, all as shown and described.

83,856.—SAWING MACHINE.—Samuel Hunter, Andrew county, Mo.

I claim the plates, a a', the lower rigid the upper pivoted, provided with the orifices, c c', adapted to varying the direction of the driving shaft, substantially as described.

83,857.—AUTOMATIC CAR COUPLING.—William W. Jeffery, Greenview, and Cyrus Snyder, Middletown, Ill.

We claim the links, A' B', constructed and arranged as described, with the pins, C C, and double cam, D, in the drawheads, as and for the purpose set forth.

83,858.—PUMP.—Jacob O. Joyce, Dayton, Ohio.

I claim, 1st, The combination and arrangement of the valves, N N' and M' with the openings, U V and R, substantially as and for the purposes specified.

2d, The combination and arrangement of the piston chamber, B, piston or plunger, D, tube or cylinder, E, and discharge pipe, G, with the flues or passages, R U and V, substantially as specified.

3d, The combination and arrangement of the air chamber, A, piston cylinder, B, piston or plunger, D, tube or passage, E, and pipe, G, with the passages, R U and V, valves, N N' and M, with their openings, T, substantially as and for the purposes specified.

83,859.—ADJUSTABLE BOX FOR ARBOR, ETC.—Benjamin D. Kay and Henry E. Kay, Fall River, Mass.

We claim the brasses, B1 D2, etc., hinged in the casing, A, and arranged relatively to the arbor, M, the hinge screws, C, and adjusting screws, D1, D2, or their equivalents, substantially as and for the purposes herein set forth.

83,860.—RAILWAY TRACK CLEANER.—Richard A. Kendall and Thomas Kendall, Mineral Point, Wis.

We claim a railroad track clearer, composed of the shovel, A, attached to the check board, E, by levers, C C, and rods, D D, in combination with the hinged and divided platform, operated by the rods, L, substantially as described, as and for the purposes specified.

83,861.—BEE-HIVE.—Isaac King, Germantown, Ohio.

I claim the combination of chamber, A, with removable chamber, B, and the interior box, D, and chamber, C, without the interposition of a diaphragm, when the parts are constructed, ventilated and arranged in the manner and for the purpose substantially as described.

83,862.—HORSE POWER FASTENER.—Richard Knott, Suisun, Cal.

I claim the arrangement of the frame, A, with arms, E E, attached to the timbers, C C, the hooks, G G, and adjusting screws, I I, for fastening the horse power to the ground, retaining it in position, and leveling it, substantially as herein described.

83,863.—STEAM GENERATOR.—William H. Laubach, Philadelphia, Pa.

I claim, 1st, The combination of the transverse pipe, a, the horizontal pipes, b, and the inner vertical feed pipes, b c, constructed substantially as described.

2d, The feed pipes, b c, in combination with the steam pipes, d, and the outer tubes, e, as set forth.

3d, The construction of the horizontal water pipes, b, and the horizontal steam pipes, d, combined as herein described.

83,864.—SLEIGH RUNNER.—Jacob Laux, Cleveland, Ohio.

I claim, 1st, The semi-disks or plates, F, radial arms, H H', in combination with the sleigh runner, in the manner and for the purpose specified.

2d, The cap, J', provided with a groove, K', as arranged in combination with the plates, J, for the purpose and in the manner set forth.

3d, The center, E, when constructed in two sections, in the manner substantially as set forth.

83,865.—VAPOR BURNER.—David H. Lowe, Boston, Mass.

I claim the reservoir, A, burner, C, perforated cap, G, and non-conducting material, D, when all are constructed and arranged to operate as shown and described.

83,866.—WEEDING-HOE.—Alfred E. Lyman, Northampton, Mass.

I claim the graduating expansive weeding hoe (or weed cutter), as substantially described and herein set forth.

83,867.—GATE.—Peter McCollum, Fayette, Mo.

I claim the gate, A A', when arranged in two parts, hinged together so as to allow the bottom part to be folded up or thrown open as described.

83,868.—APPARATUS FOR COLLECTING PRECIOUS METALS.—James T. McDougall, San Francisco, Cal.

I claim, 1st, Vertical or inclining iron standards, C C, with stems or bars, D D, resting on a plate or plates of copper, B, or plates of some other metal having affinity for mercury, when used for collecting the precious metals, substantially as described.

2d, Iron standards with a supporting horizontal base, on the edge of which there are projections, E E, so that, when placed side by side, open spaces, F F, will be formed between the said standards, having one or more stems or bars projecting upward, all of which serve as riffles, when placed in running water, substantially as and for the purpose specified.

3d, Iron stands, with hollow projecting stems, H, containing bars, slips, or tubes of copper, H', or other metal having affinity for mercury, communicating with the water outside through slits or openings, I I, substantially as described.

4th, Copper resting on iron, the iron resting on copper, the copper having amalgamated, silvered, or mercurialized surfaces, when placed in sluice boxes, or other apparatus, or equivalent device, designed to intercept and collect the precious metals moving with the water, in the manner and for the purposes herein specified.

5th, The metallic obstructing and collecting surfaces, or equivalent device, separately or in combination, whether placed in sluice boxes, concentrators, or other apparatus for collecting the precious metals moving in running water, substantially as described.

83,869.—BLIND HINGE.—William McKee, and Chas. H. Jordan, Washington city, D. C.

We claim, the arrangement and combination of the latch, D, with its forked head, H, when operated as herein described, and for the purpose set forth.

83,870.—MACHINE FOR CUTTING OUT GARMENTS.—W. A. McLaughlin, New York city.

I claim the slider, u, and clamping lever, t, constructed as set forth, and actuated by the arms and rock shaft, q, in combination with the follower, e', and toggles, f, actuated as specified, to operate the cutters when the feeding device is not acting upon the cloth as set forth.

83,871.—FARM FENCE.—E. G. McMillan, Norwalk, Ohio.

I claim the band, C, cap, I, and stakes, D, as arranged in combination with the posts, G, and rails, A, for the purpose and in the manner substantially as set forth.

83,872.—MEDICAL PLASTER.—S. I. Merrill (assignor to D. U. Young, and M. C. Merrill), Falmouth Me.

I claim the above described compound of ingredients, in the named proportion, for the purposes set forth.

83,873.—GUN CARRIAGE.—Alexandar Moncrieff, Woolwich, England. Patented in England, June 4, 1866.

I claim the before-described system of mounting and working ordnance, whereby the gun is supported upon a moving fulcrum, which, on the firing of the gun, is caused to shift nearer to the gun, and farther from a counterweight, spring, or other force, while at the same time the gun is brought into a lowered position, for reloading, and is then automatically raised into position for firing.

83,874.—LAMP.—Samuel C. Moore, Boston, Mass.

I claim, 1st, the combination and arrangement of the cap, H, cup, G, hangers, I, slide, F, and tube, B, all constructed and operating in the manner described.

2d, So arranging the chimney supporters, that the lower edge of the chimney shall extend below the level of the rim of the base plate, substantially as described and shown.

3d, The hangers or supporters, I, whether depending from the base plate or rising from the screw cup, when so arranged as to support the lower edge of the chimney below the rim of the base plate, as and for the purpose set forth.

83,875.—HORSE RAKE.—L. H. Morrill, West Cumberland, Me.

I claim the sliding clutch, c, on the axle, b, together with its spring, f, chain, l, lever, g, and pin, d, set in the axle, b, all as and for the purposes set forth, the clutch being attached to the axle at the center, to make the draft upon the cattle even when the rake head is being lifted.

83,876.—GAS BURNER.—Henry B. Myer, Philadelphia, Pa.

I claim the combination of the upper cup, J, metallic crown, C, glass body, A, valve, K or K', a lower cup with side aperture or apertures, E', therein, and b ase, B, all constructed substantially as shown and described.

83,877.—ILLUMINATOR FOR STOVES, GRATES, ETC.—Benjamin Nott, Albany, N. Y.

I claim, 1st, The within described illuminator, hinged to a stove or other heater in the manner and answering the purpose of a door, as set forth.

2d, The hollow glass cylinders, F, having currents of air circulating through them, substantially as and for the purpose as set forth.

3d, Using glass cylinders to transmit the light from a stove or heater, when protected by adjustable doors or dampers in rear thereof, as set forth.

4th, The cylinders, F, in combination with the plates, D and E, or either of them, substantially as and for the purpose set forth.

5th, The cylinders, F, in combination with the doors, C and C', or either of them, substantially as set forth.

6th, The combination of the cylinders, F, plates, D and E, or either of them, with the doors, C and C', or either of them, substantially as set forth.

7th, The combination of the cylinders, F, plates, D and E, or either of them, doors, C and C', or either of them, with a stove, or door of a stove, substantially as set forth.

83,878.—HARROW.—William F. Osborn, Mount Pleasant, Pa.

I claim, 1st, The combination, substantially as set forth, with a harrow, of a supporting carriage, inclosed within the harrow, and carrying devices for lifting the harrow at the will of the driver.

2d, The combination, substantially as set forth, with a supporting carriage and hinged harrow frame, of the interlocking lifting levers, for the purpose specified.

3d, The combination, as set forth, with the supporting wheeled carriage carrying a seat for the driver, of the centrally hinged sectional harrow frame, arranged to fold upon the carriage for transportation, without interfering with the driver.

4th, The combination, substantially as set forth, with the supporting carriage of the pivoted tongue and locking catch, for the purpose specified.

83,879.—WAGON BRAKE.—J. J. Pierce, Maquoketa, Iowa.

I claim the combination of the lever, K, arm, F, slot and bolt, H, and rack, L, the rock shaft, D, arms, M M, rods, N N, collars, O O, springs, R R, and bar, P, the whole combined, arranged, and operating as described.

83,880.—RAILWAY RAIL.—James Potter, Portland, Me. Antedated October 28, 1868.

I claim, 1st, The chairs, d, when secured to the sleepers, c, as described, by bolts, f, an i braces, i i', as and for the purposes set forth.

2d, The base, e, in combination with braces, i i', part, m, and screw bolt, n, as and for the purposes set forth.

3d, The construction of the brace, i i', with projection, m, and slotted base, j j', operating as described, on the rail and chair.

4th, The method of attaching the whole rail, a, to the chair, by means of base, e, braces, i i, and clamps, s r i, constructed and combined as herein set forth.

5th, The combination of the divided rail, b, with the base, e, chair, d, clamps, r w, and braces, i i', as and for the purposes set forth.

83,881.—GATE.—Fitch Raymond, and August Miller, Cleveland, Ohio.

We claim the spring, F, and hinges, C, as constructed and arranged, in combination with the gate, for the purpose and in the manner specified.

83,882.—HYDRANT.—Robert Reilly, Baltimore, Md. Antedated October 27, 1868.

I claim, 1st, The combination of the parts, C D E, the two former capable of being firmly attached together, by the screw, N, with the tubular plunger, I, having the discharge pipe, J, when so arranged as to enable the operator to detach and remove the hydrant from the pipe, by simply turning the handle of the plunger, substantially as described.

2d, The combination of the packing, L, and cylinder, K, with the plunger I, walls, C C, valve, F, spring, G, and stem, H, substantially as and for the purpose described.

83,883.—HASP FOR TRUNK LOCKS.—Nathan P. Ryder, Boston, Mass.

I claim the eye, E, so attached to the hasp, D, as to allow a motion of the latter independently of the eye, as and for the purpose specified.

83,884.—BATH ROOM RACK.—Mrs. Mary Ann H. Saurman, Philadelphia, Pa.

I claim a series of receptacles, for the purpose described, arranged and applied so that the water dripping from them will be conducted to a place of discharge, substantially as set forth.

83,885.—STEAM HEATER.—Frederick W. Schultz, and John A. Wilson, Baltimore, Md.

We claim, 1st, In combination with the elevated water back, the boiler and steam coils, made and arranged to operate substantially as and for the purpose set forth.

2d, Also, the screw thread form of the coil pipes, when so arranged in series that the threads of the adjacent pipes shall nearly or quite touch each other, and leave openings between them for the air to pass through and becomes heated, by impinging upon the extended surface, substantially as described.

3d, Also, in combination with a hot water heater, the introduction of the cold air from the top or upper part of the house, by means of a turn cap, air flue and valve, substantially as described.

4th, Also, the supplementary air flue and valve to furnish air momentarily, while the turn-cap may be veering, substantially as described.

83,886—GAS-BURNER ATTACHMENT.—Fred'k Shaller, Hudson, N. Y.

I claim the wire cone or cap, A, in combination with the support, b, and spring, c, when constructed and employed substantially as and for the purpose set forth.

83,887.—RETURN-DRIP FOR PUMPS.—James B. Stevenson, Bloomington, Ill.

I claim the combination of the funnel, conductor, pipe, hinge, guide, and spring, all arranged as described, and for the use specified.

83,888.—MACHINE FOR SPLITTING LEATHER.—John Taggart, Boston, Mass.

I claim the combination of a set of feeding rollers, (provided with mechanism for operating them) a series of rotary cutters, B, carrying frame, D, therefor, and mechanism for revolving such cutters, and imparting to the carrying frame a reciprocating rectilinear movement in order to cause such cutters to cut a sheet of leather into seperate pieces or sheets, when it is forced against them by the action of the feeding-rollers.

And in such a combination, the employment or combination of a mechanism with the cutters, such as will cause those of them on one side of the medial vertical line of their sustaining frame to revolve in directions opposite to those in which the remainder of such cutters are made to revolve, the same being for the purpose of stretching the leather in opposite ways while the cutters may be in action on it to cut it.

Also, the combination and arrangement of sharpening devices s s t, or mechanism, with the feed rollers, and the series of rotary knives or cutters, their supporting carriage or frame, and mechanism for operating it and them so as to cause them to revolve, and at the same time to move together back and forth, in a manner to separate, when presented to them, a sheet of leather into two sheets, as described, the said sharpening devices or mechanism being made to effect the sharpening of the cutters while they may be in action, as stated.

Also, in combination with the feed rollers, a series of rotary cutter s, and their carry-frame or carriage, as explained, devices for moving such frame toward the feed rollers, from time to time, as the wear of the cutters may require.

Also, in combination with the feed rollers, a series of rotary cutters and their carrying-frame or carriage, as explained. The series of tapering deflectors, l, arranged with the cutters and their shafts as set forth.

Also, the arrangement and combination of the steadying and guide plate F, with the feed-rollers, and a series of rotary cutters, provided with mechanism for operating them, as described.

83,889.—APPARATUS AND PROCESS FOR ROASTING COFFEE.—O. H. Taylor (assignor to himself, John A. Parks and Darius Allen), Brooklyn, N. Y.

I claim, 1st, The hot-air pipe B, located in the steam chamber D, in connection with the coffee-chamber A, substantially as shown and described, and for the purpose set forth.

2d, The coffee chamber A, provided with a discharge or escape-pipe, W, in which is a safety-valve, H, the condensing-pipe, I, and condenser, O, in connection with the receiver, P, for the purpose herein set forth, and substantially as described.

3d, Roasting coffee, in the manner substantially as herein described, and for the purposes set forth.

83,890.—MACHINE FOR SIZING YARN.—John S. Thomson and Kelly Girvin, Brooklyn, N. Y. Antedated October 22, 1868.

We claim the combination of rollers B and C, wedges c, spring D, brush E, and box A, provided with handles F, or their equivalents, when constructed, arranged, and operating substantially as and for the purpose set forth.

83,891.—MITERING MACHINE.—Robert F. Tompkins and H. T. Williams, New York City.

We claim 1st, The knives or cutters, N, arranged in pairs, each pair fitted on a vertical shaft, D, in such manner that they may turn, rise, and fall thereon, as described, and for the purposes herein set forth.

2d, The guides, M, attached to the arm, K, and knives, N, so as to move, in connection with the knives, as described, and for the purpose desired.

83,892.—CRIMPING PIN.—Charles N. Tyler and Augusta C. Tyler, Buffalo, N. Y.

We claim, 1st, In combination with a hair pin, H, formed with a loop at its head, the double tongue, b, substantially as described, and for the purposes, set forth.

2d, In combination therewith, the clasp or slide, a, substantially as described, and for the purposes set forth.

3d, The double tongue, b, formed with the clasp or slide, a, substantially as described, and for the purposes set forth.

83,893.—COATING AND WATER-PROOFING COLLARS, CUFFS, AND OTHER ARTICLES OF WEARING APPAREL.—S. W. H. Ward, New York City.

I claim the described means of rendering collars, bosoms, cuffs, and other articles of wearing apparel composed of paper, or compounded of cloth and paper, water proof.

83,894.—TENTER-BAR FOR CLOTH.—Frederick Willig, Joilet, Illinois.

I claim the combination of the movable horizontal bars, a, pawls, n, ratchets, m, pulleys, e, and weights, d, with cords attached, as described, perpendicular bars, f, and, g, and windlass, i, as described, constructed and arranged as and for the purpose set forth.

83,895.—MODE OF FILLING MARSHES.—John B. Wood, Jersey City, N. J., and John T. Chapman, Brooklyn, N. Y.

We claim the removable and adjustable caps, B, secured to piles, A, in combination with the adjustable flexible track, C, all constructed and arranged to operate in the manner substantially as and for the purpose herein set forth.

83,896.—SCHOOL DESKS.—William S. Wooton, Richmond, Ind.

I claim, 1, A combined school desk and seat, when the seat and desk are made to turn on separate pivots, and are so connected together that, by raising the seat, the upper angle of the desk is made to fold into the angle of the seat, in the manner and for the purposes substantially as herein shown and described.

2d, The combination of desk, B, seat, C, and the devices connecting them together, with the standards, A, and brace, D, when said parts are constructed and arranged to operate in the manner substantially as herein set forth and shown.

83,897.—HAMMER.—William Zimmerman, Quincy, Illinois.

I claim the above described hammer or instrument, when adapted to the different uses and purposes described, and constructed to operate in the manner substantially as set forth.

83,898.—MILK-CAN.—T. W. Akin, Patterson, N. Y.

I claim the bottom, B, having a downward projecting flange, when secured upon the inside of the milk can, above its lower edge, by the rivets, a, the portion below said flange being strengthened by the interior ring riveted to the body of the can, as herein described, for the purpose specified.

83,899.—HYDRANT.—James Allison, Cincinnati, Ohio.

I claim the hollow perforated pipe, H, provided with the elastic disk, I, waste passage, d, and elastic packing rings, e e, arranged to operate in connection with the the cylinder, F, having the waste passage, d, as herein described, for the purpose specified.

83,900.—WAGON.—Joseph F. Applegate, New Albany, Ind.

I claim, 1st, The arrangement of the coupling rod, F, made in two pieces, connected by a screw swivel, h, and attached at the front end, either to the sand board or to the king-bolt, and at the rear end provided with a yoke, g, which moves freely around the roller or shaft, f, in boxes, i i, on the inner sides or the two middle rails of the frame A, as and for the purposes herein set forth.

2d, The tail gate, G, provided with a strap, k, across its upper end, and with slides H H, extending below the wagon, which work on pieces, l l, on the inner side of the frame, A, substantially as and for the purposes herein set forth.

3d, The arrangement of the spring bolts, e d, in combination with the perch pole, C, sheath, D, and hounds, E E, all constructed and operating substantially as and for the purposes herein set forth.

83,901.—DRIVE-WELL.—John S. Armstrong, Delaware, Ohio.

I claim the point, C, having helical threads or feathers, b, and fitted to rotate independently on the perforated end of the tube, A, substantially as described, and for the purpose set forth.

83,902.—GLOBE-VALVE FOR STEAM AND OTHER ENGINERY.—E. H. Ashcroft, Boston, Mass.

I claim the construction of the bodies of globe, angle, check, and other valves, with bushing, made of the ordinary composition of tin and copper, in their ends, substantially as herein described.

83,903.—VALVE FOR STEAM ENGINES.—Leonard Atwood, Norwich, Conn.

I claim, 1st, Intermediate valves, between the steam chest and cylinder, to reverse the action of the engine, by changing the course of the steam after it has passed the main or induction and eduction valve, substantially as described.

2d, The tumblers, C and C, in combination with the steam passages, e, e, f, and f, substantially as and for the purpose described.

3d, The steam counter balanced valve, V, constructed as described, when arranged and operating in relation to the plate, D, substantially as described.

83,904.—BOTTLE-FILLING APPARATUS.—Gustav B. Bachman, Brooklyn, E. D., N. Y.

I claim, 1st, The arrangement of one or more hinged siphons, B, loaded by weights, C, incombination with the brackets, E, and reservoir, A, substantially as and for the purpose described.

2d, The seats, D, in combination with the hinged B B, and reservoir, A, substantially as and for the purpose set forth.

83,905.—MACHINE FOR MARKING AND COVERING CORN.—Elias Barto, Tiffin, Ohio.

I claim the reversible and adjustable arms, C C, provided on one side with blocks, D, and shovel, E, and on the other, with cross bar L, on which are the adjustable blocks, M M, and spades, N N, all constructed and operating substantially as and for the purposes herein set forth.

83,906.—SELF-ADJUSTING HOOK.—William Bisbee and Fleming G. Hearn, Yreka, Cal.

We claim forming a notch, b, upon the inner side of the head or heads of the hook, B, substantially as herein shown and described, and for the purposes set forth.

83,907.—CAR-COUPLING.—Timothy B. Blackstone, Chicago, Ill.

I claim, 1st, The hollow buffer, E, constructed as described, in combination with the draw head, F, and heel, G, connected by the right and left screw, J, or other suitable device for drawing the head, F, back, substantially as specified.

2d, The combination and arrangement of the hollow buffer, E, the movably connected draw head, F, and heel, G, with the springs H and H, substantially as specified.

3d, The combination and arrangement of the beams, D, applied to the platform or end of a car, with any suitable close drawn coupling, substantially and for the purposes specified.

83,908.—BILL-FILE.—C. W. Bond, (assignor to himself and John A. Gould,) Biddeford, Me.

I claim the arrangement of the separate cards, A, covers, B, and elastic straps, a, in the manner described, substantially as and for the purpose specified.

83,909.—SEWING-MACHINE FOR EMBROIDERING.—Antoine Bonnaz, (assignor to Emile Cornely,) Paris, France.

I claim, 1st, The combination of a hook or needle with an oscillating looper, B, and the universal jointed feed bar, c, when said three elements are connected to each other by a mechanism, substantially such as described which permits of turning one or the other of said devices, without changing the relative positions of said parts to each other, for the purposes described.

2d, The universal jointed feed bar, O2, in combination with the collar, n, sleeve, R, and the operating parts which constitute the universal feed motion above described, constructed and arranged substantially as and for the purposes set forth.

3d, The combination and arrangement of parts, by which the needle-bar carrier, G, is connected with the feed bar, O2, the looper, B, and the crank, S, for imparting the movements to the several parts of the machine.

4th, The coupling and uncoupling device, substantially as herein described, for the purpose of disconnecting the parts and suddenly changing the feed, when used in combination with an embroidery machine, as described.

83,910.—SEWING MACHINE FOR EMBROIDERING.—Antoine Bonnaz (assignor to Emile Cornely), Paris, France.

I claim, 1st, The needle-bar carrier, G, the universal-jointed feed bar, O2, as herein shown and described, and the horizontal looper shaft, B, connected by means of the gearings, Z Y, shaft, W, gearing, V U, shaft, z, gearings, y x, shaft, N, and endless screws, l k, substantially in the manner and for the purposes described.

2d, The mechanism herein described, for connecting the shafts, E D, consisting substantially of disk, F, cam-grooved disk, K', lever, G, spring pawl, F', rod, D', and lever, B', substantially as and for the purposes described.

83,911.—PORTABLE FENCE.—Lewis W. Bosart, St. Marie, Ill.

I claim the combination of the post, B', panels, A, and wedges or keys, F, substantially as shown and described.

83,912.—STENCIL PLATE FOR NUMBERING BARRELS, &c.—James Henry Bradford, Westborough, Mass.

I claim the combination of two or more concentric curves of the nine digits, for making numbers in horizontal or other right lines, substantially as described.

83,913.—PICTURE NAIL.—B. H. Bradley, Waterbury, Conn.

I claim a picture nail, having formed upon its end the hook, C, and combined with the head, D, constructed so as to be attached to the end, of the hook, substantially in the manner herein set forth.

83,914.—DRAFT EQUALIZER FOR WAGONS.—Charles C. Bradley, Brodhead, Wis.

I claim the combination and arrangement of the power equalizer, consisting of the duplicate poles, and the two whiffletrees, and two neck yokes, each with a long and a short arm, and the pulleys attached to the wiffle trees and poles, for the purposes herein set forth, or substantially the same.

83,915.—TICKET HOLDER.—James Bramble and Albert H. Nirdlinger, Fort Wayne, Ind.

We claim the ticket holder as constructed of a single metallic plate, provided with a fastening device, C, the edges of the said plate being bent over on three sides to form grooves, a, adapted to receive the ticket and the upper edge of the plate being cut out at d d, leaving a central tongue, e, which is bent over, substantially as herein shown and described, for the purpose specified.

83,916.—STEAM GENERATOR.—H. G. Brooks, New York City.

I claim, 1st, A boiler, in which the ends of the inner sheets of the laps or seams are prolonged beyond the fastening rivets, and chamfered or beveled, in the manner and for the purposes set forth.

2d, The offset, flanged outwardly, in the manner described, on the end of the forward course of the cylinder portion of the boiler, in connection with the smoke arch or box, substantially as and for the purposes set forth.

83,917.—CARRIAGE.—Charles Brown (assignor to himself and Aaron G. Salmon), Adrian, Mich.

I claim the use and manufacture of the side straps, A and C, combined with the corner iron, B, by means of the portions, a and b, substantially as set forth and described.

83,918.—MACHINE FOR DRESSING HOP POLES.—C. D. Brown, Bainbridge, N. Y.

I claim the construction of the three wheels, A, B, and C, and their combination with and arrangement on the shaft, E, substantially as herein shown and described.

83,919.—FASTENING HORSE POWERS TO THE GROUND.—Walter Buchanan, Jr., Main Prairie, Cal.

I claim the straps, C and b b, and the beams, D D and G, together with the links, g g and m, with their keys, the whole constructed and operating substantially as and for the purpose herein described.

83,920.—DUMPING WAGON.—William S. Bullock and Hugh Hanigan, Wilmington, Del.

We claim the combination of the curved springs, s, bed frame, a, applied and operating in connection with the hind axle, d, and body, m, as herein shown and described, for the purposes specified.

83,921.—TATTING SHUTTLE WINDER.—E. S. Burns, La Crosse, Wis.

I claim a machine for filling tatting shuttles, consisting of the rotating disk, F, operated by the wheel, C, and having the stationary loop, c, and the pivoted loop or hook, d, arranged thereon, all substantially as shown and described.

83,922.—APPARATUS FOR MAKING EXTRACTS AND ESSENCES.—Edward E. Burrough, Baltimore, Md.

I claim, 1st, The vessel, D, constructed with the concave bottom, d, plug, d', flanges, c c' e, and cocks, J K, all arranged to operate in the manner and for the purpose set forth.

2d, The arrangement of said vessel with the vessels, I and B, substantially as described.

3d, The arrangement of said vessels, D I B, with the casing, G, substantially as described.

4th, The arrangement of the vessels, D I B, with the pipe, E, substantially as described.

5th, The arrangement of said vessels, D I B, and pipe, E, with the reservoir, F, and pipe, f, substantially as described.

6th, The arrangement of stove, A, pipe, E, vessels, F G B I D, cocks, J K L, plug, d', and flanges, c' e, substantially as described, and for the purposes specified.

83,923.—AUTOMATIC GATE.—W. W. Burson, Rockford, Ill. Antedated October 31, 1868.

I claim, 1st, The combination and arrangement of levers, F F', pendants, H H', connecting pieces, I I', arm, K, and ways, D D', when the whole are constructed and operated substantially as and for the purpose set forth.

2d, Constructing the way, D or D', with suitable curve to overcome the gravity of swinging arm, K, substantially as specified.

3d, The combination and arrangement of the pendants, H H', wire, m, and posts, E E', operating substantially as and for the purposes set forth.

83,624.—FLUTING MACHINE.—S. G. Cabell (assignor to Flora B. Cabell), Quincy, Ill.

I claim, 1st, The cap plate, F, when constructed and arranged substantially as herein described for the purpose of furnishing a support and bearing for the cylinders, I, as set forth.

2d, The combination of the lever, C, bolt, D, cross bar, E, frame, G, and cap plate, F, when constructed and arranged to operate substantially as described and for the purpose set forth.

3d, The cap, L, and bolt, g, when constructed and arranged to operate substantially as herein described and for the purpose set forth.

4th, In combination with the cylinder, H, the cap, M, on the end of the crank, N, constructed substantially as herein described and for the purpose set forth.

5th, In combination with the cylinders, I, the covers, O, and thimbles, P, when constructed and arranged substantially as described and for the purpose set forth.

6th, The fluting rolls for fluting machines, constructed with ogee fluting, of the form herein described, and shown in figs. 4 and 5.

83,925.—BRONZE DRESSING FOR LEATHER.—M. S. Cahill, Boston, Mass.

I claim a bronze dressing for leather, composed of spirit varnish and aniline fuschine, substantially as herein set forth, either with or without the addition of aniline blue or bronzed powder, all as described, as a new article of manufacture.

83,926.—HAY AND COTTON PRESS.—Stephen Q. Carey, Waxahatchie, Texas.

I claim the arrangement, herein described, of the shaft, J, pulleys, I I', cord, G, pulleys, H H', plates, P, press box, B, capstan, L, cord or chain, N, and large flanged pulley, K, all constructed and operating substantially as set forth.

83,927.—MACHINE FOR APPLYING REINFORCING PATCHES TO BUTTON HOLES OF COLLARS.—H. F. Cary, Boston, Mass.

I claim the process herein described, of applying to paper, before or after its conversion into collars, reinforcing button hole patches, automatically cut from gummed strips, continuously moistened in their passage through the machine, substantially as described.

Also, in a machine for applying strengthening patches to button-holes of collars, a trough and guides, for moistening the cement applied surface of the ribbon.

83,928.—WIND WHEEL.—Chandler P. Chapman, Madison, Wis.

I claim combination of the pivoted main vane, F, connected to the governor by the rod, a, with the pivoted auxiliary vane, G connected by rod, d, to the vane, F, for the purpose of changing the position of the wheel to the wind, substantially as described.

83,929.—BRAKE FOR VEHICLES.—E. M. Chumard, Pittston, Pa.

I claim the arrangement of the crank shaft, D, rods, g g, arms, x x, slotted guides, m, loops, b b, and brake blocks, l, with the brake bar, C, and operated by the lever, K, and spring, l, all constructed substantially as set forth.

83,930.—ELASTIC CALK FOR BOOTS AND SHOES.—Gilbert H. Clemens, New York city.

claim 1st, A rubber heel calk, molded or made to fit on to a boot or shoe heel, in combination with the metallic disks, C, in the bottom of the same, all as and for the purposes specified.

2d, A rubber heel calk, molded or made to fit on to a boot or shoe heel, in combination with a band or bands, strap or straps, to pass around the instep of the boot or shoe, for the purpose of holding the heel calk on the heel of the same, as shown and described, and for the purpose set forth.

3d, A rubber heel calk, molded or made to fit on to a boot or shoe heel, the bottom of which is made with a series of corugations, constructed substantially as shown and described, and for the purpose specified.

4th, The combination of a rubber heel calk, made to fit on the heel of a boot or shoe, with a strap or straps to hold it thereon, the metallic disk, C, and the corrugations on the bottom of the calk, all substantially as shown and described, and for the purpose specified.

83,931.—CULTIVATOR.—Leander Clifton, Barry, Ill.

I claim, 1st, The safety detaching device for a cultivator plow, consisting of the curved piece, B, and spring piece, H, substantiallyas and for the purposes described.

2d, The cultivator, constructed of the iron bow, A A', curved piece, B, spring piece, H, ring, I, pieces, F F', standards, C C', having bent and slotted ends, a a', rod, D, nuts, b c, brace, K, and plows, G G', all combined arranged and operating as and for the purposes described.

83,932.—SCRUBBING BRUSH.—A. E. COLMAN, New York city.

I claim as a new article of manufacture, the brush, made up of bristles and rubber, substantially as herein recited, and for the purposes set forth.

83,933.—TIP FOR CHAIR LEG.—Edward Coogan and Howard Miller, Washington, D. C.

We claim, 1st, A tip for chairs and other articles of furniture, constructed substantially as shown and described.

2d, The combination of the tips, B, the elastic dividing plate, F, and the leg or post, A, substantially as and for the purpose shown and described.

3d, The within described method of securing the tips to the legs or posts of furniture, it being by means of the shank, D, the recess or chamber, E, and a suitable cement.

83,934.—ROLLING PIN.—Warren Cook, Arsenal, Pa.

I claim the kitchen utensil, consisting of the cylinder, A, having a cavity, B, the removable perforated cap, a, and the detachable handles, C D, provided respectively with bands, b d, substantially as herein set forth and shown, for the purposes specified.

83,935.—FASTENER FOR GLOVES.—Ph. Courvoisier, Paris, France.

I claim the cap, A, provided with points, a, and containing the spring bolt, b, in combination with the bottom, B, provided with points, c, and with a neck, f, substantially as and for the purpose described.

83,936.—PARLOR BEDSTEAD.—Mark Crosby, Boston, Mass.

I claim, 1st, In combination with the side pieces, A and B, the hinged pieces, F F', when attached to the front part, K, in such a manner as, when closed, to form a finish around the corner and across the side piece, A, and underneath the projecting end of the top, D, substantially in the manner shown and described, as and for the purposes set forth.

2d, In combination with the base, G, the end pieces, A and B, having their ends rounded off so as to allow them to turn down into the base, G, when closed, and when open to form a continuous side piece at the bottom, without the addition of intermediate pieces, substantially in the manner described, as and for the purpose set forth.

83,937.—HORSE RAKE.—Samuel L. Denney, Christiana, and John N. Chalfant, Chester county, Pa.

We claim, 1st, The lever D, rod E, arm F, spring, G, and curved stand, H, when arranged to operate in the manner and for the purpose described.

2d, The combination of the serrated rim, I, rod, E, lever, D, arm F, spring, G, and curved stand, H, when operating in the manner and for the purpose set forth.

3d, The combined tooth guard, guide, and pressure bearer, when constructed as here shown and described.

83,938.—DERRICK.—J. B. Drake and William H. Hutson (assignors to themselves and J. Sill), Montoursville, Pa.

We claim, 1st, The guide, E, in combination with the arm, D, and the hoisting device, when operating substantially as set forth.

2d, The combination of the rope, J, having the two parts, j j', with the crane, D, when operating substantially as described.

3d, The arrangement of the sled shaped base, A, with the above described derrick, substantially as and for the purpose set forth.

4th, The combination and arrangement of the sled, A, mast, C, crane, D, rope, J, j j,, guide, F, pulleys, G H I, and braces, c c c, substantially as shown and described.

83,939.—MACHINE FOR CUTTING SLATE.—Thomas R. Drummond, Hartford, Conn.

I claim, 1st, A box knife, or a box with any number of knives attached, whereby a slate may be cut at one blow or descent of such knife or knives, substantially as herein described.

2d, The elastic cushion, K, pressed upon by either a weight or by springs, arranged substantially as and for the purposes set forth.

3d, The elastic cushioned bed, C, in combination with the shell, a, arranged and operating substantially as and for the purpose specified.

4th, The arrangement of the cutter box with two or more knives combined, so that a piece of slate may be cut at one blow, and either with or without punches at the corners.

83,940.—REEFING AND FURLING SAILS.—Frederick B. Dunton, Centre Lincolnville, Maine.

I claim the arrangement of the setting ropes, 1, the centre reefing brails, having reefing loops, l, and passing through the eyelets, m n o, the swiveled brailing rod, and the outer furling brails passing through the eyelets, j, with reference to the sail, A, yards, B C, and jack stays, d e, the hauling parts of each gear being united in sets, and arranged upon different sides of the mast, whereby the sail may be spread, furled, or reefed by hauling on any one set, as herein shown and described.

83,941.—BOTARY STEAM ENGINE.—Alfred Duvall, Baltimore Md.

I claim, 1st, An elliptical piston, constructed with elastic or yielding surfaces upon its points of greatest diameter, substantially as shown and described.

2d, The chambers, D D, formed within the piston, substantially as shown and described.

3d, The combination of the elliptical piston, B, the chambers, D D, and the set screw, H, bars, G, and springs, F, substantially as shown and described.

4th, The arrangement of the packing rings, K and I, rubber or elastic packing, J, spring, L, and set screw, M, substantially as shown and described.

83,942.—BRIDGE.—James B. Eads, St. Louis, Mo.

I claim the levers D, forming a compensating expansion joint, with the horizontal members, C, for the purpose of preventing the horizontal movement of the arch under the effect of a moving load on the bridge, when constructed and arranged as herein described.

83,943.—CORN PLANTER AND CULTIVATOR.—Alfred Edmister, Westfield, Ohio.

I claim, 1st, The combination and arrangement of the plows, P and T, draught rods, R V, and rods or bars, Q U W S, with each other and with the frame, A, to enable the machine to be conveniently adjusted for use as a planter or cultivator, substantially as herein shown and described, and for purpose set forth.

2d, The combination and arrangement of the seed box, N, guard plate, O, gage wheel, L, tube and valve plate, k, disk, J, vertical shaft, H, operated from the axle, B, by means of the bevel gear wheel, F and G, and the conductor or spout, M, with each other, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the pivoted notched bars, Y, connecting rod, Z, and lever or handle, X, with the bars or rods, U Q W, from which the plows, P and T, are suspended, substantially as herein shown and described, and for the purpose set forth.

83,944.—JOINT AND COUPLING FOR CULTIVATORS.—William H. Edwards, Moline, Ill.

I claim, 1st, The joint and coupling for cultivators, consisting of the side plates, G, the clasping plates, g, and vertical rod, H, all constructed and arranged substantially as herein described, and for the purpose set forth.

2d, The method of connecting the vertical rod, H, to the frame of the cultivator by means of the eye bolt, I, and plate, J, or their equivalents, substantially as herein described, for virtically and laterally adjusting the shovel beams, as set forth.

83,945.—CAR COUPLING.—John Elbertson (assignor to himself and Jesse L. Conner) Kirksville, Mo.

I claim, 1st, The sliding bars, P, with their springs, r, and pins, s, in combination with the spring, G, lever, K, and its attachments, herein described and shown, substantially as and for the purposes specified.

2d, In combination with a bumper, having springs, E, attached thereto, as described, the plate, D, lever, F, guide, c, bar, H, springs, b, and link, n, constructed and arranged substantially as specified.

3d, The lever, L, with its ratchet and pawl as described, bar, m, and link, n, when constructed, arranged, and operating substantially as and for the purposes herein set forth.

83,946.—ARITHMETICAL GAME.—Stephen A. Emery, Boston, Mass.

I claim the arrangement and construction, and mode of operation, as above described, by which instruction in the science of arithmetic is secured, in combination with an entertaining amusement.

83,947.—LIFTING JACK AND CANT HOOK.—Daniel Fasig, Rowsburg, Ohio.

I claim the combination of the hook, G, on the lower part of the forward edge or side of the standard, B, with the slotted adjustable lever, C, substantially as herein shown and described, and for the purpose set forth.

83,948.—FABRIC FOR FLOOR COVERING, WAINSCOTING, ETC.—Michael Flurscheim, New York city, assignor to Henry Whittemore, Passaic, N. J.

I claim, as a new article of manufacture, the herein described portable wainscoting or floor covering, composed of narrow strips of wood, secured upon cloth or its equivelent, as described.

83,949.—FOLDING LOUNGE.—Duncan Forbes, Chicago, Ill.

I claim the combination of the two part bolster, D D, body, H, and folding part, A, the whole being arranged substantially as and for the purpose set forth.

83,950.—TUCK CREASER FOR SEWING MACHINES.—H. W. Fuller, Brooklyn, N. Y.

I claim, 1st, The lever which carries the nipping points, the spring, and the base plate, all formed of or from the same piece of metal, substantially as described.

2d, The adjustable tongue plate and tongue, combined with its supporting plate, as specified.

3d, The combination, with the base plate and supporting bolster, of the scroll spring, constructed as described, and for the purpose set forth.

4th, The combination, with the adjustable tongue plate and tongue, of the graduated scale, whether on the cloth smoother or the base plate.

5th, The combination with the adjustable tongue plate and tongue, and the graduated scale, of the nipping points, D D'.

6th, The gage, G, in combination with the clamping block and the tucker proper, constructed substantially as described, and all separately adjustable with respect to the needle of the sewing machine, and for the purposes set forth.

83,951.—MACHINE FOR PACKING TEA, COFFEE, ETC.—John Garsed, and Clayton Denn, Frankford, Penn., assignors to John Garsed.

We claim, 1st, The plunger, N, attached to or connected with a rising and falling shaft, I, placed within a tube, J, connected with a treadle, G, and arranged substantially as shown, so that the plunger will have a rising and falling and also a turning movement communicated to it, for the purpose herein set forth.

2d, The rising and falling box, B, with the fixed bottom plate, F, in combination with the plunger, N, all arranged to operate substantially as and for the purpose specified.

3d, The box, P, in combination with the fork, Q, rising and falling box, B, and plunger, N, all arranged substantially in the manner as and for the purpose set forth.

83,952.—BEEHIVE.—J. C. Gaston, Cincinnati, Ohio.

I claim, in combination with a beehive, the angular passage way, a d, and receptacle, c, arranged and used in the manner described.

83,953.—BEER COOLER.—Joseph Gecmen (assignor to himself and Leopold J. Kadish), Chicago, Ill.

I claim, 1st, A series of corrugated pans, constructed and arranged substantially in the manner and for the purpose shown and described.

3d, In combination with a series of pans, arranged as specified, I claim a trough, B, provided with a strainer, b, and outlets, a, arranged substantially in the manner and for the purposes described and set forth.

3d, The opening, L, in the inclosure, A, below the series of cooling pans, for the purposes specified.

83,954.—SAWING MACHINE.—Jason C. Gillett, Holly, Mich.

I claim, 1st, The arrangement of the driving pulley, A, with reference to the platform upon which the operator stands, and to the levers, B H1, and connecting link, H2, substantially as shown and described.

2d, The arrangement of the driving pulley, A, crank shaft, with its disk, C, crank, D, and cross head, E, for giving motion to the saw, substantially as shown and described.

83,955.—TOBACCO CUTTER.—Edward L. Gilman, and Theophilus S. Smith, Somerville, Mass.

We claim a tobacco cutter, constructed and operating substantially as shown and described, that is to say, with the knife, D, the rods, e, springs, g, cap, F, and tray, C, in combination with the box, A, and either with or without the match box, J.

83,956.—SWAGE FOR SAWS.—H. H. Gridley, Auburn, N. Y.

I claim, 1st, The raising of the cutting edge of the saw tooth by means of the swage, c, herein described, and for the purpose set forth.

2d, The swage for up-setting saw teeth, having the triangle, c, formed thereon, as described and for the purpose set forth.

83,957.—CURTAIN FIXTURE.—Benjamin Handforth, Chicago, Ill.

I claim providing one end of a curtain roller with an angular spindle, to operate in connection with an angular bearing, or with pins, to operate in connection with stops, upon the support for the roller, so that said roller can be locked or unlocked by a longitudinal movement thereof, substantially as herein described.

83,958.—SAW HORSE.—Cyrus H. Hardy (assignor to himself and B. L. White), Bath, Me.

I claim the clamp, C, herein described, sliding longitudinally between the frames, A B, of a saw horse, in combination with the frame or lever, D, by which it is operated.

83,959.—NUT CRACKER.—Chas. Hayden, Collinsville, Conn.

I claim the nut cracker, consisting of the stationary jaw, A, and pivoted lever, B, when the former is made with extensions, a b D, and provided with the clamping screw, substantially as herein shown and described.

83,960.—REVOLVING TABLE.—Julius S. Heator, Ovid, Mich.

I claim the arrangement of the metal box socket, B, the tube, C, cone nut, c, and rotating table, D, in combination with the caster, E, as constructed, and operating substantially as and for the purposes herein set forth.

83,961.—JOURNAL BOX.—George H. Henfield, San Francisco, Cal.

I claim, 1st, The frame, C, having a center, b, secured to the shell, A, by pins, d d, and dovetailed ends in the recesses, h h, in combination with the soft metal bearings, B B, separated by the single longitudinal bar, b', substantially as described.

2d, The frame, C, surrounding and separating longitudinally the soft metal bearings, B B, the latter secured to the shell, A, by pins, e, and the former by pins, d, and dovetail recesses, h h, protected and strengthened by the corner pieces, k k, cast upon the shell, as herein shown and described.

83,962.—HARROW.—H. M. Hickman and B. G. Devoe, Vandalia, Ill.

We claim, 1st, The central hub, A, constructed substantially as described and set forth

2d, The combination of the hub, A, and the beams, B, substantially as illustrated.

3d, The hub, A, the standard, C, the draw bar, D, the brace, F, and the spring brace, E, all arranged substantially as described and set forth.

4th, The covering, I, of rubber or other suitable substance, upon the rod, G, as and for the purposes set forth.

83,963.—TOOL HOLDER FOR LATHES.—W. O. Hickok and George W. Reisinger, Harrisburg, Pa.

We claim the employment, in combination with the improved tool holder, herein described, and a screw-cutting tool narrowing from the top downward, of a tapered wedge, c, for adjusting the tool to cut threads of a right or left pitch, substantially as and for the purpose described.

83,964.—COFFIN.—Francis H. Hill, Chicago, Ill.

I claim, 1st, So connecting and arranging a movable glass frame, B, in a coffin lid, that the same may be depressed and moved down beneath the lid, and restored to place again, substantially as herein described.

2d, So hinging or connecting said movable frame, B, with and in the coffin lid, that the same may be opened upwards and closed again, substantially as specified and set forth.

3d, So connecting and arranging the movable frame, B, with and in the coffin lid, that it may be moved back beneath the lid, or opened upwards, substantially as and for the purposes shown and described.

83,965.—LUBRICATOR.—Timothy Holland, New York city.

I claim the combination of the rib, j, on the neck of the oil holder, D, and the collar, g, formed and applied as described, substantially as and for the purposes set forth.

83,965.—RAILWAY CAR COUPLING.—D. D. Howe, Beaver Dam, Wis.

I claim the buffer, B, constructed as described, of the fixed part, C, and the movable part, D, operated by the spring bolt, H, yoke, E, and lever, F, whereby the mouth of said buffer is expanded or contracted, substantially as described for the purpose specified.

83,967.—RETAINING DEVICE FOR DOORS, ETC.—Levi T. Howell (assignor to himself, William Sharp, and Smith Fisher), Camden, N J.

I claim a retaining device, consisting of a curved plate, A, its projection, a, and lug, b, extending from the projection parallel to the plate, all substantially as and for the purpose described.

83,968.—PISTON FOR DEEP WELL PUMP.—Charles Jarecki (assignor to H. Jarecki & Company), Erie, Pa.

I claim the steel valve seat, D, provided with the concentric collar, c, adapted to be clamped between the shoulder, f, of the detachable crown, A, and the top of the section, B, whereby the valve is held rigidly in place, as herein shown and described for the purpose specified.

83,969.—DOUBLE WALLED PITCHER.—Godfrey Jepson (assignor to himself and Thomas F. Bryan), Chelsea, Mass.

I claim the arrangement of the hollow flanged screw, E, hollow flanged nut, F, and washer, W, with the outer and inner walls of a double-walled pitcher, substantially as and for the purpose specified.

83,970.—HAND-SPINNING MACHINE.—James L. Johnson and J. Wilson Foust, Evansburg, Pa.

We claim the combination of pulley, C, having a vibrating support, the ratchet, a, pawl, b, and the pulley, D, having an adjustable support, all constructed, arranged and operating substantially as and for the purpose described.

83,971.—VALVE FOR MELODEONS.—Edgar A. Jones and Julius A. Bidwell, Sturgis, Mich.

We claim, 1st, The bearer, C, constructed as described, with its lower edge slotted to fit over and play upon the staple, h, in the under side of the valve, whereby the lateral movement of the bearer is prevented, as herein described for the purpose specified.

2d, The spring, D, when formed as described, together with the regulating screw, E, when employed for the purposes and used set forth.

83,972.—MACHINE FOR CUTTING SUGAR INTO BLOCKS.—Gilbert D. Jones, Brooklyn, E. D., N. Y.

I claim, 1st, The combination of the dividers or pins, b and c, arranged to project at suitable distances apart from surfaces or tables, in lines corresponding to the desired profile of the blocks to be produced, and made to approach and recede from each other at intervals, to effect splitting of the slab into blocks of uniform size, substantially as herein set forth.

2d, The table, D, provided with dividers or cutters on its face, and hinged or arranged to swing relatively to a table, E, also provided with dividers or cutters, for operation in concert therewith, essentially as specified.

3d, The combination, with the table, E, provided with dividers or cutters, and arranged to have up-and-down play or motion, of a hammer, I, operating at intervals to strike and depress said table, essentially as specified.

4th, The combination, with the hammer, I, of a spring, N, arranged to give impetus to the hammer at starting, for action in concert with or on the table, E, substantially as described.

83,973.—STAY FOR COLLARS.—S. Kaufman, Fairbury, Ill.

I claim the detachable inner stay or lining, B, and the narrow detachable band, C, applied to the collar, A, as described and shown for the purposes specified.

83,974.—MANUFACTURE OF SUGAR.—Walter Knaggs, Claredon, Jamaica. Antedated Nov. 7, 1868.

I claim, 1st, The combined processes for manufacturing sugar herein shown and described.

2d, The application of a combination of manganese and oxygen, combined or uncombined with a base.

3d, The double cover to the evaporating tray, composed of the curved outer case, J, and the inner inclined plates, B, constructed and arranged as described for the purpose specified.

83,975.—HARVESTER.—J. M. Knepley, Jersey Shore, Pa.

I claim the independent spring arms, 1 and 1', having the pulleys, e, attached thereto, and arranged to operate in connection with the chain that drives the reel of a harvester, substantially as described.

83,976.—MACHINE FOR BUNDLING WOOL.—H. T. La Roy, Richmond, Ill.

I claim the arrangement, herein described, of the hinged sections, c d, the fixed sections, a b, connecting rods, E, four-armed frame, B, guide rods, D, the belt, F, lever, G, and yoke, H, all operating as shown for the purpose specified.

83,977.—SLED BRAKE.—J. Latta and L. Snyder, Bethlehem Centre, N. Y.

We claim the curved levers, I x I x, in combination with the sliding bar, F, and fixed rod, D, whereby, as the longer lever is raised, the curved ends of both levers are forced between the bars, F D, to hold them in a fixed position, and under the levers, H H, inoperative as herein shown and described.

83,978.—TOY WATCH.—Joseph Laubereau (assignor to J. de Susini), Paris, France.

I claim the combination of the pulleys, f g, elastic string, d, and friction lever, a e, with each other and with the watch case, substantially as described for the purpose specified.

83,979.—CORN PLANTER.—E. B. Lawrence and C. Quick, Lakeville, Ohio.

We claim, 1st, The seed slide, G, provided with the arm, g, arranged to be operated by the cams, b, upon the wheel, C, substantially as described.

2d, The stops or lugs, d, secured to the wheel, C, in combination with the lock bar, K, arranged to operate as described.

3d, The combination of the slide, G, and the levers, H and I, arranged as shown and described.

83,980.—BOOKBINDING.—J. S. Lever, Philadelphia, Pa., assignor to R. C. Browning, Orange, N. J.

I claim the within described means or method for cementing the muslin or other surface material upon the boards of book covers.

83,981.—PUNCHING MACHINE.—Warren Lyon, New York city.

I claim the construction and arrangement, hereinbefore described, of the lever, J, and pinion, I, slotted toothed sector, H, pitman, G, punch stock, E, guide, F, and frame, A, for the purpose set forth.

83,982.—HEAD BLOCK.—A. C. Martin and Wm. Ritchie, Hamilton, Ohio.

We claim, 1st, The arrangement of the block, L, loosely on the shaft, G, between the beveled rings, N O, to produce a traversing or feeding movement, substantially as and for the purpose described.

2d, The combination of the four segmental portions, m, and the portion, l, of block, L, with the shaft, G, substantially as and for the purpose specified.

3d, One or more pawls, with an oscillating block, in combination with the rotary shaft, G, substantially as and for the purpose described.

4th, The pawl-shipping mechanism, consisting of the ferrule, e, and plate, g, in combination with the pawls, z, operating in the manner and for the purpose described.

5th, The ring or ferrule, e, springs, x, and plate, g, in combination with pawls, z, in the manner and for the purpose described.

83,983.—SASH FASTENER.—W. K. Marvin, New York city.

I claim, 1st, A sash fastener, composed of one or more sliding jaws or equivalent compressing and holding devices, in combination with a double cam or eccentric, shaft, and handle for actuating said jaw or jaws, substantially as and for the purposes set forth.

2d, The herein described construction and arrangement of the two-jawed sash-fastening plates placed together and recessed to receive the double cam or eccentric, in the manner specified, the under or lower plate being slotted to receive the end of the cam shaft, and to admit of the movement of the same in the direction of the length of the said plate, as and for the purposes set forth.

83,984.—FEED CUTTER.—Norman McLeod, Clio, S. C.

I claim, 1st, The knives, L L, when made in the shape described, and attached to the arms M M, in the manner set forth.

2d, The circular screen, B, composed of two parts, the upper one of which is provided with a spout, P, and hinged to the lower portion, which is rigidly secured to the frame, A, all constructed in the manner and for the purpose set forth.

3d, The combination of the arm, I, with the ratchet wheel, J, pawl, K, feed roll, E, and knives, L L, whereby the said parts are made to operate together substantially as and for the purpose set forth.

4th, The arrangement and combination of the shafts, C C, cutters, M L, screen, B, feed table, F, rolls, E G, ratchet, J, pawl, K, and arm, I, substantially as described and shown.

83,985.—IRON FENCE-POST.—William Merrell, Kent, Ohio.

I claim the fence post, A, formed with groups of studs, a a a a a, holes, c, and wings, C, all substantially as and for the purpose set forth.

83,986.—HOOP SKIRT.—Isaac T. Meyer, and James F. J. Gunning, New York city.

We claim, 1st, The combination with the hoop skirt, of an adjustable bustle, made up of springs so hinged, pivoted, or connected at their ends to the skirt, and provided with straps uniting them to the waistband at points or in lines intermediate of the ends of the springs, as that said bustle, by letting out or taking in said straps, may be readily raised or lowered, substantially as and for the purpose herein set forth.

2d, The trail, C, made up of springs hinged, pivoted, or otherwise connected, at their ends, to the skirt, in such manner as that said trail may, at pleasure, be let down or thrown up and back out of the way, essentially as shown, and decribed.

83,987.—HAMES FASTENING.—Charles Morgan, Waumandee, Wis.

I claim the hames fastener, constructed as described, of the bar, A, provided with a socket, C, to receive the end of the bar, F, carrying the hook, B, which bar is held in place by the slide, D, all operating as described, whereby, when the bar, F, is released by the slide, the hooks are detached from each other, as herein shown and described.

83,988.—FIRE KINDLER.—Issachar Morris, Clinton, Ill.

I claim the burner, B, made conical, or tapering towards its orifice, for the purpose described, in combination with the cup, C, sack, c, containing pumice stone, or other porous substances, and handle, A, substantially as described.

83,989.—SHUTTER WORKER.—Louis Muller and Cornelius Hood, Hartford, Conn.

We claim 1st, The combination of the box or casing, f, with the wheels, d, and e, and the pivot, g, all arranged as described.

2d, The combination and arrangement of the button or arm, l, having the connecting rod and handle, k, with the lever, m, for the purpose of securing the blind or shutter when closed, and for operating the slats, substantially as described.

83,990.—REGULATING GAS BURNER.—Henry B. Meyer, Philadelphia, Pa.

I claim, 1st, The glass body, B, fig. 2, having a small aperture in its bottom, in the manner and for the purposes set forth.

2d, The glass body, B, with its small aperture at the bottom, for gaging the gas, in combination with the metallic base, A, and lava or other non-metallic tip, C, all constructed and arranged as and the purpose specified.

3d, In combination with the above-described burner, the wire gauze or other fibrous valve, resting upon the small aperture, at the base of the glass body, B, as and for the purpose set forth.

83,991.—DIVIDED CAR AXLE.—J. K. Nelson, Greenpoint, N. Y.

I claim the divided car axle, A, constructed as described, with the revolving self-lubricating box, C, removable collars, e, and flexible collar, f, substantially as and for the purpose herein set forth.

83,992.—POTATO AND CORN PLOW.—Charles F. Noftz, Toledo, Ohio.

I claim the combination of the screw, K, nut, b, and jointed levers, J J, for adjusting the position of the wings, I I, substantially as and for the purpose herein shown and described.

A plow, consisting of the combination of the beam, A, handle, D, standard, F, arrow head share, H, adjustable wings, I I, adjustable coulter, B, and adjustable draft chain, C, that works in the up-and-down adjustable notched plate, L, all made, arranged and operating substantially as and for the purpose herein shown and described.

83,993.—BOILER FEED WATER REGULATOR.—James K. P. Nourse, West Medway, Mass.

I claim 1st The combination, with the vessel, C, and float, F, of the pump, P', the bent pipe, d, and its gate, g, contained within the said vessel, and connected to the said float, the whole being arranged substantially as herein shown and specified.

2d, In combination with the arrangement of parts claimed in the preceding clause, the steam whistle, H, pipe, a, and lever, h, connected with the float, F, as specified, the whole being arranged substantially as herein shown and set forth.

83,994.—SCAFFOLD.—Frank Odenbaugh, Middletown, Pa.

I claim a portable platform or scaffold, having end pieces, A, platform, B, ladder rounds, a, pin, b, axle and wheels, c, crank and shaft, d, ratchet and pawl, f, cross bars, g and h, ropes, i p r and u, and staples, as described and shown, constructed and arranged substantially as herein specified.

83,995.—HORSE POWER.—T. G. Palmer, Shultzville, N. Y.

I claim the herein-described brake combination, consisting of the lever, C, rubber, D, support, E, and trigger, F, or their equivalents, all constructed and arranged as and for the purpose specified.

83,996.—MANUFACTURE OF SOAP.—Henry A. Pease, Hartford, Conn.

I claim, the manufacture by cold and hot process, and combination of these two processes, above-described, together, thereby obtaining a soap which will harden in two hours, when, by the old process, it requires about five days.

83,997.—IMPLEMENT.—William K. Rairigh, Rural Valley, Pa.

I claim the implement herein described, constructed and arranged in the manner and for the purpose set forth.

83,998.—MACHINE FOR SPINNING SHEET METAL.—Adrian Rais, Waterbury, Conn.

I claim, 1st, The combination, with the metal holding clamp or dies, the one being fixed on a stationary arbor, and the other upon an arbor capable of sliding longitudinally, of a plunger or sliding bolt, to force the movable clamp against the stationary one, and a toggle jointed lever for operating said plunger, substantially as shown and set forth.

2d, Dividing the bearing or journal box of the sliding arbor longitudinally, and hinging the two parts together, substantially in the manner and for the purposes set forth.

3d, The combination of the sliding carriage, F, the spinning rollers, their transverse slide rests, and the screws for regulating the position of said rests, so as to adjust the spinning rollers with relation both to each other and to the metal to be operated on, substantially as herein shown and set forth.

4th, The arrangement of the plates upon which the spinning rollers are mounted, the same being pivoted to and adjustable upon the transverse slide rests of the carriage, F, as and for the purposes specified.

5th, The method of automatically spinning to a pattern, by the employment in connection with the spinning rollers, their sliding carriage and the hinged or vibratory frame, on which said carriage moves, of a pattern plate, a guide pin for following said pattern, and a weight, or its equivalent, operating upon the free end of the vibratory frame, so as to hold at all times the guide pin against the pattern, under the arrangement herein set forth.

6th, The combination of the sliding carriage, its actuating screw shaft, and the vibratory frame on which it moves of an adjustable plate, H, to which the frame is hinged, as described, the said plate carrying a pulley and shaft, connected with the driving shaft of the machine, and communicating motion to the screw shaft, substantially in the manner and by the means herein shown and set forth.

7th, The movable half nut, in combination with the sliding carriage, and its actuating screw shaft, under the arrangement and for operation as set forth.

83,999.—PLOW FENDER.—S. J. Reed, Middletown, Ohio.

I claim the curved fender, c g, in combination with lever, f, constructed, arranged, and connected with a plow, in the manner and for the purpose substantially as described.

84,000.—MOP HEAD.—Otis Root, Wendell, Mass.

I claim a mop head, consisting of the frame, A B, with the sleeve, C, secured to the handle, I, by means of the spurs, e, and the end of the handle protruding through the sleeve, and turning in a socket in the cross head, D as herein shown and described.

84,001.—MACHINE FOR SCOURING, BLACKING, AND FINISHING LEATHER.—F. William Rust, Umatilla, Oregon, assignor to himself and A. E. Rogers and A. C. Gibbs.

I claim, 1st, The scouring blocks, H, hinged to the pendulum rod and held in place by rods, G, working through the cross heads, F, and provided with springs, substantially as described.

2d, The hinged levers, I, attached to the swinging frame, and arranged to operate or adjust the scouring block, H, substantially as set forth.

3d, Suspending the scouring apparatus upon a yielding support, and providing it with a lever and weight, arranged substantially as described, for the purpose of adjusting the scourers to the thickness of the lever operated upon, and also to regulate the pressure of the scouring devices, as described.

4th, The hollow pendulum, or its equivalent, for holding the blacking, and feeding it upon the leather while in operation, substantially as set forth.

5th, The perforated cross pipe, T, or its equivalent, when arranged to move with the scouring or smoothing devices, for distributing the blacking evenly over the surface of the leather, as described.

6th, The platform, B, provided with a series of balls, C, secured loosely in its under side, substantially as set forth, for the purpose of enabling it to be moved in any desired direction, while the machine is in operation.

84,002.—POTTING AND PACKING PLANTS.—Benjamin L. Ryder, Chambersburg, Pa.

I claim the above described mode of potting and packing plants with rectangular masses of earth about the roots, such masses fitting closely against each other, and against the sides of the crate or large box in packing, substantially in the manner and for the purposes set forth.

Also, the above described close jointed sectional box, or its equivalent, for the purpose of forming the rectangular masses of earth and for potting and packing plants, substantially in the manner above described.

84,003.—MANUFACTURE OF ARTIFICIAL STONE.—Carl Schaefter, Elizabeth, N. J.

I claim artificial stone, formed of the ingredients herein specified, and treated repeatedly with sulphuric acid, substantially in the manner set forth.

84,004.—RAILROAD CAR VENTILATOR.—Wilhelm Scharrath, Bielefeld, Prussia.

I claim forming the walls, ceilings, or partitions of permanent or temporary habitations, wholly or in part of porous material, covered wholly or in part with fibrous or textile fabric, leaving a space between said walls and the fibrous material, as herein set forth for the purpose of ventilation.

84,005.—WASHING MACHINE.—Oscar Schimmel, Chemnitz, Saxony.

I claim, 1st, The aprons, d, in combination with the beaters, B, and tub, A, substantially as and for the purpose described.

2d, The double crank, E, and sliding boxes, a, in combination with the suspended beaters, B, substantially as and for the purpose described.

84,006.—HARVESTER.—Jacob Siebel, Manlius, Ill.

I claim, 1st, In the construction of harvesters, connecting or coupling the frame supporting the binding platform to the main frame, A, by means of hinges or joints, F, arranged at or near the center of said main frame, so that it may oscillate upon said hinges to admit of the raising and lowering of the cutter bar without tipping the binding platform, substantially in the manner and for the purposes specified and shown.

2d, In combination with said binding platform and main frame, A, hinged as described, the lever, L, so connected and arranged that the driver, from his seat, on the main frame, can operate the machine in the manner and for the purposes set forth.

3d, In combination with a harvesting machine having a raking platform with a rear delivery, a binding platform, arranged close behind the raking platform, and hinged to the main frame at or near its center, substantially as described, so that the grain can be raked directly from the raking to the binding platform, and otherwise operating substantially as specified.

84,007.—MECHANICAL MOVEMENT.—J. A. Shanner, Plainview, Ill.

I claim the combination, with the wheels, F and G, of the segments, H and I, and the rack, E, arranged to operate substantially as and for the purpose described.

84,008.—VENEER.—Henry F. Shepherd, Framingnam, Mass. Antedated October 31, 1868.

I claim a compressed and burnished veneer, applicable as wood hangings and for other purposes, substantially as specified.

84,009.—WAGON WHEEL.—Silas Shirley, Rockford, Ill.

I claim the wheel described, consisting of the box, A, beveling blocks, B, with curving flanges, o b, friction plates, D, rods, c, and caps, E, the whole being combined and operated in connection with the spokes of an ordinary wheel, substantially in the manner and for the purpose described.

84,010.—BEEHIVE.—Simon Shrock, New Philadelphia, Ohio.

I claim, 1st, The combination and arrangement of the central hive, C, provided with comb frames, H H, sliding face, G, feed box, D, slant board, S, and central tube, b, all constructed and operated in the manner and for the purpose set forth.

2d, The combination of the central hive, C, slant board, S, central tube, b, openings, K, honey boxes, I I, provided with corresponding openings, and ventilating boxes, L L, all constructed, arranged, and operated, substantially as described.

3d, The combination of the drawers, a' a', tubes, a a, and slant board, S, all constructed, arranged, and operated as set forth.

4th, The arrangement of the central hive, C, slant board, S, central tube, b, honey boxes, I I, ventilating boxes, L L, feed box, D, drawers, a' a', and tubes, a a, all constructed and operated as set forth.

84,011.—PAINT FOR BUILDINGS, ROOFS, ETC.—J. H. Smith, and George O. Smith, Chicago, Ill.

We claim a paint composed of the ingredients herein named, and compounded substantially as herein set forth.

84,012.—RAILWAY CAR MOVER.—Ezra Springer, Davis, Ill.

I claim, 1st, The driving wheel, D, in combination with the driving gears, arranged and operating conjointly, as and for the purpose substantially as specified.

2d, The lever, Q, rod, R, and stay, P, in combination with the arm, N, feather keys, and shifting gears, applied to the purpose set forth.

3d, The racks, A', sliding dog, C', in combination, arranged in the manner and for the purpose set forth.

84,013.—ANIMAL TRAP.—William A. Stack, Hillsborough, Md.

I claim the arrangement of the box, B, the rotating wheel, having the trap door arms, c c1, c2 c3, the stop, m, pivoted bait holder, b, spring, o, wall, D, and metallic bait box, E, when the said parts are constructed and arranged to operate in the manner described.

84,014.—STEAM ENGINE STEAM CHEST.—William Stamp, Susquehanna Depot, Pa.

I claim the construction of the wire packing, inserted in both surfaces of the joint to be made, substantially as herein described.

84,015.—BIT HOLDER.—Charles H. Stockbridge (assignor to himself and Osmore O. Roberts), Northampton, Mass.

I claim the bit stock, formed of the clamping jaws, c, set in grooves having curved bottoms, in combination with the contractile spring, i, and sleeve, d, substantially as set forth.

84,016.—CULTIVATOR.—Alferd F. Stoner, West Unity, Ohio.

I claim, 1st, The spiked roller, B, in combination with the spring concave or toothed bar, M, arranged and operated substantially as set forth.

2d, Also, the arrangement of the hiller, E, in combination with the share C, in the front part of the frame, and the pulverizing roller and concave substantially as described.

84,017.—HORSE HAY FORK.—Ole O. Storle, Norway, assignor to himself and J. B. Smith, Milwaukee, Wis.

I claim the parts, B F, and G, in combination with the screw on shaft, A substantially as described.

84,018.—COFFEE AND TEA POT.—R. Strickland, Albany, N. Y.

I claim, 1st, A coffee or tea pot, having a strainer hinged to it inside, and applied over the orifice at the base of the spout, substantially as described.

2d, The hinged strainer, C, provided with a weight, b, operating substantially as described.

84,019.—MACHINE FOR WELDING TUBING.—John E. Tencate, Pittsburg, Pa.

I claim, 1st, The arrangement of the rolls, A and B, guides, c, levers, C and D, and mandrel, F, provided with enlargements, x, and x1, the whole being constructed, arranged and operating as herein described, and for the purpose set forth.

2d, The scrapers, y, in combination with the rock shaft, P, provided with oblique slots, 4, constructed, arranged, and operating substantially as herein described, and for the purpose set forth.

84,020.—COFFEE POT.—Hermann Thal, and Gustav Schlottmann, New Haven, Conn.

I claim the arrangement and combination of the strainer, C, tubular neck, g, flanged mouth piece, f, gutter, d, cap, h, perforated disk, i, and vessel A, all constructed and operating substantially as and for the purpose shown and described.

84,021.—GAS MACHINE.—William Thompson (assignor to H. S. Myer), Cleveland, Ohio.

I claim, 1st, The bellows, B B, for forcing air into the receiving bag, as described, in combination with the carbureters and purifiers.

2d, The combination of receiving bag, C, and bellows, B B, substantially as set forth, with the upper and lower carbureters.

3d, The arrangement of the bellows, B B, the large air bag, C, the passage pipe, D, and the perforated coil pipe, D', substantially as set forth.

4th, The coil partitions, G G G, filled with sponge or other equivalent material, forming a lower carbureting chamber, substantially as set forth in combination with the purifier.

5th, The combination of the purifying chamber, S, and the upper carbureting chamber, substantially as described.

6th, The pipe, T, and cock, T', for conveying residue or surplus oil from the carbureting cylinders, substantially as described.

7th, The combination of the bellows, B B, the receiving bag, C, the passage pipe, D, the coil partitions, G G G, the chamber, S, the pipe, T, and cock, T', when the said parts are arranged, combined, and operating as and for the purposes herein set forth.

84,022.—PACKING FOR JOINTS OF STEAM ENGINES.—William J. Towne (assignor to the Silver Lake Manufacturing Company), Newtonville, Mass.

I claim the application of a glazing or coating to the exterior surface of a packing, substantially as and for the purpose described.

84,023.—RAILWAY CHAIR AND SUPPORT.—Aaron Van Guysling, West Albany, N. Y.

I claim, 1st, The railroad chair support, consisting of the hollow supports, A connected by the tube, B, the chairs, C, having the fixed lip, c1, and the

detachable lip, c2, the key bolt, D, the rubber block, G, the wooden block, F, and the connecting bar, E, said chairs being slotted to receive the beat ends of the connecting bar, and for the passage of the wooden blocks, all arranged as described for the purpose specified.

2d, The chair C, fitting over the hollow supports, A, and constructed as described, having the fixed lip, c1, detachable lip, c2, and the key bolt, D, and provided with an opening in its side for the introduction of the rubber block, G, which is kept in place by the sliding door, H, as herein set forth for the purpose specified.

3d, The combination of the horizontal metallic bar or tie, B, with the vertical hollow supports, A, substantially as herein shown and described, and for the purpose set forth.

84,024.—MAGAZINE IN BASE-BURNING STOVES.—Jasper Van Wormer and Michael McGarvey, Albany, N. Y.

We claim, 1st, Attaching to the ordinary contracted reservoir a neck, having its lower end enlarged, substantially as and for the purpose described.

2d, The method of attaching the neck to the reservoir, substantially as set forth.

84,025.—HAND-PEGGING MACHINE.—F. J. Vittum, Newburyport, Mass., assignor to W. N. Ely

I claim, 1st, A hand pegging machine, so constructed, arranged, and adapted as to its several parts, that, while the machine is held to the work, as it passes over it, with one hand, the movements of the awl and peg driver, and of the feeding devices, shall be actuated or managed with or by means of the other substantially as described.

2d, So constructing, arranging, and adapting the parts of a hand-pegging machine, as to operate the same by means of a crank, turned by the hand of the operator, substantially as described.

3d, Arranging and adapting a crank handle, cam, and spring in a hand-pegging machine, in combination with the awl and peg-driver bars, or either of them, substantially as and for the purposes described.

4th, Arranging and adapting a crank handle and cam, in a hand-pegging machine, in combination with an awl or piercing or pointed instrument, as a feeding device, substantially as described.

5th, The rate'set bar and pinion, in combination with the awl or peg-driver bar in a hand-pegging machine, substantially as and for the purposes described.

6th, Constructing the bar, C, in connection with the dog, G, so that the latter may operate without the aid of a spring, substantially as described.

7th, The combination of the portable frame with crank handle, cam, spring, and piston, all constructed to operate substantially as described.

84,026.—REEL FOR YARN, ETC.—F. Voegtli (assignor to A. Montgomery City, Mo.

I claim the reel, C, and its shaft, B, to operate the finger, d, pinion, D, finger d1, pinion, D', and indicator, d2 d3, substantially as set forth.

84,027.—MUSICAL INSTRUMENT.—W. Vogel, Norwich, Conn., assignor to Ezra Durand.

I claim 1st, The arrangement of the diagonal dampers, L, with relation to the bridges, F, sound board, c, and strings, G, of the dulcimer, as herein shown and described.

2d, The construction of the bridges, F, stiffening end bars and central frame, E, and curved braces, H, beneath the sound board, c, all arranged as described for the purpose specified.

84,028.—HORSE RAKE.—J. E. Volles (assignor to himself and J. W. Hutchings), Madison, Ind.

I claim a releasing device for the teeth of revolving horse rakes, composed of the coil spring, A, roller, C, and vibrating cross head, D, when arranged and operated substantially as shown and described.

84,029.—CULTIVATOR.—Joseph Vowles, Milford, Mich.

I claim 1st, The mold board, L, constructed substantially as shown and described.

2d, The combination of the mold board, L, with a cultivator.

3d, The construction of the wedge, N, and its arrangement with reference to the tongue of a cultivator, or for any equivalent purpose, substantially as shown and described.

4th, The arrangement of the hangers, H H, with their teeth, M M, with reference to the wheels of the machine, substantially as shown and described.

5th, The arrangement of the sub-tongue, F, frame, E, sector, D, lever, C, hangers, H and K, and braces, I, substantially as shown and described.

84,030.—PUMP FOR COMPRESSING AIR.—C. W. Wailey, New Orleans, La., assignor to New Orleans Pneumatic Propelling Company.

I claim the combination of the concave heads, G and G', with the vertical sections, A A', of a pump, through which flows a continuous stream of water, when the valves of the induction ports are placed in said heads, and are operated by the springs, d and d', substantially as set forth.

84,031.—SASH STOP AND HOLDER.—Felix Walker, New Orleans, La.

I claim the combination of the double flanged plate, A, with notches, n n, and secured to the window frame, with the pivoted catch, C, having two arms, one being weighted, as shown, all operating as set forth.

84,032.—SHUTTER FASTENER.—Benjamin D. Washburn, Boston, Mass.

I claim the construction and arrangement of the piece, A, with the projections, a a and b, the latter extending below the former, which formed in one piece, as and for the purposes herein set forth.

84,033.—DROPPING PLATFORM FOR HARVESTERS.—George Wellhouse, Akron, Ohio.

I claim the arrangement and combination of the roller, H, pinion, I, segment, J, and platform, D, in the manner substantially as set forth.

84,034.—MOP WRINGER.—George Wells and S. A. Haynes, Island Pond, Vt.

We claim the bail, B, arranged with relation to the bail, A, uprights, D, plates, E, G, H, I, J, and rollers, C C, as herein described and operating in the manner and for the purpose specified.

84,035.—WATER WHEEL.—George W. Wesley, Troy, Pa.

I claim a water wheel having buckets of a concave or depressed outer surface, and with a corresponding convex or raised inner surface, in combination with the side issues or escapes, for the purpose and in the manner set forth and described.

84,036.—COMPOSITION TIP FOR BILLIARD CUES.—Albert Wetherbee, Waltham, Mass.

I claim a tip of a billiard cue, made of vulcanized rubber, one part, and pulverized chalk, more than one part, intimately mixed, and baked in combination, all substantially as and for the purpose described.

84,037.—STEAM RADIATOR.—Charles Whittier (assignor to himself and Benjamin F. Campbell), Boston, Mass.

I claim, 1st, Constructing each section on opposite sides, near the ends, with an aperture, a, of same shape as aperture, a, of body of radiator, substantially as and for the purposes described.

2d, Connecting the alternate ends of the radiator, by means of lugs, b b b b, etc., and bolts, c, etc., constructed substantially as described.

84,038.—PRESERVING MEAT.—Wilhelm Wiesmann, Bonn, Prussia.

I claim, 1st, The within described process of preserving meat, by first coating the pieces of meat with powdered saltpeter and olive oil, and then storing them away in a hermetically closed vessel, with intermediate layers of charcoal filled bags, as herein set forth,

2d, The vessel, A, provided with perforated movable shelves, a, and closed by a disk, e, and lid, c, leaving an oil space, which is filled through stop cocks, b b, all as shown and described.

84,039.—PUNCH.—George C. Wilder, Lawrence, Kansas.

I claim combining with said combination, the spring, E, as and for the purpose described.

84,040.—APPARATUS FOR SIZING GLASS CYLINDERS.—S. R. Wilmot, Bridgeport, Conn.

I claim the arrangement of the several fingers, a, operated so as to size the cylinder by opening the said fingers upon the inside or closing them upon the outside of the said cylinder, substantially as set forth.

84,041.—TREATING CAST IRON FOR THE MANUFACTURE OF CAR WHEELS.—Henry M. Woodward, St. Louis, Mo.

I claim, 1st, The herein described improved process for producing cast metal car wheels, substantially as and for the purpose described.

2d, Car wheels produced by the herein described improved process, as a new article of manufacture, substantially as and for the purposes set forth.

84,042.—SUSPENDER FASTENING.—Wendell Wright, Bloomfield, N. J.

I claim the double clamps, B, having teeth on their inner faces, and provided with slides, b, said clamps being hinged together by the collar, f, and removably attached to the buckle, A, by means of a snap hook, a C b, formed on the latter all constructed and arranged substantially as herein shown and described,

84,043.—MACHINE FOR MAKING HORSE SHOES.—Jacob Zept, Troy, assignor to James T. Walker, Albany, N. Y.

I claim the arrangement of the sliding arm, c, and its corrugated wheels, d, with the vertical shaft, a, and wheels, e, and b, operated by the shaft E and shaft K, with its cam, Z, all substantially as shown and described.

2d, The horizontal notched cutter, V, and sliding dies, U U, in combination with the vertically reciprocating male die and former 1, substantially as herein specified.

3d, The vertically reciprocating male die, I, provided with a pressing and creasing shoulder, and with a projecting guide, all as herein shown, in combination with the dies, U U, substantially as herein specified.

84,044.—CONSTRUCTION OF FIRE PROOF HOUSES.—William A. Berkey, Grand Rapids, Mich.

I claim, 1st, The combination of the iron straps, C, and furring, D, with the joists, B, and lath, E, for the purpose substantially as described.

2d, The floor strips, L, when attached to the deafening partition, K, in the manner described, for allowing the morter, M, to be interposed, in the manner and for the purpose substantially as described.

3d, The combination of the construction for suspending the ceiling and the construction for sustaining the floor, as described, with the interposed mortar, for preventing the burning of the timbers in such construction, and the passing of water or sound, as set forth.

REISSUES.

61,907.—APPARATUS FOR STIRRING, MIXING, HEATING, COOLING, AND EVAPORATING LARD AND OTHER SUBSTANCES.—Dated Feb. 5, 1867; reissue 3,185.—Elisha M. Allen, New York city, assignee of Giles B. Williams.

I claim the continuous flange, C, secured to the shaft, B, by arms, ax, leaving an opening, bx, between the flange and shaft, in combination with a receptacle, A, whose bottom is curved concentrically with said shaft, substantially as described, for the purpose specified.

35,528.—PIANO WITH MELODEON AND TREMOLO ATTACHMENT.—Dated June 10, 1862; reissue 3,184.—Division A.—Lafayette Louis, Boston, Mass.

I claim the arrangement of a melodeon tube board (including reeds and swell) above the keys and below the sounding board of a piano-forte, in the manner and for the purposes and substantially as described.

Also, so combining and arranging a melodeon tube board with a piano-forte that the performer can instantly, and at pleasure disconnect the melodeon tube board from the piano-forte keys, in the manner substantially as herein set forth.

Also, the combination of a tremolo attachment with the melodeon.

Also, in combination with a piano-forte, a melodeon having a connection of the bellows with the tube board by means of a tube.

35,528.—WIND MUSICAL INSTRUMENT.—Dated June 10, 1862; reissue 3,185.—Division B.—Lafayette Louis, Boston, Mass.

I claim in combination with a rotary tremolo valve, a tremolo actuating wheel placed upon the tremolo valve shaft, or directly connected therewith, so as to actuate the rotary tremolo valve, substantially as described.

Also, in combination with a wind musical instrument, a rotary wind actuated bellows, substantially as described.

29,495.—SKATE.—Dated May 29, 1860; reissue 3,186.—John Lovatt, Newark, N. J.

I claim, 1st, The adjustable hooked clamps, D D', or their equivalents, for fastening skates, arranged to be tightened and adjusted by means of an adjusting screw.

2d, Constructing a skate having a supporting plate, with a projecting piece or lug, to prevent the boot from slipping forward, and clamp fastenings adjusted by means of an adjusting screw.

3d, The combination of the movable slotted blocks, E E', or their equivalents, with clamps, D D', and the adjustable screw, G, arranged substantially as described and for the purposes specified.

70,490.—TIP FOR THE FEET OF CHAIR LEGS.—Dated Nov. 5, 1867; reissue 3,187.—Edward S. Winchester, Boston, Mass.

I claim an elastic foot or tip of rubber or other material, for the leg of a chair, having its means of attachment in an external rim, made to embrace the lower portion of the leg or foot of a chair, substantially as described.

9,781.—MOP HEAD.—Dated June 14, 1853; extended seven years; reissue 3,057, dated June 2, 1868; reissue 3,188.—Colby Brothers & Co., Waterbury, Vt., assignees by mesne assignments of Harvey Murch.

We claim, 1st, The combination of a socketed cross head with a rigid binder, that is to say, one having rigid or inflexible ends connected directly with each other, substantially as and for the purpose specified.

2d, The combination of a socketed cross head with a rigid binder, having its ends connected directly together, and a single fastening for holding the binder to the handle itself in such a position as to clamp rags, etc., substantially as and for the purposes set forth.

3d, The combination of a socketed cross head, handle, and a metallic binder, having rigid or inflexible ends connected directly to each other, constructed and arranged in such manner that the rigid or inflexible ends will be allowed to move freely by a graduated movement up and down on or over the handle itself, or the socket thereon, as I hold or aid in holding the cross handle when the parts are in clamping position, substantially as set forth.

4th, The combination of a metallic cross head with a handle and a rigid metallic binder, having inflexible ends connected directly with each other, constructed or arranged in such manner that the rigid or inflexible ends of the binder will be allowed to move freely up and down on the handle, or a metallic socket thereon, so as to hold or aid in holding the cross head to the handle when the parts are in clamping position, substantially as set forth.

5th, The combination of a metallic cross head, socket, handle, and a metallic binder, having rigid or inflexible ends, connected directly together, the latter being constructed or arranged in such manner that the rigid or inflexible ends will be allowed to move freely up and down on or over the handle itself, or the socket thereon, and hold or aid in holding the cross head to the handle when the parts are in clamping position, substantially as set forth.

15,735.—HARVESTER.—Dated Sept. 16, 1856; reissue 3,189.—Division E.—William Gage, Buffalo, N. Y., and Andrew Whiteley, Springfield, Ohio, assignees of Wm. Gage.

We claim, 1st, The shoe, M, or an equivalent thereof, which, when disconnected from the frame of the harvester, to which it is connected, leaves the finger bar of the cutting apparatus entirely disconnected from said frame, and which shoe has, in combination, the guide way, I, the horizontal slot, k, and the projections, l l, fitted to receive the axial bolt, e, or equivalents of these parts, for the purposes specified.

2d, The combination of the shoe, M, or an equivalent thereof, constructed with the guide way, I, the horizontal slot, K, and the projections, l l, with the coupling frame, F, or an equivalent thereof, which enables this shoe to be moved, in respect to the main frame and the plane of the cutter's driving wheel, substantially as first herein described, for the purposes specified.

3d, In combination with the main frame of the harvester and the shoe, M, or an equivalent thereof, which is constructed with the guide way, I, the horizontal slot, k, and the projections, l l, the coupling frame, F, or an equivalent thereof, which has its inner end connected to said frame by the axis, e, or an equivalent thereof, and its outer end connected to the shoe by the axis, e, or an equivalent thereof, and having no other axis than these two between the main frame and shoe, for the purposes specified.

4th, In combination with the main frame of a harvester, and with the shoe M, or an equivalent thereof, which is constructed with the guide way, I, the horizontal slot, k, and the projections, l l, fitted to receive the axial bolt, e, or equivalent of these parts, the skeleton coupling frame, F, or an equivalent thereof, which has its inner end connected to the main frame by the axis e, or an equivalent thereof, and having no other axis than these two between the main frame and this shoe, for the purposes specified.

5th, In combination with the main frame of a harvester and with the shoe, M, or an equivalent thereof, which is constructed with the guide way, I, the horizontal slot, k, and the projections, l l, fitted to receive the axial bolt, e, or equivalents of these parts, the skeleton coupling frame, F, or an equivalent thereof, made of separate parts, for the purposes specified.

19,699.—ROTARY PUMP.—Dated March 23, 1858; reissue 3,190.—Jacob O. Joyce, Dayton, Ohio.

I claim, 1st, The exit valve chamber, I, when located wholly within the curved cylinder, A, and held in place by beads or projections fitting annular grooves of the curved cylinder, substantially as and for the purposes specified.

2d, The centrally located shaft or bearing, B, arm, D, and the two arms, E, provided at their ends with pistons or plungers, in combination with the annular chamber, A, provided with the centrally interposed valve chamber, I, so arranged that they can be operated by suitable levers or shafts located outside of the cylinder, substantially as and for the purposes specified.

36,159.—SEEDING MACHINE.—Dated Aug. 12, 1862; reissue 3,191.—Wm. M. Jones and D. W. Hall, Horicon, Wis., assignees by mesne assignments of W. M. Jones and S. E. Tyler.

We claim, 1st, The cylinder, I, with buckets, k, attached, secured to a rotating and sliding or longitudinally adjustable shaft, E, in combination with the head, J, and semi-cylinder, K, provided with an opening, l, all being arranged within a suitable box, D, and in such relation to a seed box or hopper C, as to operate in the manner and for the purpose substantially as described.

2d, The curved plate or gate, L, placed or fitted within the semi-cylinder, K, connected to the cylinder, I, and arranged in relation with the opening, l, of said semi-cylinder K, and the buckets, k, to operate substantially as and for the purpose specified.

3d, The arrangement of the clutch, F, collar, pinion, f, and shaft, E, substantially as shown and described, for the combined purpose of permitting said shaft to be thrown in and out of gear with the wheel, B', and also permitting said shaft to be adjusted longitudinally when desired.

4th, The combination and arrangement of the cylinder, I, with the buckets k, arranged to traverse through the disk or head, J, for the purpose of increasing or diminishing the rate of feeding or the length of the buckets, substantially as described.

5th, The collar, e, and pinion, f, arranged in relation to the hub plate, N, and clutch, F, substantially as and for the purpose specified.

22,990.—MOP HEAD.—Dated Feb. 15, 1859; reissue 3,192.—Luke Taylor, Springfield, Vt.

I claim, 1st, In a mop head in which the cross head or stationary jaw is attached permanently and immovably to the handle, operating the movable jaw or binder by means of a screw fitted to the handle, and having its screw thread on its exterior, in combination with a nut encompassing the screw and connected with the movable jaw, so as to operate substantially in the manner as shown or described.

2d, Operating the movable jaw by means of the loose screw collar, C, revolving between the nut, D, and the handle, A, substantially as described.

DESIGNS.

3,228.—BLIND HINGE.—Hardy N. Baker (assignor to Benj. B. Washburn), Boston, Mass.

3,229.—VAPOR BURNER.—Peter Baumgras, Washington, D. C., assignor to Geo. W. Thomson.

3,230 and 3,231.—WELL CURB.—David Benson, Nanuet, N. Y. Two patents.

3,232.—TRADE MARK.—Alfred Berney, Jersey City, N. J.

3,233.—TRADE MARK.—Amory Edwards, Elizabeth, N. J., assignor to Union Metallic Cartridge Company, Bridgeport, Conn.

3,234.—ORNAMENTS OF A STOVE.—James Spear, Philadelphia, Pa.

3,235.—BRANCHES OF A GASOLIER.—James F. Travis, New York city.

EXTENSIONS.

WARMING HOUSES BY STEAM.—Stephen J. Gold, Cornwall, Conn.—Letters Patent No. 11,747, dated Oct. 3, 1854.

I claim, 1st, The combination of generator, radiator, and condenser, as herein described, for the purpose of heating buildings, when the connection between the generator and condenser is perforated as specified, so as to admit of the formation of a hydrostatic column balancing the pressure of steam on the valve, b, and permitting the water from the condensation of the steam to return to the generator, as hereinbefore specified.

2d, The mode of regulating the quantity of steam admitted to the radiator, by means of the o' o', and the tubes constructed and operating as set forth.

3d, The herein described method of producing a steam-tight connection between the plates of the condensing and radiating chambers, E E', by means of a cord packed between the edges of the plates, substantially as set forth.

4th, The securing of the thin metallic sheets forming the chambers, E and E', by depressing and riveting, as shown in fig. 3, for giving the requisite strength to withstand the outward pressure of the steam in a simple and economical manner.

GRINDING SURFACE IN MILLS.—John Ross, Brooklyn, N. Y., administrator of Charles Ross, deceased.—Letters Patent No. 11,811, dated Oct. 17, 1854.

I claim the forming of a grinding surface in mills by lining a cast iron concave with radial segment of burr or other stone, said segments being fitted and secured to their places in the manner herein set forth.

SECURING LAMPS TO LANTERNS.—William Porter, Williamsburg, N. Y.—Letters Patent No. 11,849, dated Oct. 24, 1854.

I claim the above described lantern, constructed substantially as described.

METALLIC HEDDLE.—Jacob Senneff, Philadelphia, Pa.—Letters Patent No. 102, additional (dated July 30, 1853) to Letters Patent No. 8,562, dated Jan. 13, 1852.

I claim casting the eye on the wire which constitutes the heddle, harness or heald through which the warp passes, in the manner and for the purpose set forth, producing a heddle much superior to any other known or used, and which will remove many of the difficulties heretofore experienced in the use of the common twisted wire heddle.

ADDITIONAL CLAIM.

Casting eyes of harness or heddles upon single or multiplied strands of worsted, silk, cotton, thread or other material, in the manner and for the purpose herein set forth.

GRATE BAR.—Samuel Van Syckel, Titusville, Pa.—Letters Patent No. 11,879, dated Oct. 31, 1854; reissue No. 3,989, dated June 9, 1868.

I claim constructing grate bars with pins or projections on one of the sides of the bar, and with corresponding mortises or recesses in the other side whereby the bars can be interlocked and held together, and made self-sustaining throughout their entire length, substantially as described and specified.

ALARM CLOCK.—Jonathan S. Turner, Fair Haven, Conn.—Letters Patent No. 9,123, dated July 13, 1852.

I claim the combination of the double notched cam, I with the locking apparatus, K and L, with their appendages, f m r n i j and q, when used in any kind of time pieces for giving alarms at the time desired, and giving more than one alarm with once winding, when the whole is constructed, arranged, and combined substantially as herein described.

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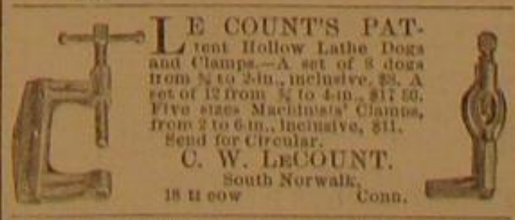

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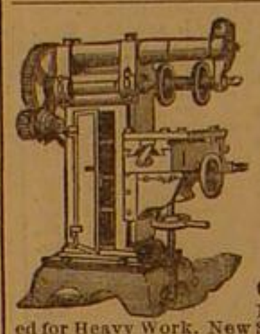

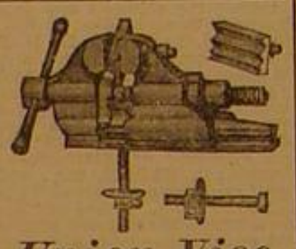

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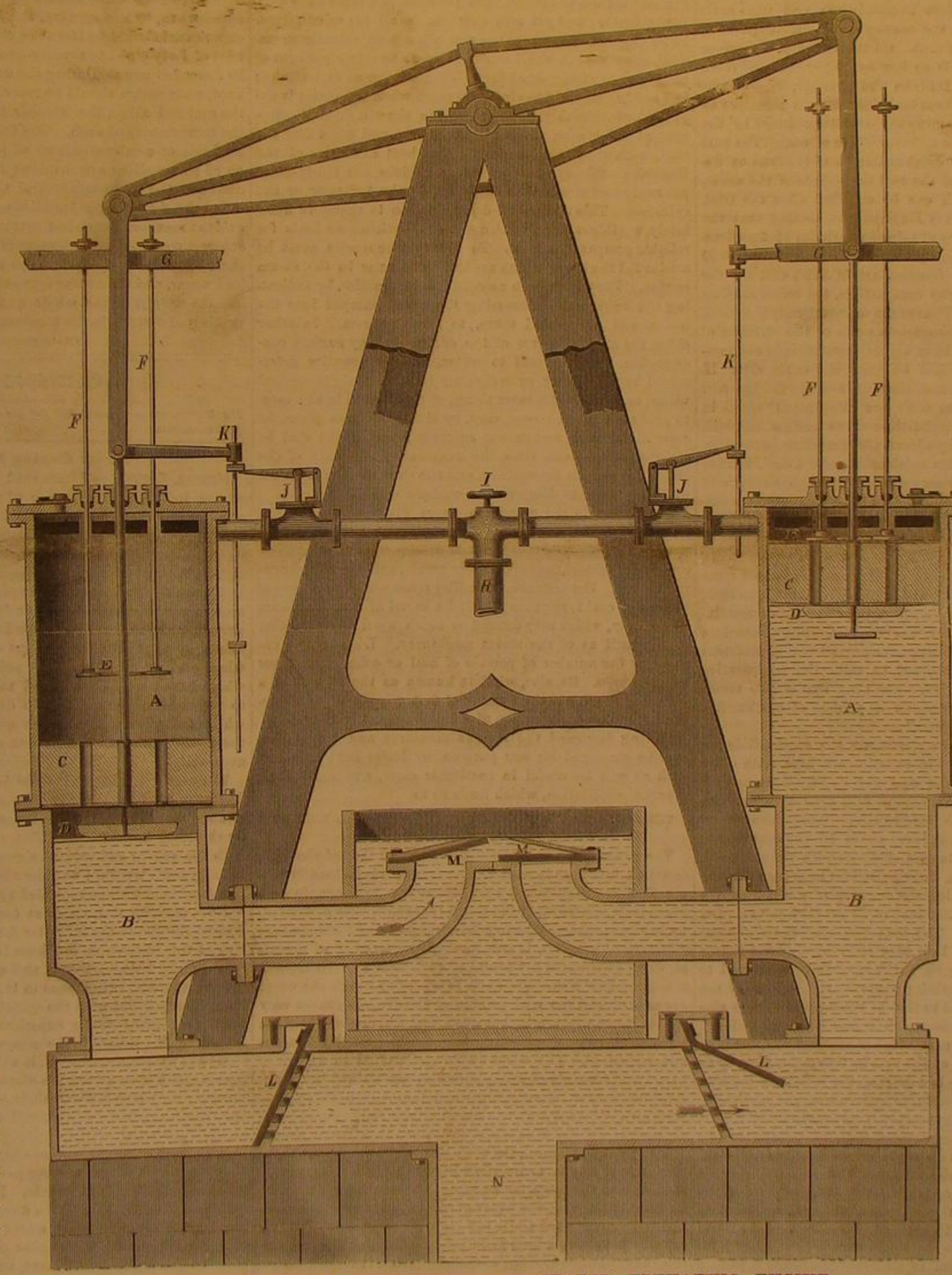
Improvement in Devices for Raising Liquids.

The application of natural laws and well-known principles to practical use is the peculiar domain of the inventor and mechanic, and it detracts nothing from the merit or value of an invention or machine that no new principle is established or no new law discovered, if it utilizes either one, although both may be old and well known. Indeed, this faculty of putting to practical use truths which may have been generally known, but which have not heretofore been harnessed and and made to add to human advancement, constitutes mainly the value of the talent of the inventor and the skill of the mechanic. A knowledge of natural laws is very well, but only when that knowledge is usefully employed is it really valuable, except for the exercise and discipline the intellectual faculties have received in its acquirement. But the inventor must not only have acquired this knowledge, but must also put it to practical use in its application to some practical device.

These remarks receive an illustration in the machine represented in the accompanying engraving. It is an adaptation of the well known laws governing the formation of a vacuum by the condensation of steam, and the lifting of water or any other liquid by the over balance of a column of atmospheric air.

Water held in an inclosed vessel air tight will not descend, even if the lower portion of the vessel is open, so long as this opening is beneath the surface of water in a lower vessel. This is often illustrated by a common experiment of filling a tumbler and a bottle with water and inserting the neck of the latter in the former. It matters not what the relative volume of the two may be, their contents will be, to all intents and purposes, one solid column, and the contents of the higher vessel, however much greater, will not affect the lesser and lower volume, until air is admitted, when the equilibrium is destroyed and the contents of the upper vessel obey the law of gravitation and descend. Now this heavier and upper column of water is held suspended, or is lifted by the weight of the atmosphere, and until a limit of about thirty feet in hight is reached this action of the atmosphere is the same, and the column would not only be held at that hight but be raised to that hight by the atmospheric pressure.

This is the principle of the common lifting pump. But in raising large volumes of water, and especially when the hight exceeds the action of the atmospheric pressure and to this is added the necessity of forcing it a still further hight, the general practice has been to apply the power—steam or otherwise—directly to an engine that drives the pumps, which are usually combined lifting and forcing pumps. It is evident that the amount of power thus used must be greater than if the action of the atmosphere was also employed.



REYNOLDS' STEAM CONDENSING AND WATER ELEVATING ENGINE.

The pumping engine herewith illustrated uses the atmospheric pressure mainly as the means of raising water, steam being employed simply to assist. The engraving is a vertical section of Reynolds' steam condensing, water elevating engine, the machine being double and the pistons being reciprocatory in action by means of a walking beam. The cylinders, A, may be called the steam cylinders, although they also receive water. These are bolted to the lower or condensing cylinders, B. In the upper cylinders are plungers, C, of wood, which merely float on the surface of the water in the cylinders. These plungers or pistons are pierced through with a series of holes forming passages for the water. On the lower side these may be closed by a floating valve, D, and on the upper side by a metallic ring valve, E, guided in its vertical movement by the rods, F, passing through stuffing boxes in the upper cylinder head. The bars, G, are portions of a permanent frame serving as guides for the rods, F. H is a steam pipe furnished with a gate, I, and having two branches, in each of which is a trip valve, J, operated by lugs on the lifting rods, K. This reference to the parts will be sufficient for a comprehension of the operation of the machine, as the use and action of the valves, L and M, will be obvious.

The water enters at N, from any source not more than twenty-five feet below the machine. Following the direction of the arrow, it fills the cylinder on the right, as seen, its upward pressure holding the floating valve, D, against the bottom of the floating piston, C, the two combining to form a solid plunger. The central piston rod rises with the piston and carries with it the lifting bar, K, the lug on which opens the lever, J, when the piston has nearly reached the top of the cylinder, and thus the steam is admitted to the cylinder above the piston. The pressure of the steam on the valve, E, and piston, C, forces them down until the nuts on the top of the guide rods, F, strike on the frame, G, when the valve is lifted, as seen in the left-hand cylinder, and the water and steam rush down, the descent of the former being due to the force of gravity—it having a fall of about five feet—and the steam being almost instantly condensed as it comes in contact with the water, thus forming a vacuum above the piston, C. The downward rush of the water closes the inlet valve, L, and the water is delivered to the tank, in the direction of the arrow, through the valve, M. Now the return stroke is produced, soon as the downward stroke is completed, by the atatmospheric pressure lifting the water into the vacuum caused by the condensation of the steam. The first product of the effort is a closing of the valve, D, permitting no water to pass above the piston, and by means of the cap valve, E, closing as soon as the plunger reaches the position of the suspended valve, making again a solid piston for the action of the steam. It will be seen that all the movements are automatic and that a description of a single reciprocating stroke explains the continuous action of the combined machine.

The inventor asserts that the condensation and consequent forming of a vacuum is so rapid that he has been enabled to produce fifteen strokes per minute with a pressure of only from ten to fifteen pounds of steam, raising water to a hight of twenty-five feet. The engine would operate with very much less steam, although not so rapidly, as the momentum of the water is accelerated by the steam pressure, yet a larger amount of steam has to be condensed to create a vacuum, which, however, is assured by the large surface of the condensing cylinder. This cylinder is kept continually cool by a non-conducting packing between that and the upper cylinder, aided by the non-conducting material of the plunger and its lower valve. It will be noticed, also, that the lower or condensing cylinder is kept continually filled with water, the

level of which corresponds with that of the water in the receiving tank. Surplus steam, air, and gases are forced out through a check valve in the top of the upper cylinder by the momentum or hammer of the water, obviating the necessity of air pumps, siphons, or similar contrivances, and making a very cheap and direct-acting device for raising water. For draining mines, wrecking purposes, pumping for railroads, elevating water for supplying cities, towns, and villages, and for producing a water power by creating a head, this machine is believed to be applicable and efficient. Forty-five barrels of water can be raised twenty-five feet high per minute with this machine and a ten-horse power boiler carrying twenty-five pounds of steam.

Patented Oct. 27, 1868, by A. J. Reynolds, who may be addressed at the Detroit Locomotive Works, Detroit, Mich.

THE BEST MODES OF TESTING THE POWER AND ECONOMY OF STEAM ENGINES.

BY CHARLES E. EMERY, LATE OF THE U. S NAVY AND U. S. STEAM EXPANSION EXPERIMENTS.

Read before the Polytechnic branch of the American Institute, Oct. 22, 1868.

(*Continued from page* 342.)

The anthracite, as a rule, contains much more refuse than the other varieties. The English coals probably average 10 per cent of waste; the West Pennsylvania and Ohio coals have only 5 per cent, and the maximum of our bituminous coals rarely exceeds 13 per cent. On the contrary, the refuse from anthracite rarely falls as low as 10 per cent and often reaches to 30 per cent, so that, on the average, its waste is double that of the bituminous varieties. It will therefore be interesting for us to examine the results produced by the combustible portions of the different kinds of coal. The part consumed is called the "combustible," and is found by deducting from the weight of the coal the weight of the ashes, clinkers, soot, etc., which can be collected after the trial. Referring again to the Navy Experiments, we find that the mean evaporative efficiency of thirteen varieties of American anthracite combustible was equal to the evaporation of 10·69 pounds of water, from a temperature of 212°, and, for the three varieties of bituminous combustible, the corresponding effect was 10·84 pounds. The results are practically identical. By throwing out of the comparison some of the varieties of anthracite, which justly have a poor reputation in the market, the preponderance would be upon the other side. If, then, we take it for granted that the average foreign and American and bituminous coals are substantially equal in value, the value of the combustible of the foreign coal will equal that of American bituminous and American anthracite, and we may assume that the combustible of the coal, burned in any case, is a tolerably accurate comparative measure of the economy of a steam engine. All these restrictive qualifications are necessary, for, if selected coal of the best quality, be used in a trial, the results will be above the average in any case. We wish simply to indicate that the greatest difference in the results given by different coals is due to the difference in the quantity of non-combustible matter, so that, if this be thrown out, the weight of the combustible remaining gives the nearest approach possible, without absolute trial, to the comparative heat-producing powers of different specimens. The best standard to show the comparative economy of the steam engine, other than that of the steam used, is therefore "The number of pounds of combustible used per horse power per hour."

We cannot fairly, however, compare the combustible per horse power per hour, used in experiments here, with other experiments when only the coal was noted. This necessitates us to correct the amount of coal used by a common standard, founded on the combustible. Good bituminous coals, here and in England, leave about 10 per cent refuse; hence, to make our experiments compare with those abroad, as well as for convenience, we suggest that in every case, the coal burned in determining the economy of a steam engine be reduced to a common standard of 10 per cent refuse. Let us see the effect of this. The true comparative test for engines is the amount of heat they receive; we have shown that the heat-producing power of the coal is proportioned to the weight of the combustible; hence, if the weight of the coal be also proportioned to that of the combustible, it also expresses the relative economy. The coal is so proportioned when it leaves the same percentage of refuse, so by our plan of correcting the weight of the coal by its combustible, so as to give 10 per cent refuse in each case, the weight of the coal is a true comparative test of the relative economy of the engine. For instance, 100 pounds of coal leaving 20 per cent refuse will evaporate no more water that 88·9 pounds leaving 10 per cent refuse, for both contain only 80 pounds of combustible. If to the combustible we add one ninth of its weight, the quantity added is one tenth, or 10 per cent of the sum, which represents the weight of the coal, corrected to the uniform standard of 10 per cent refuse. Suppose a horse power in a certain foreign steamship costs 2·8 pounds of bituminous coal per hour, and in an American vessel it costs 3 pounds of coal, using anthracite, are we to say our engines are inferior? Let us see. We first deduct the refuse from the anthracite—for instance, 20 per cent, which leaves 2·4 pounds of combustible. This, then, is nine tenths of the weight of coal having ten per cent of refuse; so multiply 2·4 by $\frac{9}{10}$, gives 2·67 pounds as the true cost of the power in the American engine, to compare with 2·8 pounds used by the foreigner, when both are compared by the same standard.

We have been thus explicit because the fuel is so generally used in the comparison of the performance of steam engines. The coal bills of course show the absolute cost of the power in any particular case, no matter what quality of coal was used; but, under such circumstances, the weight of coal consumed, even when corrected as above pointed out, is, as must be seen, but an imperfect comparative measure. To make comparisons sufficiently correct to answer the demands of science, we must measure the steam used in each case—in other words, compare engines by the Number of Pounds of Steam used per Horse Power per Hour.

The calculations are usually made from the pressure shown at the termination of the stroke; the assumption being that the engine uses, at every stroke, one full cylinder of steam at that pressure. In other cases, however, the initial pressure, and the portion of the cylinder filled at the point of cut off, are used in the calculation. These methods of determination pre-suppose that dry or saturated steam enters the cylinder, which may be true, and that the steam continues in this state, through at least part of the stroke, without condensation, which is never the case. Steam is necessarily condensed to set free the heat transmuted into the work done; and the temperature of the metal of the cylinder is a mean of the temperature to which it is subjected, and therefore forms a condenser with respect to the initial steam. The consequence is, that there is always more steam taken from the boiler than is shown by the indicator; the discrepancy increasing with the degree of expansion and amount of external refrigeration. Clarke, in his work on the locomotive, points out great differences between the amount of steam calculated from the initial and terminal pressures shown by the indicator; and yet uses the first in all his calculations. Later experiments, where the steam has been actually measured, show that in small engines twenty to thirty per cent of the steam is unaccounted for by the indicator at full stroke; and as high as sixty to eighty per cent when the steam is expanded considerably. Large engines show a small discrepancy at full stroke, which rises to thirty, and often fifty per cent, with shorter admissions. The best examples of the English double cylinder pumping engines use thirty-three per cent more steam than is shown by the indicator or the cylinders. This method of determination is therefore absolutely worthless for our purpose, as it furnishes no basis for reliable comparative tests. To these discrepancies must be attributed the losses which are known to arise in the steam engine. They have been ascertained, in practice, by indicating the engine and measuring the water pumped into the boiler, and evaporated there, to furnish steam. In other cases, the exhaust steam of the engine has, by surface condensation, been reduced to water, and its quantity determined by measuring or weighing it. The weight of feed water, or, what is the same thing, of steam used in any case, to produce a given power, may, by either of these plans, be ascertained with scrupulous accuracy; and if the coal be weighed at the same time, the evaporative efficiency of the boiler can also be determined, and the excellence of both engine and boiler be detected and credited aright.

In addition to the standards above given, expressing the economy of the engine, others of special application are used, which give the cost in terms of that which costs money every day; namely, the coal, and the result in that which returns the money. For instance, the miller speaks of the number of pounds of coal it requires to grind a barrel of flour—a thing, by the way, which may depend as much upon the condition of the mill as of the steam machinery. Locomotives are rated by the number of pounds of coal or coke burned per ton, per mile. So, also, what is known as the "duty" of a pumping engine, is the number of foot pounds of work derived from the consumption of a certain quantity of coal.

Having discussed the various measures and means that may be employed for our purpose, we desire next to select such as will be useful in particular cases, and show their practical application, which leads us to

THE METHOD OF CONDUCTING EXPERIMENTS.—I. TESTING BOILERS.

The power of an engine can never exceed that of the boiler which furnishes it with steam; hence, it is eminently proper that we should first select measures to ascertain, in a given instance, whether the steam is economically generated. As has been said, the heat producing power, or evaporating efficiency of a boiler, is measured by the number of pounds of water evaporated per pound of coal from a given temperature, say 212° Fah. We have therefore to weigh the water evaporated, and the coal producing the evaporation—a very simple thing apparently, but one about which there is much misapprehension, resulting in statements grossly erroneous and ridiculous. The water may be measured in a tank or barrel, the contents of which have been ascertained by careful measurement, or by weighing water into it of a given temperature. When experimenting, the water in the tank should be pumped out dry if possible, or at least to a given mark; the pump then stopped, the tank re-filled to the proper hight (the easiest way is to overflow it), when the supply can be shut off and the operation repeated. The supply pipe should be arranged so that the water can be seen entering the tank, and leakage detected while the pump is working. The better way is to have a hose to throw in and out of the measuring tank. Before making even experiment, it should be ascertained if the boiler foams or raises water; if so, it must be remedied before proceeding farther. All leaks about the tank, pump, and boiler, should be stopped; and all extra pipes leading water in or out of the boiler be disconnected, or frequently examined. The steam generator may be worked off in the engine, blown off through the safety valve, or otherwise disposed of, so long as no water is lifted with it. The latter is less liable to happen when the evaporation takes place under considerable pressure. The greatest care is necessary in commencing and ending experiments. There are two methods of doing this. The first is to measure the temperature and hight of the water in the boiler, and, immediately upon starting the fire, to keep an account of the fuel consumed, until the close of the experiment; then to weigh the coal and ashes hauled out of the furnace. This involves a calculation to ascertain the heating effect of the fuel used in generating steam. It is of little value for the purpose of comparison, for the shell of the boiler and its surroundings (often a heavy mass of brick work) has also to be heated; and of this no estimate can be formed. The better plan is to get every thing in average working condition before starting the experiment. The steam should have the proper pressure, the fire be clean, and of a certain thickness, judging by marks on the sides of the furnace, the ash pit clean, and the water at a certain known hight. The experiment may then proceed, weighing all the coal afterward used, and measuring the water pumped into the boiler, till near the desired time to stop, when the fire should be thoroughly cleaned and filled up with coal to the same marks as at the beginning; and should be maintained at that point, with the steam at the starting pressure, till after pumping in the last tank of water, when, as soon as the water level reaches the same hight as at starting, the experiment may be terminated. The ashes in the pit should then be weighed, as well as those previously collected. The fire should be equally bright, and the steam pressure the same at the beginning and end of the experiment, so that the water level will be disturbed in like manner. At stopping or starting a certain feed should be kept on; or the water should be pumped too high, and time noted when, by evaporation, the level falls to the mark. No experiment should be less than eight hours in length; and a trial of forty-eight to seventy-two hours' duration can better be depended upon. During the experiment a log should be kept, upon which should be recorded the time, the weight of the coal and ashes, the number of tanks of feed water, and the temperature of each. The temperature of the escaping products of combustion, and of the fire room, may also be noted; as well as any evident remarks about the kind of coal, and the circumstances of the trial. After the experiment, the following calculations are necessary: First, in an evident manner, ascertain the total amount of coal and ashes, subtract one from the other, which gives the total weight of the combustible. Then find the average temperature of the feed water, and the average pressure of steam. Then calculate the weight of the whole quantity of water evaporated, making allowance for its temperature.

(To be continued.)

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Steam Engine Indicator.

MESSRS. EDITORS:—I have read with surprise the criticisms on the indicator as a means of ascertaining the power exerted by steam engines, contained in the paper by Mr. Emery, published in your last two numbers. The writer says that its indications have been shown to be of a most unreliable and deceitful character, even in those respects in which they had heretofore been considered practically perfect; and that although the Richards Indicator is undoubtedly a great improvement upon the old style, still the best of these instruments give, at fifty revolutions of an engine per minute, when cutting off at an early point of the stroke, diagrams which have been demonstrated to be erroneous by from ten to twenty-five per cent. He describes an experiment by which he states that any one may prove the existence of these errors, and then attempts to show that they are unavoidable.

The connection leaves it to be inferred that this startling discovery has been made in the course of the experiments on steam expansion, which have for several years been carried on by the Navy Department. This show of authority, together with the candor and evident sincerity of the writer, is likely to carry some weight; and the charge might, if permitted to pass unchallenged, be regarded by many as confessed.

Now, nothing can be more certain than that the defects here attributed to the indicator have no existence. The action of this instrument has been investigated too thoroughly, by too many able engineers, and under too many varied conditions, to permit confidence in it to be shaken by any statements inconsistent with the general experience. I cordially unite in recommending experiments of the character suggested by Mr. Emery to be generally made; and whenever these are properly conducted, it will be found that all the diagrams taken from an engine when exerting the same power, however they may differ in their outlines, instead of presenting the discrepancies stated, will contain the same area exactly.

Mr. Emery accounts for these imagined errors by supposing that the inertia of the moving parts of the instrument compels the indications to be tardy. Let it be assumed that such tardiness of action exists, in a degree sufficient to account for the least amount of error stated; namely, ten per cent at fifty revolutions of the engine per minute. Then, if the speed of the engine is increased, this error also must increase in the same ratio in which the power required to overcome the inertia of the moving parts increases; or as the square of the speed, and at four hundred revolutions of the engine per minute will amount to six hundred and forty per cent, and we find ourselves far beyond the limit of speed at which the indicator can give any diagram at all. But I have taken diagrams with the Richards indicator at four hundred revolutions and over per minute, which were demonstrably perfect, although the entire figure was completed in less than the one seventh part of a second. I have also taken diagrams from locomotive cylinders at two hundred and sixty revolutions per minute, in which the admission line was carried by the momentum of the moving parts, much above the point which

would mark the pressure of the steam; and the reaction of the spring was so instantaneous that the pencil descended on the same line. To those who are familiar with the action of this instrument at high speeds, the idea of its being tardy appears quite absurd; and they will unite in assuring our critic that he must look elsewhere for the causes of the discrepancies which he imagines he has discovered.

Thanking you for your courtesy in permitting me to trespass so much on your valuable space, I am yours,

New York, Nov. 20, 1868. CHARLES T. PORTER.

Testing the Power of Steam Engines.

MESSRS. EDITORS:—I notice in No. 21, page 322, the following from the pen of "C. E. Emery, late of the U. S. Navy and U. S. Steam Expansion Experiments:"

"The measurement of the power in the steam cylinder by the indicator is defective, also, because it takes no account of the friction of the engine."

Will Mr. Emery please state what we shall call the result we get by the indicator when we throw off all resistance and run the engine by itself alone? ENGINEER.

Curiosities of Vision.

MESSRS. EDITORS.—In a recent number of your paper I notice an article on a subject which has often occupied my thoughts, that is, the difference in the real appreciation of the magnitude of the same objects by different persons. We know that the vision of all persons is affected by their idea of the distance of the object viewed in relation to its magnitnde, and that correct ideas of magnitude gathered simply from vision are impossible.

The painter when he represents an object, a landscape, or an architectural structure, always places somewhere in the field of view, some well known object, with the proper size of which, all are acquainted, and which object is really the scale by which the dimension of the picture is to be estimated. But even in real objects there is great liability of mistake. It is said that to a stranger not accustomed to the sight, a large man standing in the door of St. Paul's, London, looks like a boy, and that it is necessary for a person to become familiar with the great cathedrals of Europe, and time and again compare them with well known things that have been handled before they can fully appreciate their majestic proportions.

But the question has occurred to me: Is there not a real difference in the appreciation of two persons in relation to the magnitude of the same object even when it can be handled; and is not this the real reason why one person will go into extacies at a view of Niagara, or of Barnum's fat woman, while another will only, like the tailor, see "a glorious place to sponge a coat," or a lump of disgusting humanity? From what I have seen, read, and experienced, I believe that such a difference does exist, and that it is the main spring of what has been called taste by some, in relation to an appreciation of the sublime.

We may read a description of Niagara written by one of these large viewers and our mental vision, may be enlarged by his or her descriptive figures till our ideas may come up almost to the glowing picture painted, and the "Tremendous Current" of our school-boy days be really worth more than the money it would cost to go and see it, but alas for the disenchantment, if perchance we do get to see the original especially after roaming the broad prairies and crossing the wide rivers of the West.

Under such circumstances I must confess my first thought was when I looked on the "insatiable abyss:" Is that all? and I passed on my way, not waiting for it to "grow" on me. But I believe I am not totally devoid of the faculty (or whatever else the phrenologists call it) of sublimity. I can look at the moon on a cloudless night, and by an exercise of will, or imagination, or of reason or arithmetic, I know not which, I can make it appear to my "mind's eye" as large as it should appear if some twenty thousand miles distant. The same experiment is successful with many other objects which can be excluded from other objects in the field of vision.

I recollect that one time when out hunting in a snowy winter on the prairie I saw across a shallow valley, at as I supposed a half mile distance, a "tremendous varmint," smelling around on the sun-lit snow. After screwing up my courage for a few moments, I cautiously advanced, and after a few rods walk, succeeded in slaying one of these little mephitic quadrupeds, which so strongly excited the disgust of old Carver when he traveled here a hundred years ago, and which some call skunk. I would have bet at least on a black wolf or anything larger if we had such, until I had taken a few steps toward him. At another time I got a view of one of the most tremendous structures for a few moments ever seen or made by man. A steamboat had landed against a small island in the Mississippi, covered with low trees, upon the other side of which I happened to be. Beyond, on the other side of the river was a clean prairie horizon which could just be seen above the trees. I saw nothing of the boat but her two chimneys, and at first sight, and indeed until reason had time to prove the contrary, they seemed to me to be two immense towers, at least a thousand feet high, resting on the distant landscape. By imagination, I suppose, I repeated this effect several times, until I really began to feel quite "sublime." Capt. Parry tells us how he used to see on the great snow wastes of the North great cairns of stones, which with a few minutes walk he could pick up in his hand, and I have often seen on a prairie ridge, when traveling, an immense mansion, which in a short drive turned out to be the the 16×20 "box" of a new settler. That there is but a few steps in such cases from the sublime to the ridiculous, I have found out by experience, and that the faculties or the "tastes" of different men depend very much upon a difference in natural or perhaps acquired appreciation in sight as well as in other senses I am fully persuaded. C. BOYNTON.

Lyons, Iowa.

Meteorites--New Theory Propounded.

MESSRS. EDITORS:—Perhaps it may interest your scientific readers to know that this morning (Nov. 14th), especially after 3 o'clock, meteorites fell here and around this vicinity in great numbers—superseding anything of the kind ever heretofore seen, as many of the early-risers say. One fell after 4 o'clock, on the Gloucester ferry-slip, and exploded with a loud report resembling that of a pistol. Several were seen falling, leaving long and luminous trains behind them; and one was observed moving with great velocity in a northwestern direction, and leaving behind it a very long luminous tail. Another blazed forth in the southern heavens, and threw so clear and vivid a light around it that the whole scenery was lighted up for the time being, as it would have been by a flash of vivid lightning.

Two years ago I wrote to a certain scientific editor that the true cause of our annual or November meteoric showers was the fact that, at that period of the year, the earth actually *crosses the sun's path;* that is, the earth is direct behind the sun, and passes over his orbit on the 14th day of November of every year.

For some cause or other the editor referred to did not give my article publicity. I therefore, for the sake of astronomic science, appeal to the SCIENTIFIC AMERICAN. I think it capable of demonstration that not only does the earth actually cross the sun's path on the morning of the 14th Novembar every year without exception, but that the sun is actually moving around the heavens in westward orbital motion, and that he is positively leaving a meteoric train behind him, which stretches out many degrees beyond the earth's orbit.

These are facts of astronomical science, which ought to be carried to the ears or eyes of every scientific man, and which I hope the worthy editors of the SCIENTIFIC AMERICAN will aid me in bringing publicly before the world.

JOHN HEPBURN, SEN.

Gloucester, N. J.

Manufacture of White Lead---New Processes.

For the Scientific American.

The adulteration of white lead with sulphate of baryta has become so common that it is one of the regular steps in its preparation in all factories. The pure white lead of the most finely ground quality is called "Silver White;" when mixed with equal parts finely ground sulphate of baryta it is called, on the European continent, "Venice White." When adulterated with double its weight of sulphate of baryta it is known as "Hamburg White;" and even three parts of the baryta and more to one of lead are frequently used. This adulteration is not entirely a deterioration, and many of these adulterated qualities are preferred for certain purposes to the pure article.

There exists another kind of white lead, called "Kremner White," which owes its pure white color to the original purity of the lead employed (which is free from silver and iron), and the carefulness in the method of manufacture, clearing it from all powdered metallic lead or sulphuret, which, especially the last, even in the smallest quantities, injure many other qualities of white lead.

The method described on page 298 is usually called the Dutch process, and being very injurious to the workmen has in certain localities been superseded by the so-called French process, of which Thenard first established the principle. It consists in making a solution of a soluble salt of lead, and by passing carbonic acid gas through it the lead is precipitated as a carbonate. This process may be executed on a very small as well as on a large scale, and requires the following steps: First, a saturated solution of acetate of lead (lead sugar) is made, either by dissolving this salt in water, or by heating metallic lead with pure vinegar; this solution is boiled with oxide of lead (litharge) till it cannot dissolve any more of it; one part of pure strong wood vinegar (pyroligneous acid) will dissolve a little less than one part of litharge (oxide of lead) and form a neutral acetate, when dissolving twice that quantity of litharge in it (correctly 60 parts of acetic acid to 112 of litharge, one atom of each) we obtain a so-called subacetate, a basic solution, which colors litmus paper blue, and when dissolving three times the amount of litharge the solution is saturated, and the excess of lead above the neutral solution will be readily precipitated as carbonate of lead by passing carbonic acid gas through the solution, till the solution becomes neutral again, or even acid.

This carbonic acid gas may be obtained by the action of sulphuric acid and water on chalk or marble, as is done in the preparation of the so-called soda water, or it may be obtained from the combustion of charcoal, but in this case it must be purified, chiefly from sulphur vapors, as these color lead black, and consequently make the precipitate very dirty looking. The best way is to pass the gas resulting from combustion first through a separate solution of lead, before passing it into the receptacle from which the white lead is to be precipitated. As soon as this precipitation is completed the liquid is left to settle, the supernatant neutral acetate of lead solution is decanted off, and boiled with another dose of litharge; thus a limited amount of acetate could be used for an indefinite period, if there were not unavoidable losses during the process, which have to be supplied from time to time with fresh acetic acid. It is clear that during this method of operation, the white lead being obtained from the first in a wet condition, the workmen are not exposed to the poisonous dust, as is the case in the old process described on page 298.

Several modifications of this French process have been proposed; for instance, Button and Dyer make a solution of litharge in nitric acid, and precipitate with carbonic acid obtained from the combustion of coke. Richardson uses sulphuric acid to precipitate the solution of acetate of lead, and thus forms not a carbonate but a sulphate of lead; and Leigh precipitates a carbonate from a solution of the chloride of the metal by means of carbonate of ammonia, which is only a more expensive way of operating without compensating benefit. Pattinson has a similar method, but precipitates the white lead by means of a solution of carbonate of magnesia in carbonic acid water, which solution he obtains from the mineral hydrate of magnesia, or from magnesia limestone; the solution he uses contains chloride of lead, and he treats the precipitate with caustic potash or soda, and he asserts that in this way his white lead becomes equal to the best known.

A method was recently patented in England and the United States to simply use an impure ore of lead of such a kind as is soluble in acetic acid, boil it with the acid, decant and filter the solution till clear, and then precipitate with carbonic acid. A common lead ore of this class is a mineral carbonate of lead of a reddish brown or gray color, it is abundantly found in England, but when introducing this method in the United States a great drawback was found to consist in the fact that not such a lead ore had been found here. Fortunately railroad cuttings in Missouri quite recently brought to light large deposits of this mineral, which are now oeing used for the manufacture of lead, white lead, and other lead compounds.

Dr. Vander Weyde, of New York, recently patented an apparatus by which the wood vinegar necessary for the solution of this ore, could be distilled from the wood at the mine, and the residue of the distillation, the charcoal, while hot in the still, was converted into carbonic acid gas, by simply blowing a current of air through the still, as soon as the volatile products were driven off by the distillation; this carbonic acid gas, after passing through cooling and washing tubs, is used for the precipitation of the carbonate of lead, the whole process thus being accomplished in one apparatus and one operation.

By this process of using the lead ore, the labor of reduction to the metallic state is entirely saved, a labor required when following either the old or so-called Dutch method, or when using the lead sugar, or when dissolving in acetic acid the litharge which is manufactured from the metallic lead.

Generally the white lead obtained after the French method by precipitation, has not the body, or else does not cover so well as that prepared after the old Dutch method; the cause is revealed by the microscope; the precipitated white lead consists of little semi-translucent crystals—the Dutch white lead—out of opaque white grains, but later improvements in the French method have overcome that difficulty to a great degree; they consist in preventing the formation of these small crystals by the use of nitric, sulphuric, and hydrochloric acids, and thus form a compound which consists not only chiefly of a carbonate, but also of a sulphate and chloride, which last two, by themselves, are inferior to the carbonate, but when combined in the formation of the precipitate, appear to improve the pure carbonate in a manner not yet precisely explained.

Chemical analysis has proved that the pure white lead manufactured after the Dutch process, is a compound of two atoms of carbonate of lead and one atom of hydrated oxide of lead, therefore is it probable that when the carbonate of lead obtained by precipitation after the French process was boiled with a sufficient quantity of a pure solution of subacetate of lead, it would take from this solution some hydrated oxide of lead, and become also a compound of carbonate and hydrated oxide of lead, and be as opaque, and dense of body as the Kremner white. A hint worth trying.

Of course the white lead manufactured after the French method is also adulterated with sulphate of baryta in different proportions, and this will be the case till a method is found of making pure white lead directly from the ore, and as cheap as the baryta, in which case the adulteration would not pay any more and come to an end. V.

The Defects of Railway Tracks.

Standing by the side of the line when the engine is slowly passing, says the *American Railway Times*, and watching the effect of the wheels, it will soon be detected why the annual repair and reconstruction expenses are so large. As each driving wheel passes over the cross tie, the tie is driven down in the ballast just in proportion as the bearing surface is deficient to sustain the load. Now where the cross-ties are irregular in size, the resisting power to depression varies, the smaller tie sinking deepest, the blow from the driving wheel being aided by the fall so that the effects are aggravated in proportion. This result leaves the track a succession of short and irregular waves of the chop-sea variety, and not the condition for smooth running, or favorable to the "life" of any portion of the track or rolling stock. No amount of tamping up can prevent the formation of these depressions in the track where the cross-ties are irregular in size, and consequently there is an unequal amount of bearing surface. How many of the track-men, or in fact, how many of the managers ever give any heed to this matter or suppose it of any importance? Not many we fear. on many lines can be seen, lying side by side, cross-ties of every size and shape, some large and long, some small and long, short and small, some crooked. Frequently can be seen one tie extending from one to two feet outside of one rail longer than it does outside of the other, and frequently it is found that no attention is paid to the distance between the ties, and no effort is made to equalize the amount of bearing surface on the ballast per running foot or yard of track. This practice, or mal-practice, is very common, and there can be nothing more wasteful or improvident, nothing more unphilosophical. Vast amounts

of money are expended to secure a smooth and even road-bed, for that is the theory of all railway construction, and then the practice is to so arrange the super-structure that the evenness and smoothness are at once destroyed, and the trains instead of having that easy gliding motion so favorable to economy of operation and safety, go thumping and pounding over the line, causing a useless waste of power, destroying the road-bed, and every part of the superstructure, and destroying every part of the rolling stock as well. Railway managers, most of them at least, can see this state of things on their own lines, any day they may take the trouble to examine them; and knowing as they do, for so they say in their reports, that the smooth track is favorable to economy of operation, they yet permit their road-masters and track-men to violate, in a hundred different ways, every principle of common sense and good railway practice that goes to secure this smoothness and evenness of track. The deficiency in this matter we believe is greater now than it was a dozen years since, but it is certainly safe to say that no improvement has been made during the time except in isolated cases. It is common enough to berate the rail manufacturers for failure to produce a serviceable article, but the cause of the early destruction of rails is, we fear, not always the quality of the make, it is in some degree due to the treatment they receive in the track. With the increased weight upon driving wheels and more frequent trains, and the condition of the tracks, with all the disturbing and destructive elements in them to which we have alluded, it is not a matter of wonder that iron rails wear out at an early day, and it is simply absurd to expect any other result. We do not hesitate to say, that unless the railway managers reform the character of the superstructure, arranging its details so as to secure that amount of evenness and smoothness which is practicable even under the present insufficient system, our sympathies will be with the rail makers, and not with the railway managers. In the different details of the superstructure, such as chairs, wood and iron splices, and other joint fastenings, there are some methods which are better than others, but we shall not attempt to sit in judgement upon them at present, and perhaps it is needless that anyone should do so; but one thing the railway manager must be certain of, and that is, that the best results of any system of rail fastening cannot be secured until the rails have equal, continuous, and permanent bearing, so that they may be kept truly in plane and line, and not liable to become disarranged by every passing train. The bearing surface of cross-ties is little enough on all the lines, but what there is should be evenly distributed under the rails. If the road-masters or managers think undue stress is laid upon this matter, they are simply very much mistaken.

Rapid Railroad Building.

The two departments of the great trans-continental railroad seem to grow fully as rapidly as the Ohio pumpkin vine, which the farmer advised the traveler to bestride as being a better means of travel than his jaded nag. As regards the eastern branch, we know that although to-day the newspapers state its working terminus at so many hundred miles west of Omaha, before we can comprehend the fact the report comes that it has added fifty or a hundred miles to its length. It seems to be the same on the other side, if we may credit the San Francisco *Bulletin*, which says:

"A few days since a merchant came down to the city from the eastern side of the Sierra Nevada. Having bought an extensive assortment of goods he gave directions that they should be shipped to the end of the Central Pacific Railroad, wherever that should be, expecting to have a considerable job of teaming to fill up the gap between the working end of the road and his place of business. His directions were obeyed to the letter. But, to his astonishment, on returning he found that the goods ordered had been carried about fifteen miles beyond his residence.

"The Continental Railroad is now 'on its travels.' It is not safe to limit its progress. There are probably twenty thousand days of work performed on every secular day. If a merchant sends goods to the end of the road, they will bring bring up somewhere this side of Salt Lake city, possibly in some ambitious little town that he never heard of before his departure. Miles of road are created, and even towns, in a single day. The dot on the map showing the working terminus of the road at the beginning of the week, must be moved forward at the end of the week to a point representing from eighteen to twenty miles of progress. Only a few months will elapse before a general direction to send goods to the end of the road will insure their bringing up either at Omaha or New York. It might be a safer plan just now for the interior merchant to drive a stake before leaving home, and order his goods not to be sent beyond the stake, lest he should have to chase them into the wilderness."

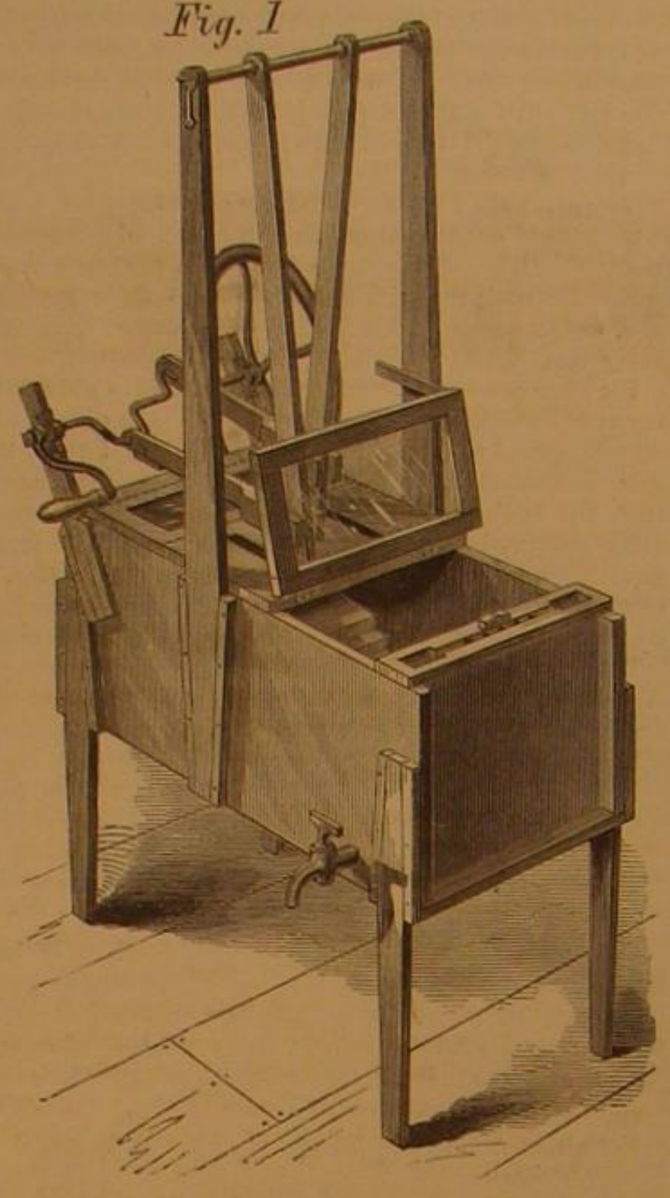
Mead's Monument of Lincoln.

A monument to the memory of Abraham Lincoln is to be erected at Springfield, Ill., at an expense of $200,000, of which sum $135,000 are already secured. Thirty-two designs were offered to the committee, and the decision was given in favor of the one made by Larkin G. Mead, of Vermont, and whose studio is at Florence, where, by patient industry and a refined genius, he has achieved a deserved fame. We had the pleasure of seeing the artist's drawing in perspective, and were favorably impressed by it. The whole hight is to be one hundred feet, and with the exception of its bronze figures, the monument will be of New England granite. Mr. Mead is making immediate arrangements for all preliminary work upon the monument, and will leave for Italy in about two months, to begin his models for the figures necessary. He thinks it will be about four years before the entire monument will be completed. His contract provides that the foundation must be completed during the summer and autumn of next year, 1869; the entire granite work is to be finished by Jan. 1, 1873. The artist will be allowed four years after that date for the completion of the sculpture.

SELFRIDGE'S PATENT WASHING MACHINE.

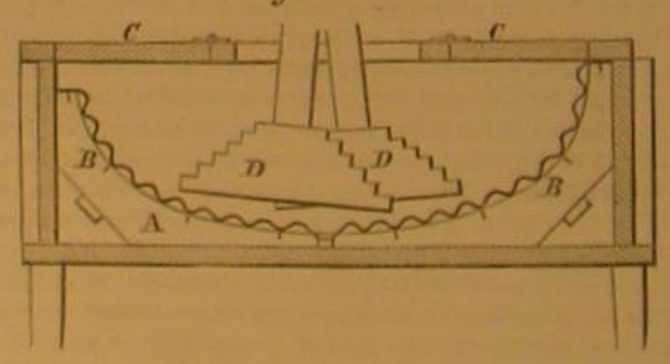
Inventions for lessening the household labor of women do not seem to meet with so great a success as those improvements on machines of which men have the sole charge. The sewing machine is an exception, but it is notable that the

Fig. 1



fact thus stated is evident. Whether the genius of women does not affect mechanics, or that the apparent complication of the devices contrived for women's convenience frightens them from a thorough trial of them may be an open question; but it is certain that the simpler the form and the easier the manipulation of a machine intended for the use of the gentler sex, the better chance it has for success. Apparently acting on this belief, the inventor of the machine of which the accompanying engravings are representations, has contrived a washing machine that is compact, portable, easily cleaned and worked, and very simple. Its form and general appearance is seen in Fig. 1, and the internal construction is seen in the section, Fig. 2. The tank, A, holds a washboard, B, which is in two parts, semi-elliptical and corrugated. These parts can be removed for cleaning by opening the hinged lids, C, which may be glassed, as seen in Fig. 1, to allow of a view of the interior as the work progresses.

Fig. 2



Two plunger or rubbers, D, having corrugated inclined sides, are suspended by pendulum arms to an elevated shaft held in uprights at the center of the machine, the arms being operated by means of hooked connecting bars, driven by cranks set isochronously on a shaft at one end of the machine turned by a handle. As one plunger moves forward the other is returning and a continuous rubbing of the clothes is assured. A faucet is inserted at or near one end of the tank for drawing off the dirty water. All the parts are so arranged that they may be separated for convenience in storing or removing. The recommendations from those who have used it are numerous and very favorable.

Patented through the Scientific American Patent Agency Nov. 5, 1867, by G. C. Selfridge, whom address for additional particulars at Saratoga Springs, N. Y. State rights for sale.

Sharpening Saws.—A correspondent informs us that, in answer to an advertisement, he paid fifty cents for the accompanying information: "After filing your saw, lay it on a level board and pass over the side of the teeth with a whetstone until all the wire edge is off the teeth. This will make your saw cut true and smooth, and remain sharp longer. Your saw must be set true with a sawset."

CULTIVATION OF WASTE LANDS ON RAILWAY LINES.

Nothing is more noticeable to the observant traveler on our railroads than the contrast between the land inclosed by the fences confining the road, and that on either side belonging to adjoining farms. Where the latter are cultivated, yielding crops of grass, grain, or vegetables, the former are either gravelly cuttings, scored by rain floods, plats of level denuded of their soil to be used for fillings on the line, or stretches of arable soil, left to grow up to weeds and wildness, detrimental to the adjoining properties and useless to anybody. Occasionally a patch of cabbages or potatoes, in the vicinity of a station or the dwelling of a switch tender, shows what industry can do in utilizing these waste spots. Such cases in the desert of the railroad line prove that "what has been done may be done." There can be no reason why the unimproved lands on the lines might not, in many instances, be cultivated, with a three-fold object, not the least of which would be the gratification of the eye accorded to the passengers. Another would be the additional income afforded to shareholders of the road, or the additional comforts to their employés. Still another advantage would be preservation of the embankments and cuttings from the effects of heavy rains or local floods or freshets, which, in one case, wash away the material of the road, rendering the ties insecure, and in the other deposit upon the track an excess of ballast.

Where an embankment or causeway has been carried across a low-lying "meadow," to equalize the level of the line, the perpetual moisture, aided by numerous trickling rills and running streams, gradually undermine the embankment and cause tumbles or slides, endangering the safety of passing trains and the permanency of the roadway. In such cases these embankments may be preserved by planting the slopes, however steep, with the osier. Wherever there is sufficient moisture, this species of the willow will grow. The kinds most adapted to our northern climate are the *Salix Viminalis* and the *Salix Forbyana*, both very valuable for basket making and other textile fabrics of wood. But beside this value as a material for manufacture, the long tendrils of the main root pierce the soil, on which they are subsisting, horizontally, binding the material of the embankment or dike into a solid mass; while the stocks, or the growing osier, present a barrier to the action of temporary floods and heavy rains. A notable instance of the value of this plant may be seen in the condition of the extensive dikes built in Hartford, Conn., by the late Col. Colt, where hundreds of acres of splendid arable soil has been preserved from annual overflow, and lands, before almost useless, have been turned into fertile fields or covered with villages, the inhabitants of which are supported by the great pistol factory, the manufactory of willow ware—the material for which is drawn annually and wholly from the products of the sides of the dike—and one or more sawing and planing mills.

There can be no valid reason why such embankments on the lines of our railroads may not be similarly utilized. After planting the osiers—which is done simply by slips—no other care is necessary. In the fall the shoots may be cut by a pruning knife, and can be sold as basket stuff, while the roots and stock remain to defend the embankment and furnish another crop the coming year.

But there are also slopes caused by cuttings, in localties where their bases—not like embankments—do not reach perpetual moisture. Few of them are of such an angle that grasses and grains may not be grown upon them. At least they will support the masses which will tend to preserve the integrity of the slope, and, in time, prevent its wearing away except when destroyed by a violent rain storm. Grass and grain seed scattered over these slopes, however gravelly and denuded of true soil they may appear to be, will take root and bear, and clots of grass sod, and of moss, will readily adapt themselves to their new conditions, so that even if *they* should not flourish, they will form a holding place for more useful plants.

On the level of the lines, frequently, large areas are fenced in, which belong to the railroad, that have been used either as deposits from which earth has been drawn to make embankments, or from which the trees have been cut for ties for the road, stringers or braces for bridges, or culverts or for other purposes. Although in many of these places the soil has been removed so that the clean gravel is exposed, in many others the surface is undisturbed except by the removal of the superincumbent growth of trees and brushwood, leaving the soil in tolerable condition for the plow or the spade. These spots might be cultivated by adjacent proprietors, or by the section men when the localities are removed any considerable distance from a village or farm house. The aggregate yield of useful or marketable commodities on a line of say twenty miles would amount to something of value either to the cultivator or owner, whoever the latter may be, and the appearance as well as the value of the road be greatly advantaged The subject is worth attention.

These matters are better managed in the old countries. There the station houses frequently are flanked on either side by beds of vegetables and parterres of flowers, protected by fences from the public way and the railway lines. Each one of these little stopping places are pleasant homes, attached to which are beautiful gardens bearing evidences of thrift and patient industry, forming pleasant views for the passengers of passing trains. What can prevent a similar condition on our railway lines?

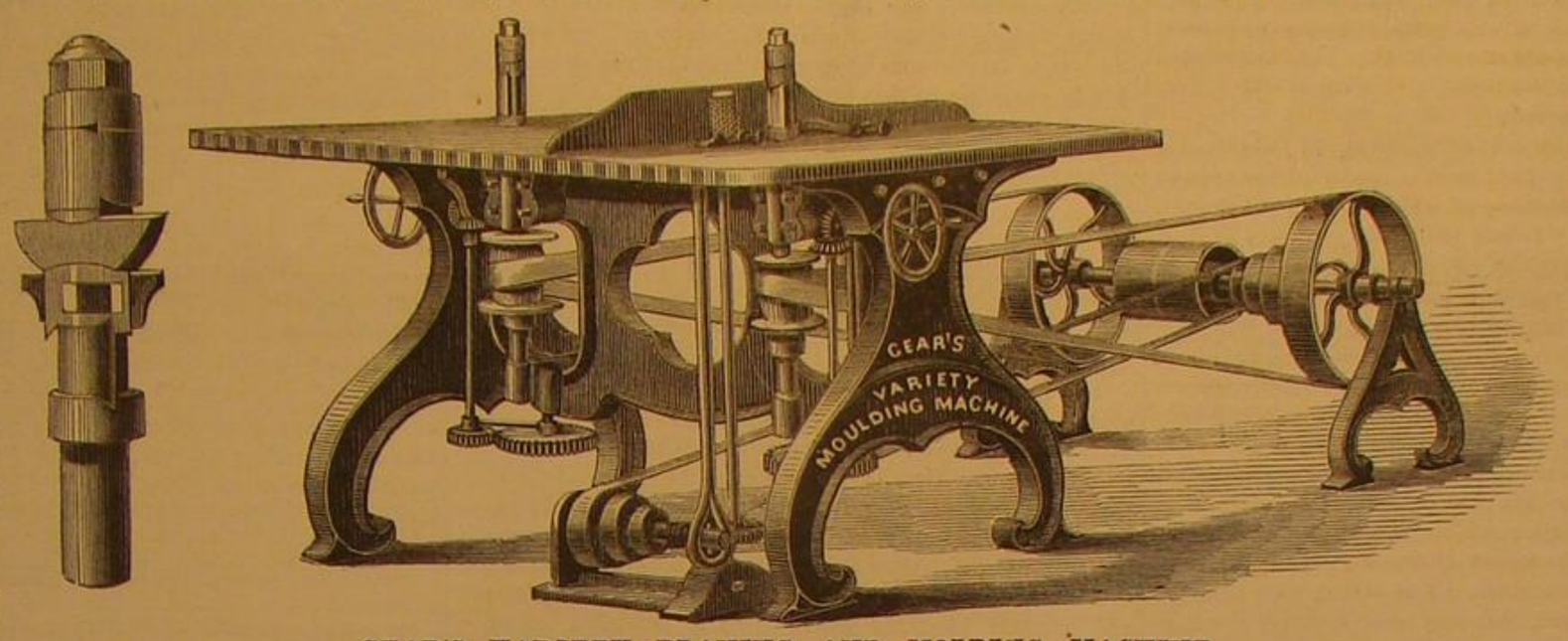
It is proposed to illuminate the great cross upon the Pittsburgh Cathedral with gas lights, to be ignited by electricity.

Hard steel and dry grindstones reduce the temper of the one and injure the usefulness of the other.

Improvement in Wood-working Machinery.

Among the many noticeable articles exhibited at the Crystal Palace in this city was a curious and ingenious contrivance for cutting irregular forms in wood—the need of which had been long and seriously felt, and which has since completely revolutionized the manufacture of furniture—the invention of Mr. Nathaniel Gear. A broad table, say four feet square, rested upon an iron frame, at the usual hight of a carpenter's bench, and rising from the surface near one end were the heads of two vertical spindles, or shafts, which projected but a few inches and constituted the most important part of the machinery; in fact, the very principle of the invention.

The peculiar construction of the heads, into which were placed sharp knives similar to common planing irons grooved and formed to suit the various styles of work desired, could not be more simple or efficient. The whole strength of the cutters being available and not impaired by holes or strained by wedges as is generally the case in holding all other cutters. The material to be planed was held upon a pattern of the form desired, by a few metallic points, and the pattern being carried past and against the heads while rotating, the material upon it was planed and molded to the shape of the pattern and knives used. Two heads were used in order to work the grain of the wood and thus impart a beauty of finish that could not be otherwise obtained.



GEAR'S VARIETY PLANING AND MOLDING MACHINE.

The engraving accompanying represents this same machine in its improved state, the result of some fifteen years experience in building and perfecting it, and while it has been essentially improved in build, it is worthy of note that the principle of the machine, the manner of holding the cutters and using the heads as a gage or guide to the pattern conveying the material to be dressed, has never been changed. By the graduation of the knives, the machine may be adapted to work of any size, making the heads even from one-half of an inch, to four inches in diameter; so that the machine may be used in doing the most delicate irregular wood work.

It is now used in planing the wood handles to hair brushes, and also in dressing plow beams and the knees of ships.

The engraving represents upon the table top of the machine, a guide, connected with which is a feed roll, which receives power to move it from the pulleys beneath the table, and when attached completes the machine for doing straight as well as irregular work.

By the hand wheel arrangement represented at each side of the machine, the spindles are raised or lowered as occasion requires, adapting the cutters to the thickness of the material operated upon.

The cutter head at the left of the machine (on Fig. 2) represents the head with several cutters; the additional and extra cutters being held in a simple manner by an *adjustable* intermediate collar, the invention of Mr. I. P. Tice.

The machine weighs about thirteen hundred pounds, and is valuable for furniture, carriage, sash, door, and blind makers, and any establishment working wood by machinery. Patented Nov. 8, 1853, and extended Sept, 30, 1867.

For information concerning D. Jordan's Patent Guards by which the shavings are gaged the same as in common planes (a valuable improvement to the machine), and all further particulars concerning the same, address the owners and manufacturers, A. S. & J. Gear & Company, New Haven, Conn., and Concord, N H.

Fungoid Diseases in Mangels and Other Plants.

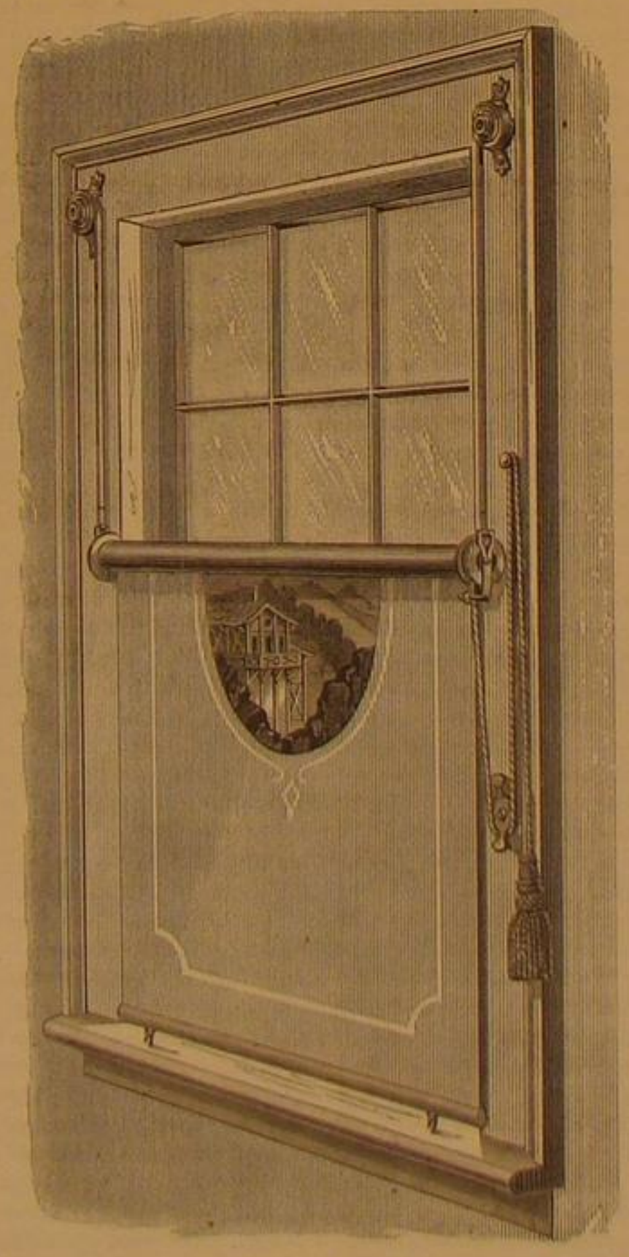
An agricultural paper contains the following on the subject of fungoid diseases in plants, called forth by the receipt of a leaf of mangel wurzel, infested with a brown parasitic fungus, with a request, first, to send name, nature, and probable cause of the disease; and, secondly, to state whether it is likely to be injurious to cattle which feed upon the leaves. It says:

"The first question is easily answered; the production in question is a fungus, its name Uredo Betæ, Persoon (Trichobasis Betæ, Léveillé), and the cause, like that of other vegetables, infection by means of its reproductive organs. The precise conditions of climate which favor the production of these parasites is not very well known; but as far as our experience goes, nothing is so likely to promote their growth as damp succeeding drought. The parasite grows on other species of beet, and when produced on very dark colored foliage acquires a deep tinge.

"The second question, which is certainly a very important one, is not so easy to answer. The matter has at present been studied very imperfectly. When these parasites are abundant, a person walking through a grass field, or a bean crop, will occasionally come out powdered densely with the orange-colored or brown spores, and it is at last pretty certain that in such conditions plants cannot have the same nutritive powers as when they are free from taint. We know that some fungi are extremely injurious. No person, for instance, who knows what ergot is—and it is often most abundant on bents in autumnal pasture—will lead his pregnant sheep or cattle where it is prevalent. If he does, he will not very improbably find that both cows and ewes are slipping their young. But there is a further evil. A great consumption of ergot, when carried on for some time, is very likely to produce dangerous gangrene. This is known to be the case in man, whole villages having occasionally labored under an epidemic of gangrene, in consequence of eating bread made of ergoted rye. It has, moreover, been suspected that this is not the only parasite which may be injurious to our flocks and herds; we should, therefore, be inclined to withhold the affected leaves, if diseased to any extent, from the farm yard; while there is not the slightest reason to suppose that the root will attain any noxious qualities, though it may have been checked in its growth by the demands made on the foliage for the nutritive matter which ought to have been modified by the influence of the atmosphere, in order to nourish the root."

LEGG'S IMPROVEMENT IN WINDOW SHADES.

Little annoyances are the musketoes of life. Any device that reduces the annoyance, however trifling it may appear at first sight, is an absolute blessing. Such is a device for the handy and ready management of window shades, by which we may exclude the direct rays of the sun and enjoy, at the same time, the benefits of ventilation. Curtains or shades which either obstruct half the light or cannot be adjusted to cover either the lower or the upper part of the window at will, are annoying, in many cases the light of the whole surface being dimmed in order the exclude the sun's rays from a portion, only, of the window.



The engraving shows a device not only useful and handy, but elegant and tasty. With this the shade may be either raised or lowered to exclude or admit light from the top or bottom. As represented, the curtain or shade is drawn down from the top, leaving the upper portion of the window free for the admission of light or air. The shade is attached to a roller in the usual way, the roller being suspended by webbing from a coiled spring concealed in ornamental disks attached to the cornice of the window frame. To bring the top of the shade down, the bottom is attached to fixed hooks on the window sill, and the cord, wound on the grooved pulley and one end of the roller, pulled, when the shade is brought down and its position secured by the ornamental holder on the side of the window frame, which does duty as a belaying pin on shipboard. When released the roller is raised by the tension of the coiled springs, when the curtain may be raised as usual by means of the cord. Thus any portion of the window may be exposed or covered as the circumstances may demand, the cord being guided by a stirrup attached to the suspending tape, which is also a stop motion when required.

Patented through the Scientific American Patent Agency, Aug. 18, 1868, by J. D. Legg, who may be addressed for State and County rights at Long Eddy, Sullivan county, N. Y.

To Make Bread.

We extract from the *Chemical News* the following on the subject of bread-making by the celebrated chemist, Liebig: "It is a well-known fact that the products of the ordinary fermentation of bread are carbonic acid, a portion of which is retained in the dough, and, by its expansion, on the sponge being submitted to the heat of the oven, renders the bread spongy; beside this, butyric acid and also alcohol are generated at the expense of a portion of the starch contained in the flour, a loss amounting to about from 2 to 4 per cent of the flour applied for bread making. The alcohol is irretrievably lost, and its loss is estimated by Liebig to amount for Germany to 50,000,000 of liters annually, and for London (the Metropolis), at 600,000 liters. All experiments tried to collect and condense this alcohol have turned out failures. Liebig recommends the following ingredients: 50 kilogrammes of rye meal, 500 grammes of bicarbonate of soda, 2·125 kilogrammes of pure hydrochloric acid, 2 kilogrammes of common salt, and 40 liters of water; the bicarbonate of soda and the acid yield carbonic acid gas, which renders the bread light and spongy. According to Liebig, the following are the advantages of the use of this method above the old-fashioned fermentation process: 1st. Saving of time and material, since no alcohol or other by-products are formed. 2d. This bread does not readily become moldy, since, not having been mixed with yeast, it does not contain, as is otherwise always the case, the sporules of cryptogamic plants, which are the cause of moldiness. The objection to the use of this bread by many people is its insipidity and want of a flavor the palate has from childhood become accustomed to. To mend this defect, Liebig recommends the addition of from 4 to 8 liters of good vinegar upon 100 kilogrammes of flour, and to correspondingly decrease the quantity of water. When it is desired to give to this kind of bread the taste of soldier's bread, *pain de munition*, one should add to the dough and mix up with it 250 grammes of rather dry, not too rich, cheese. Liebig observes that, at Münich, bread is now largely made according to the plan described; it only takes four hours to convert a hundred weight of flour into bread. As will be readily observed by the majority of readers, Liebig's process is on a small scale. Dr. Dauglish's system, the celebrated German *savant* observes, has, neither in Paris nor other French towns, taken at all well. The same applies to Belgium and Holland. Instead of rye meal, wheaten flour can be taken."

THE Prussian Admiralty has determined upon a novel experiment in the art of naval warfare. The *Ariadne*, a corvette now building, is to be armed with six guns of very heavy caliber (seventy-two and ninety-six pounders, according to the Prussian terminology), capable of doing grievous damage to cuirassed ships a long distance off. As the *Ariadne* is to be only of wood, she will not dare to approach the iron monsters of the sea close enough to offer them a direct mark; but what would constitute her weakness at close quarters, will, it is expected, render her all the more formidable at a distance. Being much swifter in her movements than the ironclads, it is expected she will engage them at an advantage, miles off, and by her maneuvering prove a dangerous enemy to the strongest of them. A single well-aimed bullet shot from her decks, would certainly be enough to create dreadful havoc in ships protected by eight or nine-inch plates of the best kind hitherto in use.

DEATH FROM THE EXHALATIONS OF QUINCES.—One of the papers of Lyons, France, records the occurrence of death by asphyxia suffered by a lady who slept in a room in which were also kept a quantity of quinces. The effect of the odor emitted seems to be analogous to those produced by the odors of some flowers. In this case, according to scientific evidence, the air of the room was largely vitiated with a peculiarly suffocating perfume, and a very considerable amount of both carbonic acid and carbonic oxide gas. The room in question was always used as a bedroom; no fire had been lighted in it, nor was any other discernible cause for the death of this lady found but the exhalations of the fruit.

REMINISCENCES OF THE EARLY DISCOVERIES IN ELECTRO-MAGNETISM.—INTERESTING ANECDOTE OF FARADAY.

The sublime discovery known as electro-magnetism is one of the wonderful outgrowths of the nineteenth century. It owes its origin to the great philosopher Franklin, who first really brought electricity into practical use. Although Franklin was content only with atmospheric electricity, yet his great achievement led other men of science to investigate, and finally to achieve greater and more useful results from this yet mysterious element.

It is well known that from the various phenomena of electricity proceed all those abstruse subjects, such as magnetism, electro-magnetism, magneto-electricity, etc.

Electro-magnetism has been employed more than any of the various modifications of electricity. Simply because it was more obedient to the aid of man. Hence the application of it to the working of the telegraph, to plating, and the various other uses now in existence.

In 1837, Thomas Davenport, of Brandon, Vt., obtained a patent and came to New York with a model of his electro-magnetic engine, the working of which astonished the scientific men of that day. It was predicted and fully avowed that he had wrought out the great discovery of the use of electro-magnetism as a motive power. His model was very simple, having two electro-magnets, placed within attractive distances of a revolving steel magnet. These magnets were so arranged that one was acted upon by the attractive power and the other by the repulsive. He declared that it was only necessary to increase the size of the magnets in order to produce any amount of power required. This led many inventors to turn their attention to the subject, and other models were soon brought forth. Not exactly on the principle of Davenport's, but more upon the power of direct attraction alone.

Various machines were made, all of which were pleasing and wonderful to behold, but they possessed no practical value from the fact that the power obtained was entirely inadequate for practical use.

Davenport engaged a Capt. T. and a Mr. P. to go to England with a model and secured a patent there. They were quite successful in engaging the interest of men of wealth in their patent. Having means at their disposal they built a large working machine, with four of the largest electro-magnets then known, each weighing about three hundred pounds. These magnets were charged from a battery of copper and zinc containing a solution of sulphate of copper which, when dissolved, was of the capacity of a barrel. With a cast-iron wheel six feet in diameter, weighing 600 pounds, a velocity was attained of seventy-five revolutions per minute.

To the eye of the unpracticed in electro-magnetism, and even to the scientific, this was a vast stride towards the final result. Men of science, and very many practical mechanics of London, were invited to witness this great model. Among the number were the three well-known and highly appreciated Professors—Wheatstone, of King's College, Daniel, the inventor of the Daniel's battery, and the great scientific man of England, Faraday. The interest these men evinced in their examination of the model is worthy of record.

Professor Wheatstone, who has since identified himself with the magnetic telegraph in England, was loud in his praise of the working of the model. Professor Daniel was also enthusiastic in its favor, and prophesied that the days of steam were numbered: that electro-magnetism would become the leading motive power of the world. He said ships would soon traverse the ocean with only a few sheets of zinc for fuel and a small supply of acid—yea, not even acid for the waters of the ocean could supply its place.

To-day where are all these predictions? No more realized than they were nearly thirty years ago when they were made.

Notwithstanding all the varied experiments made to utilize this sleeping power of the magnet, it has as yet baffled the skill of the most skillful, and is to-day no nearer its accomplishment than when these great men of science gave their opinion.

The opinion given by Professor Faraday, the man of all others whose word was most powerful for good or ill of the success of the Davenport machine, was quite remarkable. He saw the wheel revolve for several minutes and watched with an appearance of astonishment the large electric spark which was given off every time the current was broken, a spark so large that it emitted a light in the evening sufficient to illuminate the room so that a newspaper could be read.

He spoke not one word of its merits or demerits, but taking up a broom which happened to be in one corner of the room, he gently placed the handle of it on the periphery of the wheel, and with a slight pressure the wheel gradually revolved slower. He did not, however, quite stop the motion, yet he saw how easily it could be done. Then came that nobleness of spirit and heart which has so characterized the man since, and will ever keep his memory in sweet remembrance by those who came in contact with him: none more than the Americans who were interested in this machine. He walked into an adjoining room and kindly informed those most interested that his opinion expressed to the public would greatly injure the sale of the patent. So he preferred not to advance one then, yet he would if strongly urged. His pleasant voice and kindly words of cheer, and hope for some greater discovery in electro-magnetism by which the great wish would be gratified, made a lasting impression.

How true that sagacious man's words have proved, the recorded history of the many failures will most surely attest. Thousands of dollars, many thousands, have been spent in vain, and yet there are men now living who predict the final achievement by which electricity will become the motive power of the whole world: when in reality the lightning of heaven shall become obedient to man's will, and the shuttle be moved by its power, and along the iron rail no sound of steam shall be heard—no smoke, no explosions, nothing but simply the slight decomposition of metals, all of which can be recovered again, shall take place.

CONFECTIONERY—HOW IT IS MADE, AND WHAT IT IS MADE OF.

The chief material in the manufacture of confections is sugar. There are two principal kinds of sugar. Cane sugar, and grape sugar, differing from each other in the following particulars. Cane sugar has a specific gravity of about 1·6. Water at 60° dissolves one third its own weight of it. Upon concentration of its solutions it deposits in small brilliant crystals, which if the sugar be pure are perfectly white. Absolute alcohol dissolves one eightieth of its own weight of cane sugar. Its solutions by long continued boiling become modified in character so that crystallization will not take place on cooling. Alcoholic fermentation takes place in its solutions only when a portion has become converted into grape sugar by the presence and chemical action of another substance—yeast.

Cane sugar is obtained by the concentration of the juices of the sugar cane, beetroot, sugar maple, and some other plants. Its chemical composition is by weight: carbon 72 parts, hydrogen 9 parts, oxygen 72 parts, water 18 parts. These proportions are expressed by the chemical formula: $C_{12}H_9O_9,2HO$.

Grape sugar is less soluble in water, and more soluble in alcohol. It is not so sweet, two parts of cane sugar being equal in this respect to five of grape sugar. Cane sugar crystallizes in prisms. Grape sugar either forms tubercular concretions, or fibrous acicular groups. It contains carbon 72 parts; hydrogen 14 parts, oxygen 14 parts; its formula being $C_{12}H_{14}O_{14}$ or $C_{12}H_{12}O_{12}+2HO$. Cane sugar loses its water at a temperature of 400° and becomes brown, deliquescent, and slightly bitter, in which state it is called caramel, used largely as a coloring for factitions wines. Grape sugar is converted into caramel at 284°. When strong sulphuric acid is poured into a concentrated sirup of cane sugar, and the mixture stirred, it turns brown, then black, heats, boils up and passes into a black and bulky mass—charcoal. When a solution of grape sugar is treated in like manner, a brown compound is formed having acid properties. Grape sugar is obtained from fruits, and by the action of dilute acids upon starch.

There is still another variety of sugar called fruit sugar, it is uncrystallizable but it becomes grape sugar by combination with water. Cane sugar is converted into grape sugar by yeast. Honey is probably nearly identical with the uncrystallizable fruit sugar.

We have seen that only cane sugar will produce well defined prismatic crystals and as an admixture of either fruit or grape sugar would render the crystallization imperfect, and as the change of cane sugar into grape sugar is facilitated by the presence of impurities, the sugar employed in the manufacture of candy should be cane sugar of a good and pure quality. Maple sugar is seldom made in so perfect a manner, that it will make a solid undeliquescent candy.

The perfect crystallization of sugar may be partly prevented by stirring while its solutions are cooling, or by the sudden cooling of a hot mass of melted sugar, and working it while still in a plastic state. The "white rock candy" of the shops is a good example of pure crystallized sugar. This candy is made by suspending in a very concentrated sirup, strings which act as nuclei for the formation and attachment of the crystals. [See article entitled, The Phenomena of Supersaturation, on page 323 of the current volume of the SCIENTIFIC AMERICAN]. It is perfectly pure sugar.

The ordinary hard stick candy is an example of the amorphous condition produced in sugar by working it while in a plastic state. In order to aid in producing this condition of sugar, a little cream of tartar is added which has the effect to prevent crystallization. The sugar while in a plastic mass, is pulled. A portion of it being taken in the hands of the workman, is drawn out partially by the hands. The middle of the mass is then thrown over a hook provided for the purpose and the ends being still grasped the workman steps backward thus drawing the mass into a sort of rope. This rope is doubled and the process repeated until the proper consistency is attained when the sugar is divided into sticks and allowed to become cold and hard. The soft candies are variously made, corn starch, being often an ingredient.

We have room in this article for only a very brief description of the special manipulations employed in making the different styles of candies. Stripes are put on sticks by laying upon a plastic roll of sugar while still hot, colored bars of cold sugar, which becoming soft in contact with the hot sugar, are drawn out with it to the proper size. Candies designed to be very clear and transparent are not worked by kneading or pulling. To make lozenges the plastic sugar is rolled into a sheet of the proper thickness and the lozenges are cut out like crackers from dough. These are placed when hard and cold in a jar and a quantity of whatever essential is desired to flavor them is put into the jar. The jar being closed, the volatile nature of the oil enables it soon to equally permeate the entire mass. The coating of seeds or meats of nuts is done by rolling or shaking them in a copper pan in contact with a small quantity of melted sugar. The sugar is added gradually until the coating has reached the required thickness.

The use of poisonous colors is not so frequent at present as formerly. Red and yellow candies are very rarely colored with poisonous matter. The greens are most liable to be poisonous, especially the light shade called apple green which sometimes consists of arsenite of copper, a very poisonous substance.

Attempt to Demolish a Lighthouse.

The keeper of Minot's Light had retired to rest for the night on Wednesday, and his assistant was proceeding to the top of the structure, when a great crash was heard, resounding through the whole substantial building. The lighthouse keeper supposed his assistant had, by accident, broken some glass vessel or other, but the latter, with alarm on his countenance, soon reported that the plate glass constituting one side of the great lantern at the top of the lighthouse had been smashed in, perhaps by a rifle ball. Examination was immediately begun to ascertain the cause of the occurrence, and after a little time the discovery on the ledge of the lighthouse of a dead shell-drake duck, with nearly every bone in its body broken, explained what would otherwise have been a very mysterious affair. The little winged wanderer was probably flying at a great speed, and being attracted by the light precipitated itself against the glass, and the concussion brought its career to a sudden and untimely close. The glass broken was more than a quarter of an inch in thickness, and it is impossible to replace the pane that was thus summarily displaced with glass, equally thick, purchased in Boston. The duck which achieved this feat, although his bones were broken, had no contusions on the exterior of his body. He was cooked, eaten, and pronounced excellent by the lighthouse keeper and his family.—*Boston Transcript of Nov. 14th.*

The attraction of light for birds as well as insects is so well established that the above occurrence need not be deemed incredible. We recollect a case where a gull broke the glass of the lantern of one of our light-houses on the South Carolina coast, during the war, and fell to the rock, instead of passing through the glass, and serving as boned turkey for the light-house keeper, as in this case.

Editorial Summary.

WE regret to be compelled to record the death of our late carrier, Carlisle McKee, who has served us faithfully for many years. He was a man who, although occupying a humble position in life, was possesssed of singular intelligence and large information. He spoke several languages with fluency, and it was his pride to keep thoroughly posted on current events of interest, political and otherwise. He was obliging and prompt in the performance of his duties, and in his connection with us made many friends among our city readers, by whom he will be missed, and who will regret to learn of his decease.

A REMARKABLE combination of physical forces, applied to purposes of war has lately been made the subject of experiment at Antwerp with a view to the defense of the passes of the Scheldt. Torpedoes are placed in the river, and cameras similar to those used by photographers are adjusted, so that an object directly over one of them will present its image in the instrument situated upon the shore at any convenient distance. As soon as the image of an approaching hostile vessel appears in the camera, an electric current is sent through a wire to the torpedo which underlies it, and the explosion takes place.

IMPROVED CHINA INK.—A correspondent of the *Building News* gives an account of a new preparation of China ink. The preparation is a solution of the ink in a chemical liquid which renders the glue used to agglomerate the carbon particles insoluble when it becomes dry on the paper in the usual way. The lines made by this ink will not wash in coloring a drawing. The preparation has the advantage over other solutions of China ink, that it will not decompose by long keeping.

THE American Institute announce a course of scientific lectures at Steinway Hall, beginning on the evening of the 25th inst., on which occasion Professor Barnard will lecture upon the microscope. We shall announce the other lectures in order.

WATER is a cheap and useful lubricant in the machine shop. Oil is costly and not always so effectual.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

AMERICAN MANFACTURE OF CALICO.—The calico interest of the United States is an important one. The total product of printed goods in 1826 was about 3,000,000 yards. In 1836 it reached 120,000,000. In 1855 there were twenty-seven print works in the United States, which produced in the aggregate 350,000,000 per year. This amount, at an average of ten cents per yard, was worth $35,000,000. In 1854 our exports of printed goods amounted to $3,000,000 Our imports of printed cottons in 1856 reached $19,119,752. Our exports in 1857 were only $1,785,685 worth. The total production of printed goods in 1860, according to the census of that year, was $7,743,644. There are 6,000,000 cotton spindles now in operation in the United States, of which over 2,000,000 are running on cloths for printing, and produce 453,000,000 yards.

A single locomotive and machine company of Paterson, N. J., turns out seventy locomotives and about $300,000 worth of cotton machinery yearly. Employment is given to about 700 hands.

The Spathic Iron Company is at work in the steel mine in South Plymouth, Vt., night and day, with two sets of hands. The ore grows richer as they go down.

The British Government have spent in experiments upon firearms at Woolwich $140,000 during the last five years.

The Louisville and Nashville Railroad have recently negotiated a loan with a view, it is said, of purchasing several smaller roads.

St. Louis refused by a majority of 8,336 to make an appropriation of $2,000,000 in aid of the projected railroad to Chillicothe.

The directors of the Hudson River Railroad have ordered their stock transfer books closed until the 1st of December.

The Cerro de Pasco Railroad Company has been formed in Lima and the greater part of the capital subscribed. This will be the first railway made in the interior of Peru.

The Baltimore and Potomac Railroad is progressing as rapidly as it is possible. The right of way in most cases has been secured and paid for.

Great activity is said to prevail now in the mines of the granite district in Colorado.

One week's production of the Slaughter House Gulch, in Colorado was recently 3,000 ounces of silver.

The nine-hundredth mile post on the Union Pacific Railroad west of Omaha has been passed.

The Union Copper mines in Calaveras county, Cal., have been sold at auction for $121,350.

The Indianapolis rolling mills use daily twenty car loads of Missouri iron.

One firm in Portland, Maine, have manufactured 24,000 planchettes.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PRESERVE JARS.—Nat. Raymer, New Sterling, N.C.—This invention relates to a new and improved method or process of preserving fruit and other articles, and it consists in such an arrangement as allows the air to be extracted without the use of steam, thereby adapting the can to ordinary use in families where facilities for putting up fruit on a large scale are not enjoyed.

HOEING MACHINE.—Horace C. Briggs, West Auburn, Me.—This invention has for its object to furnish an improved machine by means of which the ground between the rows of plants may be thoroughly stirred up and turned over, and the soil thrown around the roots of the plants, and which shall at the same time be simple in construction and easily operated.

HAY CUTTER.—Henry Kinsey, F. W. Kissell, J. E. Smith, and J. M. Smith, Ligonier, Pa.—This invention has for its object to furnish an improved machine for cutting hay, straw, and other fodder, which shall be simple in construction, easily operated, effective in operation, and self-feeding.

PAPER MAKING MACHINE.—James Viney, Manchester, N. H.—This invention relates to an attachment to machines for manufacturing paper, whereby the process is greatly facilitated and much valuable time is saved.

STEAM PUMPING ENGINE.—Ralph R. Lee and Geo. H. Wren, Mahaney City, Pa.—This invention relates to the manner in which the valves of pumping and other engines are operated, and it consists in the construction of the main valve and steam chest, and the manner in which steam is admitted thereto for the movement of the valve.

MACHINE FOR SEPARATING THE PULPY MATTER FROM FIBER-PRODUCING LEAVES.—G. Sanford, Bergen Point, N. J.—This invention consists of a wheel arranged to rotate in a vertical plane, which is provided with combs and scrapers arranged upon its sides radially and operating between vertically suspended holders for the material to be operated on, which is previously crushed between rollers, the said holders being provided with means for pushing them against the combs or scrapers as the thickness of the mass being combed varies. Provision is also made for supplying water to the mass as the combs and scrapers are acting upon it.

TANNING APPARATUS.—Silas Hosmer, Concord, Mass.—This invention consists in the arrangement or combination with a vacuum tanning vessel, of an agitating mechanism to produce and maintain currents in the liquor bath containing the skins to equalize the action of the liquor on the skins.

VELOCIPEDE.—E. K. W. Blake, Chicago, Ill.—This invention consists of an arrangement of loose hollow pulleys on the driving axle, having pawls taking into ratchets within the said pulleys secured to the axle, and belts for operating the pulleys passing over guide pulleys at the front of the machine to the hands of the operator, whereby he may propel the machine by pulling from directly in front of him. Springs connected by cords to smaller drums on the said pulleys are used for retracting the pulley to wind on the operating belts.

SAFETY LOCK FOR FIRE-ARMS.—Michael Tromly, Washington, D. C.—The nature of this invention consists in constructing the hammer in two parts, the upper one, containing the head, being so attached to the lower part that it can slide about a half inch upon the latter, and so operating that when the hammer is bent back to a "full cock" and sprung from that position, centrifugal force throws the head outward so that it can strike the cap and explode it; but when let down by the thumb or sprung from less than a "half cock," the head will not be thrown out in the manner described, but will strike upon a guard near the nipple, and be prevented from coming in contact with the cap. The hammer itself is so formed as to guard the cap when down.

EXCAVATOR.—Barna P. Stowell, Quincy, Ill.—The object of this invention is to construct an excavating machine to be operated by steam or other power, which shall perform its work in an easier and more expeditious manner than those heretofore invented, and which shall be economical and convenient of operation.

CAR COUPLING.—James Osman, and John F. Potter, Linden Hall, Pa.—The object of this invention is to accomplish the coupling and uncoupling of cars in a safe and ready manner.

WATER WHEEL.—J. H Bodine, and T. A. Hill, Mount Morris, N. Y.—In this invention the gate is made in a peculiar form to adapt it to be opened and closed with less power and a novel device is employed for the purpose of moving it. In addition to this, the curb is so constructed that, as the step wears away the joint between the wheel and the curb still remains water tight.

AWNING OR HORSE CARS.—Manfred C. Battey, Washington, D. C.—The object of this invention is to provide a neat, light, strong, and cheap attachable and removable awning, to be used in connection with horse cars on street railways, for the purpose of protecting the horses from the excessive heat of the sun.

TANNING PROCESS.—C. J. Bagh, Eau Claire, Wis.—This invention has for its object to furnish a superior tanning process by means of which furs and hides may be easily, quickly, and thoroughly tanned.

SELF-SETTING TARGET.—William Stein, Camden, N. J.—The object of this invention is to construct a target which will produce a constant display of passing objects to the practitioner, said objects or aims being hinged, so that they will be turned down, when hit; but after being thus turned down, they will be automatically set up before they are again exposed to the view.

STEAM WHISTLE.—Bernhard Weinmann, Cincinnati, Ohio.—This invention relates to a new steam whistle, which is so arranged that the sound produced in it can be regulated at will. The invention consists in arranging either one or both ends of the tube of a steam whistle adjustable, so as to thereby make the length of the tube variable.

TURBINE.—Albert M. Maynard, Savoy, Mass.—The nature of this invention relates to those horizontal water wheels known as turbine. It consists in the peculiar V-shaped formation of the turbine buckets, arranged on the inner side of a cylindrical box, in combination with a diaphram through which the shaft passes, together with other devices perfecting the whole.

BRIDLE BIT.—W. F. Clark, Hagaman's Mills, N. Y.—The object of this invention is to provide a simple bit and bridle for horses, which combines several advantageous features, each of which are herein duly set forth.

SPINNING JACK.—Jacob Sands, Waterloo, N. Y.—This invention consists in an arrangement of mechanism for automatically changing the friction belt, whereby the carriage is made to effect the said changes.

HORSE BRUSH.—Amos W. Brown, Lansingburh, N. Y.—The object of this invention is to furnish a flexible back to a horse brush that the brush may be brought to conform to the animal's body upon which it may be used, and thus cause all the bristles to bear and operate in the rubbing process. It consists in a jointing to the back of the brush and connecting the jointed parts with a steel plate or spring, or by suitable hinges in combination with a spring.

APPARATUS FOR HOLDING SHEEP.—G. D. A. Krigbaum, Zanesville, Ohio.—This invention consists of a bench provided with hinged legs or legs otherwise adjustable connected to it, and with four notches, two in each edge, about the size of the legs of the sheep above the ankles; and also with notched levers which are pivoted to the bench, one to each notch in the bench, so that the notches of the levers are co-incident with those of the bench. The sheep is placed upon his back under the bench and one leg secured in each notch by the levers which may be held in position by pins or otherwise.

PROCESS FOR DYEING AND RECTIFYING COPAL VARNISH.—Desso Dudult, New York City.—The object of this process is to clarify or rectify copal varnish and also to give it in a few hours that peculiar quality which renders it suitable for being used and which previous to my invention required to be "aged," that is to say, to stand from eight to ten months to allow this quality or change to be obtained spontaneously.

WATER WHEEL.—Vincent M. Baker, Preston, Minn.—This invention relates to a new and improved horizontal water wheel, and of that class in which power is obtained both from the percussive and resecting force of the water. The invention consists in a novel construction of gates and chutes and in a peculiar form of bucket, whereby several advantages are obtained.

BEE-HIVE.—J. H. Thurston, Rainsborough, Ohio.—This invention relates to a new and useful improvement in the construction of bee-hives, whereby a perfect ventilation is obtained and the hive kept dry during the winter season—free escape of the moisture exhaled by the bees being allowed, and consequently the condensation of the same on the walls of the hive, which is so destructive to bees in a closely confined hive, avoided. The invention also relates to a peculiar construction and arrangement of the bee entrance of the hive, whereby the bees are enabled to protect themselves against the encroachments of the bee-moth.

WIND WHEEL.—R. Waite, Blue Earth City, Minn.—This invention consists in a horizontal wheel having a spiral tapered vane of varying twist, enclosed in a correspondingly tapered case provided with bell months at each end, and with the means for regulating the passage of air at the receiving end or shutting it off altogether.

ANTI-FRICTION WASHER.—U. H. Reed, Jeremy Lake, and Luther Sisson, N. Easton, Mass.—This invention consists of a washer composed of two rings and a tubular section, one of the said rings and the tubular section formed to have an annular recess, when joined together, which is filled with spherical balls, which take the pressure of the screw or nut from the other ring which is held in contact with the balls by an outer annular projection, taking behind an inner annular projection of the tubular section, and which is free to turn on the balls.

BED BOTTOM.—Gustavus Reneky and Samuel Kiess, Edgerton, Ohio.—This invention consists in the manner of securing the springs to the frame; also, in the manner of securing the slats to the springs; also, in a manner of arranging some of the slats to economize the use of springs and in the arrangement of the parts forming the frame.

GARDEN ROLLER.—James B. Brown, Peekskill, N. Y.—The object of this invention is to so construct a garden roller, in which weights are suspended from the axle, that the said weights can be readily taken off and replaced whenever desired, so that the roller can be made more or less heavy at will, according to the kind of work to be done.

ATTACHMENT TO GLASSES AND TUMBLERS.—Johann Winkler, Hudson city, N.J.—The object of this invention is to prevent the froth of effervescent liquids, such as "white beer," soda waters, etc., from spattering into the face of the drinker, and to allow the real liquid to flow from the glass without being mixed with froth.

WATCH ESCAPEMENT.—Julius Hietel, John Wenzel Hietel, and John Loomis Geissler, Philadelphia, Pa.—This invention relates to a new manner of constructing the lever of an escapement, and consists in the application and arrangement of a self-regulating spring lever, which will, when the watch is shaken or violently agitated, allow the ruby pin to pass, and which will therefore permit the balance to turn freely under the influence of such shock or motion. The object of the invention is to prevent the breaking of the ruby pin, which in ordinary lever escapements is frequently the case, and to still, at the same time, avoid the complications of the chronometer escapement in which the same freedom of the balance is provided.

HARNESS TREE AND PAD.—W. A. Sharp and John A. Shannon, Tama City, Iowa.—This invention consists of a tree or yoke made of wood or other suitable materal sufficiently arching to bridge the back of the animal, and adjustably connected at each end to pads of improved construction.

LANTERN.—George W. Putnam, Peterboro, Town of Smithfield, N.Y.—This is a useful invention for travelers and others. It burns a piece of full-sized candle, enough to last two and a half hours. It is provided with a magazine which carries extra candles and matches. This magazine draws out behind when the lantern is in use, and is pushed in when the same is closed. The whole thing is quite compact and strong.

WINDMILL.—Charles Goodwin, Beardstown, Ill.—This invention consists in so arranging the wheels upon the shaft of a windmill, with reference to the other parts, as to cause it to act as a vane or tailboard. Also, in providing a vane in front of the wheel, above the shaft, and at an angle with it, to prevent the resistance of the wheel on the vertical shaft from working the wheel edgewise to the wind, and also in providing the wings with springs which will allow them to open when the wind blows hard, and close again when it subsides.

BUTT HINGE.—William Wells, Ashtabula, Ohio.—This invention relates to an improvement in butts for hanging doors and gates, and for similar uses, whereby such doors or gates are made self-closing by the action of a spiral spring.

APPARATUS FOR BURNING PETROLEUM.—Louis Verstraet, Paris, France.—This invention relates to improvements in the use of petroleum, or other mineral oils, for fuel for generating steam in steam boilers, and for other purposes.

FAN BLAST PORTABLE FORGE.—John B. Bolinger, Detroit, Mich.—This invention relates to the means employed to supply the air blast to a portable smith's forge.

BURGLAR PROOF LOCK.—William F. Ensign, New York city.—This invention relates to a new and improved lock of that class which are provided with a series of circular tumblers having notches or gateways in their peripheries to receive a stump and admit of the bolt being thrown back.

FRUIT BASKET.—Charles Moore, Stratford, Conn.—This invention relates to a new and useful improvement in the construction of fruit baskets such as are used for carrying small fruit, berries, etc., to market. The object of the invention is to obtain a basket which may be manufactured cheaper, and be far more durable than the various wooden baskets now in general use.

LOCK.—Amos S. Blake, Waterbury, Conn.—This invention relates to a new and improved lock, and is designed to supersede the various locks used for freight and baggage car doors, and the ordinary padlock generally, as this invention is applicable in all cases where the ordinary padlock may be used. The object of the invention is to obtain a lock which may be used in all cases where the ordinary padlock may be applied, and without the liability of being injured by water getting within it, or being rendered inoperative or incapable of being opened or unlocked on account of ice—objections which attend the use of the ordinary padlock.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

W. T. H., of Wis.—The trouble with your microscope is undoubtedly imperfection in the lenses.

J. T. E., of Mich.—Shellac varnish made with alcohol, is a good preparation to prevent iron from rusting, but it will not stand wear neither will any other varnish.

E. R., of N. Y.—Stains obtained in making cider and paring apples may be removed from the hand by lemon juice, or citric acid, obtainable at any drug store. We know of nothing that will prevent rubber boots from cracking, but they may be mended by the use of rubber dissolved in benzine.

E. J. N., of Cal.—To separate gold from copper, dissolve in nitro-hydrochloric acid, (*aqua regia*). Precipitate with a solution of protosulphate of iron; the precipitate washed and fused will be pure gold.

J. A. S. of Texas.—We have never had any trouble in keeping our razors in order by the use of an ordinary strap. If you are a barber by trade, and have not acquired the art of keeping your razors in condition, we do not think printed instructions on the subject would be of any value.

P. C. C., of Pa.—"If a boiler with pressure of steam at 30 lbs. to the square inch be heated until its pressure is 100 lbs., has the last mentioned steam less moisture in it; and if so has part of the steam first mentioned (30 lbs) been condensed by additional pressure back to water?" In reply we ask if a bladder be half filled with air and then heated until entirely filled is there more air in it when at the point of bursting than when the bladder was flaccid? In other words, do you in generating steam from water expand the water or the gaseous products of water and heat combined? Suppose you pass your steam at 30 lbs. pressure into a heater having no water, as is done every day in hundreds of boilers, cannot you get the heat of 358° Fah. and the consequent pressure of 100 lbs? In other words, do you know what is meant by dry steam?"

J. W. C., of N. Y.—"I inclose a diagram representing the half of a revolution of an 18-inch crank and ask why, if the ordinates on an indicator card represent the power exerted by the engine, this does not represent the effective length of a crank of 18 inches; the ordinates being measured the same as in an indicator diagram using, however, a common scale rule? If they do then there is a gain in the use of the crank." The indicator is in no sense a crank. It represents the action of a reciprocating body, and even if the ordinates used in measuring the stroke of an engine and the half revolution of a crank were the same, these are all the elements the two cases have in common. The calculations necessary for measuring the proportional powers of the crank between right angles to the piston rod and the dead center have no analogy to those used in estimating the varying powers of steam at different portions of the stroke.

Business and Personal.

The charge for insertion under this head is one dollar a line. If the Notices exceed four lines, an extra charge will be made.

NEW PUBLICATIONS.

READY RECKONER FOR SAWMILL MANAGERS.

We have received a chart intended for the use of sawmill owners and operators, giving the amount of lumber, in boards, joists, scantling, etc., that may be sawed from a log or bolt of any ascertained diameter. It is arranged in tabular form on one sheet, convenient for reference and handy to be posted in the mill. It has full directions for use printed on the same sheet, and is as easily understood as the ordinary chart for a screw cutting lathe. The table is the result of experience and observation by a practical sawyer, and appears to be well adapted to subserve its purpose. Copy right secured by the author, Titus Whitmore, Yankee Settlement, Clayton Co., Iowa. Price 50 cents single. See advertisement on another page under the heading, "To Mill Owners and Sawyers."

THE ATLANTIC MONTHLY for December contains, among other excellent articles, a good one entitled "Our Painters," the second article on "Coöperative Housekeeping," "A Day at a Consulate," etc. The new volume begins with the coming January number, with promised contributions from J. Lothrop Motley, James Russell Lowell, Edward Everett Hale, James Parton, and other distinguished writers. The well-known firm of Ticknor & Fields have dissolved by the retirement of Mr. Ticknor. The successors are Fields, Osgood & Co.

Improvement in Open Grates.

All who value home comforts understand the enjoyableness of a glowing open fire, notwithstanding the superior heating qualities of heaters and closed stoves, and many prefer the inevitable waste and additional costliness of the open grate, with its home-like pleasantness, to these more economical and less healthful appliances. If the grate or open fireplace could be made to yield the same amount of heat that the stove does, at no greater cost, every one would prefer it, for there is nothing to which poor human nature is more addicted than "seeing faces in the fire" and poking burning coals.

To extend these comforts is the object of the improvement shown in the engravings. Fig. 1 shows a pleasant family group enjoying the quiet of home and the warmth of a good fire.

Fig. 1.

HATTAN'S PATENT FIREPLACE.

Fig. 2 is a sectional view of the device. A is the fire box or receptacle for the fuel. B is the flue through which the smoke or other products of combustion pass to the chimney. C is a sliding plate, moving on lugs or ledges in the sides of the fireplace and passing through a slot in the back. D is an air tube below the movable plate for inducting air to the gases of combustion. E is an angular wing or flange on the front of the sliding plate, C, for convenience in moving the plate back and forth by a poker or other utensil.

It will be seen that the throat of the flue may be increased or diminished in area as the plate, C, is moved back or forth, while at the same time the plate may be used to deflect more or less of the heat of the fire into the room, according to its position. The current of atmospheric air that passes through the tube, D, mingles with the ascending heated gases, and by its provision of oxygen, induces an additional combustion.

The inventor very truly says that "by the ordinary method of combustion in fireplaces or grates a large percentage of the fuel passes up the chimney unconsumed for want of an additional supply of air *properly applied*. This invention meets the difficulty effectually. As the heated gases impinge against the movable plate they meet with a new supply of air and are thus to a good degree consumed, the available heat is increased, and the waste of fuel saved." He says further that forty of these improved grates have been set and tested, all of them giving full satisfaction.

Date of patent August 4, 1868. The patentee, D. Hattan, may be addressed for further information, at Zanesville, Ohio.

THE TRANSPLANTING OF LARGE FOREST TREES.

In this fast age when people seem too impatient to await the slow and normal growth of anything; when the demand seems to be principally for things ready made, it may be useful and interesting to notice some methods for the transplanting of large trees. The season is also at hand when the necessary preparations must be made for this purpose.

We recently discussed the subject of circulation in plants and its relations to their growth and nutrition. The principles noticed in the article referred to have an important application to the present subject. We have said that the "blood of plants" enters the circulation through their roots; but the power of the roots to absorb, depends principally upon the rootlets found in greatest numbers at the extremities of the principal root branches in trees and shrubs. In young trees in vigorous growth a greater proportion of minute root branches are found than in old trees. The close contact of earth with these rootlets is necessary also to rapid and healthy growth. Nearly all plants suffer by transplanting on account of the greater or less rupture of this contact. Exceptions are of course to be made in regard to plants removed from pots, in which case the earth ball is comparatively little disturbed. The law of constitutional adaptation to circumstances holds good also with plants as with animals. A young tree growing in thick shade, will droop immediately if exposed to the hot sun, by the abrupt cutting away of the surrounding timber.

To transplant successfully then, it is necessary to change the conditions under which the plant is growing at the time as little as possible, or if considerable changes are requisite to make them as gradually as possible. The larger a tree is at the time of transplanting, the more difficult it is to observe this rule. Yet with proper method and care almost any tree not too heavy for transportation may be successfully transplanted.

The method most common in this country is to dig a trench about trees, deep below the surface, after they have shed their leaves in autumn, and letting them stand until the cold weather has frozen the entire ball. The trees are then tipped over by the use of a tackle, the frozen ball adhering to the roots, and the tree with the entire mass of frozen earth is then removed to the place designed for it. Of course this method is applicable only in cold climates, and cannot be applied to all trees, as the hard freezing necessary will kill many valuable and beautiful species.

The system adopted in Europe is a better one, more generally applicable, and based upon more philosophical principles than the American. When plants are potted, the roots at first shoot out in all directions through the soil. When they reach the walls of the pot they turn about and recurve toward the center again. In this way they interweave until the earth is so firmly held that the plant may be taken out of the pot with scarcely any disturbance of its roots. The same thing would take place if instead of meeting the hard impenetrable walls of the pot, the roots should approach a hard innutritious soil; the roots having the peculiar selective power which is found even in the lowest orders of living things, will return into the more nutritious soil.

The effect of a deposit of rich soil at or near the extremities of roots is to greatly promote the growth and number of the small roots. This principle, together with that of the selective power of the roots above mentioned, forms the basis of the European method of transplanting large trees. The tree being properly braced to protect it from the force of winds, a trench is dug about it and filled with very rich, light soil. The tree is then allowed to stand for one or two years. It can then be tipped over and the ball will not only remain, nearly unbroken, but the great number of rootlets which have developed themselves give much greater vigor to the tree when it is placed in the desired position. In transplanting the tree the ball is swung upon a truck adapted to the purpose, the top being allowed to trail.

DIMOCK'S THERMO-ANNUNCIATOR.

Perhaps no simple article of food is more difficult to cook uniformly than eggs. There is only one condition of the egg that may be always assured, and that is hard boiled—the most unfit condition for the stomach. Unless the water into which the eggs are put is kept violently agitated, by boiling all the time the eggs remain in, time is a very unreliable test of their condition when taken out; indeed, time is never a correct gage for boiling eggs. The inventor of the device shown in the engravings recognizing these facts, and appreciating the truth of the old maxim that "eggs badly boiled are good things spoiled," has constructed this apparatus to operate by a combination of time and temperature, rather than by time only—more heat requiring less time, and *vice versa*. It is correct in principle, and beautiful in design and finish, rendering it both useful and ornamental. It is seen in perspective in Fig. 1. The operation may be understood by a description of the section, Fig. 2. A is a reservoir, to be filled with water, mercury, or other expansive fluid, after which it is closed by a disk of thin rubber; a metallic ring or washer is placed over the rubber, and the reservoir is then screwed firmly into the cap, B, to which the standard pipe, C, is attached, thus forming a tight joint between the top of the reservoir and the rubber disk. In the lower part of the pipe is a plug, D, screwed to a stem, on which is an open spiral spring which holds the plug to the rubber. The stem has a thimble, or bell-shaped collar on its top, on the under side of which the catch of a hammer lever, E, engages, which, when released, is thrown sharply down; the hammer striking the bell (see Fig. 1) to give warning of the requisite amount of heat imparted to the eggs. An index cap, graduated with numbers and the words, *soft*, *medium*, and *hard*, is screwed to the top of the stem, and has vertical slots corresponding to the numbers, either of which fits a screw or pin in the side of the pipe. In operating, place the eggs in the receptacle, raise the index cap sufficiently high to disengage the vertical slots from the pin in the side of the pipe; then turn the index, placing the desired number opposite the hammer lever. The apparatus being latched in the act of lifting by the hammer lever, is then placed in a saucepan of water, either hot or cold, sufficiently deep to cover the eggs; as soon as a suitable amount of heat has been imparted to the fluid in the reservoir, to expand it sufficiently to raise the plug, D, and stem, the requisite amount, the hammer lever will disengage itself from the bell-shaped collar, and give warning of the amount of heat imparted to the fluid in the reservoir.

Fig. 2

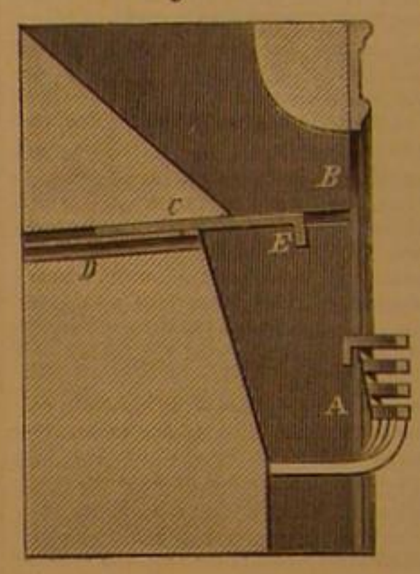
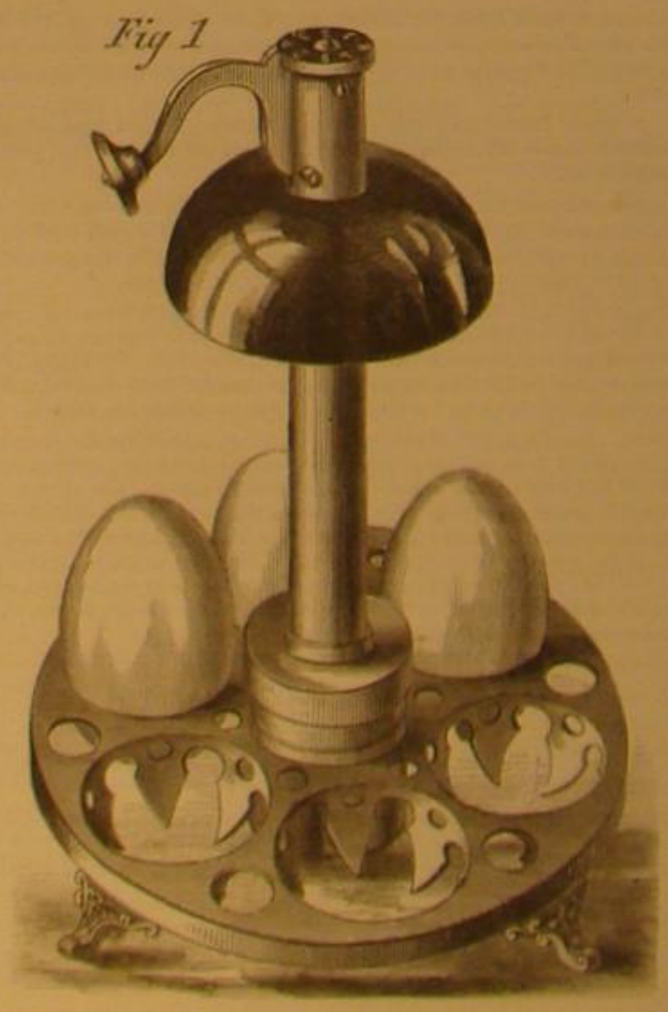


Fig 1



It is obvious that, as heat is transmitted to the eggs through the same medium as to the apparatus and under the same circumstances, the condition of the one will have a corresponding relation to the other, and the index being properly set, warning may be given when the eggs are cooked to any degree desired.

Patents for this invention have been obtained in the United States and abroad through the Scientific American Patent Agency by the inventor, I. Dimock, who may be addressed at Florence, Mass. The apparatus may be obtained of the Meriden Britannia Co.'s office, 199 Broadway, N. Y.

The Poison Generated in Putrefaction.

Drs. Bergmann & Schmiedeberg, have communicated to the *Centralblatt* (German) an account of the isolation of a crystalline substance, which they believe is the proper poison generated in putrefactive fermentation. This poison, the terror of the dissecting room, has hitherto been known only by its effects. The substance which these chemists have succeeded in isolating, they call the "*sulphate of sepsin*." The London *Lancet* gives the following details of its preparation. It is obtained by diffusion through parchment paper, precipitation with corrosive sublimate, from an alkaline solution, removal of the mercury by silver, of silver by sulphureted hygrogen, evaporation, and purification of the residue. Large, well-defined, acicular needles are thus obtained, which are deliquescent in the air, and, exposed to heat, melt and carbonize. They possess a powerfully poisonous action. A solution containing scarcely more than one-hundredth of a gramme was injected into the veins of two dogs. Vomiting was immediately induced, and after a short time diarrhœa, which in the course of an hour became bloody. After nine hours the animals were killed, and, on examination, their stomachs and large intestines were found ecchymosed and the small intestine congested. Frogs could be killed in the same manner.

Fig. 2

Baron Rothschild, head of the great Jewish banking house, is dead. He left sufficient property to pay his debts and funeral expenses.

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VOL. XIX., No. 23...[NEW SERIES.]....*Twenty-third Year.*

NEW YORK, WEDNESDAY, DECEMBER 2, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

THE NATIONAL FINANCES.

The future of the financial situation, considered in a national point of view, is being extensively discussed. The subject is one of very great importance; in fact there is no question of national policy that requires more careful and thorough attention. We have noticed with much interest the suggestions offered by the press on financial affairs, and acknowledge our astonishment at the fact that many of these would-be doctors of finance seem ignorant of the true nature of the disease that is preying upon the vitals of the nation. That disease is the want of elasticity in the currency; it cannot adjust itself to the wants of the business population.

The *Financial and Commercial Chronicle*, an able exponent of finance and commerce, in its issue of the 7th inst., very frankly acknowledges that the situation is dangerous, and intimates that it will require extraordinarily judicious and experienced statesmen to guide the ship of state safely through the dangers which surround us.

"Our monetary circulation requires to be elastic enough to admit of such expansion now as would meet the legitimate demand. This elasticity, as we have often explained, is almost wholly wanting in our currency machinery. The rigid uniformity at which it keeps our circulating medium is one of its worse defects. And any man who can show us how it may be remedied will confer a benefit on the financial interests of the country, the magnitude of which it is not easy to over estimate."

The New York *Times* of the 14th inst., in an editorial very properly entitled "WANTED A FINANCIAL POLICY," complains and properly so, in most emphatic terms, of the impropriety of vesting in any one man such power as Secretary McCulloch now wields. It however makes no suggestion as to the duties of Congress in the premises, and the measures that should be adopted to avert disaster, except that the control of the currency should be taken from the Secretary of the Treasury. It asserts that the volume of the currency, the issue of bonds, the sale of gold, and other matters of like importance, all of which are now subject to the will of the Secretary, should be positively fixed by Congress; leaving him no power in the premises save to obey the law's behests. This done, the field of speculation will be greatly restricted, the uncertainty which at present prevails will be obviated, and the scandal which identifies an important department with unscrupulous combinations will come to an end.

The only plan calculated to remedy present existing evils in the monetary management worthy of notice, is the one put forth some time since by the *New York Mercantile Journal*, and more recently advocated by the *New York Herald* as a plan of its own devising, of which the former journal we think reasonably complains. These views are in our opinion worthy of attention. They are briefly as follows: "The country requires for the transaction of business a token that shall be universally acknowledged as the true representative of a dollar. The Government is competent to issue such a token, and no other standard or measure of a dollar should be tolerated. This of course excludes the paper issue of corporations, and the reasons for such exclusion are that such issues are unreliable in business emergencies, and that such corporations always willing to grant accommodation at times when accommodation is least needed, are in times of business emergency necessarily the most unaccommodating of institutions. These views also embrace the issue of legal tender notes convertible at the will of the holder into bonds bearing an interest of 3·65 per cent., said bonds being reconvertible into legal tender notes at will of the holder. It is contended that this would give perfect elasticity to the currency, as in times of redundancy the surplus over the ordinary needs of business would be absorbed by 3·65 per cent bonds, and that no pressure could by any possibility occur, as the people themselves have the power to obtain the legal tender as they want it.

That these views are gaining ground is evident from the tone of financial journals, and also from the following telegram to the New York *Times* of the 16th inst.:

"It has been announced lately that a bill is to be introduced into Congress at the approaching session providing for the issue of convertible and reconvertible 3·65 currency interest bonds for the purpose of preventing such pressures in the money market as has lately been witnessed."

That such a measure will be urgently opposed by the money kings, is, although an argument against the probability of its adoption, an equally strong argument in its favor. Those who fatten when healthy business stagnates, who live by speculating upon a business depression created by such operations as have recently occurred in this city, may be expected to be its bitter opponents. On the contrary the people will be its friends. Who will be victorious the future will show.

The *Tribune* of the 17th makes opposition to these views on the ground that a general depreciation of the currency would result, and that such depreciation would flood the country with currency by the rapid conversion of bonds bearing so low a rate of interest. We think these reasons erroneous. The issue of convertible bonds and legal tender is, as we understand the matter, intended to be limited in amount so as only to absorb the surplus over the immediate wants of business and commerce. This surplus for the most part never draws interest; upon the plan in question it would do so at the same time that it would be available at any moment for purposes of business. The banks of this city alone would absorb a hundred millions of the 3·65 bonds, and there is scarcely a business man throughout the country who would not invest in them. The mistakes of the *Tribune* are, that while money loaned in the usual way bears a much higher rate of interest than is proposed for these bonds, it does not recognize the fact that a large amount of money is always kept on deposit drawing no interest, and also that it regards the issue as limited only by the amount of the National debt.

We believe the proposition in question is destined to become prominent in the future, and we believe it contains the germ of a radical cure for our financial troubles.

MECHANICAL SKILL SHOWN WITHOUT MECHANICAL APPLIANCES.

It may be a cause of proper pride for a mechanic, who has all the materials and the tools necessary, to succeed in constructing a machine that shall yield good results; but if one not possessed of the skill obtained by long practice, and unsupplied with proper tools and materials, can attain the same result, to him should be accorded the name of the best mechanic.

Many of the models sent to us to show the principles of an invention or the points of an improvement tell of the difficulties which surround the inventor. They are frequently whittled out by the pocket knife with great expenditure of care, time, and labor, the materials not being adapted to the work; yet they bear indisputable evidences of close calculation, mechanical skill, and inventive talent. Some of them come from the backwoods of Maine, the winter haunts of our hardy lumbermen, and from their cabins, miles away from civilization, these models, wrought by the light afforded by pine knots, or by the blazing wood fire, come to us, and, through us, to the teeming millions of this and other continents, to enlighten, improve, and bless.

Others come from our yet unexplored and only partially occupied territories, the outposts of civilization, where the adventurous miner, trapper, hunter, and settler dispute with the adverse forces of nature and the cruel jealousy of the untamed savage his right to exist. All of these crude specimens of handicraft show the mechanical genius of our people and their wonderful adaptability to circumstances.

But many of these are really elegant specimens of art, and prove the workman to be more than a novice. Occasionally one comes to our office which is almost too elegant and costly to be packed away in the cabinets of the Patent Office. Such, for instance, was the model of an improved horseshoe, illustrated in our pages a short time ago, made of solid silver, and sent from Colorado. But for its weight and size, it would have made a beautiful charm, to be suspended from the watch chain, as it was elegantly engraved and highly polished; but being nearly a pound weight avoirdupois, it was rather too "hefty" for ornament.

To show what enterprise and natural mechanical talent may do, unaided by the appurtenances with which civilization enriches the mechanic, was probably the chief object of De Foe's immortal story of Robinson Crusoe. There is hardly an incident in this wonderful narrative, however it may tax our credulity, that cannot be equaled or duplicated even now. We remember a little circumstance, witnessed in Nova Scotia, where we found a saw mill in full operation, which, beside the saw itself and a few wrought nails and spikes, did not have iron enough in its construction to load a man's coat pockets. The building and the dam were of unhewn logs, held together by wooden pins; the wheel had not a particle of iron in its composition, not even a nail; the crank was of wood, the frame of the saw, the uprights, the sash—every portion—was of wood only. Even the shafting that lead to a circular saw was wood, running in wooden boxes, yet this "wooden concern" was every day turning out excellent work and gradually making its owner, who had never seen a machine shop, a rich man.

NATIONAL PRIDE OF MECHANICS.

No low sentiment is more reprehensible than that which assumes for some section or country an indisputable superiority over another, and yet we regret to say none is more common, and intelligent mechanics too often indulge in its exercise and manifest its effects. The honest and honorable pride in the success or superiority of those with whom we feel ourselves associated by companionship, nativity, or identity of interests is perfectly proper, and no sensible man will object to it; and if sensible he will be as ready to allow all well backed-up claims for others, as he is or should be, to sustain his own or those of his associates. The mechanic who is enough of a cosmopolitan to acknowledge the improvements of others, whether of his own country or race, or not, and to give due credit therefor, while maintaining the honor of his own people, is our idea of the true mechanic. The mechanic should be one of the most liberal of men, willing to impart his own knowledge and anxious to utilize that of others, while careful to acknowledge the source of his information. Dirty slurs against the value of others' improvements and unwarranted assumptions of superiority are no evidences of real excellence. When a prominent English mechanical periodical chooses to interpolate in a mention of a valuable American invention, favorably noticed, the statement that "what will please an American engineer will not satisfy *our* more refined mechanical tastes," we believe the writer is influenced by his national prejudices rather than by the facts. We are not prepared to acknowledge that the English have more refined mechanical tastes than the Americans, or that English mechanics show more refinement either of taste or workmanship than our own. Indeed, our observation inclines us to a very different opinion. If refinement of mechanical taste has anything to do with grace of form, proper distribution of material, strength without clumsiness, and grace without meretricious ornamentation, we believe American mechanics are not surpassed. In fact, English machinery of every description appears clumsy where it should be only strong, and the material is wasted to make a show of strength where this grand element would exist without this waste. So in the form or shape of the machine or its parts, the show of strength with cumbrousness seems to be considered by English mechanics as better than the reality with grace of form. If this is a refined mechanical taste our English cousins are welcome to it; but where real strength, power, availability, and utility can be united to gracefulness of form and proper proportions, we prefer the sort of mechanical taste that is competent to produce it, and that we believe the works of our American mechanics fully prove they do possess.

THE CULTURE DEMANDED BY THE AGE.

The report of a lecture by the Hon. Frederick De Peyster, LL.D., delivered before the Alumni Association of Columbia College, on the evening of the 9th inst., as given in the New York *Tribune* of the 10th inst., either does that gentleman great injustice or else we are compelled to avow, that in our humble opinion the subject was very superficially treated. That report represents the lecturer as stating that there are two opinions prevalent in regard to the object of education; the first being that it should be the acquisition of useful knowledge, the second, that its end should be solely mental discipline. Those who entertain the former opinion, according to Dr. De Peyster, maintain that a study of the natural sciences is best calculated to promote the desired result; those who believe in mental discipline advocate the languages and mathematics.

Dr. De Peyster may be fairly presumed—being a learned man lecturing to the alumni of a college of high rank—as referring to opinions of learned and thoughtful men upon the subject of education. It is scarcely supposable that he alludes to the crude views of those who have scarcely nothing of either mental discipline or useful knowledge. Taking it for granted then, that the views of men whose opinions are valuable are referred to, we respectfully submit that both sides are misrepresented in this statement.

We claim to have read something of those opinions, and to be not altogether ignorant of the past and present status of the educational question, and we have never heard or read anywhere an expressed opinion that either the attainment of useful knowledge or mental discipline should be made the sole end of a course of study. A fair statement of the matter is that the advocates of a more scientific course of training regard both objects as of about equal importance, while those who cling to the old system of classical and mathematical study, consider mental discipline as of paramount importance. The latter view is only correct upon the supposition that one must be sacrificed to obtain the other. The scientific school of educators maintain that such a supposition is absurd, that both can be combined, and can be obtained together as well if not better than if either object were pursued separately, and they are right.

The analogies between mental and physical development are very striking, and in discussing this subject, Dr. De Peyster enunciated a principle which is the strongest argument in favor of combining acquisition of useful knowledge with discipline.

"Physical education as a means is not to be neglected, but careful observation had shown that where mere muscular training was sought as an end it was less successfully attained than when the bodily exercise was conducted in connection with some other end, either of amusement or useful labor to be attained by it."

Can the mind be educated as advantageously by a course of exercise avowedly for discipline and for no other object, as when "*some other end*" is to be attained by it? We do not hesitate to answer: no. And we appeal to the experience of

instructors throughout the civilized world to substantiate the correctness of our view. But they must be men who have tried both methods or their testimony will not be admissible.

But let us see what is the opinion of the lecturer himself upon the object of study; he has an opinion, which, according to the report referred to, is thus stated:

"It appeared to him that the true object of education or culture was the development of all the powers and capacities of the individual in such a manner as to best enable him to promote the happiness and usefulness of himself and others."

This is delightfully clear and definite. We can now understand exactly what is wanted. It is "development of the powers of the individual" (so far all right) "in such a manner as to," etc. Now what sticks us is the expression "such a manner." That is all that educators have been writing and talking about for years, simply *the manner*.

Leaving the questions at issue upon the subject of education entirely undecided, the lecturer proceeded to prescribe a course of study that should be best adapted to the development of all the powers and capacities of the individual in a manner which is so clearly characterized by the pronominal adjective "such". Here we suppose that a child shall have learned to read at least short sentences in its native tongue before it enters upon the first studies of the prescribed course, namely Astronomy, Chemistry, and Geology. Such rudiments of language would seem to be required in order to make satisfactory progress even in these light branches of study. Having mastered these easy, and to the minds of children, most entertaining and captivating studies, the child is recommended to mount the hill of science by the following stepping stones in the order here specified. Natural History, Botany, Compound Chemistry (whatever that may be), Physiology, Moral Philosophy, Psychology, and Sociology, at which time it will be found profitable to commence the mathematics and the study of languages. Astronomy first and language last, and this course is recommended as the natural order; the "proceeding from the simple to the complex."

We feel sure that the report has misrepresented the Doctor's views, as it is inconceivable to us that a man who can write Hon. before his name and LL.D. after it, should have been so bold as to expose himself to criticism by the public enunciation of views so crude and impracticable as he is represented to have done.

THE FULTON FERRY ACCIDENT--THE DUTIES OF PASSENGERS.

On the 14th of November, a collision occurred between two boats of the Fulton Ferry, plying between New York and Brooklyn, by which one person was killed and a number wounded, some of them dangerously and others fatally. From what we can learn, and from what we know personally, we cannot attribute the occurrence to carelessness nor want of skill on the part of the employés of the Ferry Company. It appears to have been an unavoidable accident, such as might occur under circumstances of the greatest care and precaution; indeed, it is strange that such accidents are not more frequent especially when all the facts are considered.

The estuary separating the two cities is thronged with craft of all descriptions at every hour in the day. Those insects of our commercial marine, the tug boats, are forever flitting hither and thither, sometimes rushing along alone at a speed almost approaching that of a race-horse, and again laboriously and slowly tugging away at an unwieldy raft of canal boats or barges, or a big ship like a helpless giant in the power of a vivacious dwarf. These, perpetually crossing the path of the ferry boats, render navigation across the strait difficult in the most favorable seasons. Added to these difficulties is the fact that the tide in the East River is of tremendous power, to be likened to nothing more appropriate than a rapidly-running, broad river.

Under such circumstances it is no wonder that the *Hamilton*, delayed and hampered by a tug and her convoy, should be diverted from her course, and especially as the tug swung around, closing the entrance to the slip just as the ferry boat was about to enter. In consequence she came in collision with the boat in dock, and being depressed forward by the crowd of impatient passengers, her guards passed under those of the lighter boat, which tore away the slender framework of the cabin and crushed the people into a mass of writhing and helpless humanity.

Undoubtedly, the lamentable results of this accident might have been greatly mitigated if not altogether prevented but for the insane practice of crowding the forward part of the boat. However crowded one of these ferry boats may be, two minutes suffice to land all the passengers, and it is well-known that no position or condition is so unfavorable to steering a vessel as when she is "down by the head." Even those who are content in these short transits to sit in the cabins or stand aft, no sooner hear the engineer's signal for stopping or backing, as the boat approaches the bridge at the inner end of the slip, than there is a general rush forward to the extreme bow, just at the time, too when the steersman has most difficulty in managing the wheel. These being the facts, the observant man will wonder, not that an accident does sometimes take place, but that such occurences are not frequent, and he will admire the skill of the pilot which under these adverse circumstances is able thousands of times to bring his valuable freight safely across the channel without injury.

The nonsense of the engine standing on the center, which has been suggested by some in connection with this accident, is too puerile to merit serious contradiction. Every engineer, especially every one who understands the construction of the ferry boat engines, and knows the skill of their engineers, will scoff at such a statement given as the cause for the collision.

It is estimated that forty millions of people cross the waters of New York on the various ferry boats that ply between the city and points on the opposite shores. Few, comparatively, are ever injured, and generally where injury is sustained it results from a disregard of the rules of the company. The safety of this system of transit may challenge comparison with that of any other in existence—we should say that more than one hundred persons are either killed or wounded every year in the Central Park, a thing which rarely ever occurs in any Park or public drive in Europe—yet our newspapers are comparatively silent upon the subject beyond the bare mention of the facts. We do not justify carelessness on the part of corporations, and we believe in holding them to a strict account, but it is sometimes impossible to avoid casualty. "Accidents happen in the best of families," hence we see no reason for the outcry raised by a portion of the press against the Ferry Company, and especially the inhuman proposition that the regular pilot should be arraigned for manslaughter. There is wanton wickedness in raising such a hue and cry against a poor man who has to support himself and family upon the wages of his trade.

The verdict of the coroners' jury in the case of the young man, Brewer, killed by the accident, entirely exonerates the Ferry Company and its employés from blame. It is as follows: "The death of George Brewer was caused by a collision of the ferry boats *Hamilton* and *Union* on the 14th of November, 1868, at the Fulton Ferry, New York; the said collision being the result of the excess of passengers on board the *Hamilton*, thereby rendering her in a great measure unmanageable in such a state of the tide."

ARE METEORS AND FALLING STONES IDENTICAL?

A meteor so large, and moving at so great an altitude that it was seen both in England and France was observed on the night of the 7th of October. The occurrence having drawn forth an expression of opinion from a celebrated French Observer upon the identity of meteors with the so-called "stones" which have fallen from time to time upon the surface of the earth is worthy of attention. A full account of the event, and a conversation held between a contributor to *Le Petit Journal*, Paris, and M. Chapelas-Coulvier-Gravier the observer referred to, we copy from the *Mechanic's Magazine*, of October 23d.:

"A very remarkable meteor was seen at Wimbledon on the night of the 17th inst., about ten minutes before twelve o'clock. It consisted of a red ball, emitting bright sparks, and exhibiting a flaming tail of great length, illuminating the earth with great brilliancy, much as a flash of vivid lightning might do. The color of the light was bluish. The sky was perfectly clear at the time, and the moon was shining brightly, but the light of the meteor, which lasted for several seconds, completely overpowered that of the moon, and cast actual shadows on the ground. This phenomenon appears to have been observed at Paris also. It is thus spoken of by 'Galignani' in Friday's issue:—An extraordinary meteor passed over Paris the night before last, about ten minutes to twelve, and inundated the city with a bluish light like that of electricity. The luminous globe proceeded from the south to the star Alpha in the constellation of Cepheus towards the north of the star Gamma of the Little Bear. Its size was about that of the moon, and just before its bursting, which was marked by a loud report, assumed the form of an immense cone. We learn from the local journals that it was also seen at Havre and Rouen. But the most graphic account of this visitor is given by a writer in '*Le Petit Journal*' of the 8th instant, and of whose article we give the following translation: Yesterday, about midnight, the late retirers of Paris were witnesses of one of those magnificent phenomena of which we often read. We refer to those celestial bodies that approach very near us, and to which we give the name of meteors. We have long known that these bodies are strangers to the earth, that they come from space, and when they thus approach it near enough in their rapid transit through the atmosphere, their friction against the air is sufficient to heat them, or melt, or inflame, or even volatilize them, so that on departing they leave behind them a long train of luminosity, analogous to that of an enormous fusee, and shedding a vivid light which has often been compared to that of the moon. In such of these bodies as have fallen on the face of the earth we find no foreign substances. The luminous train, or "sillage," enables us to know the direction of their movement in a very exact manner. Thus we ascertain that they move in a direction nearly horizontal, that they have a velocity of twenty or thirty kilometers per second, or 1,000 times greater speed than an express train. It is a velocity only comparable with the movements of celestial bodies. When they explode and burst into a shower of stones, it is with a noise analogous to that of a cannon or a peal of thunder. The stones are projected over a surface often larger than that of Paris. The number of these stones perhaps is many thousands, and their weight is often considerable.

"To see these bodies well the night is necessary, but they are to be seen all hours of the day and all periods of the year. To cite examples this year. On the 30th of January last, at seven o'clock in the evening, in the environs of Varsovie, a globe of fire was seen of the apparent magnitude of the moon. It left behind it a pale train of light; the luminosity surpassed that of the moon, and it passed successively in color from a bluish green to deep red. The velocity was about fifty kilometers per second. After two extremely loud explosions it terminated in a series of smaller ones, comparable only to the fire of a file of well trained soldiers, and a whistling was heard, owing to the rapid transit of the stones in the air. These stones were distributed on a surface of about sixteen square kilogrammes; their number was many thousands.

"On February 29, about half-past ten in the morning, there was heard in several localities of the arrondissement of Cassale, Piedmont, a loud detonation, which could only compare with the discharge of a piece of artillery, or the explosion of a mine. It was followed by many other detonations resembling the rattling of distant musketry. While these disturbances were lasting, at a considerable hight, a mass of irregular form was seen enveloped in smoke. At the same instant, a shower of grains of sand and of stones fell on the ground, but only a small number of fragments were found, the greater part having penetrated the earth at a great depth, more or less owing to their great velocity in striking the ground.

"Since the memorable inquiry of Biot in 1803 on the shower of stones at l'Aigle, Orne, the observation of all these meteors following the shower of stones does not confirm the exactness of the details furnished by that illustrious observer. Now, the description of all the phenomena of that nature is in some way based on the theories of Biot. In order to have the precise information, relating to the late meteor, from the Luxembourg, I went to the court of the palace, and took the right hand staircase, and soon arrived at the top—one step more and I was in the roof story.

"M. Chapelas-Coulvier-Gravier, if you please?—He is here.

"M. Chapelas was accordingly gracious enough to be put to my interrogation.

"You have undoubtedly seen the meteor of yesterday; you, who are always on the watch for these things?—Assuredly.

"Will you give me the details of such?—Very willingly. It was a meteor of first grandeur.

"Was it then, much larger than the apparent disk of the moon?—Oh, dear no. It was only as large as my fist!

"But M. Elysée Peraire, who saw it, told me it had the apparent size of many moons, and Gaborian believed his house on fire?—The effect of the dazzling light. The light is so great, and the contrast so violent with the obscurity of the night, that the body appears incomparably larger than it really is.

"Have you heard any detonation?—Not more this time than at others.

"However, my cousin Bernard told me that he had heard two deafening reports, as those of a distant cannon?—Another illusion. I never have heard any thing of the kind.

"You singularly upset my ideas, or, rather, the universally accepted notions on the subject?—I agree with you in that.

"Have you seen enough to be able to affirm so much of them?—This is my 377th observation.

"But perhaps they have never passed near enough to you to be enabled to hear the reports?—I have been as near as possible.

"Then you ought to have heard some sounds, or, in a word, have had some *debris* of them?—Never.

"Oh, but you joke?—Me! not at all. I do not deny that there have been showers of stones; but I have never proved the phenomenen during the pretended fall of a meteor. I have read descriptions describing the explosion of a meteor and the descent of showers of stones. I have always seen the meteors continue their course, and have not seen them descend.

"Do you believe, then, that those you saw were reduced to gas in the atmosphere, while others were at a luminescent temperature?—I do not know; only I consider the meteors and the showers of stones are distinct phenomena.

"This is beyond the subject?—I tell you what I have seen only; I don't pretend to estimate their velocity, nor their hight or movement.

"Yes, but this was the reverse; the number approximate has been given?—This is, again, much unauthenticated. It has not been ascertained.

"Enough for to-day. I am afraid of too much influence from your theories. *Au revoir* and thank you."

THE METEORIC SHOWER was observed at a great many different points throughout the United States. The accounts received seem to vary in the general direction of the meteors, but many agree in the description of peculiar appearances of the trails left after the disappearance of the bodies themselves, something like what a long smoke wreath might be supposed to present when acted upon by currents of air. In this city a peculiar figure formed by one of these trails was seen to the south, described by some as shaped like a letter S, and by others as a figure 5. The shower took place principally upon the night of the 14th, and as the weather was particularly fine, we suppose that this general display of natural fireworks was witnessed by an unusually large number of observers.

THE *Moniteur Meridional* describes the mode that is adopted on a large scale for preserving the eggs required for consumption in Paris. Into a caldron of boiling water a colander containing a dozen eggs is plunged, and kept in it during a minute. This short immersion coagulates a thin layer of albumen, which, attached to the interior of the shell, constitutes an impermeable lining.

CENTER OF GRAVITY IN A VERTICAL REVOLVING WHEEL.—We are in receipt of a letter from J. McCarroll, upon the above subject. Having given both sides of this question a fair hearing, and expressed unmistakably our own opinions upon the subject, we shall drop the matter, as the continuance of a valueless discussion is not to our taste nor that of our readers.

THE DENTISTS AND THE HARD RUBBER CONTROVERSY.

This case (Goodyear vs. Rust), which has excited a great deal of interest on the part of the dental profession, has just been decided by Judge Shipman, at the United States Circuit Court, Hartford, Conn.

OPINION.

This is a motion for a preliminary injunction founded upon the well known Nelson Goodyear patent for vulcanizing rubber and other similar gums. The validity of this patent has been so often sustained by adjudications that no question will be considered in deciding the present motion except that of infringement. The bill of complaint in this case is supported by affidavits, which clearly entitle the complainants to the injunction prayed for, unless the respondent's proofs overcome or avoid their effect. The respondent works under the patent of Edward L. Simpson, and uses the compound made in accordance with the process described in that patent. The complainants allege that this process is clearly within the scope of Goodyear's invention as described in his patent, and is therefore an infringement of their rights. This is denied by the respondent, and the question, so far as it is necessary for the determination of this motive, is now to be decided.

Avoiding all useless rehearsal of the details of this Goodyear patent, and of the repeated litigations to which that patent has been subjected, it may be briefly stated that the process covered by it is secured by mixing about four ounces of sulphur and one pound of rubber, and subjecting this mixture to not less than 260° to 275° of heat, Fahrenheit scale. This under proper conditions of place, and time, produces the compound or substance known as vulcanite, a material now well known in the mechanic arts. The vital question involved in the present controversy relates to the proportion of sulphur and rubber, and the degree of heat. Does the Simpson process substantially embrace these proportions, and this degree of heat? If it does, then it is an infringement of the complainants rights.

The respondent denies that the Simpson process does embrace all these proportions as effective agents or active forces in accomplishing the work of vulcanization. In support of this denial he has adduced affidavits of distinguished chemists who give a delineation of the elements which enter into Simpson's mixture, and produce his vulcanite. It will be sufficient in this place to refer to the affidavit of Professor Seeley, as that contains all the materials of the defence to this motion.

Prof. Seeley says that the substances used by Simpson in the preparation of his hard rubber are sulphur, gum benzoin, oil, and common rubber; and his manner of using these substances, as set forth in his patent, is as follows: He mixes two ounces of benzoin with sixteen ounces of sulphur, and to sixteen ounces of this mixture he adds one quart of linseed oil. This mixture of sulphur, benzoin, and oil is then subjected to the proper degree of heat, and the result is the substance which he calls his vulcanizing compound. To make hard rubber, or vulcanite, he takes from ten to fourteen ounces of this compound and one pound of rubber, and thoroughly mixes them by grinding between warm rolls. He then subjects this mixture of rubber and vulcanizing compound to a heat of 320° Fah. The result is a vulcanite.

Without rehearsing the details of the analysis presented by Prof. Seely, it may be stated that the quantity of this compound which is necessary to perfectly vulcanize one pound of rubber, contains, in some form, not much less (to use the language of Goodyear's specification) than four ounces of sulphur. In other words, this amount of sulphur goes into this quantity of the compound and forms one of its original elements. About half of this sulphur chemically combines with the oil and forms what Prof. Seely calls vulcanized oil, and the other half exists in the mass of vulcanized oil in the form of free sulphur. Vulcanized oil alone, when mixed with rubber will not vulcanize the latter, according to the evidence before me. Prof. Seely says: "The effect of vulcanized oil on mixing and heating with rubber is not at all chemical. The rubber does not in any chemical sense become vulcanized. Whatever advantage there be in the use of vulcanized oil with rubber must be wholly due to physical and molecular causes, and cannot be accounted for on any theory of vulcanization based on Goodyear's processes. A quantity of vulcanized oil containing four, or even sixteen ounces of sulphur, may be mixed and heated with one pound of rubber, and not an atom of Goodyear's hard rubber can be produced. Simpson's compound is composed of vulcanized oil and free sulphur." I have not failed to notice that the language is that the vulcanized oil in combination with the rubber will not produce 'an atom of *Goodyear's* hard rubber." But as the whole scope and direction of the defense are aimed at establishing a distinction between the *processes* and not between the *products*, I can come to no other conclusion than that the compound alone, if destitute of free sulphur, would not, when mixed with rubber, perform the office of vulcanization. It is true that the compound, when made according to the patent of Simpson, always contains one-half of the sulphur in a free state,—but it is agreed on all hands that this amount of free sulphur alone will not vulcanize. So the evidence in whatever light we view it, proves that that portion of the compound which contains the elements in chemical combination is powerless without the aid of the uncombined free sulphur, which is scattered through the pores of the combined mass.

Now it may be asked, how do these two agents, viz., vulcanized oil and free sulphur, by their united forces perform the work of vulcanization? No part of this work is assigned by the evidence to the benzoin. It cannot be done by the chemically combined oil and sulphur alone. It cannot be done by the free sulphur alone. The latter to the extent of its effective power, for all that appears in this case, works in the same way that it does in Goodyear's process. The effect of the former (oil and sulphur chemically combined) Prof. Seely says is not chemical, but "must be due wholly to physical and molecular causes." But whether the auxiliary vulcanizing force, whatever it is, exerted by the chemically combined oil and sulphur, is supplied by the latter or not, does not appear by the proof. From what has long been known, however, of the vulcanizing power of sulphur, when mixed and heated with rubber, that agent, though combined with another substance, would naturally be looked to as the seat of this force.

It may be true that, as Professor Seely says, the effect of vulcanized oil in hardening rubber is not due to chemical but "to physical and molecular causes." Of the nature or significance of this distinction in the scientific sense I do not presume to speak. But I do not see how this fact avoids Goodyear's patent. I do not find in his specification any evidence that he rested his invention upon any such nice scientific distinction, or that he limited his claim to sulphur when working, through chemical, as distinguished from "physical or molecular" laws. If the validity of his patent rests upon such a scientific problem as this, I think its solution should, in the present case, be left to final hearing. The suggestion of such a problem, in *ex parte* affidavits, at a very late stage of a series of protracted litigations in which every other defense has thus far failed, is not a valid answer to this motion.

There can be no question but Simpson uses a degree of heat within the scope of Goodyear's patent.

Let an injunction issue.

For the complainants, C. T. Blake, and Hubbard and Hyde. For the respondents, S. D. Law, and H. T. Blake.

The Right to Use Sewing Machines.

UNITED STATES CIRCUIT COURT.—Gordon Mackay against Benjamin Wolff.—The plaintiff in this suit is the inventor and patentee of a machine for sewing the soles of shoes to the "uppers," an invention from which it is said he has made during the last five years the enormous sum of $35,000,000. The machines are sold only on condition that the persons using them shall put upon each pair of shoes manufactured by them a stamp purchased of the inventor. The case came up on a motion of the plaintiff for an injunction to restrain the defendant from using the machine on the ground of a breach of the contract in the matter of putting stamps upon each pair of shoes manufactured. The case has already been argued in New York upon two similar motions which were dismissed. The case was fully argued and the decision reserved.

We find the above item in a Brooklyn paper. We knew that the sewing machine folks were all rich, but we do not believe that Mackay has made so many millions out of his patent. It is simply ridiculous.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING NOVEMBER 17, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

84,045.—DEVICE FOR RAISING AND ADJUSTING WICKS IN LAMPS.—Joseph Bell Alexander, Washington, D. C.

I claim, 1st, The making of the rack, with the guides, H and H', and the stops, L and L', by striking it up of one piece of sheet metal, substantially as described and for the purpose set forth.

2d, The combination with any lamp, of the imperforate wick tube, A, the sliding wick holder, B, the rack, C, the pinion, D, and the bow spring, S, when arranged together substantially as described and for the purpose set forth.

84,046.—DEVICE FOR SAW CARRIAGES.—Levi Black and Milton Gaffney, Logan, Ohio.

We claim adjustable plates, a and b, holders, F and H, sliding stop or clamp, E, and plate, D, herein described, constructed, combined, and arranged to operate in the manner and for the purpose set forth.

84,047.—WATER WHEEL.—J. H. Bodine and T. A. Hill, Mount Morris, N. Y.

We claim, 1st, The arrangement of the top feed vertical discharge wheel, B, in connection with the flanges a a, upon the lower edge of a curb, which has the gate at its top, its side walls being water tight, substantially as and for the purpose herein set forth.

2d, The gate, I, when cast with recesses or concaves, e e, on its under surface, substantially as specified.

3 The arrangement of wheel, B, gate, I, arm, v, screw shaft, T, block, R, working upon the screw shaft and spindle, S, operating the screw shaft by means of cog gearing, W, when said parts are constructed to operate in connection with each other, in the manner and for the purposes above described.

84,048.—PORTABLE FORGE.—John B. Bolinger (assignor to himself and L. R. Fitch), Detroit, Mich.

I claim, 1st, The pulleys, o and q, formed of rubber, with metallic faces or peripheries, substantially as described, in combination with the pulleys C and p.

2d, In combination with a portable fan blast forge, the air chamber, S, the double lever, D, and the slotted arm, F, operating in the crank, G, all constructed and arranged substantially as and for the purposes described.

84,049.—CAR COUPLING.—John H. Chadwick, Bristol, assignor to himself and George B. Peck, Warren, R. I.

I claim the arrangement and combination with the arms, b c, and part or abutment, m, with the lever, D, the draw bar chamber, B, and its mouth, C, substantially as described, the whole being to operate in manner and for the purpose specified, with a connection bar, E, made as set forth.

84,050.—WASHING MACHINE.—Wesley Cornell and Thomas L. Blakely, Buchanan, Mich.

We claim, 1st, The eccentric cams, K, adjustable ways, G, and guide blocks, M, when constructed substantially as set forth.

2d, In combination with all the above named parts, the box, A, slide bars, C, rollers, E, and rubber board, L, all operating substantially as specified.

84,051.—HARVESTER.—Alexander G. Donnelly, Breesport, N. Y.

I claim the wheel, D, constructed and operating as herein described and for the purposes set forth.

84,052.—BEE HIVE.—Benjamin Douthett, Pittsburg, Pa.

I claim a hive for bees, having all of the herein described characteristics, that is to say, a box divided on a vertical line, so as to form two equal and distinct parts, A A, and with an india rubber packing, T, between the two, each part or half of the hive being provided with a horizontal partition, E, inclined bottom and perforated plate, F, and a wire gauze, m, extending from the partition to the bottom, and a narrow horizontal box, P, beneath the hive, open at both ends, and provided at each end with a metallic curtain, N, as a passage way, common to each half of the hive; the whole being constructed, arranged, combined, and operating substantially as and for the purposes hereinbefore set forth.

84,053.—MANUFACTURE OF IRON AND STEEL.—Francis Ellershausen, Ellershause, and Augustus E. Stayner, Halifax, Nova Scotia, and Adolph Guzman, New York city.

We claim, 1st, As a new article of manufacture, pig bloom or pig scrap, being a conglomerate of cast iron, oxides, wrought iron, and particles of matter more or less nearly approaching one or other of those substances produced by admixing, and bringing in contact with fluid cast iron, oxidizing substances in a solid state, in such a manner and in such quantity as to produce a solid condition of the mass.

2d, The mixing of cast iron with an oxidizing agent, one or other of which is rendered fluid by heat applied previously to such mixing.

3d, The production of wrought iron from cast iron, by mixing with the latter, while fluid, a sufficient amount of oxidizing material to produce a solid condition of the mass.

4th, The production of wrought iron from oxides of iron, by mixing the latter with molten cast iron to such an extent as to produce a solid conglomerate of the two.

5th, The employment of detersive agents and useful alloys, by mingling them, or either of them, with the oxides used in the process hereinbefore described, so that they shall become part of the conglomerate, and have such intimate contact and connection with the mass as to produce their proper chemical effects when it is afterwards subjected to the action of heat.

84,054.—STEAM ENGINE SLIDE VALVE.—John S. Everitt and Ossian Cook, Oshkosh, Wis.

We claim, 1st, The valve bolts, S S, of the valve, H, with lugs, r r, constructed and arranged relatively to the cams, n n, arms, m m, provided with slots, x x, and the valve stem, C, as a means of adjustment in compensating for wear of valves and valve seats.

2d, The valve case, A A, when constructed substantially as described, and arranged relatively to the slide balance valve, H, as herein set forth.

3d, The arrangement of the hollow balance slide valve, H, throttle valve, F, with the valve case, A A, injection and ejection pipes, I I', supply pipe, K, and exhaust pipe, K', substantially as herein set forth.

84,055.—SUSPENDING CLAMP.—Dan. P. Foster, Waltham, assignor to himself and N. M. Lowe, Boston, Mass.

I claim a suspending clamp, formed of two segment cams, B B', pivoted to the supporting frame, A, and connected by a link, C, substantially as described and for the purpose set forth.

84,056.—POTATO DIGGER.—Hamilton France, Hinmansville, N. Y.

I claim, 1st, The geared wheel, E, shaft, F, pinion, G, and arms, H in connection with the axle, A, frames, C and I, connecting rods, J, for the purpose of giving a vertical vibratory motion to the grate, K, substantially as herein described.

2d, The frames, C and I, hinged together at their front ends, in connection with the axle, A, and lever, Z, when constructed and operating substantially as herein specified.

3d, The bar, N, arms, R and U, lever, Q, tuleram, S, and pin, T, in connection with guides and standards, O, axle, P, and tongue, V, when combined, arranged and operating substantially as and for the purposes herein described.

4th, The combination of the above named parts with the wheels, B and X, bails, M, and seat, Y, when constructed, arranged and operating substantially as herein set forth and shown.

84,057.—CHUCK.—Charles F. Hadley, Chicopee, Mass., assignor to Clifford Arrick, Belmont county, Ohio.

I claim, 1st, The arrangement of the adjustable nut, E, bevel gear, F, divided ring, G, and securing pins, h h, or their equivalents, constructed substantially as described and for the purpose set forth.

2d, The arrangement of the adjustable nut, E, bevel gear, F, divided ring, G, annular groove, d, and securing pins, h h, or their equivalents, in combination with the bevel pinions, D, constructed and operated substantially as and for the purposes set forth.

84,058.—WASHING MACHINE.—Mortimer S. Harsha (assignor to himself and Edwin Meredeth), Batavia, Ill.

I claim the combination of the bars, F F, pivoted at their centers to the frame, B, the two rollers, D D, having gearings in in opposite ends of said oscillating bars, F F, the roller, C, arranged beneath and between said rollers, D D, and the cam wheels, A A, all arranged and operating so as to give the rollers, D D, a rotating, a longitudinal, and an oscillating motion with respect to the roller, C, substantially as herein shown and set forth.

84,059.—TWEER.—Adam Herbig (assignor to himself and Thomas Blackburn), Corry, Pa.

I claim the circular duck's nest, A, provided with the inlet pipe, d, and the outlet pipe, d', placed opposite each other, and with the damper, e, all arranged and operating substantially as described.

84,060.—WATCH ESCAPEMENT.—Julius Hietel, John Wenzel Hietel, and John Loomis Geissler, Philadelphia, Pa.

We claim, 1st, The described construction of the self-regulating lever, C, for watch escapement, consisting of the arm, b, fitting around the staff, D, and provided with a shoulder, e, against which rests the end of the shorter arm, d, said arms being connected by the spring, f, as herein set forth.

2d, The combination and arrangement in a watch escapement of the balance wheel, A, spring lever, C, partly flattened or grooved staff, D, pallets, F, banking pin, h, and ruby pin, s, all made and operating substantially as herein shown and described.

84,061.—REIN HOLDER.—Isaac Hull, Stamford, Conn., assignor to himself and J. Ferguson Morsell.

I claim a device for holding driving reins, composed of the clamp, A, and spring, B, constructed and operating substantially as herein specified.

84,062.—METALLIC FENCE.—Michael Kelly (assignor to himself, William Lalor, and James Slammon), New York city.

I claim the construction of thorny fence by fixing the thorns, B, in holes in the wire, A, in the manner and for the purposes herein set forth.

84,063.—HAY CUTTER.—Henry Kinsey, F. W. Kissell, J. E. Smith, and J. M. Smith, Ligonier, Pa.

We claim, 1st, The knives, H, constructed and operating substantially as herein shown and described, and for the purpose set forth.

2d, The combination and arrangement of the double crank, f', of the shaft, F, bent pitman, J, and vertical sliding rod or bar, I, having arms, f f2, formed upon it, with each other and with the slotted knives, H, substantially as herein shown and described, and for the purpose set forth.

3d, The combination and arrangement of the ratchet wheels, L, sliding pawls, P, short arms, Q, rock shaft, R, long arm, S, and pitman, T, with each other and with the feed rollers, K L, and sliding rod or bar, I, for the purpose of operating the said feed roller from the said sliding bar, I, substantially as herein shown and described.

84,064.—VALVE FOR STEAM ENGINES.—Ralph R. Lee, and George H. Wren (assignors to themselves and John C. Northall) Mahanoy city, Pa.

We claim, 1st, The main valve, C, constructed substantially as herein shown and described.

2d, The combination of the valve, C, with the stationary heads, F G, of the steam chest, substantially as herein shown and described.

3d, The arrangement of the valve, C, and heads, F G, with relation to the steam ports, p, substantially as herein shown and described.

84,065.—REEL FOR GRAIN BINDERS.—Sylvanus D. Locke, Janesville, Wis.

I claim the combination of the reel, A, spring, D, and brake, E, either with or without the pins, I, or with or without the cylinder, B, substantially as and for the purpose set forth.

84,066.—CAR COUPLING.—James Osman, and John F. Potter, Linden Hall, Pa.

We claim the pivoted plate, I, having the guides, e e, or their equivalent, when employed in connection with a draw head, substantially in the manner and for the purposes described.

84,067.—ANTI-FRICTION WASHER.—U. H. Reed, Jeremy Lake, and Luther Sisson, North Easton, Mass.

We claim the combination of the parts, A B, and D, and the spherical balls, substantially as and for the purpose described.

84,068.—WINDOW SHUTTER.—Frank A. Reiher, Cincinnati, Ohio, assignor to Frank A. Reiher and Company.

I claim the arrangement of the two series of lipped or flanged slats, I II III IV, I' II' III' IV', racks, D D', pinions, E, and guiding grooves, 1 2 3 4 1' 2' 3' 4', substantially as set forth.

84,069.—SPRING BED BOTTOM.—Gustavus Reneky, and Samuel Kless, Edgerton, Ohio.

We claim the arrangement herein described, of the longitudinal slats, A, blocks, C, transverse slats, B D G, double looped springs, E, grooved and slotted blocks, F, metallic loops, I, and straps, H, as and for the purpose specified.

84,070.—MACHINE FOR SEPARATING THE PULP FROM FIBROUS SUBSTANCES.—Gelston Sanford, Bergen Point, N. J., assignor to the Mallory and Sanford Flax and Hemp Machine Dressing Company, New York city.

I claim, 1st, The holding planks, F, suspended vertically upon each side of the rotary scraper disk, when the feed openings therein are arranged above the horizontal plane of the axis of said disk, as herein described, for the purpose specified.

2d, The vertical holding planks, F, suspended above the disk, A, free from contact with the combs, E, and adapted to be operated by the cam levers, G, to press the material to be operated upon against the radial combs from opposite sides, as herein shown and described.

3d, The described arrangement of the rotating disk, A, the radial combs, E, upon opposite sides of said disk, the suspended planks, F, having the feed openings and the spouts, I, the side rails, H, and cam levers, G, all operating as described, for the purpose specified.

84,071.—HARNESS TREE PAD.—William A. Sharp, and John A. Shannon, Tama city, Iowa.

We claim the pad, F, made heart shaped, or triangular, to increase its bearing surface parallel with the animal's back, and having formed upon its outer and small end the loop, G, for the passage of the rug buckle strap, whose upper end is secured by a rivet passing through the hole, H, and also provided with the two lugs, C, between which the tenon of the terret is secured by the bolt, E, all arranged and operating as described, for the purpose specified.

84,072.—VENTING METALLIC CORES.—Amos Shepard (assignor to "Union Manufacturing Company," New Britain, Conn.

I claim venting the interior surface of the molten metal which comes in contact with the solid metal by means of grooves, d, formed in the solid metal, substantially as described, and for the purpose herein specified.

84,073.—CLOTH DRAWERS.—H. P. Wetmore, Elizabeth, N. J., and J. G. Hitchcock, New York city.

We claim, as a new article of manufacture, cloth drawers, formed in pieces A and B, having the joining seam extended across the back of the leg, at or near the knee joint, substantially as and for the purposes herein set forth.

84,074.—MACHINE FOR SPREADING PAINT OR MASTIC.—John W. Wheeler, Cleveland, Ohio, assignor to H. H. Wheeler, New York

I claim, 1st, The spreader or roller, B, in combination with the apron, E, and rollers, F F', when operating conjointly and reversely in relation to each other, for the purpose specified.

2d, The guards, J, springs, K, as arranged, in combination with the apron, E, and in relation to the frame, A, and spreader, B, in the manner as and for the purpose set forth.

84,075.—CORN PLANTER.—Lorenzo D. Wyatt, Castleton, Ind., assignor to himself, Samuel Farley, and Edward McManama.

I claim the arrangement, A B C D E F, and G, and the agitator, N, all arranged and operating substantially as described, for that purpose.

84,076.—PAPER BAG MACHINE.—Christopher Amazeen, New York city.

I claim, 1st, The arrangement of the knives, G and H, with the collars, I I, and the spring forwarders, J J, substantially as and for the purposes herein set forth.

2d, The arrangement of the cog wheel, u', on the main shaft, h, and gear wheels, v' v', secured in slots to the frame, A, so that the former may be changed, and the latter are movable, for the purpose of adapting the machine to making bags of different sizes, substantially as herein set forth.

3d, The bag former, K, constructed as described, in combination with the pressing roller, d', for the purpose of forming the bag, and pressing down the pasted side of the same, substantially as herein set forth.

4th, The arrangement of the rollers, r and w, one placed under the rear end of the bag former Kf and the other under the pressing roller, d', the rubber carriers, p p, and the rollers, b' b', which latter are provided with rings to hold the carriers in proper position, and constructed as described, and operating substantially as and for the purposes herein set forth.

84,077.—THILL COUPLING.—William Wallace Anderson, Camden, N. J.

I claim the steel spring, b, in combination with the segments or arches, d and E, which bear upon the shaft pin, g, but do not touch each other, and with the screw bolt, a, the whole arranged and operated substantially as and for the purpose herein set forth.

84,078.—SAFETY APPARATUS FOR LAMPS.—Cephas Applebee, Lyndon, Vt.

I claim my improved arrangement of the air pipe, d', with the annular body, A, and its series, d, of gas discharging holes.

Also, the combination and arrangement of the neck, c, and the male and female connection screws, a b, with the annular body, A, the air entrance tube, d', and the gas eductors or series, d, of discharging holes, arranged in such body, as hereinbefore specified.

84,079.—FLUE CLEANER FOR BOILERS.—William C. Baker, New York city.

I claim the tube scraper, constructed and arranged as specified, so as to form a partition for directing the products of combustion, except during the operation of scraping the tubes, as specified.

84,080.—CHECK HOOK FOR HARNESS.—Charles H. Bassett, Derby, Conn.

I claim the arrangement of the conical headed spindle, F, through the bolt or base of the hook, and provided with a spring, arranged within the body of the bolt and spindle, so as to operate in the manner herein set forth.

84,081.—DEBRIS CHECK FOR PUMPS.—Sanford O. Blanding, Smithfield, R. I.

I claim a debris check or strainer, c, water charging pipes, D E, and air chamber, A, arranged and combined substantially as described, for the purposes specified.

83,082.—WAIST BELT.—Almena R. Boylson, Chicago, Ill.

I claim a metallic belt supporter, made in sections, with an elastic or flexible piece, b, interposed between the sections, a, substantially as and for the purposes specified.

84,083.—CATAMENIAL SAC.—George E. Briackerhoff, Brooklyn, N. Y.

I claim a catamenial sac, with four elastic straps, two of which are longer than the other two, and all attached to the sac, so that the latter may be adjusted on the body of the wearer in such manner that it will not interfere with the performing of the ordinary functions of nature, substantially as shown and described.

84,084.—HORSE HAY FORK.—J. H. Brinton, Thornbury, Pa.

I claim, 1st, The use of an adjustable ball or other enlargement upon the operating rope of a hay elevator, for automatically unloading the same, substantially as herein set forth.

2d, The combination of the adjustable ball, H, with an arm, F, jointed to one of the jaws of a hay elevator, connected to the other by a cord, h, and having an opening, e, for the passage of the operating rope, the whole being constructed, arranged, and operating substantially as and for the purpose described.

84,085.—HORSE RAKE.—Henry L. Brown, Adrian, Mich.

I claim the segmental gears, G and K, lever, L, quadrant, M, stop, N, and spring, O, substantially as herein described, and for the purposes specified.

84,086.—ROLLING MILL.—William Brown, Smethwick, Eng.

I claim, 1st, The combination and arrangement in rolling machinery such as described of two sets of rolls, having parallel axles, the one set consisting of two rolls, and the other of three rolls, driven at different speeds, substantially in the manner and for the purposes herein set forth.

2d, In conjunction with two sets of billeting or reducing rolls, the one consisting of two and the other of three rolls, driven at different speeds, and combined as herein specified, the arrangement of the flattening and edging grooves formed in said rolls, as described and shown, for preventing the necessity for turning the bar on passing from one set to another.

84,087.—HAY SPREADER.—J. M. Burdick, Ilion, N. Y.

I claim, 1st, The combination and arrangement of the tedder teeth, F F,

bars, E E, with cranks, H H, and revolving ring, I, constructed and arranged to operate substantially as described.

2d, In combination with the teeth, F F, the loop, b, and clamp, a, for fastening said teeth upon the bars, E E, substantially as described.

3d, In combination with the tedding devices above claimed, hinging the shafts to the main frame, A, and making their direction, relatively to said frame, adjustable, by means of the link, M, rock shaft, N, and hand lever, O, to raise and lower the tedder frame as required, substantially as described.

84,088.—SASH SUPPORTER.—ROBERT M. Campbell, Cambridgeport, Mass.

I claim the within-described sash supporter and lock, consisting of the plate, C, with its friction roll, D, in combination with the screw, E, and a projection, c, locking the sash when closed, operating substantially as described.

84,089.—HEAT RADIATOR.—William B. Choate, Galt, Canada West.

I claim, 1st In combination with a radiator of serpentine form, the method of placing the flanges, d and f, on the end plates, substantially as shown and described.

2d, Depressing the flue of the radiator after the curves or turns, so as to form a series of diving flues, substantially as and for the purpose set forth.

84,090.—HORSE RAKE.—Lyman Clinton, North Haven, Conn.

I claim the combination and arrangement of the two treadles, D E, with the axle, A, the one fixed directly to the axle, and both in relative position to each other, so as to be operated in the manner specified.

84,091.—MACHINERY FOR FOLDING AND CORDING THE EDGE of Paper.—John E. Coffin, Portland, Me.

I claim, 1st, The creasing rolls, c d, chutes, b b', of guards, pasting disks, 1 2 3, grooved as shown, pressing roll, m, and finishing rolls, p q, all arranged and combined substantially as and for the purposes set forth.

2d, The pasting disks, 1 2 3, provided with grooved edges to receive the cord, c' substantially as shown.

84,092.—MEANS FOR SECURING SPRINGS TO SLATS OF BED-Bottoms.—Z. S. Cracraft, Lacon, Ill.

I claim securing the semi-elliptic spring, b, to the slat, d, by means of the plate, A, provided with the bent lips, c' c', passing through slots in the slats, substantially as described.

84,093.—SASH FASTENER.—William J. DeGrummond, Cincinnati, Ohio.

I claim the series of springs marked, F or F', and the pieces, D or D', or the equivalent of said devices, in combination with the catch, E, and the series of cavities or notches, K, as and for the purposes described.

84,094.—CORN PLOW.—Thomas Dillon, Highland, Ohio.

I claim, 1st, The tenoned plow-beam, E, pivoted in the beam, A, and provided with a bent arm, F, by which it is adjusted at any hight desired, substantially as herein set forth.

2d, The curved plow blade, H, provided with an ear or lug, I, for the purpose of attaching it to the plow beam, E, substantially as herein set forth.

84,095.—ATTACHING HANDLES TO CROSS-CUT SAWS.—Samuel Disston, Philadelphia, Pa.

I claim the socket, B, forming a part of the slotted stem, b, and having an internal screw thread for the end of the handle, D, in combination with the grooved washer, c, and a ferrule, E, having an internal screw thread adapted to a thread on the socket, the whole being constructed and arranged substantially as and for the purposes set forth.

84,096.—COMPOUND FOR TREATING LEATHER.—August Doepp, Newark, N. J.

I claim a compound for treating leather, the chief ingredient of which is oleate of glyceryl, as set forth.

84,097.—PLOW.—V. C. Duclos, New Harmony, Ind.

I claim, 1st, The arrangement of the notched standards, J J, arm, K, and pin, d, for the purpose of regulating the plow, substantially as herein set forth.

2d, The combination of the bounds, C C, hinged beam, F, arm, K, standards, J J, and lever, L, all constructed and operating substantially as and for the purposes herein set forth.

84,098.—SASH FASTENER.—William Edson, Boston, Mass.

I claim the segment wedge, F, horn, H, and leaf, A, operating in combination with the plate, B, substantially as described and for the purpose set forth.

84,099.—TAKE-UP FOR SEWING MACHINE.—John V. D. Eldredge, Detroit, Mich.

I claim the combination and arrangement of the needle bar, F, provided with pin, G, face plate, B, provided with slot, I, take-up spring, E, and spring lever, A, with the curve, H, and projection, D, all constructed as described and shown.

84,100.—POST DRIVER.—Joseph Ellenberger, Easton, Ohio.

Antedated Nov. 18, 1868.

I claim the arrangement of the adjustable guides, K K, grooved weight, R, slotted beam, H, pulley, g, cord, f, and windlass, I, with the frame constructed as specified, with its various parts, for operating as herein set forth.

84,101.—SHIELDING ARCHES FOR EVAPORATING KETTLES.—James English, Syracuse, N. Y.

I claim the combination of the enclosing shield, C, with the cogs, a a, in the ends of the sections forming the joint, the whole arranged as described, and operating in the manner and for the purpose specified.

84,102.—WASHING MACHINE.—Caroline F. Fleming, Belleville, Ill. Antedated Oct. 28, 1868.

I claim the roller, B, when formed of the sector pieces, b, and combined with tee shaft, C, by the washer plates, c, substantially as set forth.

84,103.—CANDLE CAP.—James H. Foote, Pittsfield, Mass.

I claim, a candle cap, a, when provided with an annular flange rest, b, in the form and manner described, as a new article of manufacture.

84,104.—HYDRANT.—Charles E. Frazier, Baltimore, Md.

I claim, 1st, The cap or top, B C, constructed and operated in the manner substantially as shown and described, and for the purpose set forth.

2d, The combination of the hollow screw H, and the valve stem I, arranged, constructed, and operated in the manner substantially as shown and described, and for the purpose set forth.

3d, The combination of chamber, F, screw, H, rod, I, and hollow pis on b, arranged, constructed and operated in the manner substantially as sho n and described, and for the purpose set forth.

84,105.—THRESHING MACHINE.—Peter Geiser, and Daniel Geiser, Waynesborough, Pa.

We claim, 1st, A threshing machine and separator, combining in its construction, the following elements, viz, on adjustable feed board, a cylinder and concave, two sets of reciprocating rakes, and a series of spur wheels and intermediate pinions for driving both rakes from the fan shaft, substantially as set forth.

2d, The combination of the fan shaft, the two sets of reciprocating rakes and the pinions, U2 X X1 X2 and X3, and arm, with wrists supporting the intermediate pinions, X and X2, substantially as set forth.

3d, The arrangement of the shields in relation to the gearing for driving the rakes, substantially as and for the purpose set forth.

4th, In combination with the reciprocating rakes, the intermediate notched bars, the slides and guides, the cranks, and the system of driving gearing, substantially as set forth.

5th, So arranging the parts of the driving mechanism, that the motion of the several parts shall be communicated from one to another at a regularly reduced speed from the cylinder to which the power is first applied, substantially in the manner set forth.

6th, The cast shoe, side plates with pivot or joint bearings, shelf or apron recesses, adjustable slide board, flanges, and with notched recesses to receive the second roller shaft, substantially as set forth.

7th, The shoe, when constructed with combined metallic and wooden sides, and so arranged in relation to the case of the separator, that blasts of air may pass between the shoe and the case, substantially as and for the purpose set forth.

8th, In combination with the fixed register plates, the oscillating inner plates V1, connected by a tie, V2, and having one side loaded so as to open the register by gravity, and a regulating weight attached to the hook, V3, said parts being so arranged in relation to the blast as to operate substantially as and for the purpose set forth.

9th, The dividing apron, O, in combination with the graduating rib, O2, substantially as and for the purpose set forth.

10th, The chaff board, g, for separating the tailings and the chaff, when constructed and arranged so as to be applicable, also, for the purpose of closing the rear end of the winnower, substantially as set forth.

84,106.—ROTARY PUMP.—Charles V. Genung, Duquoin, Ill.

I claim, 1st, The hollow cylindrical piston, A, having the slotted V-formed projection, V, when used in combination with the follower, B, and vane, C, as herein specified.

2d, The hollow piston, A, provided with the opening, H, forming an eduction passage, substantially as described.

3d, The vane, C, having an enlarged head, forming the follower, B, as specified, as arranged in relation to the trip, D, and valve, E, as herein described and for the purpose specified.

84,107.—SASH LOCK.—Joseph U. Gerow, Brooklyn, N. Y.

I claim the arrangement and construction of the slotted and suspended plate, A, to which is attached the projecting fastener, D, with the weighted handles, C', in combination with the cam, B, and lock-plate or case, E, as shown and described.

84,108.—PROPELLER FOR CANAL BOATS.—Samuel D. Gilson, Oswego Falls, N. Y.

I claim, 1st, The canal boat, with pairs of shafts, a a, carrying propellers, B, of small diameter, and applied on each side of the center of the boat, at its stern, upon said shafts, which are all on the same or nearly the same horizontal plane, and driven substantially as described.

2d, The combination and arrangement of two small steam boilers, depressed engine, and boiler room, E, and shafts, a a, with small propellers, B, in pairs, on each side of the center of the boat, substantially in the manner and for the purposes described.

84,109.—MAGAZINE STOVE.—James Gray, Albany, N. Y.

I claim, 1st, In a base burning stove, having a fuel magazine suspended free from the grate, and having an unobstructed free space around and below it, and having an illuminated casing surrounding the same, the construction of descending flues, N N, passing from the brim of the fire-pot, C, and outside the base, A', and near the front of the stove, in combination with ascending flues, L and O, chamber, R, and descending flue, T'', substantially as shown and described.

2d, The construction of hooded chute, I, with a flue opening, T, upon the top thereof, for the purpose of causing the products of combustion from flue, O, to pass through the said hooded chute on their passage to exit flue, M, substantially as and for the purposes set forth.

3d, The combination of the intermediate air chamber, J, the descending flues, N N, the annular flue, K, and the ascending flue, L, substantially as shown and described.

4th, The combination of combustion chamber, E, flue, O, and hooded chute I, with its top flue opening, T, substantially as herein set forth.

5th, The revolving cover or valve, Q, in combination with the coal reservoir, H, and the hooded chute, I, substantially as and for the purposes herein set forth.

6th, In a coal stove or furnace, having a depressed fire pot and a supplying reservoir sustained free from the grate and fire pot, and so arranged that the inflamed gases may burn in a free space, so constructing and arranging such stove or furnace that a portion of the products of combustion arising from the fire will be conducted up, around, and above the reservoir, H, and hooded chute, I, to the top of the stove, and at the same time another portion of said products of combustion will be carried down outside the fire pot, C, to and around the bottom of the stove, thereby producing an equal degree of heat over the entire surface of the stove, substantially in the manner herein described.

84,110.—HYDROCARBON BURNER.—John Gray, San Francisco, Cal.

I claim the above described adjustable burner, consisting of the cylinder, B, plug, E, adjusting stem, D, and openings, a a, constructed and arranged substantially as described.

84,111.—WRENCH.—A. C. Greth, Reading, Pa.

I claim, 1st, The roller, B, moving in the slides e e, when applied to the jaw of a wrench in the manner described, for the purpose set forth.

2d, The shell or case of substantially the described construction, when carrying the roller, B, and fitted to be placed over the jaw of an ordinary monkey or key wrench, in effect as and for the purpose set forth.

84,112.—GAS AND STEAM FITTINGS.—Albert Hallowell, Lowell, Mass.

I claim the mold or molds constructed and arranged substantially as described, for the purpose of forming finished fittings or parts of fittings, as and for the purpose specified.

84,113.—ROASTING IRON ORES BY WASTE GASES.—Alexander Hamar, New York city.

I claim the combination, as set forth, with the kiln, of the open top for charging the raw ore, the open bottom for discharging the roasted ores, the flue encircling the roasting chamber and communicating with it by the slits, d, and a fan for forcing in the heated waste gases escaping from the blast furnace.

84,114.—MACHINE FOR FORMING TIN-LINED LEAD PIPE.—A. Hamon, Paris, France.

I claim the combination and arrangement of the sliding cross head, F', of a cylinder, G, and the parts thereto attached, with the slotted nuts and screws, H I, or their equivalents, and pillars, C C', for the purpose of confining, releasing and moving the cross head, F', at the times specified and for the purposes set forth.

84,115.—WASHING MACHINE.—Wm. S. Harrison, Germantown, Tenn.

I claim the frame, F, hinged at one end of the stationary tub, and provided with levers, G, connecting the board, A, and with an adjustable lever for operating the interior board, B, with slotted arms, m, all as herein shown and described.

84,116.—PADDING OR STUFFING FOR HARNESS.—Henry Hauer, Philadelphia, Pa.

I claim the stuffing of collars, saddles, and other parts of harness, with granulated cork, combined with a gum elastic or other equivalent cement as and for the purpose herein set forth.

84,117.—DRYING KILN.—B. R. Hawley, Normal, Ill.

I claim, 1st, The dry house or kiln, A, when provided with an inlet, b, surrounding the fire box, at or near the base of the house, and with the heating chamber, B', which is to be so arranged as to conduct the heated air to the top of the building, and the upcast shafts or chimneys, D, when the latter are arranged to take the vitiated or spent air from the bottoms of the chambers, A', substantially as described and for the purpose shown.

2d, The fire box, B, the smoke tubes, C, and the hot air chambers, b and B', when constructed and employed as and for the purpose set forth.

84,118.—CHAIR.—David B. Hedden, Newark, N. J. Antedated Nov. 5, 1868.

I claim, 1st, The seat, C, constructed with one or more pins, d, and the holes, E, with the plugs, F, substantially as and for the purposes set forth.

2d, In combination with the said seat, the legs, A B, constructed and secured as described.

3d, In combination with the said seat, the back, G, constructed and secured in the manner described.

84,119.—COMPOSITION ROOFING.—Clement F. Hinman, Chicago, Ill.

I claim a roofing composition composed of coal tar, clay (or other similar suitable substance), glycerin, and dissolved india rubber, either with or without animal oil, substantially as and for the purposes specified.

84,120.—ROOFING COMPOUND.—Dwight Hitchcock, Syracuse, N. Y.

I claim a roofing compound composed of the within ingredients, in about the proportions mentioned.

84,121.—SEEDING MACHINE AND CULTIVATOR COMBINED.—Sidney S. Hogle, Berea, Ohio.

I claim, 1st, The revolving cultivators, E, as arranged in combination with the jointed frame, A, for the purpose and in the manner substantially as set forth.

2d, The combination of the revolving cultivators, E, and rollers, B B', in the manner as and for the purpose specified.

3d, The combination of the revolving cultivator, E, rollers, B B', and seeding boxes, substantially as and for the purpose specified.

4th, The special construction and arrangement of the drill box, A', when operated in the manner as and in combination with the cultivators, E, and rollers, B B', for the purpose described.

5th, The slotted standards, I', revolving cutters or disks, F', in combination with the box, D, in the manner as and for the purpose set forth.

6th, The windings, wings, or ribs, d, as arranged in combination with wings c, and roller, I, for the purpose set forth.

7th, The combination of the toothed wheels, K, rollers, B B', agitator, I, and chain, J, for the purpose specified.

84,122.—CAN OPENER.—Guy C. Humphries, Washington, D. C.

I claim the bearing block, C, hinged or pivoted to the knife, A A, substantially as and for the purpose set forth and described.

84,123.—DIFFERENTIAL GEAR ELEVATOR.—Daniel Hussey, Nashua, N. H.

I claim the combination of the racks, c c, pinions, d d, internal gears, J and and differential gear, k, when constructed and operating substantially as and for the purposes described.

84,124.—IRON WINDOW SHUTTER.—Benj. A. Jenkins, La Crosse, Wis.

I claim, 1st, Metal slats, a, which, in transverse section, are of a form very similar to the letter U inverted, the leaves of each slat being pressed together, so as to leave an air space between them and form an eye just below the arch of the U, to receive and confine the pivot on which the slat is hung all as herein described and shown.

2d, As a new article of manufacture, the metal window shutter, with its hinged sides, made of U iron, and its closing sides of a similar shaped iron, lapping at the closing edges, said shutter having its slats double, and pivoted to the arch of the U iron, and also having its bar, which adjusts the slats, made of U iron, and connected to the slats by iron brackets, all as described.

3d, The arranged of the U sheet metal hinging facing strips, G G, in combination with the double slats and U metal frame, all in the manner described and shown.

4th, The pins, c, carrying slats, a, with bent ends, in combination with the retaining strip, b, as herein described.

84,125.—LEMON SQUEEZER.—John Klepzig, San Francisco, Cal.

I claim the movable button, E, with its opening, H, the spiral spring, F, in combination with the two levers, A and B, operating substantially as and for the purpose specified.

84,126.—CASTER.—Charles Lewando, Boston, Mass.

I claim in a ball caster, the concaved friction rollers, D D' D'', said rollers running on inclined axles, made substantially as described and for the purpose set forth.

84,127.—ELEVATOR.—Wm. Louden, Cedar township, Iowa.

I claim, 1st, The within described arrangement of the bar, N, for suspending the track or railway, A, substantially as set forth.

2d, The manner of attaching the pulley, E, to the track or railway, A, substantially as shown and described.

3d, The adjustable stop, P, when provided with a projecting pin or hook, around which the hoisting rope is fastened, substantially as shown.

4th, The lever, L, so arranged and operated that it can be used both as a latch and as a brake, substantially as shown and set forth.

5th, The combination of the levers, L L', having a flexible or sliding connection, substantially as and for the purpose set forth.

6th, The levers, L L', having a flexible connection, in combination with a weight for producing, and a stop, F, for releasing the pressure on the hoisting rope, substantially as and for the purpose set forth.

7th, So arranging the latching apparatus that the hoisting rope will pass by instead of through it or around it, and the latch be released by one edge of the plate, S, coming in contact with it, substantially as set forth.

8th, The guide or keeper, K, for the purpose specified.

84,128.—WOMB SUPPORTER.—John Magoffin, St. Louis, Mo.

I claim, 1st, The instrument herein described, consisting of the curved rods, A B, having their forward ends provided with the plate, b, and claws, a', and pivoted together by means of the pin, a, substantially in the manner and for the purpose described and set forth.

2d, The instrument, A B, in combination with the external supporter, C, as described and shown.

3d, The arrangement of the adjusting screw, D, by pivoting it to the rod, B, and sliding it in a slot in the end of the rod, A, as described and set forth.

84,129.—SCRUBBING BRUSH AND MOP.—Jabez F. Mason, Brooklyn, N. Y.

I claim, 1st, A handle attachment for a scrubbing brush formed of the ring c, flange, i, stem, e, and screw, h, in combination with the plate, b, and thumb screw, g, substantially as and for the purposes specified.

2d, The mop frame on the stem, e, in combination with said handle attachment for a scrubbing brush, substantially as specified.

84,130.—COFFIN.—Silas Merrick, New Brighton, Pa.

I claim in the construction of coffins, burial cases or caskets, the sheet metal bottom, A, the angle iron, B, the sheet metal side and end plates, C C, the strip of wood, D, the rubber packing, E, in combination with the cast metal top, F, arranged substantially as and for the purposes herein described and set forth.

84,131.—MANUFACTURE OF LAMPBLACK.—Adolph Millochau, New York city, assignor to himself, Jules Marceiin, Louis A. Geyer, and Edwin D. Barnes.

I claim the use of lampblack as a porous material, to supply oil to the flame in the manufacture of lampblack.

84,132.—STEAM DEVICE FOR WASHING BUILDINGS.—Charles Sivert, Paris, France.

I claim the combination of the injectors, A A, their delivery pipes, t, tank, C, communicating through pipes, a a, with the injectors, and steam generators, G, communicating with the injectors through pipes, d, the whole being arranged and constructed as herein set forth.

84,133.—DROPPER FOR HARVESTERS.—A. L. Peters and G. M. Peters, Lancaster, Ohio.

We claim, 1st, A dumping platform, which is adapted to be swung or vibrated, in the arc of a circle, to a position behind the frame, for discharging the gavel, while at the same time it preserves its parallelism with the finger bar.

2d, The tilting or dumping platform, in combination with means for operating the same, whereby said platform is adapted to be swung to a position behind the main frame, and there tilted upon a pivot or hinge parallel with the platform and at right angles to the path of the machine, as set forth.

3d, The parallel arms or links, C C', or their equivalent, for supporting and operating the platform, as described.

4th, The combination of the parallel arms or links, platform bar, and tilting platform, hinged or pivoted thereto.

5th, The retaining teeth, in combination with the platform bar and tilting platform.

6th, The arrangement of the fulcrum of the cut-off in rear of the cutting apparatus, and above the same, so that said cut-off in being operated to intercept the falling grain, shall be moved downward and forward in the arc of a circle, the center of which is in rear of and below said cut off, as described.

7th, The inclined way or cam on the heel of the shoe or drag bar, for raising the platform as it is swung to the rear of the frame for the discharge of the gavel, substantially as described.

8th, The angular extension of the platform arm C', or its equivalent, operating in combination with the platform, substantially as described.

9th, The forked lever, or its equivalent, for operating the cut-off, in combination with the vibrating cam or cam rod on the platform arm, C', or platform, substantially as described.

10th, The combination of the swinging and tilting platform cut-off, and means for operating the same, substantially as described.

84,134.—APPARATUS FOR EVAPORATING CANE JUICE.—S. A. Pochè, St. James Parish, La.

I claim the boiler, A, when constructed substantially as described, and combined with a set of sugar kettles, as and for the purpose set forth.

84,135.—LUBRICATOR.—Wm. M. Rennyson, Pottsville, Pa.

I claim the combination of the reservoir, A, neck, B, shoulder, a, rubber gasket, C, and strap, D, all constructed and operating substantially as and for the purposes herein set forth.

84,136.—DITCHING MACHINE.—Leonard Rickard, Danville, Ill.

I claim the arrangement of the point, I, mold boards, H H and B B, adjustable wings, D D, and braces, C C, all constructed and operating, substantially as herein set forth.

84,137.—REEFING FORE-AND-AFT SAILS.—William C. Rogers, Newark, N. J.

I claim the combination and arrangement of the pinion, K, endless screw, L, and crank, M, attached to the upper side of the jaws, F, and operating the roller at its inner end, as herein described and for the purposes set forth.

84,138.—HARVESTER REEL.—John L. Rohrer, Upper Leacock, Pa.

I claim, 1st, The rake, F, arranged upon the beater of a harvesting machine and adjustable thereon, so that its teeth may be projected beyond or withdrawn from the edge of the beater, substantially as and for the purpose described.

2d, The revolving beaters or blades, D, and their adjustable rakes, F, in combination with a pin, i, arranged eccentric to the axis round which the blades revolve, and connected to the rakes, substantially as and for the purpose specified.

94,139.—FRUIT BOX.—James S. Shields, Medora, Ind.

I claim, 1st, A box or crate, having its ends secured therein by means of cleats on the end pieces and grooves on the sides, top, and bottom of the box, substantially as shown and for the purpose described.

2d, In combination with the ends of the box the secret springs, F, substantially as shown and described.

84,140.—SHOEMAKER'S SHAVE.—J. Y. Simons, Troy, N. Y.

I claim, 1st, The combination of the bars, B and C, and lugs, I I, the knife, D, cap, G, and screw, A, substantially as and to the effect hereinbefore set forth.

2d, The formation of the handle, A, in such a manner as to give space for the fingers below them, and with downward projections at their ends, substantially as set forth.

84,141.—APPARATUS FOR RAISING FENCES.—Thomas J. Smith, Jackson, Mich.

I claim the combination with the lever of a carriage jack of a hook, H, substantially as and for the purpose described.

84,142.—WRENCH.—William S. Smoot, Washington, D. C.

I claim a wrench, constructed with a head, A, handle, B, and sliding jaw, C, when arranged substantially as and for the purpose set forth.

84,143.—FIRE PROOF COMPOUND.—Robert Spencer, New York city.

I claim a fire proof molding compound or paint, composed of the within-described ingredients, mixed together in about the proportions set forth.

84,144.—LEVER POWER FOR SEWING AND KNITTING MACHINES.—Greenleaf Stackpole, New York city.

I claim, 1st, The application to the sewing machine and knitting machine, of an auxiliary lever power, consisting of the friction wheel, E, or its equivalent, when used to produce continuous motion by the alternate application of friction to its opposite sides, substantially as and for the purposes set forth.

2d, The cord, I, frame, J, and thumb nut, L, substantially as and for the purpose set forth.

3d, The brake, P, as and for the purpose set forth.

84,145.—LOG CART.—John Stitt, St. Johns, Mich.

I claim, 1st, The arm, E, cast with hollow axle, F, when constructed and operating substantially as herein described.

2d, The weighted lever, T, pawl, S, and ratchet wheel, R, in combination with windlass, O, rope, M, block, N, and chain, U, when arranged and operating substantially as described.

3d, The combination of the above-mentioned parts with the cross ties, H, hounds, I, pole, J, braces, K, hook, L, bearing, Q, evener, X, and connecting rods, Y, operating substantially as herein described.

84,146.—SCRUBBING MACHINE.—Worden E. Stoddard, Fort Edward, N. Y.

I claim, 1st, The arrangement of the hollow shaft, D, pinion, F, cog wheel, G, shaft, H, crank, J, bottom, B, and crossbar E, all substantially as and for the purposes herein set forth.

2d, The combination of the hollow shaft, D, and stationary collar, M, with the movable collar, N, plate, O, arms, P P, rods R R, collar, S, arm, T, and screw, V, all arranged and operating substantially as and for the purposes herein set forth.

3d, The arrangement of the hollow shaft D, provided with a slot, a, and the rod b, substantially as and for the purposes herein set forth.

4th, The combination of the hollow shaft, D, and tub A, with a circular brush, scourer, or dryer, when arranged and operating substantially as and for the purposes herein set forth.

84,147.—EXTENSION LOUNGE.—Charles Streit, Indianapolis, Ind.

I claim the slats, B, attached to the movable front rail, A, movable pieces I and J, and to the strip, C, in combination with the slats, E, attached to the strip F, and the slats, D, attached to the front and rear rails of the principal frame, when constructed and arranged to operate substantially as herein described.

84,148.—HYDROCARBON BURNER.—Edward W. Taylor, Norristown, Pa.

I claim, 1st, The improved process of producing in intensity, and at small expense, heat and other effects of combustion by burning petroleum and other liquid and liquescent fuel on the surface of an open plate, surmounted and combined with an incombustible covering, without the intervention of sand or other materials, the combustion being facilitated and the effects intensified by the employment of a current of steam passing into the fire chamber, substantially as shown and described.

2d, The blast apparatus assisting in said process, being the arrangement described, of the air passage, D, in combination with the steam receptacle, E, arranged to move up and down, and the method of bringing heated steam into union with the air at a point and in a mode as described, so as to form a most intimate union, and at the same time creating a powerful blast, conveying the mixture into combination with the burning fuel.

3d, The combination of a fuel plate with a blast apparatus, assisting in the combustion of liquid and liquescent fuel, substantially as shown and described.

4th, The slide, P, as a device for the purpose of accommodating hydrocarbon burners to fire-boxes and other spaces of varying sizes, without requiring the burners in such cases to be constructed on different scales.

84,149.—HOOP SKIRT.—William H. Towers, Boston, Mass.

I claim, as a new article of manufacture, a hoop skirt, consisting of the bustle hoops, a a, flounce hoops, b b, and suspending wires, D D, arranged substantially as herein described.

84,150.—FIELD ROLLER.—Wesley Westfall, Chelsea, Mich.

I claim the frames, B B B and C C C, when constructed as described, and secured by the pins, F, to bear the rollers, A' A'', all arranged, constructed, and operating as described as shown.

84,151.—HARVESTER.—Cyrenus Wheeler, Jr., Auburn, N. Y.

I claim, 1st, A main frame having a tubular projection on one side, for supporting the bevel wheel shaft, in combination with an axle for the driving wheel, bolted to the other side, substantially as described.

2d, A main frame, having a tubular projection on one side, for supporting the bevel wheel shaft, in combination with an adjustable axle on the other side, for receiving the driving wheel, substantially as and for the purposes described.

3d, In combination with a main frame and an adjustable crank frame, an adjustable axle, as and for the purposes set forth.

4th, In combination with a main frame, an adjustable crank frame, an adjustable tongue frame, and an adjustable axle, substantially as set forth.

5th, So uniting the platform with the finger bar as to compensate for the sag of the platform or its tendency to spring or bend when in use in reaping.

84,152.—RAILWAY RAIL COUPLING.—John T. Wilson, Pittsburg, Pa., assignor to himself, Frank Bahm, and Thomas J. Louis, same place.

I claim strengthening the joints between contiguous rails by means of the chairs, c, and the inclined wrought iron splice piece, E, having horizontal flanges, d, struck up upon it, and connected together and supporting the ends of said rails, in the manner and for the purpose described.

Also, in combination with the chairs, splice piece, and ends, or joint between the rails, the joint plate, F, held to the base of the rails, and to the splice piece, substantially as and for the purpose described.

84,153.—BURGLAR ALARM.—Herman John Wolters, Chester, Mass.

I claim, 1st, The combination, with the horizontal sliding rods t, for actuating the bar, s, of the upright posts, a', and their pointers, c', moving in slots formed in the case, A, and arranged, with relation to the numerical figures or letters attached to the said case, as herein shown and specified.

2d, The combination, with the vibrating bar, s, operated by the rods, t, as described, and the tripper, m, to which said bar is attached, of the vibrating match carrier, and its actuating spring, arranged to operate in connection with the friction plate, k, and lamp, s, as herein shown and specified.

3d, The herein-described construction and arrangement of the friction

plate supertor, h, so that it may be adjusted to any desired distance and angle, with respect to the swinging match carrier, as and for the purposes set forth.

84,154.—GRAPE AND VINE TRELLIS.—T. G. Yeomans, Walworth, N. Y.

I claim the combination with the independent wires, C C', of the lever, B, having openings at different points, whereby said wires are connected thereto, and thereby tightened, and a sliding ring, d, for holding the wires when so tightened, substantially as described.

84,155.—OPEN OR MIDDLE RING.—B. F. Zinn, Mount Rock, Pa.

I claim the oval or circular parts, A A and B B, with the trapezoidal extensions, C and D, and the trapezoidal apertures, C and D, and the rivet or bolt and screw, E, connecting the parts, A A and B B, all combined and operating in the manner and for the purpose herein set forth.

84,156.—REEL.—Elijah Baker, Lorraine, assignor to himself and Augustus L. Baker, Mannsville, N. Y.

I claim the screw, b, nut, D, and hooks, a a, in combination with the arms, A A', by means of which said arms may be secured together or disconnected, for the purpose herein specified.

Also, in combination with the above, the pins, E E' E'' E''', the latter made adjustable by means of the screw, F, substantially as and for the purpose herein shown and described.

84,157.—MODE OF FASTENING STRAPS TO BOOTS.—Peter H. Baker, Virginia City, Nevada.

I claim the plate A, constructed as described, provided upon its outer edges with the long teeth, a, and upon its inner edges, opposite to each other, with the short teeth, a', said plate secured to the boot and strap by inserting the teeth and lapping the outer rows, a, over the inner rows, a', upon each side of the frame, as herein described, for the purpose specified.

84,158.—WATER WHEEL.—Vincent M. Baker, Preston, Minn.

I claim, 1st, The buckets, C, composed of the three parts, a a' b', constructed and arranged as described, to be acted upon by the water, as herein set forth.

2d, The gates, D, composed each of two plates, e f, arranged as shown, and connected to the rim, h, by rods, g, in combination with the tangential plates d, between the rims, A B, all being constructed, arranged, and made to operate substantially in the manner as and for the purpose set forth.

84,159.—DOOR SPRING.—Warren S. Barlow, Paterson, N. J.

I claim the within described combination and arrangement, with a door or blind A, and casement, B, of a spring, C, and stud, D, in such a manner as that the opening of the door or blind shall draw or extend the spring, substantially as herein set forth.

84,160.—AWNING FOR HORSE CARS.—Manfred C. Battey, Washington, D. C.

I claim, 1st, The combination of the pole, A, and hinged arms, B C, with a system of ropes and pulleys capable of folding or expanding said hinged arms, in the manner described.

2d, The arrangement of pole, A, hinged arms, B C, fixed arms, D F, and ropes, G I, substantially as described and shown.

84,161.—SHAFT COUPLING.—A. Bigelow, Hamilton, Canada.

I claim the shells, B B, on shaft, A, in combination with the rings, D, and sockets, F F, which receive the shafts, G G, the rings and sockets being connected together and to the shells respectively by the bolts, E H, with the bolts, E, passing through the bolts, H, all being constructed and arranged substantially as and for the purpose set forth.

84,162.—PADLOCK.—Amos S. Blake, Waterbury, Conn.

I claim the frame, A, provided with the spindle, B, in combination with the cup, C, provided with the catch or bar, D, or its equivalent, and the cone E, attached to the cup, all being constructed and arranged substantially as and for the purpose specified.

84,163.—VELOCIPEDE.—E. K. W. Blake, Chicago, Ill.

I claim, 1st, The combination with the driving axles having the fixed ratchets, C, of the loose pulleys, B, actuating pawls, and propelling belts, the latter passing over guide pulleys at or near the front of the machine, substantially as and for the purpose described.

2d, The combination with the axle of the guiding wheel, of the slotted guide brackets, L, swinging bearings, K, adjustable foot rests, L, and retracting springs, M, all substantially as and for the purpose described.

84,164.—EXTENSION SPOKE.—D. C. Brewster, Kent, Ohio.

I claim the socket, F, tenon, C, screw, D, and thimble nut, E, all constructed and arranged as shown and described, in combination with the spoke, A, and felly, B, substantially as and for the purpose set forth.

84,165.—HOEING MACHINE.—H. C. Briggs, West Auburn, Me.

I claim, 1st, The combination of the cross bars, A and B, longitudinal bars, C, runners, D, curved parts or pieces, G, and plows or hoes, I, with each other, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the inwardly projecting adjustable hoes, J, with the rear ends of the runners, D, substantially as herein shown and described and for the purpose set forth.

3d, The draft irons, H, constructed as desired, in combination with the curved parts, G, of the runners, D, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the adjustable bar or slide, L, with the hinged tongue, K, and front cross bar, A, substantially as herein shown and described and for the purpose set forth.

84,166.—BRUSH.—Amos W. Brown, Lansingburg, N. Y.

I claim as a new article of manufacture, the horse brush having its parts, A A B, connected together by the transverse leather hinges, e e, and by the longitudinal metallic spring, d, covered with strips of veneering, b, as herein described, for the purpose specified.

84,167.—GARDEN ROLLER.—Jas. B. Brown, Peekskill, N. Y.

I claim the combination of the weight, D, and shank, a, with the shaft, B, squared portions, b b, handles, C, and roller, A, as herein shown and described.

84,168.—CONTACT PAD FOR PHOTOGRAPHIC PRINTING.—J. Buchtell, Portland, Oregon.

I claim the use of the elastic pad, a, filled with fluid, air, or gas, and also the eyelets, b, with the attendant screws, together with the diaphragm, e, substantially as set forth and for the purpose described.

84,169.—TANNING PROCESS.—C. J. Bugh, Eau Claire, Wis.

I claim the improved tanning process, substantially as herein shown and described.

84,170.—BRIDLE.—W. F. Clark, Hagaman's Mills, N. Y.

I claim, 1st, The revolving bit, A, having pulleys, a b, and working in the plates, B, substantially as herein described.

2d, The combination of the gag runner, D, rein, C, and martingales, E, with the bit, A B B a b a b, substantially as herein described.

84,171.—SKATE.—W. F. Cornell (assignor to himself and S. Hurlbut), Adrian, Mich. Antedated Nov. 7, 1868.

I claim a skate having the following characteristics: arched brackets, B, sliding ball flanges, M, adjustable sectional heel flanges, E, padded hinged metallic straps, P F, bands, H, with yokes, I, hinged band, K, and hinged ankle support, G, constructed, arranged, and operating as herein represented and described.

84,172.—PAPER FILE.—E. H. Craige, Brooklyn, N. Y.

I claim, 1st, The combination of a base plate, A, having an upright pin or pointed wire, a, with a weight, C, having one or more holes, b, the whole constituting a paper file, substantially as and for the purpose herein shown and described, as a new article of manufacture.

2d, The angular base plate, A B, having a pin or pointed wire, a, in combination with a weight, C, having one or more holes, b, the whole constituting a paper file, substantially as and for the purpose herein shown and described as a new article of manufacture.

84,173.—CORN SHELLER.—Elihu Doud, Oshkosh, Wis.

I claim an outer half cylindrical shell, constructed in segments, d e f, in the manner described, when used in combination with the toothed roller, J, spring S, plate, C, and hopper, C', as and for the purposes described.

84,174.—PROCESS FOR AGEING AND RECTIFYING COPAL VARNISH.—Desso Duduit, New York city.

I claim the process for rectifying and ageing copal varnish, substantially as herein described.

84,175.—STEAM VALVE.—O. P. Dunbar, Norwalk, Ohio, and H. D. Dunbar, Hartland, Vt.

We claim, 1st, The herein described steam valve, consisting of the heads, G, flange, M, ring, N, and nib, a, when constructed substantially as set forth.

2d, The bridge, O, as arranged in relation to the valve, for the purpose specified.

84,176.—PUMPING ENGINE.—C. E. Emery, Brooklyn, N. Y.

I claim, 1st, The combination, with cylinder, A, main piston, J, and the equal heads, M and N, of auxiliary piston, E, of the ports, e f g h, in a valve face operated by E and e' f' g' and h', in the valve seat, when arranged substantially in the manner specified.

2d, The arrangement of the exhaust passages, f' and g', with reference to the ports, B and B', substantially as described, to accomplish the results specified.

3d, The combination of two auxiliary pistons, the first to operate the valve of the second in both directions, without the assistance of tappets, and the second to operate the main valve in the usual manner to accomplish the results specified.

4th, The connection of a moving piston or cylinder with the seat of its slide valve, in such manner that the motion of the piston or cylinder causes the valve seat to follow the initial movement of the valve, and close (and, if necessary, reverse) the ports, and thus bring the moving piston or cylinder to rest, substantially in the manner described to secure the results specified.

5th, The passages, r' and s', so arranged, in combination with r and s, as to admit steam to the auxiliary piston, E, after the valve, F, has moved the desired distance.

6th, The extra exhaust ports, Z Z, when arranged as shown, in the face of the valve, substantially as described.

7th, The particular arrangement of the valve seat piece, Q, with the valve-chamber, R, and the face of the pump cylinder, at w.

84,177.—PERMUTATION LOCK.—William F. Ensign, New York city.

I claim, 1st, The slide, H, bars, J K, with stump, L, attached to the latter, in connection with the bolt-locking mechanism, composed of the bar, O, wheel N, pivoted bolt, P, arm, M, and spring, i, all arranged to operate in connection with the bolt, I, in the manner substantially as and for the purpose set forth.

2d, The step-like projections, k, at the free or disengaged end of bar, K, when used in connection with the wheel, N, for the purpose specified.

3d, The annular plates, R R' R'' R''', provided with the internal annular grooves, connected by passages, g', in connection with the traveler, W, all arranged for operating the tumblers substantially as set forth.

4th, The toothed rims, T T' T'', in connection with the pinions, e' e', attached to the slides, V V, having springs, f', bearing against them, all arranged in connection with the tumblers, U U' U'', substantially as and for the purpose specified.

5th, The combination of the tumblers, U U' U'', toothed rims, T T' T'', plates R R' R'' R''', traveler, W, and hub, F, all arranged to operate in the manner substantially as and for the purpose set forth.

84,178.—CORN PLANTER.—Snyder Filson and W. E. Kinert, Bluffton, Ind.

We claim, 1st, The movable notched collar, o, provided with arm or arms, k, in combination with the lug, n, on the shaft, a, when operated by means of one of the wheels, M, which is firmly secured to said shaft, substantially as and for the purposes herein set forth.

2d, The cross bar, g, provided with the arms, h and i, in combination with the movable notched collar, o, and arm, k, for the purpose of moving the slides, H H, substantially as herein set forth.

3d, The lever, I, arranged, as described, on top of the box, D, in combination with the bar, m, and movable notched collar, o, for the purpose of throwing said collar in and out of gear with the lug, n, substantially as and for the purpose herein set forth.

84,179.—MILKING PAIL.—R. A. Fish, Worcester, Mass.

I claim the manner of securing the pail while milking by allowing its weight to rest upon its knees on the curved springs, A A. Said springs are made of steel, and tempered, and firmly fastened to the pail, the lower portion of which projects above the rim of the pail, with an aperture in them, through which the bail passes. Said springs can be attached, either in front or rear of the ears of any ordinary pail in use, and can also be fastened to a hoop, and firmly secured to the pail in the usual manner manner of hooping. These springs can also be constructed of iron, or other metal, or of wood, or their equivalents, arranged substantially in the manner described and for the purpose set forth.

84,180.—MODE OF MAKING COMBINED WOOD-AND-WIRE FENCE.—Geo. Fletcher, Sr., Greensburg, Ind.

I claim, 1st, The mode of constructing a wood-and-wire fence, by means of a stationary crab or anchor, U, and a loom, adapted to be drawn over the ground in manner substantially as set forth.

2d, In the described combination, the suspended and detachable batten, R, and notches, S S, as and for the purpose stated.

3d, In this connection, the gage or knife, V, upon the frame, K.

84,181.—DEVICE FOR BENDING SCROLLS.—Edwin Gibbs, Painesville, Ohio.

I claim the finishing-scroll former, B, and the scroll former, A, constructed and combined as and for the purpose set forth.

84,182.—WINDMILL.—Chas. Goodwin, Beardstown, Ill.

I claim, 1st, The arrangement of the vane, F, in an inclined position upon the shaft, D, and operating in connection with the wheel, G, as herein described for the purpose specified.

2d, The arrangement of the wings, H, shafts, I, straight springs, K, and ring d, operating as described for the purpose specified.

84,183.—RAILROAD CAR STOVE.—E. M. Grant, J. B. Van Dyne, and T. R. Pugh, Nashville, Tenn.

We claim, 1st, In combination with the base tank, A, the bottom, b, with its apertures and lids or valves, d, made and arranged in the manner and for the purposes herein set forth and described.

2d, The arrangement of the bottom, b, in the stove, forming, between it and the water line in the tank, the space, C, as shown and for the purposes described.

84,184.—CULTIVATOR.—A. A. Harmon, Olney, Ill.

I claim, 1st, The plows, H H, attached by clevises to the front bar of the diagonally braced open frame, A B D E F, and connected by a cross bar, I, which admits their adjustment as to relative distance, and causes them to swing by a parallel motion as they are deflected laterally, substantially as described.

2d, In combination with the said plows, thus attached and connected, the sliding foot bar, K, arranged as described, and adapted to hold them in elevated position, for the purposes described.

84,185.—AXLE BOX.—E. P. Haskell (assignor to the Hale Patent Washer Co.). New Bedford, Mass.

I claim, for employment with axle boxes, and washers, the hub plate, g, constructed with the internally projecting ring on flange, h, substantially as and for the purpose described.

84,186.—SADDLE.—G. H. Hayden. New Market, Ala.

I claim, 1st, A saddle, provided with a tobacco pipe, A, and a case, C, having a lookingglass secured therein, and otherwise arranged substantially as and for the purpose described.

2d, The combination, with the cantle of a saddle, of an adjustable back piece, I, substantially as and for the purpose described.

3d, The back piece, I, provided with the lugs, K, arranged to slide on the rods, L, and with the jointed braces, M, substantially as and for the purpose set forth.

84,187.—METHOD OF ETCHING RELIEF PLATES FOR SURFACE PRINTING.—Charles Henry, Brooklyn, John McLoughlin, Morrisania, and Edmund McLoughlin, New York city.

We claim, 1st, The transforming of etched plates into relief plates, in which the relief lines shall be of the same continuous material as that composing the body of the plates, by the process and in the manner substantially as herein described.

2d, The filling of the etched lines upon the plate with varnish, or other protecting gum or compound, in the manner and for the purpose specified.

3d, As a new article of manufacture, relief plates, of metal or stone, for printing and similar purposes, prepared direct from etching, and in which the raised surfaces shall be of the same continuous material as that composing the body of the plate.

84,188.—STONE-DRILLING MACHINE.—C. W. Hermance, Schuylerville, assignor to W. P. Ostrander, A. H. Pearsall, B. G. Schults, and A. L. Finne, all of the State of New York.

I claim, 1st, The arrangement of one or more flanges or cams, or their equivalents, on the side of a wheel, for the purpose of operating a machine, by raising a certain part thereof and letting it fall again when said flanges or cams operate from the periphery to the axle of the wheel, that is, commence the raising at or near the periphery, letting go near the axle, substantially as herein set forth.

2d, The tube, H, having its sides slotted and notched, as described, in combination with the movable collar, b and pins, e e, for the purpose of compressing the spring, J, thereby regulating the force of the drill operated by said spring, substantially as shown and described.

84,189.—NAIL-CUTTING MACHINE.—Cyrus D. Hunt, Fairhaven, Mass.

I claim the arrangement as well as the combination of the gears, I k, their crank pins, h r, the connecting rods, g p, the arm, f, rocker shaft, e, toothed sectors, c d, shaft, I, toothed sector, H, and gear, G, as applied to the vibratory arm, F, and the tubular shaft, E, the whole being for effecting the vibratory motions of the said arm, and the reciprocating semi-rotary movements of the nail plate carrier, as set forth.

84,190.—TANNING APPARATUS.—S. Hosmer, Concord, Mass.

I claim the combination, with a vessel arranged for tanning *in vacuo*, of an agitating wheel, B, or its equivalent, substantially as and for the purpose described.

84,191.—MACHINE FOR HOLDING THE CUTTERS OF MOWING MACHINES WHILE BEING GROUND.—D. W. Jameson, Warren, Ohio.

I claim, 1st, The flanged rod, C, grooved bar, D, forming the sliding joint, E, as described.

2d, The flanged rod, C, grooved bar, D, in combination with the bar, D', uprights, A', cross bars, B B'', and foot pieces, B', all constructed and arranged to operate as and for the purpose described.

84,192.—PERMUTATION LOCK.—William Johnson, Milwaukee, Wis.

I claim, 1st, Guard, I, and fence, h, in combination, with plate, L, substantially as described.

2d, The stop, O, held in slot, P, by shaft, T, in combination with tumbler, U, substantially as and for the purpose set forth.

3d, Key bit, Y, socket, Z, rubber ring, a, and nut, b, in combination with key stem, X, substantially as described.

84,193.—APPARATUS FOR ROASTING COFFEE.—William Johnston and John D. Flansburgh, Philadelphia, Pa.

We claim the elevated condenser, C, with its valve, c', the tube, D, and the tube, E, in combination with the hollow perforated sliding shaft, A1, the roasting vessel, A, and the furnace, S, the said parts being constructed and arranged to operate together as and for the purpose set forth and described.

84,194.—CULINARY VESSEL.—A. C. Kasson (assignor to himself and Nelson C. Gridley), Milwaukee, Wis.

I claim, 1st, The vessel, B, provided with its central steam chamber or tube, I, with its openings and slides and a series of compartments, C, constructed and arranged to operate substantially as described.

2d, The vessel, A, provided with the compartment, F, and the drip chamber, G, substantially as and or the purpose set forth.

3d, The combination of the vessels, A and B, the latter having the annular flange, t, fitting into the drip chamber, G, of the former, when said parts are constructed and arranged for joint operation, substantially as set forth.

81,195.—PETROLEUM STILL.—Edward G. Kelley, New York city.

I claim, 1st, The gate, F, arrranged in combination with the two vessels, B C, to regulate the gravity of the products of distillation, substantially as and for the purpose herein shown and described.

2d, The petroleum still, consisting of the cylinder, B C, the latter having the shells, D, and the former being provided with the automatic indicator, I J, all made and operating substantially as herein shown and described.

84,196.—REFRIGERATOR.—Theodore Dwight Kellogg, New York city.

I claim the combination of the casing, B, lining B, ice chamber, G n, grating, g, strips, b b b' b', openings, c c, boxes, C C, and wire cloth, W W, all constructed, arranged, and operated in the manner and for the purpose set forth.

84,197.—TELEGRAPH INSTRUMENT.—George W. King, Georgetown, D. C.

I claim the core, D, acting as an armature, and oscillating in the helix, B, when pivoted to the supporting spring, I, in the manner and for the purpose herein described.

84,198.—APPARATUS FOR HOLDING SHEEP.—Giles D. A. Krigbaum, Zanesville, Ohio.

I claim the sheep-holding table, A, provided with the holes, a, the legs, B, and pivoted levers, b, notched to coincide with the holes in the table, all arranged and operating as described, whereby the sheep is suspended beneath the table, with its feet clamped in the holes, a, by the levers, b, as herein set forth for the purpose specified.

84,199.—WAGON TOP BOW.—S. C. La Halt, P. Listeman, and C. Hadley, Collinsville, Ill. Antedated November 9, 1868.

We claim arranging the central hoop, A, in hinged parts, a a1 and a2, and the end hoops, B, in hinged parts, b b1 b2 and b3, so that the said parts may be folded together into small compass, substantially as set forth.

84,200.—BOX.—Joseph J. Leighton, Boston, Mass.

I claim a round or cylindrical wooden box, composed of two or more layers of wood wound spirally around in opposite directions, and glued or otherwise secured together, substantially as herein specified.

84,201.—LOW WATER ALARM FOR BOILERS.—Edgar W. Manseville (assignor to himself and Charles D. Johnson), Ithaca, N. Y.

I claim, 1st, The faucet, E, as arranged and constructed, whereby the opposite ends of the same receive the two pipes, G and H, one from the upper and the other from the lower part of the globe, E, as set forth.

2d, The construction of the faucet, B, with reference to the pipes, G and H, and the arrangement of the steam passage in the faucet leading to the whistle, whereby, when the globe, E, is full of water, no steam can pass to the whistle, but when empty, the turning of the faucet open the passage, and the whistle gives the alarm.

3d, The arrangement of the direct connection between the globe, F, and faucet, B, by the lever, C, whereby to operate these several parts, in combination, through the three parted passage in the faucet, as set forth.

84,202.—HYDRANT.—J. W. Marshall, Williamsburg, N. Y.

I claim the plug, D, with openings of supply, L, and waste discharge, M, in combination with the plug seat, C, spiral spring, E, and hand lever, N, operating together in manner substantially as and for the purposes described and set forth.

84,203.—WATER WHEEL.—Albert M. Maynard, Savoy, Mass.

I claim, 1st, The chutes, C, gates, D, diaphragm, B, and external barrel, A A, in combination with the turbine wheel, all constructed and arranged to operate substantially as described.

2d, The combination and arrangement of the V-shaped buckets, b, within the box, a, diaphragm, d, hoop, e, external band, A, diaphragm, B, carrying the sleeve, n, the collar, m, rods, l, chutes, C, and gates, D, as herein described, for the purpose specified.

84,204.—WASH BOILER.—Antoine Michel (assignor to himself, James S. Hannan, and Napoleon Moisan), St. Louis, Mo.

I claim, 1st, The arrangement of a heating flue, B, within each conducting pipe, C, for the purpose of accelerating and directing the flow of fluid.

2d, The combination of the vessel, A, its flues, B, duct, C, perforated at c, and discharging head, D, perforated at d, substantially as and for the purposes set forth.

84,205.—SHEET METAL ROOFING.—Ezekiel Mills, Baltimore, Md.

I claim the continuous metallic strips, jointed and coated by the process herein described.

84,206.—OSCILLATING STEAM ENGINE.—Frank Millward (assignor to himself, Dexter D. Hardy, and Henry C. Dart), Cincinnati, O.

I claim, 1st, The combination and arrangement of the frame, J, cylinder A, and V-shaped joint or hinge, substantially as shown and described.

2d, The arrangement of the pivots, K and L, by which the wear between the parts thereof may at any time be taken up, substantially as shown and described.

3d, The arrangement of the adjusting screws, M N, with reference to the V-shaped pieces K and L, for the purpose of taking up lost motion, and preserving the pivots in line.

4th, The oscillating side pipes, E G, and flexible tubes, I, for the purpose specified.

5th, The arrangement of the independent valve motion, P Q R S, or its mechanical equivalent, for the purpose of reciprocating the valve the short distance equal only to the "lap" of the valve, and the slight additional distance necessary to give a proper "lead" to the engine, substantially as described.

84,207.—FRUIT BASKET.—Charles Moore, Stratford, Conn.

I claim a fruit basket, constructed out of a single piece of sheet metal, cut and swaged up in the desired shape, substantially as shown and described.

84,208.—MACHINE FOR THE MANUFACTURE OF ELASTIC ROLLS AND TUBES.—Joel Moulton, Boston, Mass.

I claim, 1st, A machine so constructed and operating as to hold and rotate the roll shaft, and to cause the elastic material and its accompaniments to be wound about such shaft, and condensed or tightly driven thereon, for the purpose substantially as before explained.

2d, As an appurtenance or a part of the above described machine, a device for folding and maintaing, in an upright position, the elastic material as it is fed to the shaft, and also for introducing into the fold of the elastic material a metallic wire or string, for the purpose as before premised and described.

3d, For the purpose of condensing the folds of elastic material about the shaft, and for supporting one end of it in position while winding, the combination and arrangement of the case, c, with its cam groove, i, and the circular carrier, I, with its bunters, g g, etc., the whole being arranged and operating essentially as herein shown and described.

4th, In combination with the last described arrangement of parts, the sliding carriage, p, with its shaft, supporting chuck or bearing, o, such chuck being applied and operating as before referred to and described.

5th, Applying the auxiliary frame, c, to the main frame, at an angle to its longitudinal axis, in manner and for the purpose as herein shown and explained.

6th, The combination and arrangement of the endless bands, b3 b3, and the rollers, v v, etc., or their equivalents, for producing the same result, in combination with suitable supporting and feeding rollers, as and for the purpose before set forth and exhibited.

7th, The general combination and arrangement of the bunters, g g, etc. and the shaft supporting and operating adjuncts, the sliding carriage, p, and the mechanism for folding and "wiring" the elastic material or strips, the whole operating together to produce results before set forth and explained.

84,209.—METHOD OF DETACHING RUBBER ARTICLES FROM THE MOLDS IN WHICH THEY ARE VULCANIZED.—Joel Moulton, Boston, Mass.

I claim, 1st, As a machine for loosening the adhesion of vulcanized articles to their molds, the employment of the clearing rods, c c', so arranged and operated as to produce this effect by their combined rotary motion and longitudinal movements; and

2d, Supporting the clearing rods, c c', within or by means of the dually arranged sliding head stocks, a a', and mandrels, b b', or their equivalents, the head stock and mandrels being actuated by the pinions, d d', and pinions, l l', or other mechanical devices, and the whole operating together as described; and

3d, The general combination and arrangement of the dually arranged head stocks, a a' supported substantially as described, with the mandrels and clearers connected, as explained, the twin or dually arranged pinions, d d', and l l', and gears, g g', and p p', and q q', the shafts, h r m, and m', the posts, f f', the cradle or clutches, n n', being adjuncts or important details of the machine, the operation and general arrangement of the above described combination being as here inbefore shown and elucidated.

84,210.—LIGHTNING ROD.—David Munson, Indianapolis, Ind.

I claim the lightning conductor, composed of the sections, A, formed and secured together as and for the purpose set forth.

84,211.—STEAM VALVE.—Francis S. Pease, Buffalo, N. Y.

I claim, 1st, The oscillating steam valve, consisting of two segments, V and V', constructed and operating as and for the purposes described.

2d, The combination and arrangement of the packing, L, and the slots, v v, in the valve, V V', substantially as and for the purposes explained.

84,212.—THILL COUPLING.—Levi Pentz, Canton, Ohio.

I claim 1st, The rubber block, G, when constructed with concave front face, d, upper rear flange, a, and lower side and rear flanges, c b c, and used in combination with the thill iron, H F H, and clip arm, B, constructed as specified, substantially as and for the purpose specified.

2d, The combination of the rubber block, G, constructed as specified in first claim, the thill iron, H F H, with elliptical pin, E, and the clip, A, with arm, B, provided with the slot, D, hole, C, and curved wedge part, n, the several parts being arranged in the manner and for the purpose herein specified.

84,213.—POCKET LANTERN.—George W. Putnam, Peterborough, (town of Smithfield,) N. Y. Antedated November 7, 1868.

I claim the lantern, constructed as described, adapted to receive the case, H, containing the candle and match chamber, M, in such a manner as to leave an air chamber, U, containing the sliding handle, P, between said case and lantern, to prevent the heat generated in the latter from communicating with the chambers, M, as herein described, for the purpose specified.

84,214.—FRUIT JAR.—Nat. Raymer, New Sterling, N. C.

I claim, as an article of manufacture, a stopper or cork for fruit jars, made as described, viz, furnished with a short metallic tube, through which the air may be readily drawn, and by the pressing together of which the jar is hermetically sealed.

84,215.—OIL BOX.—J. W. Rhoades, Clyde, Ohio.

I claim the combination of the oil-box, A, cut-off, C, tubes, c2, and d, and shoulder, f, all constructed, arranged, and operated substantially as and for the purpose set forth.

84,216.—COAL SIFTER.—C. K. Rice, Marlborough, Mass.

I claim, 1st, The combination with the ash box, A, and coal box, B, of the sieves, C E and D H, substantially as and for the purposes set forth.

2d, The combination and special arrangement of the sieves and frames, C, and D, in respect to each other and the box, B, substantially as shown and described.

3d, The combination of the projection, b, and pin, a, with the box, B, and sieves, C and D, as shown and described.

84,217.—FRUIT JAR.—S. B. Rowley, Philadelphia, Pa.

I claim the combination of the screw ring, D, and its flange, j, the thin metal cap, B, and its flange, b', the rib, d, shoulder, b, and screw thread, a, of the jar, and the gum ring, h, the whole being constructed, arranged and adapted to each other, as and for the purpose herein set forth.

84,218.—SPINNING JACK.—Jacob Sands, Waterloo, N. Y.

I claim, 1st, The combination, with the sliding block, A, trigger, f, spring-catch, i, and belt shifter, k, of the vibrating catch, d, on the carriage, when arranged substantially as and for the purpose described.

2d, The combination, with the spring latch, i, and belt shifter, k, of the weighted lever, n, when arranged substantially as and for the purpose described.

3d, The combination with the sliding catch, i, and belt shifting slide, k, of and lever, m, of the projection, r, on the carriage, when arranged substantially as and for the purpose described.

84,219.—MANUFACTURE OF GAS FROM VOLATILE LIQUIDS.—Charles A. Seely, New York city.

I claim, 1st, The process of generating a gas or vapor of high tension, for lighting and heating purposes, as described.

2d, The combination of the generator and the pipes or other receptacles containing hot water as described.

3d, The combination of the generator with the escape pipe and stop-cock as described.

4th, The prevention of condensation in the gas conducting pipes, substantially as described.

84,220.—GENERATING AND APPLYING CARBONIC OXIDE FOR Treating Metals.—Thomas Shaw, Philadelphia, Pa.

I claim the employment of hydrocarbon fluids for the purpose of generating carbonic oxide, for operating on heated metals, as described.

84,221.—POWER HAMMER.—Thomas Shaw, Philadelphia, Pa., assignor to himself and Phillip S. Justice.

I claim, 1st, The combination of the hammer, flexible stray, links, spring, walking beam, connecting rod, and crank shaft, substantially as herein described.

2d, The method, substantially as herein described, of simultaneously tightening the driving belt and releasing the friction or clutch belt, so as to suddenly start the machine, and by a reverse movement to as quickly stop the machine.

84,222.—HYDRANT AND GAS-PIPE STOP.—Frederick Shickle, (assignor to Shickle Harrison & Co.), St. Louis, Mo.

I claim the stop box, A, cap, B, and their lug, A', and pivot pin, b b1, when constructed and arranged as and for the purpose herein set, forth and described.

84,223.—INSTRUMENT FOR AFFIXING STAMPS.—C. B. Sill (assignor to himself and John Goldsborough), Wilkins, Pa.

I claim, the combination of the cutter and affixer, D, sponge, a, a spring feed, and the within-described devices, or their equivalents, through the medium of which the spring feed is "set" on the downward movement of the affixer, as and for the purpose described.

84,224.—FIRE-ARM.—Charles Slotterbek, San Francisco, Cal.

Antedated May 18, 1868.

I claim the combination and arrangement of the plate, B, springs, d i and l, trigger, k, scre, g, and hammer, f, when operated in the manner substantially as shown and described and for the purpose set forth.

84,225.—PROCESS FOR PRINTING IN COLORS.—Hiram F. Smart, Worcester, Mass.

I claim the mode of printing in colors from a single plate or engraving, substantially as and for the purpose described.

84,226.—REGISTER FOR TIME AND PRICE.—Kilburn Smith, Lowell, Mass.

I claim, 1st, The circular flange, F, in combination with the moving dial, A, in the manner and for the purpose set forth.

2d, The outer flange, H, in combination with the stationary circles of figures and indicating lines for the purpose and substantially as described.

3d, The pointer stands, E, having each a point, d, when used in combination with the flanges, F or H, and the moving dial, A, or the stationary figured circle between said flanges, for the purposes and in the manner substantially as described.

4th, The pivoted arm, J, in combination with the dial, I, for the purpose and substantially as described.

84,227.—LATCH.—Albert Spangler, Philadelphia, Pa.

I claim the sliding face plate, E, with its slots, e' and e", in combination with the loose collar, D, and fixed shank, C, and the sliding spring bolt, F, the said parts being constructed and arranged so as to operate as and for the purpose described.

84,228.—TARGET.—William Stein, Camden, N. J.

I claim, 1st, The swinging plates or arms, C C, hinged or pivoted to the rotating frame or disk, B, substantially as herein shown and described, to form a target in which the aim will automatically indicate when it is hit, as set forth.

2d, The rotating frame or disk, B, carrying the hinged or pivoted plates, C, in combination with the incline, D, for automatically resetting the plates, C, substantially as herein shown and described.

3d, The screen, E, having the aperture, g, in combination with the rotating frame, B, and with the plates, C, hinged or pivoted thereto, as set forth.

4th, An automatically adjusting target consisting of the rotating frame or disk, B, of the hinged or pivoted plates or arms, C, of the stationary incline, D, perforated screen, E, and ball arrester, F, all arranged in combination with each hother, and made and operating substantially as herein shown and described.

84,229.—MACHINE FOR SHARPENING SAWS.—A. R. Stewart, Douglas Harbor, New Brunswick.

I claim, 1st, The combination and arrangement of the table, b, adjustable saw rest, n, pivoted arm, c, vertical shaft, d, slotted segment, h, segment, k, and sector slide, m, all constructed and operating substantially as herein described for the purpose specified.

2d, The adjustable guides, r r, and the wedges, t t, connected with the saw-rest, combined with the stud, s, on the table, b, constructed, arranged and operating as described.

84,230.—EXCAVATOR.—Barna T. Stowell, Quincy, Ill.

I claim, 1st, The cutters, m m, when constructed in the sinuous form described and shown, and attached to the rotary cylinder, G, in the manner specified.

2d, The arrangement of the disk, J J', connecting bars, M M, scraping blades, N N, and sinuous cutters, m m, when the several parts are constructed in the manner described.

3d, In that class of excavators in which the rotary cutting cylinder operates to move the machine forward in the manner herein described, the arrangement of such cylinder horizontally across the machine in front of an inclined apron, C, so that the cylinder shall cut the dirt and throw it back upon the apron, while at the same time, it draws the machine forward, substantially as described.

4th, The arrangement of the horizontal rotary cylinder, G, apron, C, wheels, D D, frame, E, lever, F, and side cutters, P P, substantially as described

84,231.—COMBINED RAKE AND HOE.—Henry Thacker, Oneida, N. Y.

I claim as a new article of manufacture, the combined rake and hoe, cast in one piece, the cross head, A, being sharpened between the tines, B, to form a straight cutting edge, as herein described for the purpose specified.

84,232.—BEE HIVE.—J. H. Thurston, Rainsborough, Ohio

I claim the slide, n, and lever, o, pivoted in the recesses cut in the partition, b, between the same and the spare honey boxes, C C', said lever extending to the outside of the hive whereby the capacity of the opening, l m, is regulated, or communication closed between the boxes, C, and chamber, a, as herein shown and described for the purpose specified.

84,233.—GUN LOCK.—Michael Tromly, Washington, D. C.

I claim, 1st, A hammer constructed with the parts, A and B, operating together, substantially as described.

2d, The combination of said hammer with the nipple, n, and guard, G, in the manner set forth.

3d, A hammer, constructed with the depression, m, shoulders, l l, and lip or projecting plate, o, substantially as described.

84,234.—HYDROCARBON BURNER.—Louis Verstraet, Paris, France.

I claim, 1st, The reservoir, A, constructed with a double casing or wall, and filled in with the absorbent, C, substantially as and for the purposes described.

2d, Withdrawing the vapor which rises from the petroleum, or other mineral oil or liquid, from the reservoir, preventing thereby its escape into the atmosphere, and the accumulation thereof in the reservoir, substantially as described and for the purposes set forth.

3d, Collecting and using in the boiler the water produced by the condensation of the vapors in the smoke flues, substantially as described.

4th, Discharging into the furnace and utilizing as fuel the vapors rising from the oil in the reservoir, substantially as shown and described.

5th, Producing a current of air through the reservoir, in contact with the oil therein, substantially as and for the purposes described.

6th, The filling, C, in combination with an oil reservoir, substantially as and for the purposes described.

7th, The air discharge tube, E', closed at its base, having a conical end, perforated at e, and surrounding the closed conical ended tube, E", in such a manner as to leave an annual space, m, between them, and arranged with relation to the air supply pipe, F, and gas pipe, N, as herein described, for the purpose specified.

84,235.—PAPER MAKING MACHINE.—James Viney, Manchester, N. H.

I claim, 1st, Extracting the water or moisture, to a greater or less extent, from the pulp on the wire cloth or felt apron, on its way to the pressing rollers, by the removal of atmospheric pressure, as described, or in any equivalent manner.

2d, The adjustable slides, E, on the boxes, A, by which the aperture in the top of the box is made to correspond with the width of the paper, substantially as described.

84,236.—MACHINE FOR PICKING WOOL.—Wm. Wadsworth and E. H. Semple, St. Louis, Mo.

We claim the combination of the cleansing cylinder, B, roller, C, arranged in adjustable bearing boxes, c3, and having radial arms, C, and brushes, c1 c2, the slide, F, and slotted floor, F', all constructed, arranged, and operating as and for the purposes set forth.

84,237.—WIND WHEEL.—R. Waite, Blue Earth City, Minn.

I claim the wind wheel constructed as described, of the case, A, having the flanges, B C, the draft regulator, D, horizontal shaft, G, and the spiral wind wheel, E, having a variable diameter and pitch, all arranged and operating as described, for the purpose specified.

84,238.—CULTIVATOR.—Thomas Waite, Plymouth, Ohio.

I claim the side beams, C, when provided with slots, D, for the insertion and adjustment of the standards, E, in combination with the beam, A, for the purpose set forth.

84,239.—STEAM WHISTLE.—Bernhard Weinmann, Cincinnati, Ohio.

I claim, 1st, The adjustable piston, E, arranged in the upper end of a steam whistle, substantially as herein shown and described.

2d, A steam whistle consisting of the tube, A, plug, B, which has the stem, d, head, e, and the adjustable piston, E, all constructed substantially as herein shown and described.

84,240.—SPRING BUT.—William Wells, Ashtabula, Ohio.

I claim the pawl, i, and the ratchet teeth, h, when arranged substantially as and for the purposes herein shown and described.

84,241.—DESICCATED COCOANUT.—Giles B. Williams (assignor to Elisha M. Allen), New York city.

I claim an improved article of confection consisting of desiccated cocoanut meat combined with sugar and the bicarbonate of soda, substantially as set forth.

84,242.—FROTH ARRESTER FOR BEER GLASSES.—Johann Winkler, Hudson City, N. J.

I claim the oval froth arrester, A, provided with a notch, b, and arranged substantially as and for the purpose described.

84,243.—ELECTRO-PLATING.—Justin P. Woodworth, Brooklyn, N. Y.

I claim the method substantially as set forth, of depositing different thicknesses of plating or metallic coating on different portions of an article at one operation, by obstructing and deflecting the electric bath in its passage between the two poles, substantially as described.

Also, the rack or holder, fig. 1, or its equivalent, for holding the articles to be plated properly, and for receiving and adjusting by suitable means the said obstructing device, substantially in the manner described.

84,244.—BEER COOLER.—John Yates and Edgar Deuell, Brooklyn, N. Y.

We claim, 1st, Connecting the ends of the pipes or tubes, A, by means of boxes, C, divided into compartments by means of partitions, a, the ends of the pipes or tubes passing through suitable standards or plates, B, into the compartments of said boxes, substantially as shown and described.

2d, Inclosing the series of pipes or tubes, A, by means of doors, E' E', hinged to one of the boxes, C, substantially as and for the purpose herein set forth.

84,245.—MANUFACTURING BOOTS AND SHOES.—August Destony, New York city.

I claim the within described method of manufacturing boots and shoes, that is to say, securing the insole by a stitch whose parts are twisted and crossed in or at each awl hole, substantially as and for the purpose herein described and represented.

84,246.—MACHINE FOR THE MANUFACTURE OF PAPER BOXES.—Richard Smith, Sherbrooke, Canada.

I claim, 1st, A plugger so constructed as automatically to admit air beneath its lower end previous to its withdrawal from the cavity of the completed box or other hollow article, substantially in the manner and for the purpose set forth.

2d, The formation of the sides of the box by the sudden displacement of the pulp in the mold, by the introduction of the plunger into it by a quick motion, substantially in the manner described.

3d, The combination and arrangement of the piston packing, r, air passage c, and valve, v, in the manner and for the purpose specified.

4th, Discharging the completed box or other hollow article from the bottom of the mold, substantially as set forth.

5th, The molds, H, made with removable bottoms and permanent perforated linings, as distinguished from removable linings, substantially in the manner specified.

6th, The ways, W, in combination with the common bed plate of the molds, H H', for the purpose of allowing the latter to have a reciprocating movement to bring the molds alternately beneath the plunger, in the manner and for the purpose described.

7th, Forming a box or other hollow article from pulp, by forcing a plunger down into the mold containing the pulp of which the box or other article is to be made, as set forth.

REISSUES.

65,794.—MACHINE FOR FILLING CYLINDRICAL MOLDS FOR RUBBER GOODS.—Dated June 18, 1867; reissue 3,193.—John W. Cobb, Melrose, (for himself), and Edwin A. Hill, (assignee of John W. Cobb), Quincy, Mass

We claim the combination of a molding cylinder, M, and a grinding roller, R, substantially as described, and mechanism for revolving the two at different speeds, as and for the purpose explained.

Also, the combination of the pressure roller, S, the molding cylinder, M, and a grinding roller, R, substantially as described, and mechanism for revolving the molding cylinder and grinding roller at different speeds, as and for the purpose specified, the pressure roller having applied to it mechanism for revolving it at the same speed with the molding cylinder.

19,855.—ICE PITCHER.—Dated April 6, 1858; reissue 3,194.—Henry G. Reed, George Brabrook, and Henry H. Fish (trading as "Reed & Barton"), Taunton, Mass., assignees of Ernest Kauffman.

I claim, 1st, An ice pitcher having an attachable and removable lining, and a continuous or unbroken outer wall and bottom, when so constructed that the lining can be attached or removed through the top of the pitcher.

2d, The ice pitcher having the inner portion or lining, B, fitted to the outer portion or casing, A, with screw threads, or their equivalents, which make a tight joint, but provide for its ready removal and renewal, and replacement or renewal, as set forth.

70,272.—MODE OF LIGHTING STREET GAS BURNERS.—Dated October 29, 1867; reissue 3,195.—E. P. Russell (for himself) and Porter Tremain, (assignee of E. P. Russell,) Manlius, N. Y.

I claim a small supplemental burner, A, to be kept burning constantly, and the pipe leading thereto, when operating in connection with a main burner, substantially as and for the purposes set forth.

37,469.—MACHINE FOR STIRRING LARD.—Dated January 20, 1863; reissue 3,196.—William J. Wilcox, New York, N. Y.

I claim, 1st, The employment or use, for the purpose of stirring lard, of perforated or slotted dashers, E E', attached to staves, F F', which are secured to reciprocating rods or bars, C C', moving in opposite directions, all constructed, combined, arranged, and operated substantially in the manner herein shown and described; and also, the last above-mentioned parts, in combination with said tank, constructed, and operated substantially as above described.

2d, The combination of two or more dashers, moving backward and forward in the tank, in opposite directions to each other, substantially as described for the purpose set forth.

36,159.—SEEDING MACHINE.—Dated August 12, 1862; reissue 3,197.—Division A.—William M. Jones and D. W. Hall, Horicon, Wis., assignees, by mesne assignments, of W. M. Jones and S. E. Tyler.

We claim, 1st, The chamber or recess, n', formed on the inside the cap, K, and located between the seed opening in front of the cap, to allow the edges of the buckets or partitions to pass up under the cap without injuring the seed, substantially as described.

2d, Forming and arranging the cap, so that a space shall be left at the rear for the seed to begin to fall from the buckets as soon as they are turned far enough to cause the the seed to roll or slide over their edges, substantially as described.

15,659.—HARVESTING MACHINE.—Dated September 2, 1856; reissue 673, dated March 15, 1859; reissue 3,198.—Division A.—William A. Kirby, Auburn, N. Y.

I claim, 1st, The combination of the single plate, H, with the main wheel, substantially as and for the purpose described.

2d, Also the combination of the main wheel, K, single plate, H, and rim, L, when connected together and operating in the manner and for the purpose set forth.

3d, Also, placing a vibrating wheel on the outside of the main frame, or so that the outside of said frame does not bear on the outside of the wheel, in combination with the triangular shaped frame on the inside of the wheel, substantially as described.

4th, Also, hanging the seat to the plate, H, and to the standard, S, in the manner and for the purpose set forth.

5th, Also, a hinged lever seat, and outside supporter therefor, in combination with a wheel having no outside frame or support, substantially as herein represented.

6th, Also, in a harvesting machine having no outside suppors to the driving wheel, attaching a support for the driver's seat to the outer end of the axle of said wheel, substantially as described.

7th, Also, in a harvesting machine having its frame in two parts, and hinged together around the box containing the pinion shaft at one point, the plate, segment, and holding mechanism, at another point, for sustaining and holding the frame at any desired hight, substantially as described.

15,659.—HARVESTING MACHINE.—Dated September 2, 1856; reissue 673. Dated March 15, 1859; reissue 3,199. Division B.—William A. Kirby, Auburn, N. Y.

I claim, 1st, In a harvesting machine, with its frame wholly on one side of the driving wheel, and the driving wheel having no outside support, a foot supporting the driver on the side of the wheel opposite the frame, substantially as described.

2d, Also, in a harvesting machine with a frame wholly on one side of the driving wheel, and said driving wheel having no outside support, the making of the frame in two parts, one of which supports the driving wheel and a portion of the gearing, and the other part carries the other portion of the gearing, and forming a projection on one part of the frame around the pinion shaft, and a corresponding opening in the other part, which will pass over and around said projection, thus forming a joint, the center of which is coincident with the center of the pinion shaft, for the purpose of holding their gearing in position longitudinally, substantially as described.

3d, Also, in a harvesting machine, having its frame in two parts, one of which supports the driving wheel and a portion of the gearing, and the other part carries the other part or portion of the gearing, and jointed together by the projection on one and the opening in the other, as described, the use of the lug, flange, or guide, a, on one part of the frame, and a corresponding recess n, on the other part thereof, in which said lug, flange, or guide works, for the purpose of holding the two parts, with their gearing in position laterally, so as to prevent motion to either side, substantially as described.

64,554.—FRICTION PAWL.—Dated May 7, 1867; reissue 3,200 Jos. Moore, San Francisco, Cal.

I claim as an improvement in hoisting apparatus, a pulley, which shall be on the one hand, under the control of a brake, bearing upon its outer surface and, on the other hand, connected with the shaft by the pawl and ratchet device, or its equivalent, within the pulley, substantially in the manner and for the purposes set forth.

64,139.—MANUFACTURE OF STARCH SUGAR.—Dated April 23, 1867. reissue 3,201.—Narcisse Pigeon, Brooklyn, N. Y.

I claim, 1st, The within-described process of manufacturing a pure sirup, and crystallizable sugar sirup, from prepared fecula, cellulose, or other similar matter, by freeing it from salts, empyreumatic oils, &c., substantially as described, and by treating the matter so as to convert the whole dextrine, cellulose &c., into crystallizable sugar sirup, substantially in the manner above described.

2d, The within-described process of manufacturing a hard crystallized sugar from fecula, or other similar substances, substantially as herein set forth.

3d, The above-described part of my process, which consists in freeing the sirup of any acid, by the double neutralization, substantially in the manner above described.

50,016.—WEATHER STRIP FOR DOORS AND WINDOWS.—Dated Sept. 19, 1865; reissue 3,202.—Benjamin B. Savary, Boston, and Frederick O. Raymond, Haverhill, Mass., assignees, by mesne assignments of Isaac F. A. A. Lynch.

We claim, 1st, A weather strip, composed of two strips or pieces of wood and an interposed projecting strip of vulcanized rubber, or equivalent elastic material, united by tacks, or otherwise, substantially as herein set forth.

2d, The employment, with a weather strip of otherwise ordinary or suitable construction, of vulcanized rubber, held in and arranged to project from face of weather strip in contact with the door or other part to which said strip is affixed, substantially as and for the purposes herein set forth.

3d, The improved weather strip, as made with the strip of elastic material or india-rubber, c c, to project in opposite directions from the two faces of the divided holder or molding, a b, substantially in the manner shown, and described.

4th, The combination with the elastic strip, projecting from the rear face of the molding, as described, of the rebate, d, made in the molding, and arranged, with relation to the said elastic strip, substantially as specified.

56,457.—MACHINE FOR POLISHING ENAMELED PAPER.—Dated July 17, 1866; reissue 3,203.—Samuel Shepherd and Joseph Greeley, Nashua, N. H., assignees, by mesne assignments, of Samuel Shepherd and Ammi M. George.

We claim, 1st, The combination of a rotary polishing device with an endless carrying device, moving at a lower velocity than the polishing device, and supporting table, bed, or ways to the carrying device, substantially as herein set forth, for the purpose specified.

2d, the combination, with an endless carrying device to the paper or other material to be operated on, of a polishing device, arranged to reciprocate across the line or plane of feed, substantially as specified.

3d, Providing an elastic bearing for the paper or material under the rotary polishing device, by making either the endless carrying device, or support upon which it rests, elastic, substantially as herein set forth.

4th, Giving the rotary polishing device a reciprocating movement transversely to the feed, as produced by the endless carrying device, simultaneously with its rotary motion, substantially as herein set forth, for the purpose specified.

5th, The pressing plate, T, applied in relation with the rotary polishing device, and endless carrying device, and support or ways to the latter, substantially as herein set forth, for the purpose specified.

DESIGNS.

3,236.—PRINTERS' TYPE.—David Bruce, Brooklyn, N. Y., assignor to David Wolfe Bruce, New York City.

3,237.—RAY SHADED PRINTERS' TYPE.—David Wolfe Bruce, New York City.

3,238.—CLOCK CASE.—Paschal Converse, New Haven, Conn.

3,239.—COACH LAMP GLASS.—James H. Downs, (assignor to C. Cowles & Co.), New Haven, Conn.

3,240.—COACH LAMP.—James H. Downs, (assignor to C. Cowles and Co.), New Haven Conn.

3,241.—CARPET PATTERN.—Israel Foster, Philadelphia, Pa.

3,242.—CARPET PATTERN.—Israel Foster, Philadelphia, Pa. Two Patents.

3,243.—FRUIT JAR.—Alonzo French, Philadelphia, Pa.

3,244.—ORNAMENTAL TYPE FOR PRINTERS.—Julius Herriet, (assignor to David Wolfe Bruce), New York City.

3,245.—ORNAMENTED PRINTERS' TYPE.—Julius Herriet (assignor to David Wolfe Bruce), New York city.

3,246.—SCALE DISH.—John W. Kissam, New York city.

3,247.—LADIES' COLLARS AND CUFFS.—Robert Macdonald, New York city.

3,248.—FLOOR CLOTH PATTERN.—Charles T. Meyer, Bergen, N. J., assignor to Edward C. Sampson, New York city.

3,249.—CLOCK CASE.—Carl Muller, New York city.

3,250.—PRINTERS' FLOURISHES.—Conrad Reuter, Cincinnati, Ohio.

3,251.—TRADE MARK.—Edgar A. Robbins, Wrentham, Mass.

3,252.—CUSPADORE.—Samuel Roebuck, and John Roebuck, New York city.

3,253.—CLOCK CASE.—Solomon C. Spring (assignor to Welch, Spring & Company), Bristol, Conn.

3,254.—TRADE MARK.—David W. Storer, Bangor, Me.

3,255.—HARNESS TRIMMINGS.—Charles M. Theberath, and Jacob H. Theberath, Newark, N. J.

3,256.—BRANCH OF A GASOLIER.—James Frederic Travis, New York city.

3,257.—TRADE MARK.—Edwin H. Turner, Quincy, Ill.

3,258.—TRADE MARK.—Michael Werk, Cincinnati, Ohio.

3,259.—STEAM BOILER PUMP.—Leonard Egleston (assignor to Ramsey & Company), Seneca Falls, N. Y.

3,260 and 3,261.—TRADE MARK.—D. Foerster, Zanesville, O.

3,262.—STANDARDS OF A SCHOOL DESK.—Calvin W. Sherwood, Chicago, Ill.

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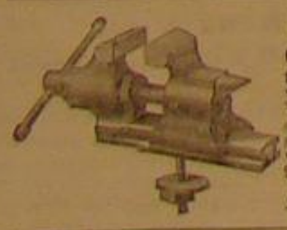

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Fig. 1 is a perspective view of the machine for cutting moldings of any desired pattern, on curves, regular or irregular, and of any radii required. There are two up right cutter heads projecting above the top or table of the machine, driven by belts on flanged pulleys or drums, from a counter shaft, provided, as usual, with fast and loose pulley. Instead of raising or lowering the table to adjust the work to the cutters, as is generally done, the cutter heads and their shafts, boxes, and pulleys, with a frame in which all are held, are raised and lowered by means of a screw, gear, and a pinion on an up-right shaft, to each cutter head, so that one works independently of the other. The upright shaft, carrying the pinion at its lower end—that gives motion to the gear and screw directly under the cutter-head frame—has a bevel gear on its upper end connecting with a similar gear on a horizontal shaft under the table, provided at its outer end with a hand wheel conveniently situated for the hand of the operator even when he is intently engaged in guiding the stuff to be cut.

Fig. 2 is the same machine as Fig. 1 with the addition of a guide for cutting either straight or waved moldings. The guide is a plate which is held to the table top by two bolts for straight moldings. The guide is adjusted by means of horizontal screws at either end and held by set screws. The stock to be cut is fed between the guide and cutter-head by a roller on an upright shaft receiving motion by means of a belt, A, from a similar vertical shaft, B, that is driven by a belt from the counter shaft. This belt is taken from a cone on the counter to a similar cone to allow a change of feed. The shaft of the latter carries a worm that revolves the shaft, B, and consequently the feed roller. Buffers or spring guides, against which the stuff to be cut impinges in its passage, hold it well up to the vertical guide.

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Fig. 3 is an enlarged view of the cutter head used on both these machines. It is a combination of cutter head and rotary plane stock. Cylindrical flanges project downward from a disk or collar fitting the head stock and secured by set screws. These dished collars may be made of different sizes to suit the varying projections of the cutters from the head. In doing irregular work, where it is necessary to hold the stuff by hand to the cutter head, there has been danger of mutilating the hands by a sudden and undue action of the cutter upon the stuff in starting into the work. This has been a serious objection to other machines which this improved machine for irregular work has entirely obviated, it being impossible for an accident of this kind to occur. With this cutter head six or more cutters may be used at once to form a single molding; these may be transposed, producing over thirty different forms with the same cutters, at a great saving of time and labor. The cutters may be set at such an angle that they may cut against the grain without splitting the wood.

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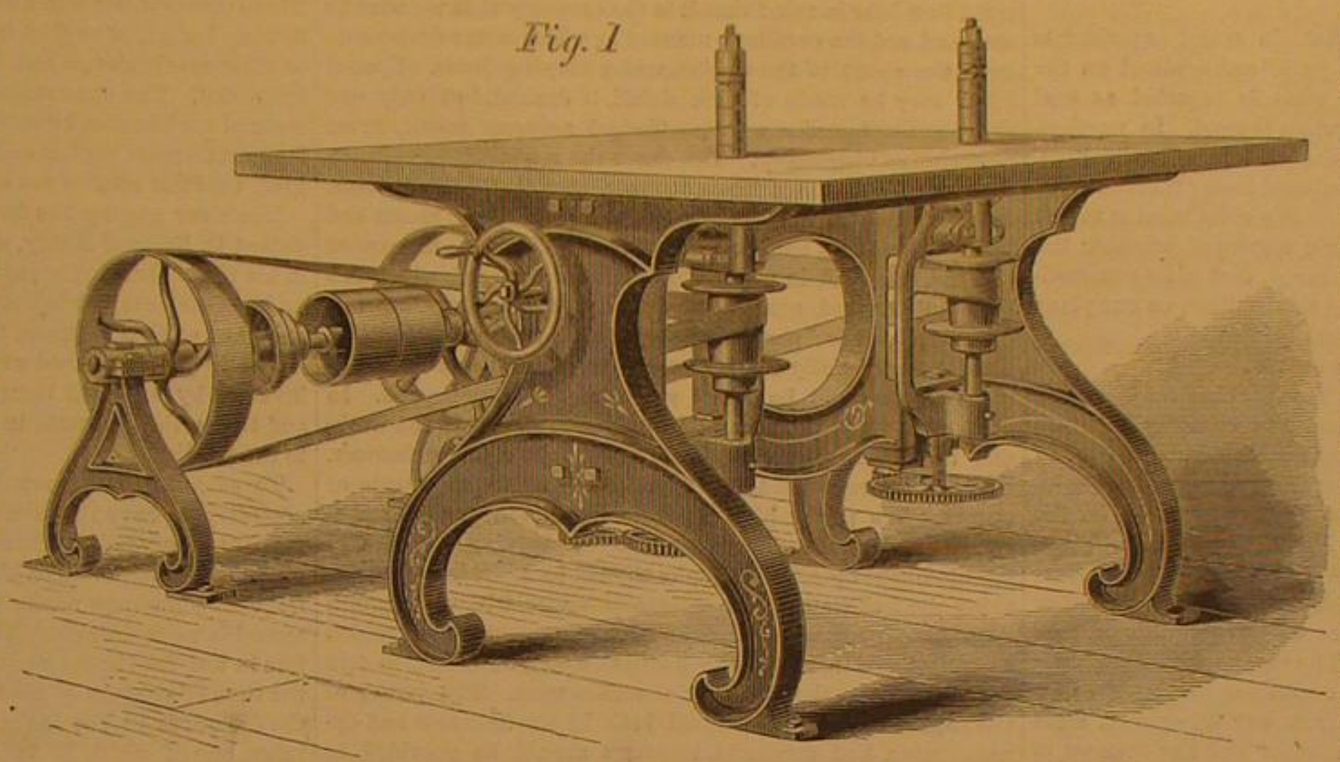
Fig. 1



GROSVENOR'S IMPROVED VARIETY MOLDING MACHINE.

Fig. 3

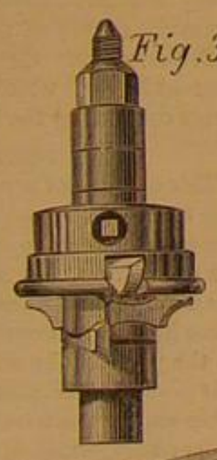


Fig. 2

Grape Shot.

"We have to record the demise of a distinguished and well-tried servant of the public, one of the very oldest members of the artillery service. Grape shot is no more. Who shall say when the career of this ancient projectile commenced? It was probably contemporary, or nearly so, with the introduction of artillery; for, without too nicely specifying particular patterns it may be said to have had its origin in the charges of old nails, coarse gravel, bits of iron, bolts, and the like, which, under the comprehensive term of "longridge," were used by artillerists as early as the fourteenth century. The little bags filled with stones of this epoch, and the canvas cartridges containing small iron balls, of a later time, furnish more exact prototypes of the modern form of grape, which consisted of an iron plate and spindle, piled round with iron balls enclosed in a canvas bag, the whole being "quilted" with a strong line and painted. The name "grape" was derived from the sort of rude resemblance which this projectile bore to a bunch of grapes. Outside the service, this is the form of grape best known; but, strictly speaking, it was superseded forty-six years ago by a description of grape known as "Caffin's pattern, after its inventor. The Caffin's grape, although approved in 1822, was not generally made until 1856, and it never quite shouldered the old-fashioned sort out of service, for to this day there exist at most stations stores of the latter, the greater part of these stores no doubt in an unserviceable condition. The Caffin's grape consisted of four tiers of circular iron plates, inclosing between them iron balls, and connected by an iron spindle which is passed through the centres of the plates. The old-fashioned grape never got over the shock inflicted by the introduction of this new pattern, and of late years its identity has become merged in great measure in case or "canister" shot, cylinders of tin or iron filled with balls. By increasing the size of these balls, and by improving the construction of cylinders themselves, a projectile, which was first known as "case-grape" was made to do duty at once for case and grape; and a recent order has removed the old grape shot from the list of British service stores. So distinguished a servant cannot, however, be allowed to take its departure, to mingle its ashes with those of the chain and bar shot of earlier ages, without a word, if not a tear, of regret. Its glory has been great in its day. Many and manya fine fellow has gone down before its fierce blows; many a breach has been swept by its whistling showers; the torn and shattered riggings of many a hostile ship have borne eloquent testimony to its destructive powers. But it is now among the hings which have been improved off the face of the earth—off this English earth of ours at least. Among the changes and developments of modern artillery science it has found its rest. Grape shot, *pur et simple*, grape as the sailors of Nelson's day and the soldiers of Wellington knew it, is no more. A sort of hybrid projectile, a little more of case and less than grape, a projectile of superior destructive and more enduring powers, will henceforth take its place, and satisfy the requirements of a more critical age."—*London Pall Mall Gazette.*

The above may mislead inquirers. Whatever may be the orders of the British Admiralty or the ideas of the *Pall Mall Gazette*, it is certain that grape shot is not yet driven from our Yankee gun provender. It did efficient service in our late war and is good for similar service in future wars, unless we invent something more destructive for action at close quarters. We do not use "four tiers of iron circular plates, enclosing between them iron balls, and connected by an iron spindle which is passed through the centres of the plates." Our style of grape shot is simply two plates, suited to the bore of the gun, held apart by a coiled rod of iron wire, one-quarter of an inch in diameter, the coils being close enough to hold the balls—of one and a half inches diameter—the two heads of the cylinder guiding the charge into the gun, but by the force of the explosion flying apart and releasing the balls on the

discharge of the gun. If our English cousins choose to dispense with the grape shot, we do not. It has served us too well to be rejected, until something better is contrived. Does the "case-grape" of the *Gazette* fulfill the conditions required?

THE BEST MODES OF TESTING THE POWER AND ECONOMY OF STEAM ENGINES.

BY CHARLES E. EMERY, LATE OF THE U. S NAVY AND U. S. STEAM EXPANSION EXPERIMENTS.

Read before the Polytechnic branch of the American Institute, Oct. 22, 1868.

(*Concluded from page* 354.)

The next step is to find the quantity of water evaporated from a constant temperature, say 212°. From formula or tables find the total heat of the steam due to its mean total pressure; from this deduct the total heat which the water contained before entering the boiler. The result is the number of units of heat imparted to each pound of water. Divide this by the latent heat of steam at 212°, and multiply the quotient by the total number of pounds of water evaporated at the observed pressure. The result will be the total evaporation from our supposed temperature of 212°, and at atmospheric pressure, which divided by the total amount of coal burned, or, if desired, by the combustible, gives the the final result, in the usual comparative terms, viz., The Number of Pounds of Water Evaporated per Pound of Coal (or combustible). The coal may be corrected to a uniform rate of 10 per cent refuse, as has been before explained.

We have reason to suppose that, in many experiments abroad, the ashes were "weighed back" and credited on the coal account; in other words, that what is reported as coal was really only the combustible portion thereof. In purchasing coal we pay as much for the ashes as for the combustible, and ships must carry both, in a combined state; therefore, the report of every experiment should clearly state what is meant by the word coal, if that be the term employed, whether the weight of the coal, as actually purchased, that of its combustible, or a weight proportioned to the combustible, on our plans of correcting to a standard of 10 per cent refuse.

II. TESTING ENGINES.

We will examine, first, a simple mode which may be practically applied in every case, to test the economy of steam machinery, in the actual performance of its regular duty. In ordinary trials, where but little care and expense can be afforded, the engine and boiler must be tested as a whole, the comparison being made by "The Number of Pounds of Coal Consumed per Indicated Horse Power per Hour." The indicator is used to measure the power, because, as has been before explained, it is the simplest device we have for this purpose and most generally applicable. The results will be of little valve, however, except under the conditions hereinbefore expressed. We first desire to give, from our experience, some directions about the use of the indicator and the manner of attaching it to the engine. Since the invention of the "Richard's", or "Porter Indicator," the direct acting instrument known as the "McNaught Indicator" has fallen into disuse, except on engines working very slowly. We will make our remarks more especially applicable, then, to the first instrument, often called the "parallel-motion indicator." Before using the instrument, see that it is correctly made and in good order. To do this, examine the piston, see that it moves freely, without shake, through the entire length of the cylinder; see that the spring screws down squarely on the piston and does not tend to one side, and thus make friction in the guide of the piston rod; examine every joint and see that is free, without shake; see if the two links are parallel at all times and the radius arms at mid-position—if not, the arrangement is not a parallel motion and must be corrected; see that the arm carrying the levers has no vertical shake; see that the barrel runs true, and adjust a pencil in place to bear lightly upon it. The scale of the indicator should be tested by a mercury gage and the mark on the spring corrected accordingly. This is important, for the reputed scale is rarely correct and during repairs is often varied. The instrument should never be connected to the cylinder ports, nor in any position where a current passes the connecting pipe. The connections should be large, short, and direct. Be careful to give the barrel the correct reduced motion of the engine piston. Other details may be arranged as convenient. The instrument should be thoroughly heated before taking a diagram or marking the atmospheric line. The pencil should be made to bear as lightly as it will make a mark, and it should be allowed to run over the paper several times. Both ends of the cylinder should be indicated.

Before beginning an experiment, both engine and boiler should be in an average working condition. At the commencement, the fire should be clean and its thickness noted. The contents of the ash pit should be removed and the coal be weighed the same as in testing boilers. Indicator diagrams should be taken once an hour, or every half hour, or even less, if the load varies considerably. The pencil should be allowed to remain on each diagram a considerable time, in order to get a fair average. A register or counter should be attached to the engine, the indications of which should be noted at the beginning and end of the experiment and every even hour intervening. If a register cannot be obtained the revolutions should be counted and recorded every fifteen minutes. This should be continued not less than eight hours, and a longer time is preferable. At the end of the experiment the fire should be clean and of the same thickness as at the beginning, the same as in testing boilers. A log should be kept during the progress of the experiment, showing the time, pressure of steam, revolutions of engine, weight of coal and ashes, and other matters of interest. The calculations are simple and need not be detailed. We will here remark that the fault with most experiments is the short time for which they are tried To ascertain accurately the consumption of fuel in a given case requires, as has been said, at least eight hours continuous action, and the mean power cannot be obtained, in many instances, in much less time. A single diagram, taken occasionally, gives little idea of the actual power exerted, for, in every manufactory, the load is constantly changing. It is more than probable that the excellent results claimed in many cases are obtained by calculating the power from a diagram taken with the full load on, and the cost of the power from the average coal, or, worse yet, from the coal which is thrown in the furnace in any particular hour, without noticing whether the fire is heavier at the beginning of the hour than at the end. A manufacturer's coal bills always tell him what his steam power has cost for a given time, but his 100-horse power engine might have been exerting, on the average, only 50-horse power, so without actual and careful observation, no results can be obtained of any value to the engineering profession. The only true way is to make thorough trials and repeat them until the results practically coincide.

When the power of the engine is measured by a dynamometer, the same care should be taken to frequently record the revolutions of the engine and the indications of the instrument, so as to be able to calculate the true average power. Fuller reasons, for such precautions have already been given in the preceding discussion.

We are now prepared to select the methods and means necessary for a scientific trial of the economy of steam machinery, which shall be complete and above criticism. We must first bear in mind that it is the economy that we wish to test, and not the excellent manner in which some device controls the speed of the engine, under varying loads. Special trials may be made of each detail, if desired, but only one thing can be tested at a time. To get accurate result, great uniformity is necessary. The closer the resemblance between the records at different times, the more correct will be averages. It is essential, then, to carry a uniform pressure of steam and to have a uniform load and speed to the engine. In regular practice, the load is necessarily varied somewhat, which can only be provided against by frequent observations, but our remarks are more particularly applicable to an establishment fitted up especially to test steam machinery, and in other trials details must be varied according to circumstances. In such case the boiler should be of ample size to do the work, and the pressure should be regulated by a steam damper. The resistance should consist of wind or water wheels or pumps. We prefer high speed fans or blowers, as the resistance can then be easily regulated by varying the size of the discharge openings. Tanks should be provided for measuring the feed water of the boiler,and it would be well, though not strictly necessary, to have a surface condenser from which to collect and measure the distilled water, and thus, in two ways, ascertain the quantity of steam used. The power of the engine should be measured both by the indicator and dynamometer, and duplicate registers should be provided to count the revolutions. The better plan, in order to give the same area of indicator diagram, is to use, in each experiment, a cut-off fixed at any desired point, and not use the governor. In such case special means must be provided to keep up a uniform lubrication, which, with the uniform resistance proposed, will secure uniform speed.

When experimenting, the coal should be weighed and the feed water measured or weighed, with all the accuracy required for testing boilers. At the same time indicator diagrams should be taken at least once an hour and the reading of the dynamometer recorded. A record should also be kept of the time, revolutions of engine, steam pressure, and the temperature of the feed water, and in a condensing engine, of the hot well and circulating or condensing water. The temperatures of the engine and fire rooms, and of the external air, should also be noted, to show the effect on condensation in the pipes and passages. The direction and force of the wind are also useful, to show its influence on the fires. Barometrical observations are essential to show the true zero of the steam pressures.

Experiments conducted thus carefully, and with such apparatus, would furnish results of the greatest value to science. Each trial would show the economy of the boiler and of the engine, also the friction of the engine and its load, and the net power and its cost, besides affording much valuable information to aid in the explanation of the losses which now exist in the steam engine, and suggesting improvements in its construction. The United States Expansion Experiments were tried substantially on this plan, but were stopped when results of the greatest interest were being obtained. Could an establishment be now opened to manufacturers and inventors, how much capital, physical exertion, and mental anxiety could be saved, and how greatly the steam engine might be improved. Without such a place, however, much good can be done if every engineer will carefully use the means at his command and record the results. The awards at all our Fairs should be based upon trials and not upon mere opinion. We trust that this Institute will hereafter, as it has commenced, adopt this principle in all possible branches of their exhibitions; and we request that its members will assist us in promulgating the necessity of impartial and careful accuracy in all trials and statements relating to steam machinery.

The Yankees are an ingenious people. Let us assist in directing this ingenuity into scientific channels, and the character of the result may be judged from the present advanced position of our high pressure engines. By fully discussing the subject of economy and generally circulating complete records of competitive trials, an important branch of industry will be stimulated, all classes benefited, and American engineering become the standard throughout the civilized world.

A PRACTICAL acquaintance with the hand tool will save the machinist many hours of vexatious labor.

SCIENTIFIC OBSERVATIONS ON THE SUPPLY AND OUTFLOW OF THE NORTHWESTERN LAKES---THE METER AND METHOD OF USING IT---RESULTS OF THE OBSERVATIONS.

From the Detroit Post.

It is now about two years since the newspapers of the West began to discuss whether the great lakes are fed by subaqueous springs or have hidden outlets. The parties who favored the theory of subaqueous springs, asserted that more water flowed out the St. Lawrence than could be poured in by all of the sources of supply known to exist; while the upholders of the idea of hidden outlets contended that evaporation and the visible outflow could not account for all the water which the lakes received and distributed. Both sides found encouragement for their views, in the fact of the periodic rising and falling of the waters in the lakes; in that of the occasional sudden and rapid increase and decrease from the mean level of the waters; and in other phenomena which had been observed to exist. However, no one had given the matter a complete investigation, although it was one of some scientific as well as popular interest. General W. F. Raynolds, Superintendent of the Lake Survey, determined to give the subject such consideration as, in the West, could only be afforded by the engineers employed on that work, and accordingly, for the past two summers, observations have been made in the Ste. Marie's, St. Clair, Detroit, Niagara, and St Lawrence Rivers for the purpose of ascertaining the exact amount of outflow of the lakes. These observations will also and in fixing the general laws of flowing bodies, a subject in which the owner of every mill, or other machinery, which is driven by water-power, is directly interested. The observations already made, tend to unsettle some of the theories heretofore received. The apparatus used is so much more perfect and delicate than anything else of its kind that the results are of great value.

The river gaging has from the start, been intrusted to Assistant D. Farrand Henry, of this city, who has succeeded well in his task. During the summer just past, he had three parties, under Assistants Lewis Foote, A. R. Flint, and Mr. Wallace, stationed at Fort Niagara, Ogdensburgh, and St. Clair.

The implements used are peculiar to the work, and were invented by Assistant Henry. The result of his observations, and the method pursued in making them, will be interesting to the public.

To calculate the amount of outflow of any stream, it is necessary to have the area of the body of water, and its mean velocity, at any point. These two quantities multiplied together give the discharge. The first is easily obtained by making frequent soundings across the stream on a known line. The second is more difficult. The only practical methods heretofore in use, for the determination of the velocity are, first, by the time of passage of floats past a known line; second, by the difference in the hight in which water will stand in two tubes, one of which is bent toward the current at the bottom and the other is straight; and, third, by water-mills, as they are termed, which consist of float wheels exposed to the current, the number of revolutions being recorded by a system of decimal gears or telltale. Of these methods, the first is the only one which has been used in deep water.

During the first season Assistant Henry adopted the first method, using the double floats used by Generals A. A. Humphery and A. L. Abbott, of the Corps of Engineers, in their hydraulic survey of the Mississippi River. Being dissatisfied with the results then obtained, he devised a "Telegraphic Current Meter," which he has successfully used in the several rivers connecting the lakes during the past season.

DESCRIPTION OF THE METER.

This consists of a propeller or float wheel, which has on its hub an eccentric, and on the axle an ivory lever, which has one end kept on the excentric by a light spring, while into the other end a hole is drilled, meeting another hole, drilled at an angle with it, near the center of the bottom side. Into these holes a platinum wire is forced, so that the lever rests on the point of the wire coming out of the center hole. Under this point a small platinum plate is fastened to the axle. The other end of the wire is connected by a hinge joint to a long copper wire, which is fastened to the axle, but insulated from it. At the rear of the axle are two vanes, at right angles to each other, sufficiently large to keep the wheel in the thread of the current. The whole is suspended by a yoke which has two small eyes on its side.

THE METHOD OF USING.

The method of using the meter is as follows: A boat being anchored in the stream at the point where the current is to be tested, a weight with a copper wire attached is let down from the stern. The upper end of this wire is fastened to a spring pole, which takes up most of the motion of the boat. This wire is passed through the eyes on the side of the yoke in the meter, a measured cord is fastened to a swivel ring in the upper, and a weight to one in the lower end of the yoke. The meter may now be lowered to any depth, sliding down the anchored wire, and the upper end of this wire and of that are fastened together with the platinum point, being connected with a battery in the boat, then at every revolution of the wheel the circuit will be opened and closed by the eccentric, raising the ivory lever, and thus breaking the connection between the platinum point and plate. If now a Morse's paper register be placed in the circuit, at ever revolution of the wheel a dot will be made on the moving paper, and thus the number of revolutions in any given time can be ascertained. For some determinations the Morse register was used, but on account of the amount of paper required, and the labor of counting the dots, the "counter" was generally preferred. This consists of a sounder register, in front of which a frame is fastened, carrying two gear wheels of 100 teeth each, the rear wheel having on its axle a ten-leaved pinion, with which the forward one engaged. On an extension of the armature

lever is an ordinary escapement reaching a little past the center of the rear wheel, and wide enough to allow it to move freely when the armature is at the middle of its movement. The pallets engage the teeth of the wheel in such a manner, that the wheel is drawn forward one tooth each time the armature is drawn down and released, and, therefore, at each revolution of the wheel. Thus the meter can be raised and lowered on the anchored wire, can be allowed to run for any length of time at one place, and the counter can be stopped or started at any moment by a simple switch.

RESULTS OF THE OBSERVATIONS.

The observations in the river were taken on a known line, 100 feet apart, and at each five feet of depth. One of the first things noticed, was the irregularity of the beat of the counter, showing that the current pulsated. This has since been found to be the case in canals, mill races, streams, wherever it has been possible to place the meter, and it seems to be a general law of water in motion. This instability of the current had been previously noticed by Mr. James B. Francis, civil engineer, of the Lowell Hydraulic Works, in the irregular motion of floats.

The pulsations are not regular, the common maximums being from one-half to one and a half minutes apart, with every five or ten minutes a greater increase or decrease. They are least in the maximum current, and increase toward the bottom and sides of the stream.

The observations give the number of revolutions of the meter, but not the actual velocity of the current. To obtain this the coefficient of each meter, or the number by which the revolutions must be multiplied to obtain the true velocity, must be found. This can be ascertained by letting the meters run in a current of a known velocity, or by drawing them through still water. The first method being impracticable, the second was used.

Two of the meters were fastened below a small boat, which was drawn at different velocities, over a known distance in a quiet pond. It was found that the number of revolutions increased with the increase of the velocity.

One of the meters was made by taking the hemispherical cups of a Robinson's Anemometer, made by James Green, and running them in a frame upon two steel points. There was so little friction that the meter would turn in a current of a little over two-tenths of a foot, a second, or one seventh of a mile an hour. D'Aubuison gives the ratio of the resistance of plane surface, to that of a hemisphere drawn through still water to be as 100 to 35, and from this the co-efficient of three used in Robinson's Anemometer is taken. But these experiments show that when the velocity is half a foot a second, the ratio is 100 to 29 nearly, and at four and a half feet per second as 100 to a little more than 41 ; the mean being about the same as that given above. These quantities do not, however, increase in a direct ratio, but nearly in the curve of a parabola, so that in velocities exceeding three miles per hour, the coefficient should be from two and a half to two. This is an important fact for these meteorologists who are using this instrument for the determination of the velocity of the wind. This coefficient being thus found for each velocity, it is only necessary to multiply the number of revolutions by it to obtain the true velocity of the current.

Assistant Henry is at present engaged in running all the meters used together in the river here, to obtain the coefficient of each machine by comparison with those whose coefficient has already been obtained in the manner above stated.

The maximum velocity of the current was found to be at or a little below the surface, and the velocity at the bottom is probably not over two-thirds the maximum.

The following approximate velocities and discharges of the different rivers is taken from the computations of the work last year. The quantities for the Detroit River are computed.

RIVER.	Maximum velocity.		Mean velocity		Disch'ge cubic feet per second.
	Ft. per second.	Miles per h'r	Ft. per second.	Miles per h'r	
Ste. Marie's	1.921	1.30	0.957	0.66	90,783
St. Clair	4.544	3.09	3.514	2.39	223,726
Detroit	4.000	2.71	3.000	2.04	236,000
Niagara	3.570	2.32	2.253	1.54	242,494
St. Lawrence	1.462	1.00	0.954	0.65	319,943

THE MANUFACTURE OF ARMS IN PERSIA.

FABRICATION OF GUNS.

The manufacture of arms has always been one of the principal industries of Persia. The muskets of the old and celebrated manufacturer Mustapha, are still worth from $400 to $500 each, and all armorers follow the same methods which have been used by thisf amous master For the making of a gun, two old horseshoes are taken together with small pieces of old iron, so that the whole weighs nearly fifteen *sirs*, which is not quite two pounds. In the heating the small pieces are arranged in such a manner that the horseshoes form the outer rim. When a proper degree of softness has been attained they are welded on an anvil. This process is repeated for several times until the iron obtains a length of two feet and a quarter. When twelve such bars are obtained, they are bound together and then welded ; the bar obtained is cut in pieces of such a size that four or six will form the desired weapon. These bars are then twisted and welded together, the resulting piece is afterward bent and again welded to one bar which finally is turned and bored.

If the barrel proves satisfactory it is polished in order that the various twist marks may appear, which are produced by the different qualities of iron. It is afterward coated with a paste of two parts of sublimed sulphur and one part of sea salt, and left for twenty-four hours in a warm room, and being cleansed is then ready for sale. The price of a rifle as made now-a-days varies from $40 to $80, and that of a pistol from $18 to $40. These guns generally possess locks but often they are also fired by a fuse. In the southern part of Persia we find the infantry armed with such weapons. Their chief manufacturing place is Laar. This weapon is partly supported by a kind of fork which is fastened at the extremity of the barrel. The percussion guns are exclusively of European manufacture, the best of which are considered to be made in England, which can only be bought by the nobles. The common classes satisfy themselves with the products of native or Belgian art.

The Persians are good target shooters, and very fair sportsmen so far as ordinary shooting is concerned, but they are very poor on the wing.

THE MAKING OF DAMASK STEEL.

The blank weapons consist either of damask, ordinary steel, or iron, of which the smelting of the first is an industry peculiar to Persia. There exist various kinds of damask which we propose to describe as follows :

1. *The Indian damask.* It is made at Lucknow. All the workmen are Persians, one of the manufacturers being known from antiquity. His name is Mirza Hussein Chirazi. The said damask consists of three parts silicate of iron, one part cast iron, and two parts very pure iron. These substances are put in crucibles which contain five to forty *miskals* (25 to 200 grammes) ; the latter are then set in a furnace and kept therein for six days at a strong heat. Such furnaces are made to contain from 10,000 to 12,000 crucibles. When the metal is solidified they are broken to pieces, the iron being brought in an annealing oven and kept therein for forty-eight hours, where it is left to cool slowly. If this precaution is neglected the damask becomes brittle as glass does, and is then useless.

2d. *The damask of Kaswine* is entirely made in the same way, but instead of common iron the heads of old horseshoe nails are taken.

3d. *The damask of Khorassan.* This is superior to those already mentioned. Since the supremacy of Nader-Chah, who destroyed all its ovens, it is no longer manufactured.

4th. *The damask of Arsindgan, Neres, and Schiras,* is sold for an equal weight of gold, there being very little in existence, as all the furnaces of those places have been destroyed long ago and never rebuilt.

The damask of Khorassan possesses dark designs and is very brilliant. That of Kaswine possesses a gold-like reflex. The designs are intertwisted, presenting in general a series of circles.

The armorers buy the damask, the quality of which they know from long experience. For the purpose of testing it they heat, for instance, a piece to red heat and forge it then to a length of one foot and a half. If scintillation takes place it is considered of a bad quality, and also when the surface does not present a perfect evenness.

Railroad Bridge Across the Mississippi.

On the 7th of November the formal opening of the Quincy (Ill.) Railroad bridge across the Mississippi river took place, making an unbroken railway line from the East, viâ Chicago, to Kansas City on the Missouri. When the bridge at this place shall be finished the through line will penetrate the heart of Kansas. We copy from the Chicago *Railway Review* the following description of the bridge :

"The first stone was laid Sept. 25th, 1867, the last, August 5th, 1868. Its total length, including embankments, from the Chicago, Burlington & Quincy to the St. Joseph Railroad tracks, is about two miles. The draw portion of the bridge spanning the main channel of the river consists of two spans of 160 feet each ; and the main bridge consists, otherwise, of two spans of 250 feet, three of 200, and eleven of 157 each—making a total, with the mason work, of 3,250 feet. The embankments and trestle work between are 1,400 feet in length. Bay bridge, 613 feet ; one draw, 190 feet long, and four spans of 85 feet each. The bridge is elevated ten feet above high water mark, and twenty feet above low water mark, on stone piers. The masonry and foundations are the work of the Bridge Company, under the direction of the Chief Engineer. The superstructure is of iron, on the Pratt truss principle. Every piece of wrought iron in the ties, links, bolts, etc., was tested in a hydraulic press up to 23,600 pounds to the square inch, and struck with a hammer, while under tension, before being used in the bridge. Theoretically, the strength before the effect of the load becomes apparent in stretching is 28,000 pounds to the square inch ; while the ultimate strength is 60,000 pounds to the square inch. The bridge is so proportioned that a train of two locomotives and the heaviest freight cars strain the iron only about 7,500 pounds to the inch."

The tests made were these :

Three of the heaviest locomotives were coupled and placed at rest centrally upon the span 250 feet long, and the deflection or yielding of bridge very accurately observed by means of instruments. The total weight of the load was 300,000 pounds, and the maximum deflection at the center of the span was 2·4223 inches, being one-sixteenth of an inch less than the deflection previously calculated.

The same load was then placed upon a span 157 feet long, and a deflection produced of 1·375 inches, which varied but little from the result of previous calculations.

The three locomotives, still coupled, were then run over the 157 foot span several times, at rates of speed varying from ten to sixteen miles per hour. The deflection produced was 1·406 inches, being an increase of only 3·1 inches over flection while at rest. Probably no severer strain than the above will ever be applied to the bridge in actual use. In each case, on the removal of the load, the bridge at once resumed its previous form.

The strain applied to-day was 5,100 pounds to the square inch of wrought iron, and 5,800 pounds per square inch of cast iron.

On the 157 feet span, the strain applied was 9,000 pounds to the square inch on the wrought iron, and 10,200 pounds to the square inch on cast, being about one-quarter more than the strain produced by the passage of the heaviest freight trains. All the wrought iron had been tested before being used by a strain of 23,000 pounds per square inch. Specimens of the wrought iron which were subjected to the ultimate strain, broke only at from 60,000 to 80,000 pounds per square inch. The total cost of the structure was $1,500,000.

Improvements in Steam Navigation--How they will Affect the Old World.

The London *Spectator* has the following :

"Suppose it true, as many men of mark and science believe, that the next great step may be in sea-going steamers, that international communication may be accelerated as internal communication has been, that we may yet see New York brought within two days' journey of Liverpool. The probability is that in ten years every social condition now existing in Europe would have ceased to exist, that the millions who toil for others, and on whose toil modern society is built, would choose to toil for themselves, would precipitate themselves in a rush, to which all the movements of mankind have been trifles, upon the new world. Suppose the population of Britain and Germany reduced to ten millions each—a change less in magnitude than that which has occurred in many countries—and these ten millions only retained by advantages as great as the new world can offer, what would all the changes of the past half century be to that? This may happen, even without any application of Stephenson's great idea—the one idea he never worked but—that if engineers, instead of trying to increase the power applicable to driving ships, were to reduce the friction which retards ships, the world would speedily be one great parish. This writer, who has seen many countries and lived among many races, seriously believes that of all the dangers to which Europe and European society are exposed none is so formidable as the passion for emigration ; seriously doubts whether, if education once spreads in Europe, it will be possible to retain its population cooped up in their narrow and half exhausted corner of the world. We think, we English, that we know what emigration is ; but we know nothing about it, have no idea of the changes it would involve if aided by the whole force of the masses then in possession of the supreme political power. Suppose those five-sixths of the Englishmen who now work for others choose to go elsewhere and work for themselves. The change between Waterloo and Sadowa would be very slight compared with the change between 1868 and 1918, and there is not a sensible man in England who will declare that alteration beyond the reach of thought. Why should not emigration in England and Germany attain the height it has reached in Ireland, and the masses insist on aiding it through the national fleets. The Irish would if they had the power, and the British have this year the power conferred on them. We say nothing of a discovery which, if it is ever made, will remold all human society, slowly pulverize all differences among nations, fusing the world into one people, and immediately destroy all existing political arrangements—the discovery of a means of maintaining and guiding a raft ten feet or so in the air ; for we cannot resist a totally unreasonable impression that the discovery will be made ;t hat progress will not in our time make that astounding leap. Apart altogether from that, there are physical forces now at work strong enough to change the whole face of the world, by shifting its populations."

The Process of Watch Manufacturing.

Some years since we were very much interested in a work in which the process of chromo-lithography was illustrated by a series of pictures, the first plate showing the impression of one color only, that is, the portions of the picture in which this color was to appear, the next had the impression of another in addition to the first, and so on through some twelve or fifteen different plates, each picture approaching nearer and nearer to perfection, till at last we had the complete and finished whole.

We were reminded of this a few days since by seeing at the establishment of Messrs. Howard & Co., 619 Broadway, the different parts of a chronometer balance wheel of a Waltham watch, commencing with the simple rings of brass and steel in the rough state, and in a series of some ten or twelve pieces, showing the process of manufacture of this delicate part of a watch as made by the wonderful machinery at Waltham.

We had no idea of the many changes this little wheel has to undergo before it is ready for use, and all who are interested in such matters are advised to call on Messrs. Howard & Co., who will take pleasure in showing these articles to those who may desire to see them.

Size versus Numbers.

The Report on Obstetrics of the Medical Society of Illinois, while it states that only 653 births have been reported, humorously says :

"Our Western mothers are only keeping pace with the rapid and extraordinary development in the great West. Our wide spread and deep-soiled prairies, all must admit, produce larger corn, and more of it, than States further east are capable of doing. No one need now be surprised at anything in the great West, especially at large babies in Illinois ; for we can feed, take care of, and raise more of them than any other State of equal population on the globe."

The committee is impressed with the belief that children in this country are larger than statistics show them to be in the European States. Four of the children reported weighed at birth 12 lbs. each, two, 14 lbs, and one 17½ lbs. These are all larger than any reported by Cazeaux in 3,000 births, three of them are larger than any reported by Madam La Chapelle in 3,000 births, or than were witnessed by the celebrated obstetricians Profflessors Meigs, or Hodge. We offer our editorial hat to the State of Illinois

Ornamental Majollca Flower Vases.

Ceramic art is probably older than that of the working of metals; for, while the possession of iron and a knowledge of its uses is assumed to be conclusive evidence of the elevation of a people above the condition of savages, and a proof of their partial civilization, at least, the art of forming utensils and ornaments from clay and baking them to resist the action of the atmosphere and exposure to the weather, is one that the very lowest tribes of the race possess in a measure. Yet while this art is common alike to the savage and civilized conditions of society, only the latter are capable of producing works in plastic materials which charm the eye with their grace of form and elegance of ornamentation. Grecian art is as perfectly preserved and as worthily represented in the vases, urns, lamps, and other specimens of the skill of the ceramic artist as in the statues and architectural monuments that indisputably prove a high degree of refinement. Although we, to a certain degree, copy the antique in outline, yet taste, and art, and skill in these days are not a whit behind those of the Greeks. In some respects we excel them. This is seen in such products as those we represent in the accompanying engravings, which we copy from *The Workshop*, a monthly, edited by Prof. W. Baumer, I. Schnorr, and others, and published by E. Steiger, 17 North William st., this city. A notice of No. 10 of this monthly appears in another column. We cordially commend the periodical to workmen and manufacturers in every department of art.

The tallest vase in the engravings has a greenish gray tint, glazed, the leaves and violets retaining their natural color and relieved by a dark blue ground on the medallion and bands upon which they rest. The handles are of a yellow, graduating into green towards the lower parts.

The ground of the other is dark blue, glazed, the heads gray, the handles yellow, changing to a reddish tint at the upper parts, and to green at the lower parts. The leaves and flowers of the lily of the valley are of the natural colors.

Grace of form, brilliancy of color, and appropriateness of ornament combine to give peculiar beauty to these specimens.

DESIGNS FOR FLOWER VASES.

Scientific Progress.

Dr. J. Aitken Meigs concluded his inaugural address to the students of Jefferson Medical College with the following eloquent passage:

"A retrospective glance at the scientific progress of the last two hundred and seventy years shows us clearly that the glory of the seventeenth century was the development of the doctrine of universal gravitation and the establishment of the science of astronomy—a science treating of the motions and mutual relations of masses of matter; that the glory of the eighteenth century was the development of physics and chemistry, or those sciences which deal with the relations and reactions of atoms of matter; and that thus far the office of the nineteenth century, owing to the wonderful perfection to which the microscope and other instruments have been brought, has been the discovery of many of the laws upon which the mysterious phenomena of life depend. The great advance of our knowledge in histological and morphological development since the beginning of the present century, coupled with the new doctrine of the forces, has given rise to the growing conviction in the minds of physiologists that we are upon the eve of some great discovery in Biology, which will prove, in the hands of future physiologists, as powerful a means of research as has already been in those of the chemist, the law announced by Kirchoff in 1859, relative to spectral analysis. It may be that this discovery is to be reserved as the crowning glory of the coming century; it may happen, on the contrary, that some busy and ambitious brain, even now within hearing of my voice, is destined to grasp, in all their details, the facts at present in our possession, add to them still others, and suddenly, before the present century has run its course, utter to the world the formula by which they are colligated, and which expresses their true significance. In the present state of scientific progress and unrest who can tell?"

How to Practice with the Velocipede.

London Society gives from the pen of a skillful amateur the following directions for beginners with the velocipede:

Run beside your iron horse, leading it, as it were, with your hand, so as to familiarize yourself with its movements; this will be an affair of a few minutes merely. Then commence practicing with it on a slope, and, after mounting it, let it move forward of its own accord, while you occupy yourself with studying the effects produced by the inclination which you give to the balancing pole or handle of the machine. When you thoroughly understand the action of this, place one foot on the pedal, and follow its movements without assisting them. The difficulty with beginners is to restrain the unnecessary expenditure of muscular force; they ordinarily perform ten times the labor that is requisite.

Next repeat the experiment on level ground, having both feet on the pedals, and working them alternately with scrupulous regularity. Speed is obtained by simply accelerating this movement.

After an hour or two's practice the tyro will be able to accomplish a distance of from thirty to forty yards without running the risk of an upset. Should the machine incline on one side, all that is necessary to be done is to remove the foot on same side from the pedal and place it on the ground. This can of course only be accomplished when the velocipede is of a moderate height, which, by the way, is the proper kind of machine for beginners to make their first essays with.

To alight, both feet are raised from the pedals at the same instant, which has the effect of slackening the speed of the machine; the feet are then placed simultaneously on the ground without the handle being let go.

The tricycle, or three-wheeled velocipede, is easier to guide and safer to use than the bicycle; its speed is, however, less rapid; still, it can be made to pass a carriage going at full trot. As the fair sex largely patronize this vehicle, the seat is more commodious than that of the bicycle, having sides and back of wicker, and a horse-hair cushion to sit upon. The hind wheels, though large, are light, and revolve with facility; the fore-wheel, which is smaller, serves to guide the machine, being acted on by means of the handle, which causes it instantly to turn in the direction indicated by the rider. The pedals are shaped like slippers, which facilitates the movements of the legs, and at the same time admits of the foot being disengaged instantaneously. The movement required to impel the machine is a perfectly natural one, analogous, in fact, to that of walking, that is to say, without the slightest pressure of the foot, and certainly without producing any unusual fatigue, for the motion of the leg develops itself, as it were, until the limb becomes fully extended, entirely without effort.

In addition to all these advantages, the larger three-wheel velocipedes have a lever which follows the line of the eccentrics attached to the pedals and fits on to the axles. By assisting the movements of this lever, the speed of the vehicle is considerably increased, and a simple pressure against it checks the rotatory movement of the wheel and stops the progress of the machine. This lever is, in fact, both a means of impulsion and a break.

Hydro-Carbons for Generating Steam.

The London *Artizan* notices some experiments in utilizing liquid hydro-carbons as a heat-producing power, applicable to the generation of steam. It is known as the Dorsett plan, and instead of consuming the liquid, raises it to a vapor at such a heat as to sustain a pressure of from 30 lbs. to 40 lbs. The grand trial was made on a screw steamer, the *Retriever*, of 90-H.P., and 500 tuns. The engines of the usual overhead or "steam hammer" plan, cylinder 30 in. diam., and 24-inch stroke. The *Artizan* says:

"In applying this system to the *Retriever* everything has been done in a rough and ready manner. A couple of old upright boilers, one about three feet, and the other about two feet six inches diameter, have been pressed into the service and placed on the deck, from which the vapor was conveyed to the furnaces of the steam boiler, by means of one inch unclothed wrought iron pipes. All the firebars were removed from the furnaces and replaced by the layers of perforated firebrick. The boiler of the *Retriever* has three furnaces, in each of which at about the same hight as the fire bars would have been, was placed a double oblong coil of wrought iron pipe; the shape of the coil being somewhat similar to the outline of the plan of the furnaces, only smaller, so that the pipe was from one to two inches distance from the sides of the furnaces. The lower of the two coils was perforated by four small holes, or jets, about 3-16th inch diameter; namely, one at each side, and one at each end of the coil. The vapor was caused to pass first through the upper coil of pipe, and thence to the lower, by which means a considerable additional amount of heat was imparted to it just before issuing from the jets. The doors and ash-pits of the furnaces were fitted with perforated plates by which the amount of air could be regulated. The boiler, which is on the usual return tube plan, has eight rows of tubes, but the four upper rows were stopped. At first starting coal is used in the furnaces of the generator, which are about three fourths filled with creosote. As soon as the vapor of the creosote is raised to about to five pounds pressure, it is admitted by means of a small pipe which runs down from the top of the generator into the furnace beneath it, when from that time no more coals are used, as the vapor issuing from a small jet in the furnance performs the required duty. The most advantageous pressure at which the creosote vapor should be used appears as yet to be scarcely determined; in this case it was used at from thirty pounds to forty pounds for the steam boiler.

"A very interesting trial of this system was made on the 12th ult., when the *Retriever* ran from Deptford to a short way below Gravesend and back, a distance of somewhat over fifty miles, without the slightest hitch of any kind. The steam was kept up at the working pressure of fifteen pounds, dur

ing the whole time, and with one exception, which was purely the result of carelessness, and which only lasted about a minute, the smoke was scarcely perceptible during the entire journey, and it was evident that this minute quantity was entirely owing to the temporary nature of the arrangements for regulating the admission of air to the furnaces. As regards the merits of this system over coal burning, we cannot venture to offer a decided opinion without more accurate data than can at present be obtained. It was stated that the average consumption of creosote during the trip was thirty-five gallons, while the usual consumption of coals was eight hundred. As the present present price of creosote is less than one penny a gallon, this shows a large direct saving, to which must be added the great saving effected by entirely dispensing with stokers, and the increased carrying capacity of the vessel.

"We believe that this is the first thoroughly practical exhibition of the merits of liquid fuel for steam navigation, and it has certainly, so far, proved a success, as to justify perfecting the various mechanical details, and giving the system a fair trial."

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Water and Wind Power at the West.

MESSRS. EDITORS:—The Commissioners of Maine exhibit an immense grand total of water power, which the young state of Nebraska can leave far in the shade with a species of power she possesses, and which is susceptible of development to an almost unlimited extent.

Unfortunately this State, "so far as heard from," is not abundantly supplied with fuel for steam and our streams are not well located for manufacturing purposes.

Fuel here will necessarily be dear until our *planted* forests have time for growth or cheap transportation can bring us coals from the rich mines of our mountains west.

We have no lack of wind force, which can be put to turning our wheels as it passes over our broad plains.

Wind mills are now constructed so as to govern themselves to a regularity of speed, between a good running wind and a gale, not surpassed by the operation of the steam governor. With such mills pumping can be done at no expense of power, and no cost except oil and a few minutes' attention each day to apply the lubricator.

The Union Pacific Railroad Company are now better served with water at their large shops in this city, by a windmill, at nominally no expense, than they were one year ago by steam at a running expense of about fifteen dollars per day. This mill is but partially self-regulating and cost about one-half as much as did the engine.

For grinding grain, and in fact for all machine work which can be done without much attention and hand labor, wind power is both practicable and profitable; but where artisans are employed it is important that the *time* of running should be controlled, and my object in writing is to call inventors to this point. Give us a plan that will "bottle up" power to be used as we see proper.

In good situations here a wind mill will run upon an average of fifteen hours per day of twenty-four hours during the year. Elevating water to drive machinery is objectional from its scarcity, great evaporation, and expense of reservoirs. Concentration of *air* is only limited in capacity by the strength of machinery and power used, and in it we may possibly find the proper element.

Of course when wind is "in season" machinery should be driven by it *direct*, thus avoiding the loss by friction, leakage, etc. Your correspondent who discussed utilizing the sun's power, would find himself far in the rear if he should attempt a race with some of our "gentle zephyrs."

While Holland is kept above water by very rude windmills, why not use our ingenious Yankee devices to float us upon the tide of commercial prosperity? G.

Omaha, Nebraska, Nov. 16, 1868.

Smoke Wreaths.

MESSRS. EDITORS:—In answering J. M. D., of Mass. (see answers to correspondents in No. 20), you do not assign any reason for the formation of wreaths of smoke. Now as I have often asked myself the reason, and taken pains to ascertain the cause, I think that I have succeeded in arriving at a conclusion that would stand the test of experimental research. I will add that I have never heard any reason assigned for it, but have experimented solely with the view of satisfying myself (and in that at least have been successful), and the theory that I have formed is this, viz.:

In order to form a wreath of smoke, there must be another gaseous or seriform body in contact with the smoke as it issues from the tube. Smoke, especially if "fat" or damp, has an attraction to the walls of the chamber through which it is passing or in which it is confined, unless continually kept moving by a current or blast of air. Now in the smoke stack of a locomotive at rest, the smoke gathers around the sides; a volume of steam from the exhaust forced through the stack with considerable violence has not sufficient time to expand enough to drive out all the smoke ahead of it, but remains more compact and forces its way through the center of the smoke in the shape of a cylinder, dragging out at the same time a certain amount of smoke (by the force of attrition or friction), which smoke, impinging on the external air, is at one blow literally hammered or pressed down to the shape of a nimbus or wreath.

This is my theory of the formation of the smoke wreath, whether from the smoke stack, the cannon, or the human mouth. C. H. DAVIDS.

Brooklyn, N. Y.

Something for Watch and Clock Makers.

MESSRS. EDITORS:—I am a practical watchmaker—or as near it as Americans often arrive—have had fifteen years' experience and have always found more or less trouble with the pivots becoming rusty and stopping the watch, particularly in English lever and American watches; also on the staff of marine clocks. Many times I have cleaned a watch or marine clock and oiled with the best oil I could get (Ezra Kelly & Son's oil), and they would run from three to eight weeks and sometimes longer, and then refuse to go without any apparent cause. I would take them down and find in watches, generally, the lower center bearing under the canon pinion corroded or rusted, so tightly that it would be difficult to remove the wheel from the plate. This occurs on all pivots, but more generally on this than any other pivot or bearing; oftener on the large than the small pivots and on the staff in marine clocks than in watches.

The corrosive substance is sometimes nearly black, but generally of a red hue like crocus, which it appears to resemble, having the same properties in its action on steel; for in every case the pivot is cut and sometimes ruined, even when it is so hard that a file will not touch it. I used to think the fault was with the oil, but by changing the oil used I could find no advantage.

I have talked with a great many watchmakers and found them as much in the fog as myself. Some attribute the difficulty to the action of the atmosphere but can give neither reason nor remedy. D. E. C.

Traverse City, Mich.

Estimation of Size Comparative.

MESSRS. EDITORS:—The extract from the Boston *Journal of Chemistry* concerning our knowledge of magnitudes being obtained only by comparison, which appeared in the SCIENTIFIC AMERICAN of Nov. 4th, is pleasingly confirmed by the following experience: Several years ago, after experiencing for seven weeks the severe monotony of the ocean-like levelness of the plains, on arriving at the Rocky Mountains and winding among the "foot hills," the hills seemed mountains, the slopes precipitous, the valleys gorges, and the roads narrow and of dangerous inclination. One year and a half elapsed before we returned to the plains. In the meantime we had crossed and recrossed the range and stood upon the loftiest peaks of the Sierra Madre. As we returned to the "plains" and recalled the localities which were impressed upon our minds, it was with the greatest difficulty that we could recognize them, they were so changed, for the hills were but mole hills instead of mountains, the slopes were not precipitous, the valleys were not simply passes, and the roads were not narrow or steep. Our first impressions were annihilated and our feelings entertained must be experienced, language cannot express them. At first they were compared with the plains we had just crossed. Now they are compared with the lofty peaks and surroundings of the Snowy Range, thus showing in a pleasing and instructive manner "that our conception of magnitude is comparative." G. E. M.

Georgetown, Cal.

Tempering and Preserving Glue.

MESSRS EDITORS: In addition to former remarks on this subject, I will state that a cement for leather, wood, etc.—at present sold from wagons in different large cities of United States—consists simply of glue boiled in water, with the addition of very finely powdered white lead; this appears to produce a combination even superior to that made with Paris white, which I mentioned before.

Glue is often found to crack in very dry localities, particularly when the objects glued together are not in close contact, but have a thin layer of glue between them; in which case they sometimes fall apart. Very thin layers of dry glue are not only exceedingly hard, but also more or less brittle. This brittleness they do not possess when not extremely dry, and, therefore, to prevent this dry and consequent brittle condition, the addition of a very small quantity of glycerin will accomplish the desired end, for the same reason that for many purposes glass-hard steel is less strong than soft-tempered steel. The quantity of glycerine must be modified according to circumstances.

A liquid glue, far superior to any mucilage, may be made by dissolving glue in an equal quantity of strong hot vinegar, adding a fourth of alcohol and a little alum. This preparation will keep any length of time, when placed in closed bottles, and will glue together horn, wood, mother-of-pearl, etc.

P. H. VANDER WEYDE.

New York city.

Waste of Fuel for Steam Generators.

MESSRS. EDITORS:—You have often written on the subject of steam generation, and pointed out the defects in common boilers. One of these defects is the great loss of fuel, amounting to nine-tenths even in our best boilers. You base your conclusions on the experiments of Favre, Silberman, and Andrews. I think you are mistaken in your conclusion, because you assume that one pound of anthracite coal will yield as much heat as one pound of carbon gas. Carbon gas being the substance burned in the before-mentioned experiments. Coal is a solid, and in the conversion of it into a gas much heat will be absorbed.

Again, in those experiments, pure oxygen was used to burn the substances; whereas in ordinary combustion, air (oxygen, nitrogen, vapor of water, and carbonic acid) is used. The three last-named substances would not produce heat, but on the contrary absorb it. Therefore I conclude that one pound of coal would yield as much heat as one pound of carbon gas minus the heat it would absorb in its transformation into gas; minus also the heat which the non-combustible elements of the air would absorb. F. M. H.

East Pike, N. Y.

MESSRS. EDITORS:—Messrs. Morris & Co., at Baldwinsville, N. Y., put a very large Johnson wheel in their shop, with some eight feet head. Under this head the step, which was of lignumvitæ, would not last over two or three weeks, but would *char* or *burn* out although under water. Various expedients were tried without success. At the instance of Mr. Eli Perry, the shaft (which was of cast iron, eleven inches in diameter), was turned down to about four inches just above the step (which was conical), and since that time, some eighteen months, they have had no difficulty. S. A.

Phœnix, N. Y.

THE SHEFFIELD OF RUSSIA.

A correspondent of the New York *Evening Post* gives the following graphic description of Tula, in Russia, which will be found to be of interest:

"Tula presents the appearance of nearly all the small government towns in Russia; there are the same wide, Macadamized, dusty or muddy streets, without shade trees; the same one or two-story houses of wood and white and yellow stucco; the same green iron roofs, and the same churches with their tall belfries and their onion domes; sometimes a white church with a green or a gold dome, and sometimes a green church with with a blue dome studded with golden stars. From the Church of All Saints, on a hill at the south edge of the town I got a very good view of the whole place, and of the little river Upa, winding through the low rolling country. The birch woods were all yellow with the changing leaves, and here and there among the brown fields was one bright green with the winter wheat. I ascended the tall belfry, which, as usual here, stands separate from the church, and after looking around, amused myself with examining the churchyard beneath me. Some of the graves had black, wooden coffin-shaped tombs placed over them, on the end of which was usually painted a figure of Christ or some saint; but most of them had a simple wooden Russian cross at the head—the Russian cross has three transverse bars—a small one to represent the inscription, and another small one placed obliquely to mark the place where the feet rested. The Kremlin, unlike other towns, is placed on low ground on the very bank of the river, and is merely a large square piece of ground surrounded with a high and thick battlemented brick wall, with towers at the corners and over the gates. It contains nothing but two cathedrals, one quite modern, of red brick, the other lofty and square, of white stucco, with curious designs in relief, at least as old as 1606, when it was captured by the False Dmitri, and containing some interesting mosaic pictures still older than the building itself.

"Tula is the center of the cutlery, gunnery and hardware manufactures of Russia; and indeed it seemed as if every house was a hardware shop. I have never seen such quantities of *samovars* (tea machines), pistols, guns, knives, candlesticks, and all imaginable sorts of metal work. The pistols are excellent, and many of them are sold in Paris and London, with English marks, as the work of English makers. The best cutlery is very good, but the ordinary sorts are very bad. A great deal of silver filagree work—an old industry in Russia—as fine as that of Genoa, is made here, and quantities of silver and gold niello work is manufactured, which is sold, to those who know no better, as the genuine production of the Caucasus. As Tula is as well known in Russia as Sheffield in England—there is a picture on the outside of a church at Moscow, representing the Sacrifice of Isaac, in which the knife held by Abraham is marked 'Tula'—I had expected to find, as in Sheffield, large factories with smoky chimneys and all the other disagreeable evidences of a manufacturing town. There is, however, nothing of the sort. The government rifle works is the only large building, except one private gun factory of a medium size. Almost exclusively the whole manufacture of *samovars*, guns, and cutlery is carried on in small shops, where only a single part is made. These various parts are then joined in another shop. The workers on fire-arms reside in a distinct quarter, called *oruzheunoe*, or gun town, formerly a distinct village, but now a part of the city.

"Between the river and the suburb, and just opposite to the Kremlin, are the extensive gun factories of the government, which were erected by an Englishman named Trewheller, and are considered to be among the finest in Europe. The machinery is turned by water brought from the dam in the river in large iron pipes six feet in diameter, and so well protected and heated that the works go as well in winter as in summer. The works are now under the charge of General Standerskjöld, a Swedish Finn, who has the lease under a contract for the manufacture of breech-loaders and the conversion of old rifles. He receives also a compensation from the government for superintendence. The General himself very obligingly showed me through the whole establishment, and gave me an opportunity of inspecting the whole process. Among the machines were some interesting ones of his own invention. Each rifle goes through thirty-eight distinct processes before it is complete. The system now used is that of Carlé, though some rifles are still being converted according to another. The gun of Carlé is a needle gun in principle, simple in construction, and not liable to get out of order. It fires fourteen times in a minute. I have seen it stated that a breech-loader will never be of service in the hands of a clumsy Russian soldier; but the Russian peasant is not half so clumsy as he seems. If he is always breaking agricultural machines, it is through ill-will and dislike to innovation, and not through stupidity. The commonest peasant learns in a day to manage the complicated machines of the cotton factories, and needs no instruction after that. When the guns are finished they are

inspected by the proper officers, and are proved by firing five rounds, when each bullet must hit a target ten inches high by six inches wide, the shape of a man's breast. At the recent review by the Emperor, at Warsaw, twelve thousand men fired fourteen rounds in a minute at three hundred paces, and every shot told. The Prussian officers in attendance were greatly delighted and astonished. In this factory three thousand workmen are employed, and six hundred rifles are turned out daily, beside a large quantity of chambers, which are sent to the Caucasus to be used there in the conversion of old rifles. The brother of General Standerskjöld has a large gun factory at Izhev, in the government of Viatka, where he employs twenty thousand workmen. They expect by the end of next year to have finished nine hundred thousand rifles."

THE PARSONS STEEL LINED GUN.

Mr. Parsons' converted 68-pounder gun has been tested at Woolwich with 30 lb. charges of powder, since its removal from Shoeburyness. After firing many rounds, a crack appeared in the cast iron outer tube, and for the present, experiments with the gun have been suspended. So far, the steel tube is presumably intact, though it is probable that further firing would destroy it; and as it constitutes the most costly part of the weapon, it is proposed that it shall be withdrawn from its present envelope, and inserted in another, and heavier, cast iron tube. The endurance so far displayed by Mr. Parsons' guns—that under consideration is the second that has been made—is undoubtedly remarkable, and, in one sense so opposed to all theories hitherto formed respecting the action of gunpowder that it deserves some attention.

The facts are very simple. We have in the Parsons' gun an inner steel tube, which, it is generally admitted, is quite incapable of withstanding, unsupported, even one charge of 30 lb of powder. We have, in the second place, a cast iron envelope so thin and weak that it is all but certain that a single charge of 10 lb. of powder, fired behind a 150 lb. projectile, would blow it to atoms. Steel and iron put together give us a gun, weak to excess in its parts, yet strong as a whole. In this fact lies, we have no hesitation in saying, one of the most singular problems ever offered for solution to the artillerist, or the engineer. If it could be shown that one of the two elements of the gun could alone withstand half the strain due to a 30 lb. charge, and the other element the other half, we could understand how, when put together, they could withstand the total strain due to the full charge named. But as a matter of fact, neither the steel tube, nor the iron tube alone, could bear the bursting strain of a 15 lb. charge, fired behind a 150 lb. shot. How is it, then, that when combined, they withstood 30 lb. charges so long?

In attempting to solve this question it is quite unnecessary, in our opinion, to consider for a moment the elaborate mathematical investigations which have been carried out by others, in the endeavor to find a reason for the endurance of converted cast iron guns. These, each and all, so far as we are aware, have been conducted with a view to determine how much of the strain due to an exploding charge is resisted by the steel and how much by the iron. Inasmuch, however, as no mathematician has proved that either element of a converted gun, will bear half the strain of the maximum charge which the compound gun will endure, we regard their method of reasoning, and their calculations as, so far, wide of the mark. If we find that no single engine possessed by a railway company, will draw fifty loaded trucks up a given incline at all, while two engines will take one hundred similar trucks up the same gradient at rapid pace, it is a matter of little importance to consider what share of the performance each separately fulfills; and if we further find that the tractive force is actually in excess of that deduced from calculations based on the pressure of steam, and the space passed through by the load and the pistons respectively, then the calculations must be regarded as of little or no value in the face of facts, which disprove their accuracy, or demonstrate that some element has been overlooked by the mathematician; some element, that is to say, which only operates when the locomotives combine their efforts, and which has nothing whatever to do with the isolated exertions of either. That some at present obscure influence of power, operates in the compound gun to resist disruption we have no doubt whatever; but to believe in the existence of phenomena, and to explain their causes are two different matters, and the endurance of the Parsons' gun depends, we think, on causes not yet defined or properly investigated.

Mr. Parsons' gun, weighing but seven tuns, or thereabouts, has withstood a test which has sometimes proved too severe for guns weighing twelve tuns. The steel tube of the Parsons' gun is practically the same as the steel tube of the 12 tun gun. The difference lies in the envelope alone, and this, in the Parsons' gun, consists of cast iron, in some places not more than a couple of inches thick, and in no place nearly so thick as the wrought iron guns with which it compares, in one sense, favorably. Taking the facts as they stand, we are irresistibly driven to the conclusions, either that the tensile strength of wrought iron in guns is not so great as that of cast iron, or that the metal in a gun has duties to perform, to the successful discharge of which, great tensile strength may not be essential. The first hypothesis is disproved by facts; the second we can only examine speculatively, because there are few or no facts on which to base our reasoning, other than the main fact, that a gun which, according to theory, ought to have long since gone to pieces, still remains together, and probably in a condition to fire moderate service charges for some time to come.

The first point which presents itself for notice, is that if the thin outer envelope of the Parsons' gun is sufficiently strong, then the jackets ordinarily fitted on the steel tubes of wrought iron guns are immensely too thick. Yet practice tells us, in language which there is no mistaking, that this is not the case. Are we to assume, then, that the Parsons' envelope is too thin? Again practice steps in, and says, "No." How shall we reconcile facts so conflicting? In dealing with the question we must consider the nature of the strains to which a gun is exposed, and the manner in which its various parts resist them. We have already, for the moment, rejected mathematical investigation, and they would be out of place in an article like the present dealing, as it does only with broad facts, and more or less crude speculations. We shall consider the strains to which a gun is exposed as twofold in character. The first is strictly tensile, the second it is not easy to characterise by a single word or phrase. If we term it a jarring strain, we shall, perhaps, not be wide of the mark. If we strike a girder, supported at both ends, about the middle of its length, with a heavy hammer, the tensile strain thrown on the lower web may be very small. Reasoning by analogy, and regarding the action of powder as being conformable with the theory of Lynal Thomas, and the experiments by Piobert, we arrive at the conclusion that—especially when a quick-burning powder is used—no tensile strain whatever is thrown upon the outer rings of a gun, the rending force being concentrated on the inner tube, for the simple reason that the wave of transmission of force is not propagated quickly through the metal. According to this hypothesis, it matters nothing whether the outer envelope of a gun does, or does not possess much tensile strength, so long as the inner tube does. The theory is supported by the results of experiment with the Parsons' gun. If, however, we suppose the inner tube to be so weak that it gives way at once by stretching, then the strain will be transmitted immediately to what we may term the next zone of resistance, and if this lies in the outer envelope, then the outer portion of the gun will be exposed to a tensile strain. Furthermore, the rate with which a wave of force transmission travels through various substances, probably varies very considerably with the nature of the substance. On this latter point, evidence derived from direct experiment is much wanting.

Now, the nearer the zone of maximum resistance can be kept to the central axis of the gun, the better. Guns lined with steel tubes fulfill this condition admirably. Hence their success. When we hoop a case iron gun outside, we transfer the zone of maximum resistance to the furthest point from the center. Hence the failure of the Parrott and Blakely systems. We have reason to believe that the thick inner steel tube of any modern gun, whether wrought or converted, possesses in itself sufficient tensile strength to resist the charges ordinarily used. Mr. Parsons' tube, out of its case, would, were one condition fulfilled, to which we shall come in a moment, have stood the tests to which the gun, as a whole, has been exposed with success. Indeed, the bursting force which the existing envelope can withstand is so small that it did little or nothing to preserve the inner tube.

So far we have dealt with facts, or theories ordinarily and correctly received as demonstrably true. We have now to enter on the regions of mere speculation. We have called the second strain to which a gun is exposed a jarring strain, and the precise effect of jar on metals, and other substances, is not fully understood, simply because it has never been properly investigated. It appears to act on the internal atoms of a metal, not by overcoming the attraction of cohesion, but actually by annihilating that attraction for the moment. We may cite a few instances in point. By suddenly striking a flat vessel containing mercury, the metal may be separated into a multitude of little globules; cast iron and stone may be absolutely ground to powder by the explosion of some fulminates. A very moderate blow properly, and sharply delivered, will sometimes crack a large casting. It is generally assumed of the latter phenomenon, that portions of the metal were previously in a state of high tension, owing to contraction; but there is no reason for assuming that this is always the case. The action of jar on a metal is well illustrated by striking a flask rammed with sand. The particles of the sand separate from each other immediately, and the whole falls out. We have not space to prolong our consideration of the effect and mode of action of jar. Suffice it to say that its tendency is to reduce the metal to its component particles, atoms or crystals.

Let us apply this to a gun. If we fire a heavy charge in a steel tube alone, the tube will be broken—or burst, in common parlance—not by the internal strain overcoming its tensile strength, but by the jar; and this statement has been borne out by observed facts, which we shall not stop to cite. Put the tube into another of any material which will absorb the effects of jar, and the tube will stand. Reasoning on this hypothesis, we may suppose the tube in Mr. Parsons' gun saying to the outer envelope: "A charge has been rammed home within us, and we are going to be exposed to two violent attacks, one a bursting strain, the other a jar. If you will only take care of the latter, I am competent to deal with the former." If the theory embodied in these words be correct, great tensile strength is not required in the outer portions of guns having thick steel inner tubes. With iron inner tubes the case is different, and Major Palliser's failures are, in a great measure, due to the circumstance that he used iron inner tubes—a mistake which Mr. Parsons avoids.

Are we to assume, then, that guns should have cast iron, instead of wrought iron envelopes? Certainly not. In the converted gun there is but one zone of resistance; in the wrought iron gun there may be several. Besides this, cast iron is inferior to wrought iron, because it is less able to withstand external violence, as inflicted, say, by the blow of an enemy's shot. Furthermore, it is not certain, or even probable, that cast iron is the best material that can be used in neutralising the effects of jar; its great advantage lies in its homogeneity. In order to settle the relative value of the two materials—cast and wrought iron—let a steel tube, like that used by Mr. Parsons, be similarly fitted in a wrought iron envelope of the same weight as a re-bored cast iron gun. If the work is done with care, the result will be more satisfactory with wrought, than with cast iron.

In conclusion, we must beg our readers to observe that there is one way of solving the mystery connected with the endurance of the Parsons' gun. This lies in assuming that there is in reality, no mystery at all, and that we are as far as ever from the acquision of a thoroughly trustworthy system of utilising our cast iron guns by conversion. The endurance of the gun has, no doubt, been very great—for a converted gun; but, absolutely, the performance is nothing to boast of. Mr. Parsons has done not a little to show that a good many light trifles may be made from our old 68-pounders; but it remains to be proved that uniform results, such as they are, can always be obtained, and that light rifled guns will be useful to us when we have got them.—*The Engineer*,

[The gun, a 68-pounder, 96 cwt., burst at the 33d round, the charge being 30lbs of large grained pounder with a 150 lbs shot—Eds.

Modern Improvements in the Preparation of Fat for the Manufacture of Soap and Candles.

For the Scientific American.

CHEMICAL COMPOSITION OF FAT.

The manufacture of soap and candles is a very ancient branch of industrial art; notwithstanding this, very few improvements were made in it before the chemical nature of fats and fatty oils was discovered by Chevreul in the beginning of this century. He discovered that these substances have a chemical composition similar to many minerals and chemical compounds; namely, that they consist of acids combined with a base. In the same manner that, for instance, gysum consists of the base, lime, combined with the acid, sulphuric acid; or saltpeter consists of the base, potash, combined with the acid, nitric acid. So all fats and fatty acids consist of a base, glycerin, combined with one or more acids, called stearic, margaric, and oleic acids.

THE MAKING OF SOAP.

In the manufacture of soap we simply combine these fatty acids contained in the fat, with a stronger base, usually potash or soda. This is best done by boiling the fat first with a weak solution of the alkali, and afterward adding a stronger solution; the glycerin being the weaker base is driven out; in soft soaps, it remains in the moisture; in the hard, soaps it is more or less perfectly removed.

Of the acids named the stearic is the hardest; it melts at 157 deg. Fah., and gives the hardest soap. The margaric is less hard, melts at 144 deg. Fah., and gives softer soap. The oleic is fluid at the common temperature and produces an inferior very soft soap. In regard to the base, the potassa produces much softer soap than the soda, and is required in larger quantity than the soda, in order to accomplish the saponification of the same amount of fat, in the proportion of 47 to 31, which are the respective atomic weights of those two bases, representing the quantities required to saturate acids.

The chemical name of fat would thus be stearate, margarate, or oleate of glycerin. All fats contain the three acids, but in different proportions; hard tallow and lard, contain the most stearic acid; human fat contains much margaric acid; and fatty oils contain an abundance of oleic acid. When boiling these fats with a strong solution of potash or soda, we form soap, of which the chemical name, therefore, would be stearate, margarate, and oleate of potassa or soda, all with more or less glycerin; and according to what has been remarked above, the hardest of all soaps is the pure stearate of soda, the softest is the oleate of potassa.

There is a great advantage in using these fatty acids in making soap, over the undecomposed fats themselves, as they require not so strong solutions of the alkalies, they unite much more readily in shorter time and at lower temperatures; even boiling may be dispensed with, and besides they produce harder and more valuable soaps by the absence of glycerin.

OLD PROCESS OF MANUFACTURING OF GLYCERIN.

We may separate the glycerin from the fats by combining the fatty acids with a base, which makes an insoluble soap; for instance, lime, or better oxide of lead. In the last case the soap is stearate, margarate, and oleate of lead, and is precipitated in the liquid which holds the glycerin in solution, which liquid is separated, and by evaporation of the water is concentrated. This is the old way of making glycerin, and such glycerin is usually contaminated with lead, and unfit for many purposes for which pure glycerin is required.

OLD PROCESS OF MANUFACTURING FATTY ACIDS.

We may separate the fatty acids from common soap, by adding a stronger acid, diluted sulphuric, acetic, etc. This acid will combine with the base potash or soda, forming a soluble salt, the stearic, margaric and oleic acids are set free, and being insoluble and lighter than water will float on the liquid. Also this is one of the old ways of preparing these acids, but now gone out of use by later inventions.

DISCOVERY OF THE PRINCIPLE THAT WATER, HEAT, AND PRESSURE WILL DECOMPOSE FATS.

In 1822, it was found in England that in a steam engine of Perkins, which worked under very great heat and pressure, and in which the steam condensed in cylinder and air pumps was continually returned to the boiler, the fats and oils abundantly used for lubricating the piston and cylinder became, by the action of the hot water and steam, decomposed into other substances, which were analyzed by Faraday, who pronounced them to be identical with the glycerin and fatty acids of Chevreul, and the result of this investigation was published in the London Philosophical Magazine and Journal in 1823, under the title: "*change of fat by water, heat, and pressure in Perkins' steam engine.*

About thirty years elapsed before any one took advantage of this discovery, till about 1850 the use of superheated steam

was put into use in Germany to decompose the fats into acids and glycerin. During the following ten years different arrangements of apparatus were patented here and in Europe, to accomplish the same purpose with water, heat, and pressure, as announced by Faraday in 1823. The earliest of these particular arrangements, patented in 1854, was by experience found impracticable, but another of somewhat later date, was extensively introduced; its peculiar feature being to keep the hot water and fat in a permanent emulsion or mixture, by a very ingenious and simple system of circulation. In strong copper vessels, hermitically closed, and kept at a temperature of 330 deg. to 370 deg. Fah., and a consequent pressure of 7 to 12 atmospheres, the decomposition of the fat is accomplished in the course of 8 to 10 hours. The mixture of fat and water is then drawn off, when it is found that the acids above float on the top, and the water holds the glycerin in solution, which then by evaporation is concentrated, and by subsequent treatment purified.

A lower temperature may be employed for this decomposition, only the operation lasts much longer; for instance at a temperature of 212 deg. or a little above, the separation is only accomplished in several days or even weeks. At the common temperature even, an imperfect decomposition of fat takes place when moisture has access. It is this which partially causes the so-called rancidity of fat; and the bleaching of common tallow candles, by exposure to air and moisture, is such a decomposition of the fat, which, however, in this case is only very superficial.

FORMATION OF ACROLEIC ACID.

At a higher temperature, for instance 500 deg. F., a destructive change takes place in the fats, the first substance formed being called acrolein and acroleic acid, which possesses the very disagreable odor of burnt fat in the highest degree.

SEPARATION OF THE FATTY ACIDS.

The three different fatty acids, the stearic, the margaric, and the oleic are mutually separated, first from the oleic by pressing in bags at the common temperature, and the margaric from the stearic by pressing it out at a temperature of 150 deg. Fah., which melts the first but leaves the last in solid condition.

As the oleic acid is a very inferior fuel, gives a poor light, and by its acidity cannot be employed for lubricating machinery, it is mostly used for soaps, and also for greasing wool in woolen factories. The stearic acid either alone, or mixed with the margaric is employed to make the so-called stearin candles, which in fact are stearic acid candles, as stearin means the combination of the acid with the base glycerin, or the stearate of glycerin.

TEST FOR FATTY ACIDS.

To distinguish candles made from these acids, or adulterated with them, from those made of pure wax, spermaceti, or paraffin, the acid reaction of the melted fat on red litinus paper is the most simple test.

The stearic acid is also soluble in alcohol, which is not the case with fat, oil, wax, spermaceti, or paraffin.

The glycerin has found numerous very useful applications, which are increasing almost daily, and form a subject for a separate article.

Quadrature of the Circle.

In former days mathematicians devoted much time and labor to the question of determining the ratio of the diameter of the circle to its circumference. Archimedes found that it was nearly as 7 to 22, and this ancient solution is still very useful for ordinary purposes. Later researches brought it at length to such a point of precision that it would be idle to seek any further, the ratio being as a unit to 3·1415926, with a continuation of 120 decimals more. It follows, then, that any attempt to make the diameter go exactly into the length of the circumference, or to represent their ratio by an exact fraction, is simply ridiculous. As such a solution, were it possible, would enable us to make a square containing the exact surface of a circle, this problem is commonly known under the name of quadrature of the circle. At last week's sitting of the Academy of Sciences, says *Galignani*, the perpetual secretary announced that a newspaper had recently revived an old story to the effect that the Academy was in possession of a considerable sum bequeathed to it as a reward for any person who might discover the quadrature of the circle. He, therefore, suggested the propriety of again publishing the decision the Academy came to in 1775, of never more devoting the slightest attention to the solutions that might be sent in of the following problems: The duplication of the cube, the trisection of the angle, perpetual motion by means of a machine, and the quadrature of the circle. It justified this course as regards the latter, by remarking that many weak-minded persons, utterly ignorant of mathematics, and laboring under the impression that large sums were ready to be handed over to them in case they succeeded in solving that problem, devoted their time to it, utterly neglecting their regular business and the interest of their families, and even occasionally losing their reason by following such a vain pursuit. M. Bertrand stated that the belief in the promise of large prizes by the Academy for the solution in question had been propagated by very serious works. The "Biographie Générale," for instance, had stated that M. Rouille de Meslay had left the Academy 120,000f. for that purpose. He stated that in the eighteenth century an inventor of the quadrature actually summoned D'Alembert before the Parliament in order to recover that sum.—*London Building News.*

STEAM pressure in the boiler, and steam pressure on the engine piston, are not necessarily alike. Allowance must be made for condensation in conveyance by pipes.

MRS. G. W. PARKER certifies to having earned over $600 in a year, with one needle, on a Wheeler & Wilson Sewing Machine.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SLEIGH BRAKE.—Milton Satterlee, Richland Center, Wis.—This invention is a neat, cheap, and easily operated adjustable brake, which can readily be attached to any sleigh or sled.

FOLDING BEDSTEAD.—C. P. Alling, Jr., Sylvan, Wis.—This invention has for its object to furnish an improved bedstead, which shall be so constructed and arranged that the bedstead may be compactly, quickly, and conveniently folded for storage and transportation, and in such a manner that the frame of the bedstead may be protected by the slat frames that form the bed bottom from injury while stored, or while being transported.

PAPER RULING MACHINE.—William C. Smith, Brooklyn, N. Y.—This invention has for its object to furnish an improved attachment for paper ruling machines, by means of which the paper, while passing beneath the pens, may be kept smooth and free from folds or wrinkles, so that the ruled lines may be uninterrupted.

ELEVATOR.—Thomas B. Simonton, New York city.—This invention has for its object to furnish an improved elevator for use in warehouses, stores, manufactories, etc., which shall be simple in construction, convenient and safe in use, and unlimited in power.

COVERS FOR CIRCULAR VESSELS.—John Kline, Rochester, N. Y.—This invention consists of a semi circular cover, the latter being affixed in a groove in the inner surface of the vessel. The movable cover, A, turns on the bolt or screw, and slides in a groove, cut or otherwise formed on the sides of the vessel.

REVOLVING CUTTER FOR PLOWS.—Marshall Sattley, Taylorsville, Ill.—This invention has for its object to furnish an improved revolving cutter for plows which shall be simple in construction, effective in operation, and not liable to get out of order.

DOOR FASTENING.—A. F. Kitchen, Shelton Depot, S.C.—This invention has for its object to furnish an improved fastening for the doors of corn cribs, and other outbuildings, which shall be so constructed and arranged as to protect the said outbuildings from the depredations of thieves.

STOVE.—Mrs. Sarah M. Clark, Beaver Dam, Wis.—This invention has for its object to improve the construction of cooking stoves, so as to make them more convenient and effective in use.

CULTIVATOR.—Theophilus Arndt, Mount Joy, Pa.—This invention has for its object to furnish an improved cultivator which shall be so constructed and arranged as to be conveniently and readily adjusted for performing the various operations necessary in cultivating corn at the various stages of its growth.

HARROW.—Moses Atwood, New Sharon, Iowa.—This invention has for its object to furnish an improved harrow, which shall be so constructed that, should the teeth become clogged, or strike an obstruction, it may be easily and quickly cleared without its being necessary to raise the harrow frame from the ground.

ROOT CUTTER.—G. S. Perfater, Camp Point, Ill.—The object of this invention is to provide an attachment for cutting small roots, vines, and stubble, in front of plows, and is designed to be attached to a plow in the manner hereafter to be set forth. It consists of a revolving cutter, working in the rear and above a fixed cutting point, and also working in a slit in the curved shank, forming part and supporting the fixed cutter, whereby the roots and vines will be first partially severed by the fixed cutter, and afterward completely severed by being drawn between the revolving cutter and the aforesaid curved shank in which the latter works.

BLANKS FOR SPADING AND OTHER FORKS.—J. C. Richardson, Ilion, N. Y.—This invention consists in punching or cutting the blanks out of a plain strip of metal, in such a form that no metal is wasted, and which form facilitates the process of finishing the blank.

COMBINED HAMMER AND NAIL HOLDER.—Ransom W. Green, Bradford, Pa.—This invention consists of the arrangement on the handle, near the hammer of a fixed and a sliding clamping jaw, the latter being provided with a spring for causing it to clamp the nail, and a thumb piece for retracting it. It is connected to the handle by a bent strip of sheet metal whereon it slides back and forth, for clamping or releasing the nail.

EXHAUST GOVERNOR.—Samuel Trumbore, Easton, Pa.—This invention relates to improvements in governors for regulating the speed of engines used for exhausting gas from hydraulic mains in gas works, whereby it is designed to provide a quicker and more reliably acting governor, such as are actuated by the pressure of the gas in the said mains, for regulating the speed of the engines used for exhausting the same.

RAILROAD RAIL.—Henry Zahn, Toledo, Ohio.—The object of this invention is to provide a railroad rail combining several advantageous qualities. It consists in forming the rail in two parts, namely, a solid bar or rail proper, supported by a hollow base of triangular section, and having a longitudinal opening along its upper part into which a tongued rail fits.

HORSE POWER.—Milton Fisk, Sparta, Tenn.—This invention consists in the arrangement of a table to be moved around the vertical axis of a fixed bed by the horse, said movable table carrying a counter shaft and gearing deriving motion from a wheel secured to the fixed bed, and communicating it to a central spindle which may serve as the spindle of a set of stones on the top of the movable table, or as a shaft for conveying motion to other machinery when the upper stone is removed and another section shaft coupled thereto.

MACHINE FOR CLEANING ENTRAILS.—John A. Huss, Louisville, Ky.—This invention relates to the cleaning of animal entrails and so preparing them for the manufacture of sausages and other articles of use. It consists of two rollers revolving in contrary directions and armed with scraping edges affixed radially around the surfaces of the said rollers, together with other devices perfecting the whole.

DEVICE FOR HOLDING DOORS OPEN.—W. W. Green, Jr., Janesville, Wis.—The object of this invention is to prevent the door or the knob of the lock from marking the wall by striking against it when the door is swung open and also to catch automatically and hold the door open. It consists of a knob bearing a forked spring catch affixed in the end of a knob affixed to the wash board or surbase of the wall, in a suitable position to enter a socket plate affixed in the bottom part of the door.

MUSKETO NETTING.—Charles B. Seaman, Honesdale, Pa.—The object of this invention is to provide a simple and convenient apparatus for excluding musketoes or flies from sleeping persons. It consist of a rectangular frame of wood of suitable dimensions to inclose a person, and provided with several wooden or wire bows arising therefrom, and longitudinal rods over which a musketo netting is stretched.

DOG POWER MACHINE.—A. W. Hager and J. H. P. Grove, Waverly, Iowa.—This invention relates to machines for utilizing dogs by causing them to drive light machinery, as churns, washing machines, grindstones, and the like.

TENONING MACHINE.—Wm. Gilmore, Hudson City, N. J.—This invention consists in the arrangement of a sliding clamping carriage on a table, and a pair of vertically-reciprocating cutters on a suitable frame and operated by foot power.

PUNCH HOLDER.—Robert Cushman, Pawtucket, and John R. Dennis, Central Falls, R. I.—This invention relates to a new instrument for closing the pores of paper after the same have been opened by an eraser, so that the ink may not run on such erased parts of the paper. It also consists of a handle to which a bag is fastened that contains rosin and chalk, or such other material in a powdered state, by which the pores will be closed, the powder having the color of the paper to be smoothened.

PLANT PROTECTOR.—Dr. J. M. Hurt, Blacks and Whites P. O., Va.—This invention consists of a hollow cylinder made of any suitable material and size, with a glass top near one end, and perforated for a suitable proportionate part of its length from the end having the glass cover which is to be set over the plant for the purpose of protecting it. Patented Oct. 27, 1868.

SPUR FOR ICE AND OTHER PURPOSES.—C. F. Wieland, Darmstadt, Ill.—The object of this invention is to provide a simple, convenient, and effective spur or creeper, so-called, for walking on ice or inclined roofs of houses. It consists, in general terms, of two U-shaped metal plates; one constituting the heel plate, and the other which is pivoted to it in such a manner as to fold back on the heel or forward under the sole of the shoe, gears pointed studs which enter the surface walked on, and thereby prevent the wearer from slipping. A coiled spring is arranged on one of the hinge pintles of the movable part and is enclosed within a case affixed to the heel plate. This spring keeps the movable part upon the heel when not wanted for use, and a spring catch device retains the movable part under the sole of the foot when in use as a creeper.

ADJUSTABLE HOLDBACK AND EXTENSION POLE FOR WAGONS, SLEIGHS, ETC.—W. W. Rexford, Loch Sheldrake, N. Y.—The object of this invention is to so arrange the holdback on a carriage pole that it can be moved backward and forward on the pole, so as to be adjusted to different kinds of harness and to horses of various sizes. It further consists in attaching the holdback projection or ear to a tube which slides on the front end of the carriage pole, and which can be locked to the pole in any desired position by a suitable spring catch. The invention also consists in fitting around the front end of the pole, and in securely fastening the same, a metal tube which has a groove or feather corresponding to a feather or groove on the holdback tube, and which has perforations to receive the aforesaid spring catch.

BOTTLE-FILLING MACHINE.—Peter M. Sherwood, New York city.—This invention relates to improvements made in a bottle filler, for which Letters Patent were issued to Theodore Cochen, dated June 5, 1866.

SAW COTTON GIN.—William Sutton, Washington, Ga.—This invention relates to a new and useful improvement in the construction of hoppers for saw cotton gins, and also in a new and improved construction or arrangement of the breast through which the saws work, whereby several advantages are obtained over the ordinary saw cotton gin in use.

LEVER WATCH MOVEMENTS.—William Borthwick Smith, Coventry, England.—This invention consists in an improved construction of lever watch movement or frame, with the application thereto of a T-lever escapement (detached or otherwise) working in a straight line or at a slight divergent angle, and having the same action as in the ordinary construction.

STONE PRESS.—James W. Gaines, Clarksville, Texas.—This invention relates to a new and improved press for mill stones, whereby the grain is better distributed than usual in passing between the stones, the grain more thoroughly ground and a larger product of flour obtained from a given quantity of grain.

SEED SOWER.—Gottfried Rank, Greenleaf, Minn.—This invention relates to a new and improved machine for sowing seed broadcast, and it consists in a means for scattering the seed and protecting the same from the action of the wind while being sown or scattered upon the ground.

COMBINED CRUSHER, HARROW, AND ROLLER.—John Simpson, Charleston, Ill.—This invention relates to a new and improved device for crushing, harrowing, and rolling the soil for the purpose of rendering the same light and pliable to favor the growth of crops.

WATER WHEEL.—S. J. Thomas, Dawson, Ga.—This invention relates to a new and useful improvement in the buckets of water wheels and it consists in the constructing and arranging the buckets in such a manner that the best possible effect is obtained from the reactive force of the water.

WATER WHEEL.—Wm. E. Tate, Cambridgeport, Mass.—This invention relates to a new and improved water wheel which is also applicable for measuring water or may be used as a water meter.

FOLDING CHAIR.—Adam Collignon, Closter, N. J.—This invention relates to chairs that are made to fold up whereby, they are rendered much more convenient for storage and transportation than chairs of ordinary construction.

HOT AIR FURNACE.—S. J. Hare, Louisville, Ky.—This invention relates to improvements in furnaces for heating air for warming buildings and consists in the arrangement of drum and air passages in combination with the air box and combustion chamber.

VARIABLE CUT-OFF.—Thomas Hansbrow, Sacramento, Cal.—This invention relates to a new and improved method of controlling the speed and action of steam engines, whereby the quantity of steam supplied to the cylinder is proportioned to the work.

Business and Personal.

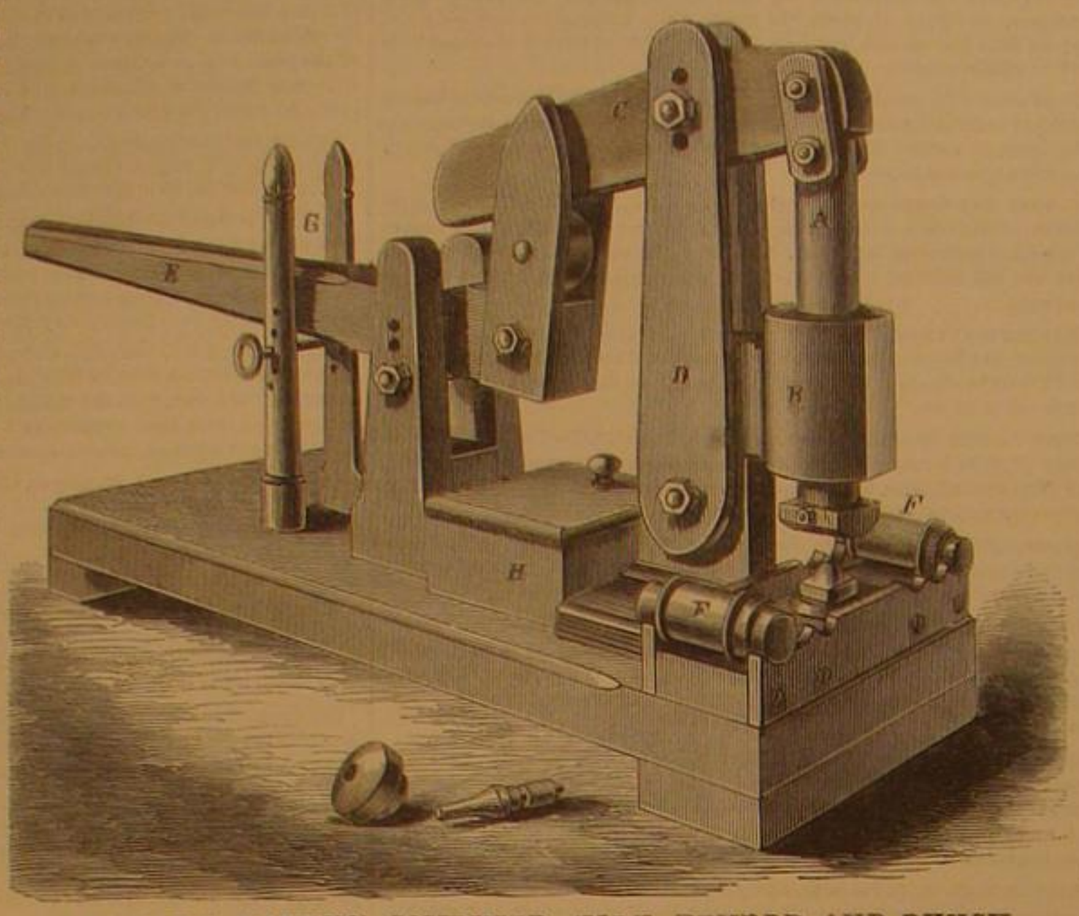
The charge for insertion under this head is one dollar a line. If the Notices exceed four lines, an extra charge will be made.

Improved Tire-bending and Punching Machine.

The objects of this machine are to bend either light or heavy iron when cold, to bend it to any given diameter or radius, and to punch cold iron, the machine being operated wholly by hand. It is a common adaptation of the lever so arranged in its parts as to yield great power.

The plunger, A, works vertically in a head, B, and its upper end is connected to the lever, C, by toggles, the lever being suspended between the upright pivoted ears, D. A hand lever, E, carries a roller on its inner end, as seen, upon which the long arm of C, rests and by which it and the plunger is operated. For bending tires or iron bars for any purpose the cylindrical formers, F, are placed in bearings on the rest, and a die, having a set screw in its top with convex head, is dropped into a hole directly under the plunger, A. Then, for bending tires, a pattern, termed by wheelwrights a "fellow pattern," of the curvature of the tire to be bent, is placed upon the formers, F, with convex edge downward; the set screw in the die is then turned to touch the under edge of the pattern, and the plunger with its rounding head is brought down toward the set screw, having a space between of the thickness of the iron to be bent, the descent of the plunger being governed by a pin passed through the guides, G, for the handlever to strike upon when brought down. The set screw gage may now be removed and the machine is ready.

The formers, F, have on one end a fixed flange and on the other an adjustable one, to guide the iron bar or tire on a straight line in passing under the plunger. The inventor says that one man of ordinary weight can bend, by means of this leverage, tires four inches by one inch, or three by one and a half inches, when cold, while another person guides the tire bar. In punching, dies and punches of any form may be used, the die fitting in a hole under the plunger and the punch in a hole in the plunger and held by a set screw. Specimens of the punch and die are shown in the engraving on the floor. The box, H, on the platform of the machine is a receptacle for the dies, punches, gages, etc.



BRYAN'S PATENT COMBINED TIRE BENDER AND PUNCH.

Patented June 2, 1868, by James M. Bryan, who may be addressed for State, county, manufacturing, or shop rights, at Penningtonville, Chester county, Penn.

Oil and White Stones--Where they Come From and Where they are Manufactured--A Large Establishment.

The New Albany *Commercial* says it is not every carpenter, silversmith, or other mechanic that uses the fine oil and white whetstone to give edge to his tools, that knows where these stones come from and where they are manufactured; and there are probably but few persons, even in New Albany, that know any more about these matters than the artisans we have referred to. We, however, propose to enlighten them.

Oil, or Ouichita stone, is the material from which are manufactured the oil stones used by carpenters of all classes for giving a fine edge to their plane bits and other edge tools. This stone is found in Arkansas, the quarries being situated near the celebrated Hot Springs of that State. The stone is quarried with great care into blocks of from two to four feet square, or of irregular shape, according as it lies in the quarry. From the Hot Springs it is shipped to Little Rock, where, at the present time, it is sold at the rate of three cents per pound in the rough, the purchaser being charged with all the expenses of its shipment from that place.

The white stone comes from the same quarries as the oil stone, but from a different vein. This stone is much more costly, and of a much finer grain than the oil stone. It is used by jewelers, engravers, and manufacturers of surgical instruments, for sharpening the instruments used and manufactured by them. It is also used for sharpening sewing machine needles, and all delicately pointed instruments, and is much more costly than the oil stone. We believe that the quarters at the Hot Springs are the only ones producing the oil and white stone in America, and have proved an immense fortune to the proprietors.

There are in America but five manufactories of oil and white stones. One is at Jeffersonville, two at New York, one at St. Louis, and one at New Albany. The manufactory in this city is more extensive than all the other four combined, and purchases more stone and turns out more product than the other four put together.

Its annual product is of Ouichita, or oil stones, one hundred and five thousand pounds; of white stones ten thousand pounds, and Hindostan stones one hundred and eighty thousand pounds. The value of this product is immense. The Hindostan stone comes from a quarry in Orange county, Indiana. To give an idea of the value of white stone, we will state that we are informed that seven thousand of the sewing machine whet stones were recently shipped to Albany, New York, in a little box eight inches long, eight inches wide, and eight inches deep, for which $70 per thousand were paid, or $490 for the contents of this one little box.

The Illinois Industrial University.

The *Weekly Pantagraph*, in discussing the inapplicability of the course of study adopted in the above institution to the wants of its students, makes the following very humorous remarks, called forth by a communication to the Chicago *Tribune* by its correspondent, "Rural":

We rather like that idea of abolishing the English, as it appears to be the only sure mode of getting clear of an unnecessary amount of Latin; make Latin the mother tongue, and we should then study English because it was a dead language. But after all, does not Rural under-estimate the value of a classical education exclusively for farmers? The Course of Study, as arranged for the University, includes the following:

French, German, Latin, and Greek languages and literature, astronomy, history, ancient and modern, political economy, civil polity, moral economy and law, rhetoric, philosophy, logic and mental science, ethics, history of science and philosophy, composition, elocution and vocal music.

According to Rural, the branches actually taught at the first term of the University were selected from the list; and the studies laid down for the present term "embrace trigonometry and surveying, structural botany, *Cicero de Senectate*, French, with Greek for an optional."

It strikes us that a young man thoroughly armed with all this lore should be able to go forth and subdue the prairie and the forest, and compel them to yield their bounties at the word of command. He might appeal in devout Latin to Ceres, for a bountiful crop of corn, wheat, oats, and barley—always remembering to call them maize, triticum hiburnum, avena, and hordeum. He might call on Pomona in mythological devotion, and implore a bounteous crop of pomum Adami (or any other man). And so might he invoke in turn all the gods and goddesses of Latin, Greek, Egyptian, and Congo mythology. Of course they would respond to a learned graduate of the "Farmer's College," and make the untilled soil laugh with a bountiful harvest.

But the dull pupils, who are unable to grasp *all* of the profound and classic lore of the University must still continue to mix a little elbow grease with their imperfect Greek and Latin; and when an obstinate yoke of oxen refuse to be moved by *sic transit gloria mundi* morning, it will still be necessary to hasten their transit with a gad. Or when the plow gets among stumps, and the unappreciative horses refuse to understand *od quod damnum*, he may still be compelled to swear at them in English. Or if the bugs are eating up his potato crop, and *aut vincere aut mori* fails to arrest them, he must do as others do—wait for victory with their death. If he could only compel the rascals to learn their own name—*cantharides vittata*, they would surely die!

Frightened to Death.

One of our exchanges relates that a gentleman on going home observed in his yard a cat, with head, tail, and hair erect, every nerve trembling with excitement, looking intently at a hen which was sitting in the grass, its head also erect, looking at the cat. The cat approached cautiously and slowly to the hen. When about three feet from the chicken, and about to spring upon it, the gentleman rushed to the rescue and drove away the cat. The hen fell over on her side insensible, was picked up, carried into the house, and died in fifteen minutes.

This is as credible as an incident related to us by a friend, somewhat of a sportsman, the other day. He says that while out hunting a short time ago he "treed" a rabbit in the angle of a stone wall, where the animal was held by the dog at one angle and the sportsman at the other, so that escape was well nigh impossible. The hunter fired, but with a very unsteady aim, and the rabbit rolled over dead. On examination not a mark of injury could be found; and even when skinned and carefully dissected it was found that not a single shot had touched the animal. The poor rabbit had been frightened to death.

JOECKEL'S PATENT REVERSIBLE SEATS.

Seats, or settees with reversible backs, enabling the occupiers to face either way, are very common. They are used in the lecture room, the school room, and even the church; but more noticeably in the railroad car. But none that we have heretofore seen are so constructed as to adjust the seat at the same time with the back. Still, it is apparent, that a seat, to be comfortable, especially when it has a back set at *any* angle, should incline downward and backward from the forward edge. This is not only a measure of comfort, but is demanded by physiological considerations.

Fig. 1.

The seat represented in the accompanying engravings is intended to subserve these purposes. Fig. 1 is a seat calculated for school houses, lecture rooms, and railroad cars. The seat is pivoted on a rod or axis under the seat, connected by a forked rod to an eccentric on the arm of the seat at either end, to which is pivoted, also, the arms supporting the back. As that is lifted and thrown over, the motion of the back compels, by means of the eccentric, a similar motion, although in a less degree, to the seat itself, tilting it slightly back, and holding it and the back in position by the weight of the person occupying the seat, both back and seat being governed in their relative positions by the occupant of the seat. Fig. 2 is another form of the seat, presenting cushioned side pieces for the arms to rest upon in whatever position the back may be. Its connections and action are similar to that intended for the lecture room, the seat being tilted or inclined with the movement of the back. The back is hung on a pivot like a pendulum, and any number of seats in a line may be connected with a rod, and the backs reversed simultaneously, the seats being locked with one lock. Not liable to get out of order, simple in construction and operation, and as cheaply made as any other reversible back.

Fig. 2.

Manufactured by Robert Paton, Manufacturer of School, Church, Lecture Room, and Office Furniture, who may be addressed at 26 Grove street, New York. Patented through the Scientific American Patent Agency, by W. H. Joeckel, December 10, 1861, and September 29, 1868.

Hair-washes.

It is only right to refer to a source of possible disease which is peculiarly wide-spread just now, and against which the public should be cautioned. At the present time there is quite a rage for the use of hair "washes" or "restorers," which, whilst the charge of their being "dyes" is indignantly repudiated, yet in a short time "restore" the color of the hair. The active agent in these washes is, of course, lead. In the majority of cases, probably, a moderate use of such a lotion would be unattended with mischief; but it is worth remembering that palsy has been known to be produced by the long-continued use of cosmetics containing lead. But of the thousands of persons who are now applying lead to their scalps, there will doubtless be some with an extreme susceptibility to the action of the poison, and these will certainly run no inconsiderable risk of finding the "restoration" of their hair attended by loss of power in their wrists.—*Lancet.*

THE SCIENTIFIC AMERICAN.—Once a week as regular as clock work, this invaluable scientific journal appears upon our table. This is the only purely scientific paper published in the country, and is worth, to all lovers of science, many times the subscription price. We hardly peruse a number but what we find something in it worth all that is asked for a year's subscription.—*De Kalb County News.*

[We could fill or columns with similar good notices.]

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VOL. XIX., No. 24....[NEW SERIES.].... *Twenty-third Year.*

NEW YORK, WEDNESDAY, DECEMBER 9, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

OUR PLANS FOR 1869.

The SCIENTIFIC AMERICAN will enter upon a new volume on the first of January next, at which time we shall introduce such changes and improvements as will enable us to give a largely increased amount of reading matter and illustrations.

We want and intend to have at least fifty thousand subscribers with the new volume, and there is no reason why we should not have a hundred thousand. We think it no egotism to say that the SCIENTIFIC AMERICAN is a marvel of cheapness in these times of comparatively high prices. The unprinted sheets of paper necessary for a years subscription, could not be purchased at retail for less than $3. We give two volumes of 416 large quarto pages full of valuable reading matter and fine illustrations for $3, or when sent in clubs of ten or more the price is but $2.50 per annum. Mechanics, inventors, manufacturers, chemists, engineers, and all others who take interest in the industrial progress of the world, we appeal to you to assist the circulation of our journal. You will find the volumes for 1869 far more interesting and valuable than any that have preceded it. We cannot at present enter into any particulars but we pledge ourselves to give every subscriber his money's worth.

NATURAL GAS---THE EARTH A GASOMETER.

What the interior of this globe of ours holds, whether it is a solid, a void or vacuum, or a seething mass of molten rocks, a globe of liquid fire, we do not really know. The phenomena of earthquakes, volcanoes, boiling springs, etc.; the increasing heat as the earth is penetrated; the fact that the temperature is greater at the surface of the earth, or the sea level, than above it, and the escape of inflammable gas from artesian wells, seem to point to an internal *inferno* of fire. Centuries ago, these phenomena were noticed, and their existence used as an evidence of a hell, the locality of which was the center of the earth. Still, no one of these, nor all taken together, is absolute proof of an incandescent interior.

We have never yet penetrated the crust of the globe, nor even probed the crater of a volcano and reached the great internal cavity. If the crust is, as has been estimated, about thirty miles thick, the amount of force necessary to raise the tuns of liquid lava to the orifice of a mountain is simply inconceivable, and its effects on the surrounding walls and the surface would be sufficient to materially change the physical characteristics of the country for hundreds of miles around. So, if the earthquake receives its impetus of motion and its almost incalculable power from the agitation of an internal sea of liquid igneous matter, confined within a crust of thirty miles in thickness, and the throes of this sea are transmitted and communicated through this mass to the surface, would the most disastrous earthquake known to history or tradition be sufficient to account for the exercise of such a power? The force that could move, or break, or shake the crust of the globe would be sufficient to turn our continents into bottomless seas and our oceans into mountainous deserts. At most, we have a shaking of the surface, a superficial disturbance of the ocean; but no disappearance of the sea through some cavity reaching the molten center of the globe, and no vomiting forth of a consequent mass of steam, vapor, and lava sufficient to destroy all animal life, and to make the earth a desert. Volcanoes and earthquakes may be accounted for without descending to so great a depth. If the earth's crust is thirty miles thick, there is ample room for the reservoirs of all the power-generating materials necessary for the production of eruptions and earthquakes. That this crust is not solid or homogeneous is not only proved by theories based on analogous truths, but is actually demonstrated by mining, well-boring, and the existence of immense caverns, with plains and hills, and lakes—a subterranean landscape. The increasing heat of the earth below the surface no more demands a vast internal furnace for its existence than does the superior temperature at the earth's surface over the inferior temperature of the cloud line or the mountain tops. Both may be assigned to the same, or a similar cause, that of weight or pressure, or both combined. What other occult or unknown causes, as electricity, magnetism, galvanic agencies, the nature of which we do not understand, it is immaterial now to inquire. Suffice it to say, that we *know* that the earth's crust (to use a familiar term without assenting to the theory of the believers in the igneous philosophy) is not solid, and that it contains explosive and inflammable gases which may be sufficient in quantity and powerful enough in explosive and dangerous quality to produce all the phenomena of volcanic eruptions and earth shakings. The difficulty of accounting for the extended character of these latter phenomena—earthquakes—is no greater than if the theory of an internal globe of liquid fire be accepted, as is evident by the statements made by the supporters of that theory of the thickness of the earth's crust.

That the earth (not merely its interior, but the crust of the globe) is a gas holder, it would be nonsensical to deny. All our coal, whether bituminous or anthracite, contains inflammable gases; coal mines are infested with it and many of the delvers in their depths annually lose their lives by its explosion, either from accidental causes or spontaneous ignition.

No one who is at all acquainted with the business of boring for oil will deny that emissions of inflammable gas are a necessary concomitant to well boring. In the oil regions this gas is frequentntly and extensively used as fuel for driving the engines, or rather for generating steam. A notable instance is one we mentioned twenty-one months ago, in No. 10, Vol. XVI., page 157, SCIENTIFIC AMERICAN. In that article we spoke of a large manufactory in Erie, Pa., the machinery of which was driven and the buildings lighted by the gas from an unproductive oil well. The establishment is that of H. Jarecki & Co., brass workers. For more than two years they have led gas by means of three-inch iron pipe from an unsuccessful oil well 1,200 feet distant from the manufactory, and used it as fuel for their boilers and as lights for their works. The flow is never stopped, never changed in amount of pressure; the gas is of good lighting properties, and when at night or on Sundays the works are stopped, the gas still comes; at night being lighted at the mouth of a pipe of two or two and a half inches diameter situated near the top of the main building. This light is sufficient to illuminate several streets and squares in every direction, and the escaping gas makes a noise as of escaping steam, that may be heard at a long distance, while the gas flame is not less than four or five feet high.

CHEAP ICE HOUSES---A GOOD PLAN.

As the time for securing the harvest of ice is rapidly approaching, a few hints looking iceward may not be amiss. We remember when the ice business was unknown; only some enterprising householders or wealthy men thought of such a luxury as an ice house. Yet as ice has slid out of the category of luxuries and become a comfort, if not a necessity, it is within the power of all living in the country and having access to a pond or a stream to provide themselves and possibly their neighbors with a sufficient supply of this comfort to assist in preserving perishable articles and to temper their beverage of water. In cities and large towns men singly or in companies undertake to provide the dwellers with ice, a crop that costs nothing to plant, tend, or raise, but only to gather and store, but yields handsome returns. But in the country the convenience of daily delivery of the gelid luxury is impossible and inconvenient. To our country readers, therefore some suggestions on the construction of ice houses and the preservation of ice may not be amiss.

A family ice house need not be an expensive structure. It may be built cheaply, subserve its object excellently, and add to the attractions of a homestead by being a sightly object. A building of twelve feet square and eight or nine feet high is sufficient for the wants of the most exacting family. It may be a frame building, entirely above the surface of the ground, and better if supported on posts, elevated a few inches, to be certain of good drainage. Built of joists, two by three inches, with an outer boarding, having inside another series of uprights, also boarded, from six to ten inches removed from the outer shell, with a solid floor of plank, the space between the two walls filled with tan, sawdust, straw, or chaff, and a roof of good pitch, the ice house is complete. A drain for water should be made from the floor, and the space above the uprights, between a loose flooring and the pitch of the roof, filled with straw, hay, or some similar dry, porous material. On the roof should be a ventilator, the top defended from the rain or snow.

The ice should be packed in one solid mass, the sides not reaching the inner walls of the building, but allowing a space of from six to twelve inches all around. The top of the ice should be covered with straw, and the door should be like the sides of the building, or double doors should be made, one in the outer and the other in the inner wall. Plant morning glories or any climbing plant around the building and induce them to creep up the walls and over the roof as an additional defence against the fervid sun of summer.

Two workmen, if not practical carpenters, can put up such a building in one, or at most, two days, which if taste and judgement is used will prove to be a sightly addition to the attractions of a country home, and a useful adjunct to the farm, its contents being convenient and comforting in health and invaluable in sickness. Such an ice house would prove also convenient as a refrigerator or a large scale, preserving food of various kinds and the products of the dairy.

WHAT AN AMERICAN HAS DONE ABROAD.

Mr. F. Watkins, of the London Works, Birmingham, England, arrived in the *Scotia* a few days ago, and will make a tour, before his return, through the Western and Southern States, on business connected with his manufactures. Mr. Watkins was born in the United States, where he resided until 1856, when he went to England to introduce his patent machine for making bolts and nuts. His object in going abroad was to sell his patents, expecting to realize a large sum on them. In this he was disappointed, and after spending some $25,000, and much effort, he abandoned the hope of disposing of his patents, and commenced, on a small scale, the manufacture of bolts and nuts under the title of The Patent Nut and Bolt Company. At the expiration of two years, the demand for his machine-made goods had become so great that Mr. Watkins' time and energies were tested to their full extent in augmenting the number of his machines, and extending his works until they covered some five acres, and the number of hands employed to about five hundred; the product of which was about fifty tuns of bolts and nuts per day. The works of our enterprising American have continued to be enlarged and now they cover an extent of twenty-four acres in the city of Birmingham, and the hands employed number about twenty-five hundred—producing one hundred tuns per day of these small goods. The capital stock of the London Company, which has so quickly sprung from such a small beginning, under the management of our energetic countryman, is now $2,000,000. Mr. Watkins informs us that his shipment of cotton-bale ties to this country will reach this year the enormous quantity of six or seven thousand tuns.

The prime object of Mr. Watkins' visit at this time is to establish agencies and to receive orders for railroad supplies, of which he is undoubtedly the largest manufacturer in the world.

Mr. Watkins' taste for inventions has not abated since he first took out patents some fifteen years ago; and notwithstanding his immense business cares, when he visits this country, which is about once a year, he brings with him several new inventions on which he obtains patents, making oath to the papers as a citizen of the United States. The career of Mr. Watkins is a remarkable example of Yankee enterprise and success.

A GAS INIMICAL TO ANIMAL LIFE.

Carbonic acid is noxious to animal life although it contains two equivalents of oxygen, the life-giving gas, to one of carbon, also necessary to life. It is generated or disengaged from decomposing vegetable and animal substances, is given off in respiration, and is artificially produced by a mixture of sulphuric acid and carbonate of lime (marble). All effervescent liquids, as fermented liquors, the so-called soda water, and even well and spring water, hold more or less of this gas.

When contained in a liquid used as a beverage it forms a grateful drink to febrile patients, allaying thirst, lessening nausea, and acting as a mild diuretic and anti-emetic. But breathed as a gas it is highly noxious. Owing to its specific gravity, greater than that of the atmosphere, it settles at the bottom of distillery tanks, caves, wells, etc., especially if either of them have contained any animal or vegetable substances.

From these facts in regard to the nature of this gas it is evident that care should be used in exploring caves, cleaning cisterns and vaults, and descending into wells. Life is simply combustion, and where a candle cannot burn a man cannot breathe and live. From this it is evident that to insure safety it is a necessary precaution before descending into a well, cistern, or vault, to lower a light or some article of fuel in a state of combustion. If the flame is extinguished there is no certainty for life. Now, to remove this heavy noxious gas. If a well, containing water, draw out or pump up the water, and, the well, being uncovered, dash the water back by the bucketfull. In its passage down it will absorb sufficient air (oxygen) to neutralize the gas. A better plan, and one applicable to all cases, is to set some quickly-burning substance on fire, as a bundle of straw, or rags saturated with benzine, and drop it into the well. The object is to rarefy the heat sufficiently to raise or lift the heavy noxious gas. If the flame should be extinguished on reaching the stratum of noxious gas, the heat, by repeated trials, will be sufficient to raise the gas and render the well safe.

So many deaths have occurred from descents into vaults, cisterns, and wells, for the purpose of cleaning them, that some attention should be drawn to the danger and the necessary and simple precautions. Some twenty years ago we saw two men killed within a few minutes by descending into a vat in a distillery from which the liquor had been drawn the day before. The second lost his life by his generous attempt to save the first, and not until these two perished did those in charge of the works seem to think that any precaution was necessary. Subsequently the writer, in descending a well to recover a lost bucket came near losing his life, and was saved merely by the accident of deep water and the timely interference of the bystanders at the mouth of the well. Most of these accidents, generally fatal—occur through ignorance, and therefore we draw special attention to the simple precautions we recommend which are neither costly nor troublesome.

REMINISCENCES OF TRAVEL IN SPAIN.

MADRID—THE ROYAL PALACE—SPANISH MANNERS.

We consider it fortunate in some respects to have visited Spain under the old regime—and before revolution had destroyed many of those ancient landmarks which add so much to the interest of the tourist—for it is notorious that revolutions in Europe have always been attended by the destruction of many rare and beautiful objects of architecture and art, which appeared to symbolize and foster oppression and cruelty.

We spent several days in Madrid and vicinity and wrote a letter for the SCIENTIFIC AMERICAN giving our impressions of that city and of its people, but for some reason the letter never reached its destination.

It was a fat looking package, and we have reasons for thinking that the post officials thought best to see what it contained. If they read it—and we think they did—some of the statements were found not very complimentary to the manners and customs of the Madrilenos. We regretted at the time the loss of that letter which had cost us some thought and labor, but had no intention to reproduce it for publication.

We think, however, in view of the interest which centers in Spanish affairs our readers may be willing to read a few stray notes about Madrid and its surroundings, which we propose to give in two or three papers.

Of the many thousands of our countrymen who make annual visits to Europe, few ever visit Spain.

Tourists usually are content to follow the beaten track of travel through France, Italy, Switzerland, and Germany. They imagine, and not without reason, that Spain is a hard country to travel in—that a trip down among the Spaniards suggests brigandage, treachery, and stilettos, discomfort and hard fare.

The hotels of the larger cities are tolerably good, it is true, but those found in out-of-the-way places are usually wretched abodes, scarcely fit for mules and donkeys, with which agreeable beasts the country is well supplied.

The floors of the houses are usually brick, fuel is scarce, and no comforts are provided against the sharp chill of a winter's night. An English gentleman, who was compelled to stop at a railway junction, informed us that he slept at one of those cheerless *posadas* upon a very tough bed, in a room having a stone floor, without any glass in the windows, and nearly starved at that, which confirms our experience. In regard to the important matter of food, it is not worth while to say much about it—oil and garlic are the staples—and to one not accustomed to these articles, fasting and prayer are excellent substitutes. Yet, in spite of all drawbacks, Spain, in some respects, is the more interesting country.

The scenery, especially in the Northern provinces and sierras, is grand and picturesque in the extreme—often desolate and peculiarly savage.

The inhabitants are also interesting in their rude manners, customs, and superstitions; whilst in the Southern provinces the cities are quaint, and the country, oriental in its character, furnishing an abundant supply of luscious tropical fruits and wines—the latter being usually kept in hog-skins which impart to it a peculiar flavor. There are also many Roman ruins (Spain was once the granary of the Roman Empire); exquisite Moorish structures; grand palaces; extensive monastic buildings, which are now being torn down; and sublime Gothic cathedrals unequaled in Europe, rich in saintly relics, precious stones, gold and silver ornaments, sacerdotal vestments and pictures—indeed the fine arts and literature flourished in the 17th century, when Spain was the proudest kingdom in Europe—but of this we may say more at another time.

It is not easy to conjecture how it happened that Madrid became the capital of Spain, but it is supposed that Charles the Fifth fixed upon it by reason of its central commanding position where he could best overlook and govern his subjects. The city stands upon a series of hills, 2,300 feet above the sea, and within sight of the snowy Guadarama mountains lying on the North. The surrounding country is entirely swept of timber so that by reason of its exposed situation the north winds sweep through it unopposed, and persons have frozen to death in winter.

In summer it is like an oven—the thermometor frequently standing at 105°. These extremes of heat and cold make it an undesirable, and at times, a dangerous place of residence. Yet, in spite of these objections, Madrid is a fine city, numbering upwards of 400,000 inhabitants, abounding in fine public buildings, broad, well-kept, well-built streets, promenades, parks, and drives. It is a modern looking city, and compared to Toledo, Grenada, Cordova, Saragossa, Seville, and Valencia, has little about it of a Spanish character—nothing to remind one of the chivalrous fighting times of Charles the Fifth and Philip the Second; and but for a few lazy Spanish gentlemen, who prefer the cloak to the paletot coat, and the hordes of miserable beggars, one might easily imagine himself in a thriving French city, so thoroughly has Paris fashion possessed itself of the costumes and equipages of the people. The ladies, however, seem to reject the hat, and usually appear on the streets with a graceful lace mantilla thrown over their heads.

In the 10th century Madrid was an outpost of the conquering Arab, and these enterprising Moors built an Alcazar for the Kalif which was destroyed by an earthquake, and the palace built upon its site by Henry the Fourth, with all its marvelous treasures of art, gold, silver, and diamond ornaments were consumed by fire. The present comparatively new palace, constructed of white colmenar stone, and completed in 1764, is undoubtedly one of the finest palatial edifices in Europe. It forms a square of nearly 500 feet, with numerous open courts, gardens, and other appendages of a royal residence, and cost upwards of four million dollars. For some reason the Queen refused to allow strangers to visit the palace, owing, it is said, to the fact that at one time an English party abused the royal hospitality by either helping themselves to some small articles, or mutilating the curtains. The palace contains among other treasures a great variety of clocks, for which Ferdinand the Seventh and his father had a great passion, though it is said of them that they never knew the right time. Charles the Fifth was also afflicted with the same horological mania, and not succeeding in making any two of his clocks go alike, he wisely concluded that they were like men's heads, always a little out of gear.

The chief open air resort of Madrilenos is the Puerta del Sol (Gate of the Sun), a considerable circular plaza, having a fine fountain in its center. This spot seem to be a central one for everybody in the city, and Spaniards, enveloped within the ample folds of their cloaks, plant themselves upon the sidewalks, where they lazily smoke and talk away valuable time, which wiser men know to improve, and appear not to consider themselves in the way of any one. The Spaniard smokes in the street; he smokes at the table, no matter who dislikes it; he smokes in the omnibus; he smokes in the cars; he smokes to the church door, and lights up as soon as he gets out; and, for aught we know, he smokes in his bed, and seems not to entertain the slightest notion that the fumes are not delicious under all circumstances; and this excessive smoking, no doubt, accounts for the cadaverous appearance of a majority of the Spanish men.

WASHINGTON CORRESPONDENCE.

FEES IN PATENT OFFICE CASES—IMPROVEMENTS GOING ON—EXAMINATION OF EXAMINERS.

Heretofore the Judges of the Supreme Court of this District have been paid a fee of $25 in each and every case of appeal from the Commissioner of Patents. Hon. Elisha Foote has come to the conclusion that such payments are illegal, and has discontinued the same, so that now and until some legislation is had in the matter by Congress, no fee will be required for an appeal to the Judges of the Supreme Court. The Commissioner takes the ground, that inasmuch as the Act of March 2, 1861, which repeals all former acts fixing the rates of the Patent Office fees, makes no mention of a fee for an appeal to the judges, none is required. If the Commissioner is right in his view of the matter, then the Patent Office has been exacting, and the judges receiving, $25 for each and every appeal that has come before them for the past seven years, without any authority of law for doing so. The judges, however, we understand, entertain a different opinion in regard to the matter. They contend that the fee paid for an appeal to them, is not a Patent Office fee, but belongs to the judge who hears the appeal; and that consequently, the Act of March 3, 1839, requiring the payment of this fee, was not affected by the Act of March 2, 1861.

Improvements in the Patent Office Building.—The sand stone tiles which have covered the first and second floors of the corridors of the old building fronting on F street, have been removed, and in their place new tiles of marble from the quarry at Lee, Mass., are now being put down, giving a greatly improved appearance to the corridors in this part of the building. In the draftmen's room the old portfolios in which the drawings have been kept since the Patent Office building was first occupied have been thrown aside, and the rooms fitted up with drawers which are hung on slides and trunnions, so that when pulled out to their extent they can be tilted into a conveniently inclined position, to admit of the ready handling and inspection of the drawings. The drawer is covered by a patent, and we understand that the eight hundred and upward which have already been put in, cost upward of twenty thousand dollars. The Agricultural Department, as you are probably aware, has moved out of the Patent Office into a building built expressly for it; and the rooms made vacant by this removal have been fitted up for, and are now occupied by the Examiners in charge of Land Conveyances, Navigation, Fire-arms, Builders' Hardware, and Chemistry.

The Board appointed by Commissioner Foote to ascertain the qualifications of Examiners and their assistants are holding daily sessions of about three hours each in what some one has facetiously named a "sweat box;" and they dispose of about two cases a day. The following are some of the questions which were been asked the candidates, viz.: "What's a parallax?" "What's a magnet?" "What's a chemical equivalent?" "What's the difference between plaster of Paris and lime?" etc., etc. Prof. Henry H. Bates, of Hobart College, N.Y., has lately been appointed a second assistant Examiner, and assigned to duty with General Spear in the class of Civil Engineering. Prof. Bates held the adjunct chair of Mathematics in Hobart College, and he passed an unusually creditable examination before the Board of Examiners.

COMMUNE BONUM.

EXHIBITION EXCHANGE FOR PATENTEES.

There has been felt for a long time among inventors and patentees a necessity for some headquarters in this city where they could exhibit their inventions and negotiate sales of their patents and patented wares. Heretofore the offices and barrooms of some of our hotels have been the resort of this class of persons, and many have realized handsome sums from sales in these saloons; but they are not desirable places for such traffic.

We hail with pleasure the inauguration of a new incorporated company who propose to fill a long desired want in this city, by establishing an exchange in a building on Broadway for exhibiting new inventions, and where patentees can have facilities for consummating sales.

An advertisement of the new project giving fuller particulars may be found on another page.

MELBOURNE, Australia, completed its thirty-third year of existence on the 29th of August last. A wilderness in 1835 it is in 1868 a fine flourishing colony.

THE SOCIAL SCIENCE CONGRESS IN ENGLAND.

Surely there is quite enough of sorrow and suffering in this sinful world to justify any well meant, even though ill devised or misdirected efforts for the eradication of social evils. So important a movement as the recent Social Science Congress, held at Birmingham, England, gave us hopes that in the deliberations of the many learned and thinking men sure to be present at such a meeting, something practical and definite might be evolved that would contrast refreshingly with the vague and unsatisfactory proceedings hitherto characteristic of similar movements. We are however compelled to say that a careful review of the transactions of this congress has resulted in the disappointment of our hopes.

Why is the mockery of applying the name of science to a conglomeration of crude speculative opinions, unsystematized, and without the solid basis of fact persisted in. There was no such thing as social science, in the strict interpretation of the term, apparent in the deliberations of the Congress at Birmingham. Not the slightest reference, so far as we can see, to the natural laws which govern the formation of all society, or even the slightest attempt to show that those laws are violated in its present organization, and if so, how and why.

In the place of such a method, which, if there be a *science* of sociology is certainly possible, and as the true scientific method, the one of all others to be closely followed we should think in in dealing with such a subject, we have discussions upon jurisprudence, free trade, international law, neutrality of the English Government during the late rebellion in the United States, change of nationality, etc., etc.

To sum up the whole matter, the efforts of the Social Science Congress seem to have been principally directed to the display of a class of talent which society could very well dispense with and discussion of topics as foreign as possible to the subject in hand.

The notoriety which is sought by a certain class of aspirants can be gained often by persistent braying, and in our perusal of reports that have reached us in reference to the Birmingham convention, we have been painfully impressed with the belief that those who took part in its proceedings, had the good of society less at heart than the successful display of their own rhetoric. Be this as it may, we are more than ever impressed with the belief that such meetings will never result in any permanent, or even temporary, alleviation of the current evils of modern society.

Wood Gas.

Some years since we noticed at length the manufacture of illuminating gas from wood. Some of the processes which were economical before the war were found impracticable for a while. Latterly the subject appears to have acquired renewed interest.

A correspondent writes us that the cities of Wilmington, N. C., Macon and Columbus, Ga., and Montgomery, Ala., are all lighted with wood gas. Another correspondent gives the following facts about the products of the distillation of wood:

"The article in your journal of 18th Nov., 1868, on the subject of wood gas directs attention to an important and thoroughly practicable source of cheap and good gas for illuminating purposes. All varieties of wood, when subjected to distillation in close retorts, yield gaseous and liquid products, and leave a residue of charcoal in the retort. The respective quantities of these products and their quality depend chiefly on the kind of wood used, on the degree of heat to which it is subjected, and the mode in which the heat is applied.

"High temperatures produce a larger proportion of gas than low, but the yield of the liquid products is thereby diminished. These liquid products contain several substances of considerable commercial value, the most important being acetic acid, tar, and wood spirit or naphtha. When properly purified and diluted with water the acetic acid yields a perfectly transparent white vinegar, which cannot be distinguished from the best French white wine vinegar, or the best English malt vinegar, and infinitely superior to any cider vinegar. The tar is of equal quality to North Carolina tar and may be used for the same purposes. The naphtha or wood spirit is an excellent and cheap substitute for alcohol; for such purposes as burning in lamps, manufacturing varnishes, for dissolving gums and the aniline colors, and for the manufacture of chloroform. Its value for these purposes is well known in Europe, and it is there extensively used. The charcoal may be used for all the purposes to which that substance is usually applied The gas is easily purified, and may, by suitable means, be obtained of high illuminating power. Its perfect freedom from sulphur is an important advantage it possesses over coal gas.

"Hard woods such as oak, beech, and birch, are the most suitable. Good oak treated at a moderate temperature yields as follows from one cord. The money values attached are very low, very much below their real or selling prices:

5,000 feet illuminating gas at $2 per 1,000 feet	$10 00.
50 bushels charcoal at 10 cents	5 00.
2 barrels tar at $1	2 00.
5 gallons naphtha at $1	5 00.
100 gallons vinegar at 25 cents	25 00.
1 cord of oak yields	$47 00.

"By a higher temperature more gas may be obtained with a corresponding reduction in the yield of liquid products. The manufacturing expenses are moderate and the necessary apparatus not very costly. In many parts of the country where wood is cheap and coal dear this manufacture could be advantageouly substituted for that of coal gas."

THE TELESCOPE.—Professor Alexander, of New Jersey College, Princeton, delivers the second lecture of the American Institute course on Friday evening, December 4, at Steinway Hall. Subject—The Telescope and its Revelations.

Editorial Summary.

THE ART OF PERFUMERY.—We have received a communication from Septimus Piesse, F.C.S., the well known perfumer of London, and a frequent contributor to the SCIENTIFIC AMERICAN, in which he states that he sent to the publisher at Philadelphia for a copy of the book "Guide for the Perfumer," noticed in the SCIENTIFIC AMERICAN Oct. 7th, and was much chagrined to find that it was almost an entire reprint of his own work, "The Art of Perfumery," and without a single reference either to his name or the source from whence the matter had been taken. Mr. Piesse further states that his work has gone through several editions, and that while people are welcome to the use of his recipes, he considers it unjust to appropriate his labor of twenty years without the honorable mention of his name.

THE SUEZ CANAL.—There were in all 96,864,554 cubic yards of excavation to be removed on the line of the Suez Canal. Two-thirds, or 64,447,545 cubic yards had been removed on the 15th of September last, and the work of removal was going on at the rate of two and a half million yards a month. The two great piers at Port Said, on the Mediterranean, will, when finished, contain 326,750 cubic yards of blocks, of which less than 20,000 remain to be sunk. The canal is to be officially opened by the imperial schooner *Laurette*, which left Toulon for the Red Sea.

THE METEORS.—Our space will not permit us to publish a large number of communications upon the above subject, of which we are in receipt. They contain few additional facts of interest, and as we are much pressed for space we are sure our esteemed correspondents will excuse us.

WHAT IS SOLD AS HONEY IN GERMANY.—A substance of a rather fine flavor and beautiful appearance is finding a ready sale as honey just now in Germany. This substitute for the genuine product of the bee-hive is simply starch converted into sugar by means of sulphuric acid.

A TURNING tool used on wood can have its temper destroyed by heating in working as well as one used in turning iron. In either case, the edge of the chisel should be exposed to the air, and not wholly buried in the substance.

THE conference of the European powers at St. Petersburgh have decided that no explosive missile shall be employed in war, which weighs less than 400 grammes.

HEAT and friction make an almost impenetrable scale on the surface of iron. Judicious annealing will remove it.

NEW PUBLICATIONS.

THE WORKSHOP; a Monthly devoted to Progress in the Useful Arts. E. Steiger, 17 North William street, New York.

Number 10 of the first volume of this excellent monthly is received. It is the American edition of *Die Gewerbehalle*, a German periodical published simultaneously in German, French, and English. Beside historical notices of the progress of the arts, and articles cognate to this comprehensive subject, it contains beautiful engravings of articles of household use, interior and exterior architectural decorations, carvings, sculptures, bas-reliefs, etc. The letter press is bold and plain and the engravings elegant. Price 50 cents a number or $5.00 a year in advance.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

SPINNING COTTON AND OTHER FIBROUS SUBSTANCES.—John Whitin, Whitinsville, Mass. Oct. 7, 1868.

3,070.—WATCHES, CLOCKS, AND OTHER TIME PIECES.—Henry Josephi, New York city. Oct. 8, 1868.

3,091.—BINNACLE FOR IRON SHIPS.—Charles Ole Olsen, New York city. Oct. 8, 1868.

3,151.—APPARATUS FOR GENERATING ATD BURNING THE VAPOR OF HYDROCARBON LIQUIDS.—David Lowe, Boston, Mass. Oct. 14 1868.

3,155.—ELASTIC MOLD.—Thomas Taylor, Edmund P. Rogers, and Miers Coryell New York city. Oct. 15, 1868.

3,165.—BREECH-LOADING FIRE-ARM.—Valentine Fogerty, Boston, Mass. Oct. 15, 1868.

3,196.—CARRIAGES FOR ORDNANCE.—Geo. R. Wilson, Washington, D. C. Oct. 19, 1868.

3,131.—REVOLVING AND REPEATING FIRE-ARMS.—F. A. Le Mat, New Orleans, La. Oct. 13, 1868.

3,171.—MANUFACTURE OF SIRUP AND SUGAR.—N. Pigeon, Brooklyn, N. Y. Oct. 16, 1828.

3,189.—SCISSORS.—Sarah H. Brisbane, Fordham, N. Y. Oct. 19, 1868.

3,227.—CARRIAGE WHEEL.—Walter K. Foster, Mass. Oct. 21, 1868.

3,233.—MACHINERY FOR PROPELLING WATER CRAFT.—Edwin S. Renwick, New York city. Oct. 22, 1868.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. C. R., of ——The glass used in an aquarium can be advantageously cemented to the frame by good putty made of white lead and linseed oil. Before putting in the fish, etc, water should be allowed to stand in it, and be changed until no taste or smell is imparted to it.

C. H. D., of N. Y.—The phrase, "The cup that cheers and not inebriates," is perfectly grammatical. The placing of the negative adverb before the verb, inebriates, without the auxiliary *does*, is not perhaps in exact accordance with our English idiom but does not by any means exceed the license accorded to poetical writers.

W. C. W., of Mich.—Registers for admitting hot air should always be placed at the bottom of the room intended to be heated by them —Ventilating registers should be placed near the ceiling.

C. G. C., of Pa.—The later Polar Expeditions have attempted to follow the Gulf Stream, in the hopes of thereby attaining a higher latitude than would otherwise be possible, but they have not reached the open Polar sea.

A. L. of Mass.—The curative or medicinal properties in petroleum (sold under various names) is owing to its carbonaceous properties. It is a hydro-darbon. The carbon contained in cod liver oil constitutes also its medicinal value.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING NOVEMBER 24, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

84,247.—PLANTING MACHINE.—Samuel L. Allen, Cinnaminson, N. J.

I claim, 1st, In combination with the carrying wheel, A, a central hopper, B, having chambers, C, constructed and arranged around in the said hopper substantially as and for the purpose described.

2d, In combination with the said hopper and chambers, arranged and combined as described, the slides, c', constructed and operating substantially as and for the purpose described.

3d, In combination with the hopper, B, and the perforated rim or tread, a', of the wheel, A, the continuous intervening channel, a6, as and for the purpose described.

84,248.—SWAGING ATTACHMENT FOR SHEET METAL WORKING MACHINES.—Henry E. Anderson, Ripon, Wis.

I claim, 1st, The screw, F, nut, G, swaging rollers, H and I, acting in combination, substantially as described.

2d, Frame, C, guide standard, D, guide, E, nut, L, and index hand, P, substantially as and for the purpose described.

84,249.—STEAM ENGINE.—Earle C. Bacon, New York city.

I claim the construction of the oblong hollow trunk, D, and its arrangement, with reference to the piston head, B, cylinder, A, and cylinder head, F, substantially as described.

84,250.—MANUFACTURE OF CARBONATE OF SODA.—Haydn M. Baker, New York city.

I claim the use of bicarbonate of soda for the purpose of decomposing soluble silicate of soda, to produce pure carbonate of soda and silica (silicic acid).

84,251.—STEAM PUMP.—John S. Barden, Providence, R. I., assignor to himself and Daniel N. Pickering, Boston, Mass.

I claim the combination of the stationary cylinder, K, and its passages, b2 c2, with the pump pistons, i' k', connected with the shaft, B, and arranged in the pump case, provided with valves and partitions, and induction and eduction conduits, as explained.

Also the arrangement of the steam engine and the pump, and their connection by the neck, I, and the shaft, B, as described.

84,252.—PLOW.—Edward D. Benjamin, Old Town, Ill.

I claim, 1st, The combination of the whiffletrees with the plow, when the same are constructed and arranged in connection therewith, in the manner herein shown and described.

2d, The levers, D D', pivoted to the ends of the axletree, and bearing wheel axles, E E, at the ends of their short arms, and having their long arms connected by the adjustable sway bar, G, the whole arranged and operating substantially as herein set forth and specified.

3d, The folding frame, K, arranged and operating as described and for the purposes specified.

84,253.—LET-OFF MECHANISM FOR LOOMS.—Thomas Booth and Chas. C. Sanderson, Norway, Me.

We claim the combination of standard, d, arms g g, rods, l l, weights, j j, arms, k k, and bands, n n, with the beam, b, as and for the purposes herein set forth.

84,254.—HORSE RAKE.—L. S. Bortree, Grand Rapids, Mich.

I claim, 1st, The vibrating frame, E, bell crank lever, F, arms, G, slotted double pronged teeth, I, provided with rollers, K, and the spiral springs, J, when constructed, arranged, and operating substantially as herein described and for the purposes specified.

2d, The standards, L, rock shaft, N, provided with arms, X, the wires, P, foot lever, O, and bell crank lever, F, substantially as and for the purposes set forth.

84,255.—BANDAGE FOR PRETERNATURAL ENLARGEMENTS.—Anson R. Brown, M. D., Albion, Mich.

I claim an elastic bandage having numerous perforations or interstices, e, in its structure, to admit air to the surface of a diseased portion of the human body while under compression, substantially as and for the purpose herein set forth.

84,256.—HINGE MACHINE.—Edward Brown, New York city.

I claim the combination with the bed, A, posts B, shaft, D, and gate, F, with their connections, constituting the frame and moving parts of a press, of the die, H, the yielding dies, K I, the levers, T T1 T2 T3 and N, and their corresponding springs, substantially as and for the purpose set forth.

84,257.—HAY SPREADER.—Geo. E. Burt and Edwin A. Hildreth, Harvard, Mass.

We claim, 1st, The forks, j j, when so arranged as to revolve horizontally over the ground, turning the hay, substantially as described and for the purpose set forth.

2d, The forks, j j, when so arranged as to revolve horizontally over the ground and sweep the hay from before the wheels, in order to give them a path clear from the grass or hay, substantially as described and set forth.

3d, The arms, g and h, in combination with the fork handle l, when so arranged as to revolve the forks, j j, horizontally over the surface of the ground, gathering and discharging or turning the hay, substantially as described and set forth.

4th, The forks, j j, when actuated by mechanism, so constructed that there shall be imparted to the forks, in addition to their horizontal rotary motion, a dipping and rising motion, to collect and discharge the hay, substantially as described.

5th, The forks, j j, when hung from hinges, l and m (one or both), and so arranged that the forks can freely rise, and pass over rising ground or obstacles, substantially as described and for the purpose set forth.

6th, The shaft, f, disk, u, and eccentric wrist, s, in combination with the driving arm, g, and operating arm, h, arranged to operate the forks, j j, substantially as described.

7th, The gear, c, pinion, d, tube, e, shaft, f, disk, u, and wrist, s, when used in combination, to operate the arms and forks of a hay tedder or rake, substantially as described.

8th, The flexible joints, l and m, in the arms, g and h, to allow the forks to follow over rising ground or obstacles, substantially as described and for the purpose set forth.

9th, The combination of the forks, j j, the pivots, q, pins, p, staves, i, and pivots, k and n, with the driving arm, g, and operating arm, h, operating as and for the purposes set forth.

10th, The springs, v v, when so arranged as to lift a portion of the weight of the of the forks, j j, and their connections, substantially as described and for the purpose set forth.

84,258.—CAR SPRING.—E. T. Bussell, Indianapolis, Ind.

I claim, 1st, The formation of a rubber spiral and air spring, by the arrangement and combination of two or more concentric hollow tubes of vulcanized india-rubber, R1 R2 R3, and four or more spiral springs, S1 S2 S3 S4, in such manner that the spirals support the rubber tubes externally as well as internally, and so as to form annular air spaces, for the confinement of atmospheric air between said rubber tubes, substantially as described and shown.

2d, The chambered base, C2, with the induction openings, I, furnished with valves, V, and eduction openings, J, between and in combination with the tubular and spiral spring, composed of the rubber tubes, R, and spirals, S, arranged to operate in conjunction, as shown and described.

84,259.—METHOD OF GENERATING FIXED GASES FROM HYDROCARBON VAPORS.—John Butler, Brooklyn, N. Y.

I claim, 1st, An arrangement of mechanism for roasting hydrocarbon vapors, or changing them into permanent gases, by exposing them to heat while minutely divided, or separated into small streams, substantially as herein shown and described.

2d, The combination and arrangement of the furnace or fire chamber, A, boiler, B, vaporizer, E, roasting chamber, H, and perforated charcoal block, I, or its equivalent, with each other, substantially as herein shown and described and for the purpose set forth.

3d, The perforated charcoal block, I, prepared and operating substantially as herein shown and described in combination with the roasting chamber, H, as and for the purpose set forth.

84,260.—STEP LADDER.—Joseph Charleville, St. Louis Co., Mo.

I claim the rail, a, its tenon, f, in combination with the mortise, g, of the seat board, B, and the brace, G, and step or round, b, substantially as and for the purposes set forth.

84,261.—SPINNING WHEEL.—Chas. L. Cole (assignor to himself and Thomas Johnson), Richmond, Mich.

I claim the rock shaft, M, wheel, L, friction wheels, H S and T, arms, Q and R, belts, N U and V, and treadles, O and P, when arranged relatively to each other, as herein described, in connection with any hand spinning wheel, and operating as and for the purposes substantially as set forth.

84,262.—WATER CLOSET.—H. H. Craigie, New York city.

I claim, 1st, The piston, l, moving in the cylinder, b, between the inlet and outlet pipes, in combination with the valve, n, and seat, f, the parts being arranged and operating substantially as and for the purposes set forth.

2d, The rod, m, piston, s, and valve controlling chamber, a, in combination with the water way, S, and valve, n, to the water closet, substantially as specified, so that the end movement given to the piston rod shall open or close the water way, S, for the purposes specified.

3d, The valve, r, applied at the piston rod, m, in combination with the valve controlling chamber, a, and a piston moving in said chamber, to regulate the closing of a water closet valve, substantially as set forth.

84,263.—MANUFACTURE OF PAPER BELTING.—Jas. B. Crane, Dalton, Mass.

I claim the process herein described for manufacturing paper fabric, substantially in the manner and for the purposes herein set forth and described.

84,264.—DIVIDED AXLE FOR RAILWAYS.—Daniel M. Cummings, Wyman Pattee, and Albert M. Shaw, Enfield, N. H.

We claim uniting the axle section, b, with the coupling section, d, by fitting a tapering portion of the former into the tapering bore of the latter, and then employing a screw nut or nuts on the inwardly projecting end of said axle section, when the said coupling section, d, is combined with its matching coupling section, c, substantially in the manner herein set forth.

Also, the arrangement of a properly proportioned disk or washer, e, within the coupling box of our improved car axle, in such a position as to prevent any lateral action that may be exerted upon the car wheels or axle from injuriously jamming the tapering portion of the axle section, b, within the coupling section, d, substantially as herein set forth.

84,265.—THILL COUPLING.—Wm H Curtiss, Panesville, Ohio.

I claim the combination of the hook, B, and its key, B', with the rigid joint bolt, E, and its notch, e', when arranged and operating in the manner and for the purpose set forth.

84,266.—DEVICE FOR HANGING PICTURE AND OTHER FRAMES.—Chas. B. Davies, Dayton, Ohio.

I claim the method of hanging frames herein described, with the eyes, B C and C', ring, D, cord, F, and slip, F, when arranged with relation to the frame, A, substantially as an for the purposes set forth.

84,267.—CLOG.—Job A. Davis, Watertown, N. Y.

I claim a clog formed in two separate parts, so connected that while drawn toward each other by force of a spring or springs, they may be stretched further apart from each other, substantially as and for the purpose described.

Also, a heel piece for a clog, mounted with a heel support and with a flexible shank, substantially as and for the purpose described.

Also the sole piece, having therein a cavity and a yielding spring or springs, substantially as and for the purpose described.

The combination of the cavity and spring or springs in the sole of the clog, with the elastic shank piece secured to the heel piece, substantially as shown and described.

84,268.—HOD ELEVATOR.—Paul Dehlinger, Buffalo, N. Y.

I claim, 1st, A frame, provided with angular notches, when used in combination with hods, provided with cleats, j for elevating the latter, substantially as set forth.

2d, The arrangement of the guard board, M, between the hod racks, as described.

3d, In an elevating apparatus, the combination and arrangement of the platform, C, with hod racks, E, substantially as set forth.

4th, The arrangement therewith of a hinged step, Q, as herein set forth.

5th, The construction of the hod rack, E, with double row of angular notches, e e', in the manner described.

6th, The arrangement of the brace and elevating bars, g g g g, and eye, b, with the hod racks, M, constructed as herein set forth.

84,269.—HORSE HAY FORK.—Wm. E. Derrick, Jordan, N. Y.

I claim the caliper shaped prongs, B, in combination with the straight piercing shaft, C, for the purpose herein described.

84,270.—REFLECTOR FOR PUBLIC HALLS, ETC.—Ossian E. Dodge, St. Paul, Minn.

I claim the double reflector, E, as arranged and operated by the cord, H, in combination with the pipe, A, and burners, for the purposes specified.

84,271.—HORSE HAY FORK.—Geo. H. Dow, Feeport, Ill.

I claim the curvilinear tine, A, in combination with the prong, B, in the manner as and for the purpose set forth.

84,272.—COMPOSITION FOR PAVEMENTS.—Gustave Dubelle, Boston, Mass.

I claim the new pavement composition as made of the several materials and in the manner as herein first described.

84,273.—TYPE SETTING MACHINE.—F. G. Foster, Eagle Rock, N. C.

I claim, 1st, The arrangement of the removable vertical plate, I, when provided with recesses, x x, and groves, x' x', as described, and entirely covered with a glass or other transparent plate, with the type boxes, D D, and fingers, f f, acting in the recesses, x x, substantially as and for the purposes herein set forth.

2d, The type box, D, constructed as described, and provided with a spring g, to press the type forward, substantially as herein set forth.

3d, The arrangement of the fingers, f f, placed in the recesses on the plate, in combination with the journal, e, lever, d, rod, b, and the key, C, all constructed as described, and the fingers operating so as to force the type down in the grooves, substantially as herein set forth.

4th, The guide, E, constructed as described, with a curved groove to guide the type properly into the composing stick, as herein set forth

5th, The combination of the setting rule, G, composing stick, h, slide, i, and galley, F, all constructed as described, and operating as and for the purposes herein set forth.

6th, The setting rule, G, constructed and working in the manner and for the purposes herein set forth.

84,274.—PUMP.—Earl J. Hall (assignor to himself and Jacob Eldridge), Indianapolis, Ind.

I claim the arrangement and combination of water box, A, horizontal induction pipes, V, valve chambers, B, and the means used for operating the same, all as shown.

84,275.—CENTRE BOARD WENCH.—Everett C. Hammond, (assignor to himself, O. H. Pennock, and Ira G. W. Pennock), Oswego, N. Y.

I claim, 1st, The barrel, A, worm wheel, B, endless screw, C, and gears, E, f, combined and operated substantially as herein described, and for the purpose set forth.

2d, The arrangement of the operating shaft or shafts, c e, when placed at right angles to the barrel, A, for the purpose herein described.

84,276.—FAN.—Anne B. Hancock, Suspension Bridge, N. Y.

I claim the combination of the whalebone frame, A, E, and buckram plate, C, to form an elastic foundation to receive the covering of feathers, D, substantially as described.

84,277.—EVAPORATOR.—James Harris, Janesville, Wis.

I claim, 1st, So constructing the opening in the partition between finishing apartment, b''', and the others, that the bottom of this opening, being above the bottom of these latter, they cannot get empty and burn.

2d, Dropping the finishing apartment, b''', lower than the others.

3d, The combination and arrangement of dampers, e and f, with the pan, C, constructed with its several apartments, as set forth.

4th, The combination of pan, C, damper f, cold air passage, g', and flue, d.

5th, The evaporator, constructed, arranged, and operated in the manner substantially as shown and described, and for the purpose set forth.

84,278.—BALANCE SLIDE VALVE.—Thomas M. Herriott and Samuel M. Meyers, South Pittsburg, Pa.

We claim the combination of the rings, C and B, with the projection, S, the whole constructed substantially as shown and described.

84,279.—MOLDING MACHINERY.—William T. Horrobin, Bennington, Vt.

I claim, 1st, The combination, substantially as described, of the reversible follow board with the sliding carriage, C, for the purposes set forth.

2d, The combination of the flask with the reversible follow board and the clamping screws, J, as and for the purpose set forth.

84,280.—ROTARY STEAM ENGINE.—Charles Kaiser, New York city.

I claim, 1st, The arrangement of the circular piston, H, in an oblong or oval cylinder, A, when said piston is provided with fly valves, N, N', N'', N''', constructed and fitted into the circumference of the piston, substantially as described.

2d, The construction and arrangement of the fly valves, N, N', N'', N''', in the circumference of the piston, H, with circular packing pieces, c, near the outer ends of said valves, substantially as herein set forth.

3d, In combination with a circular piston, H, provided with fly valves, constructed as above described, and working in an oval cylinder, the arrangement of two induction passages, n, n, and of two eduction passages, m, m, directly opposite each other, whereby to admit and exhaust the steam simultaneously at the opposite sides of the revolving piston, substantially as described.

4th, Rods or levers, s, s', s'', s''' forming a parallelogram, in combination with the fly valves, said levers being provided with springs, substantially as set forth.

84,281.—CLOTH MEASURING APPARATUS.—R. H. Kent, Middlebury, Ohio.

I claim the combination of the slide, O, and adjustable standard, R, as arranged in relation to and combined to co-operate with the rollers, a, J, winding shaft, F, all in the manner as and for the purpose set forth

84,282.—WATER ELEVATOR.—Chester King, East Cleveland, Ohio.

I claim the guide arms, F, hinged at a, and tilting arms, H, when arranged in relation to the curb, A, and spout, I, all constructed in the manner and for the purposes substantially as described.

84,283.—PORTABLE GAS APPARATUS.—George H. Kitchen, New York, and Scotto C. Nash, Brooklyn, N. Y.

We claim, 1st, A diaphragm, h, introduced in the lower part of the vessel containing the liquid hydrocarbon, so that said liquid shall freely pass into and fill the space below said diaphragm, in combination with a pipe supplying air below said diaphragm, and a pipe conveying away said carbureted air, substantially as set forth, whereby said diaphragm directs the bubbles of air, as they pass through the lower part only of the liquid hydrocarbon, and they do not disturb or vaporize the upper portion of the same, as set forth.

2d, The diaphragm, h, and spiral flange, forming a channel in which the bubbles of air travel, in combination with the pipes, 2 and k, and diaphragm, f, within the gasoline vessel, substantially as and for the purposes set forth.

3d, A gas holder, provided with perforated distributing pipes in the lower part, in combination with the carbureting vessel, pump, and pipes, arranged substantially as specified, so that the air that is forced directly into the gas holder, to dilute the gaseous hydrocarbon, will enter by the same distributing pipes that have supplied the carbureted air, in order that the contents of the gas holder may be mixed together with uniformity, substantially as set forth.

4th, The combination of a gas holder, formed of a flexible bag, with a pump and carbureting vessel, substantially as and for the purposes specified.

84,284.—BRICK MACHINE.—J. Klinkhardt and W. Kiburz, (assignors to themselves and Paul Ochler), St. Louis, Mo.

We claim the arrangement and combination of the pug mill, A, its screw, b, and passage, a', with the mold chamber, C, and plungers, D and E, and slides, F, substantially as set forth.

Also, the knife, f, when combined and operated with the slide, F, substantially as and for the purpose set forth.

84,285.—LIFTING JACK.—Francis Krick, Fidelity, Ohio, assignor to himself and Eli Sinks.

I claim the combination and arrangement of the bars, A B, the lever, C, stirrup, K, guides, E D, and spring catch, G, constructed substantially as and for the purpose specified.

84,286.—BEE HIVE.—J. C. Lander and R. R. Lander, Mazo Manie, Wis.

We claim the sections, A, B, movable sides, H, dividing boards, C', and

frames, C, when said frames are so arranged in the cases that a space is left between them and the walls, all constructed, composed, and arranged, in relation to each other, in the manner as and for the purpose set forth.

84,287.—COTTON GIN.—Charles Leavitt and W. H. Burridge, Cleveland, Ohio.

We claim, 1st, The rollers, D, and G, vibrating comb, J, and plate, K, combined and operating as set forth.

2d, In combination with the above, the rotating brush, I, or its equivalent, operating substantially as described.

84,288.—BRIDGE.—J. H. Linville, Philadelphia, Pa.

I claim the construction and arrangement of tension bars and struts for giving initial tensile stress to the bars and rigidity to the struts, substantially as herein set forth.

84,289.—MODE OF PACKING LAMP SHADES.—Edward A. Locke and William N. Weeden, Boston, Mass.

We claim a compact encased package of two or more paper lamp shade blanks, having a single margin prepared with a dried gum or cement, and with the margins or ends left unmited, substantially as and for the purposes described.

84,290.—CLOTH MEASURING APPARATUS.—Samuel B. Luckett, Corydon, Ind.

I claim the cylinder, B, arranged as described, cylinder, C, with rod, e1, and hooks, c2, and rod, D, the whole being combined and operated substantially in the manner and for the purpose set forth.

84,291.—ANIMAL TRAP.—Harmon F. Lushbaugh and Oscar Z. Hard, Mount Pulaski, Ill.

We claim, 1st, The combination of the shaft, B, coil spring, b, rods, m, m1, m2, m3, m4, o, and n, n1, n2, n3, platform, p, with its springs, q, link, l, and pawl, r, as and for the purpose specified.

2d, The combination of the platform, l, links, v and x, levers, w and z, rock shafts, E and F, with their lance heads and weight, as and for the purpose specified.

3d, An animal trap, formed by the combination of the parts hereinbefore described, as and for the purpose specified.

84,292.—WATER WHEEL.—Theodore W. Mahler, Rome, N. Y. Antedated November 9, 1868.

I claim, 1st, The double scroll, constructed and arranged in relation to the wheel, substantially as described.

2d, The extension gate, F, F1, constructed and arranged to operate as described, substantially as and for the purpose set forth.

84,293.—WATER ELEVATOR.—Cornelius W. L. Martine, Scotch Plains, N. J.

I claim, 1st, The chain, P, and buckets or cups, O, when combined, constructed, and operated, substantially as described for the purposes specified.

2d, The combination of the chain, P, buckets or cups, O, ratchet wheel, I, pawl, J, grooved wheel, F, and weight, H, constructed and operated substantially as shown, for the purposes indicated.

3d, In combination with the subject matter of the second claim, the shaft, C, box, A, and crank, N, for the purposes set forth.

84,294.—HORSE SHOE.—Samuel Mason, Newark, N. J.

I claim the rib, b, indentation, c, the pin, d, and the corresponding groove, c, when combined in the manner and for the purpose specified.

84,295.—SAFETY STOVE FOR RAILROAD CARS.—William C. McGill and William Knox, Cincinnati, Ohio.

We claim, in combination with the fire chamber, the upper and lower water reservoirs, H and A, substantially as set forth.

84,296.—SEEDING MACHINE.—Lynfred Mood, (assignor to Titus and Bostwick), Ithaca, N. Y.

I claim, 1st, the arrangement and construction of the bars, P P, fast to a cross bar, anterior to and extending to the rear of the carriage axle, but are not fixed to it, for the purpose of obviating the jar of the seed box, A, by the carriage wheels as set forth.

2d, Moving the sliding bars, H and I, in opposite directions at the same time, when made and used substantially as described, thereby giving great motion to the sowing bars, as set forth.

3d, The arrangement of the double crank, C, over and transverse to the center of its motion, for the purpose of moving the sliding bars, H and I, in opposite directions, as set forth.

4th, Attaching the agitators, G, to the bar H, when said bar H is used for the twofold purpose of agitating the grain, etc., and for forming part of the throat, as set forth.

5th, The arrangement of the hinged leaf, J, so as by the described means to regulate the throat made by the leaf and the sliding bar, H, as described.

6th, The construction and use of the lever, K, and its set screw clamp, for the purpose of setting the throat by the leaf, J, as set forth.

7th, The arrangement on the end of the leaf, J, of one or more springs, M, for the purpose of evening the sowing, as set forth.

8th, The combined whole, made and arranged of the carriage, B, the seed box, A, bars, H and I, and double crank, C, substantially as described.

84,297.—POTATO DIGGER.—F. A. Morley, Syracuse, N. Y.

I claim, 1st, a rotating cylinder, I F, sustained wholly by a central spindle, f, with arms, i i, only, which are projected from the said spindle considerably in the rear of the screen, F, when combined with the shovel, H, as herein shown, and for the purpose described.

2d, A crank axle, C c, having a driving shaft, E, working through the center of its crank wrists, c c, as shown in fig. 4, in connection with the driving wheels, B B, frame, A g, and screen, F, all constructed and operating substantially as and for the purpose set forth.

84,298.—WATER INDICATOR FOR STEAM BOILERS.—Adolphus F. W. Neynaber, Philadelphia, Pa.

I claim the construction and arrangement of rod, B, bracket, E, and pipe, F, substantially in the manner described.

84,299.—MODE OF POLING HOPS.—Garret J. Olendorf, Middlefield, N. Y.

I claim the poles, A, bill stakes, B, and cords, C, when arranged as and for the purposes herein set forth.

84,300.—SPRING BED BOTTOM.—Henry H. Palmer, Rockford, Ill.

I claim the bed bottom described, consisting of the frame, A, with cross pieces, E, slats, c, with straps, B, and projections, G, springs, F, and band, D, the whole being combined and arranged as and for the purpose set forth.

84,301.—MACHINE FOR PRODUCING WEAVER'S CUT MARKS.—William G. Perry, Manchester, N. H.

I claim the shaft, b, with the wire, a', or its substitute, attached, and trough, a', and the disk and sweep by which the wire is brought from its state of immersion in the color trough into contact with the web of yarn, all substantially as and for the purpose set forth.

84,302.—SAP SPILE.—Charles C. Post, Hinesburg, Vt.

I claim the sap spile, constructed with the longitudinal flue, B, whereby it may be held or retained in the tap or hole in the tree, without materially interfering with the flow of the sap, substantially as herein set forth.

84,303.—DEVICE FOR PREVENTING HENS FROM SCRATCHING.—Eli Rice, West Northfield, (assignor to himself and N. H. Richardson), Fitchburg, Mass.

I claim the within-described device for preventing fowls from scratching.

84,304.—ANCHOR.—Carl Wilhelm Roeden, San Francisco, Cal.

I claim, 1st, An anchor, constructed with its fluke arms, B, divided in two pieces, and attached to the shank, A, as described.

2d, The use of metal balls, G, as a means of pivoting the arms on the shank, the whole as herein described, and for the purposes as set forth.

84,305.—MOLDING GEAR WHEELS.—Warren Rowell, (assignor to himself and John Heck), New York city.

I claim, 1st, Molding my double gear wheel, A, with the groove between the two series of teeth, by in effect dividing the core into parts or steps, and mounting the parts alternately in the opposite flasks, and forming them of green sand at the same time the main parts are formed, substantially as for the purposes herein set forth.

2d, The introduction of an elastic substance between the pattern and plate, as described.

84,306.—PAPER CUTTING MACHINE.—George H. Sanborn, New York city.

I claim the combination of the knife bar, H, gears, F F', and worm wheels, D D', constructed and operating in the manner and for the purpose specified.

84,307.—PAPER CUTTING MACHINE.—George H. Sanborn, New York city.

I claim, 1st, The combination of the knife, c, and the swinging arms, b b', when the latter are arranged, relatively to each other, in the manner described, for the purpose specified.

2d, The arrangement and combination of the rod, p, arm, b, rock shaft, e, and lever, q, as and for the purpose described.

3d, The rubber, r, attached and adjusted as described, for the purpose of arresting the motion of the knife, as set forth.

84,308.—CAR HEATING STOVE.—Ethiel Sanger, Alton, Ill.

I claim, 1st, The stove, A, tubes, C, and reservoir, D, when arranged as herein described, and for the purpose set forth.

2d, The arrangement of the float E, valve or damper, b, and the connecting devices, e, e1, e2, as and for the purpose set forth.

84,309.—POTATO PLANTER.—Norman B. Sherwood, Millville, N. Y.

I claim, 1st, The tube, A, in combination with the carrying chain, B, or its equivalent, and elevating cups, C, or their equivalent, arranged substantially as and for the purpose set forth.

2d, In combination with the above, the hopper, D, constructed and operating as herein shown, and for the purpose described.

84,310.—SLEIGH AND BABY CARRIAGE.—Louis Shmetzer, Chicago, Ill.

I claim the combination of the removable carriage body, A, and wheels, D C, with the sled runners, B, when constructed and arranged as herein described, for the purpose of easy conversion into a child's carriage or sled, at will.

84,311.—RING-FERRULING MACHINE.—John Siddons, Rochester, N. Y. Antedated November 7, 1868.

I claim, 1st, The lever, O, upright slide, W, and arm, y, with its swaging rib, c2, in combination with the grooved die, C, all constructed and arranged as and for the purpose set forth.

2d, The combination of the cutting and forming dies, C, c2, and K, constructed and operating substantially as shown and described.

84,312.—RAILROAD CAR STOVE.—James Spear, Philadelphia, Pa.

I claim the arrangement of the valves, A A, on the top plate of the stove, in such a manner as to allow the stove pipe to extend through the cold air pipe, substantially as and for the purposes set forth.

84,313.—ADJUSTABLE PRESS.—Norman C. Stiles, Middletown, Conn.

I claim the method herein described, or its equivalent, of adjusting and fastening the eccentric to the lever or working part, and allowing to the supporting or crank pin freedom to rotate in the body of the eccentric, or in its own bearings, substantially as described.

84,314.—GUN LOCK.—John Stokes (assignor to Wesson Fire-Arms Company), Springfield, Mass

I claim the construction and arrangement, relatively to each other, of the main spring and the tumbler in the locks of fire-arms, whereby the hammer, after delivering its blow, is made, by the action of the main spring, to rise or return sufficiently to relieve the nipple, firing pin, or cartridge, substantially as and for the purpose set forth.

84,315.—HORSE RAKE.—O. O. Storle and Lorens Swenson, Norway, Wis.

We claim, 1st, Hinged cap, I and bolt, M, in combination with spring, K, substantially as described.

2d, Tooth, F, passing through bolt, M, with its end passing up through hinge, I, substantially as and for the purpose specified.

84,316.—CARRIAGE SPRING.—A. C. Stowe, San Jose, Cal.

I claim the shafts, E E, with their cranks or bent arms, d and g, and the connecting rod, c, together with the links, e e, and rods, b, the whole operating on the springs, D, as an equalizing device, substantially as herein described.

84,317.—STRAW CUTTER.—Edward Strothman and John Strothman, Milwaukee, Wis.

We claim, 1st, Pitman, H, shaft, I, frame, K, rollers, L L, knife, M, lever, N, arranged and combined substantially as described.

2d, Wheels, C C', bands, D, feed lever, E, spring, F, and knob, G, all combined and arranged substantially as described.

83,318.—IRON FENCE.—Andrew Terry, Waterbury, Conn.

I claim the combination of the posts and stumps, a a', with the collars, d d', tube rail, c, and pickets, e, substantially as shown and described and for the purpose set forth.

84,319.—CAR-WINDOW VENTILATOR.—Wm. Thompson, Dublin, Ireland. Patented in England Nov. 11, 1867.

I claim a dust blind and ventilator consisting of two or more rows of troughs or trough-shaped tubes, m', set in a suitable frame work, constructed and arranged substantially as and for the purposes hereinbefore set forth.

84,320.—BOILER-TUBE SCRAPER.—Charles W. Tremain, Chicago, Ill.

I claim the boiler-tube scraper, consisting of the opening disks, A' A", chamber, D, spring, C, guides, F, and lips, E, connected to rod, I, arranged substantially as set forth.

84,321.—ADJUSTABLE FLOODGATE.—Newell Tupper, Grand Blanc, Mich.

I claim the combination of the parts, C D E G H I J, in a water gate, substantially as and for the purposes set forth.

84,322.—COMPOUND FOR TREATING RINGBONE, SPAVIN, ETC., in Horses.—W. H. Vance, Corydon, Ind.

I claim the composition of matter herein described when the same is prepared and used in manner and form substantially as herein set forth.

83,323.—HAT VENTILATOR.—William F. Warburton, Philadelphia, Pa.

I claim the within described ventilator composed of the non-elastic flexible strips, A and B, secured together, so as to leave a crescent-shaped opening, a, substantially in the manner and for the purpose described.

84,324.—CANE AND WILLOW STRIPPER.—A. F. Ward and J. H. Bean, Marietta, Ohio.

We claim, 1st, The cane stripper described, consisting of the plates, A B, standards, c, scrapers, D, and springs, e, all being constructed and operated substantially as and for the purpose set forth.

2d, The plate, B, with catches, b, in combination with the adjustable catch, B1, when operated in connection with a mill frame, as described.

84,325.—FELTED TUFTED FABRIC.—John T. Waring, Yonkers, N. Y.

I claim the new and improved manufacture of tufted fabrics, consisting of tufts secured in a previously manufactured back of felt or woven cloth by the process of felting, substantially as hereinbefore described.

Also, the tufting needles, or either of them, in combination with the tuft-holders.

84,326.—JOURNAL BEARING FOR RAILROAD CARS.—Isaac P. Wendell (assignor to Ebert J. Wendell), Philadelphia, Pa. Antedated May 25, 1868.

I claim the journal bearing, A, constructed with an oil chamber, B, and tubes or openings, C, which are provided with a cord, D, or other fibrous material, substantially in the manner and for the purpose set forth.

84,327.—PAINT BRUSH.—Darius White, Portland, Me.

I claim the disk, d, when made of leather, or any equivalent substance, when used in the manufacture of brushes in the manner as and for the purposes specified.

84,328.—REIN HOLDER.—Chas. Whittaker, Milwaukee, Wis.

I claim a rein-holder, consisting of the parts, A B and C, substantially as described.

84,329.—METHOD OF INSERTING INDIA-RUBBER IN HUBS OF Carriages.—G. F. Wilson, East Providence, R. I.

I claim, 1st, The employment, in the hubs of carriage wheels, such as described, of a metallic lining, interposed between the india-rubber, or other elastic substance, and that portion of the hub in which said elastic substance is held, substantially as and for the purposes set forth.

2d, The combination, with the rubber or other elastic bearing and chambered hub, of a metallic lining, constructed as herein specified, so that while its larger end will line the sides and end of the chamber in which the rubber is held, its smaller end will extend back more or less into the interior of the hub, as and for the purposes set forth.

84,330.—ROAD SCRAPER.—J. F. Winchell, Springfield, Ohio, assignor to himself, G. C. Steele, and L. A. Simons.

I claim, 1st, The pivoted lever, D, in combination with the frame, arranged to look against the stops, m n and l, and provided with the chain, F, for operating it, substantially as described.

2d, The stops, m n and l, arranged to operate as described, for the purpose of holding the scraper in the different positions, as set forth.

3d, Providing the scraper with the adjustable stops for adjusting the handle at various angles or bights, substantially as and for the purposes set forth.

4th, The manner of securing the frame to the scraper, by means of the notch in the corner of the bars, C, and metal strap, a, arranged as described.

84,331.—HAND PLOW.—Jesse Winecoff, Berlin, Pa.

I claim the combination of two wheels, I, going before, a single plow, 10, together with a pivoted and adjustable beam, 3, and spring, 5, arranged in the manner described and for the purposes set forth.

84,332.—APPARATUS FOR CARBURETING AIR.—J. S. Wood, Philadelphia, Pa.

I claim, 1st, A carbureter, E, which is composed of an inverted cup and a number of independent concentric chambers formed by concentric rings projecting from its bottom, and which is suspended from the case, A, of the apparatus by means of an adjustable spring, substantially in the manner and for the purposes described.

2d, The construction of a carbureter, E, having a number of independent carbureting chambers or cups in its bottom, with a central guide tube, e, and side tubes, e", leaping therefrom into the central chamber, e4, substantially as described.

3d, The condenser, G, air inlet pipe, C, draw-off cock, W, and central guide pipe, d, in combination with a suspended agitator and carbureter, substantially as described.

4th, While not claiming broadly a floating carbureter, I do claim a cupped carbureter, which is suspended and balanced in the volatile liquid by means of a spring arm, T, substantially as described.

5th, The condensing chamber, S, interposed between the chamber in which the receiver, O, works, and the chamber in which the air is carbureted, said chamber, S, being in communication with the receiver, O, and also with the service pipe, R, substantially as and for the purposes described.

6th, The discharge tube, V, leading from the condenser, S, into the tank, D, substantially as and for the purposes described.

7th, The combination of the receiver and its valve, operating substantially as described, in a chamber, L, with an agitator and carbureter, which is constructed and suspended so as to operate substantially as described.

8th, A combined carbureter, regulator, and condenser, constructed and operating substantially as described.

84,333.—APPARATUS FOR REFINING IRON AND MAKING Steel.—John Absterdam, New York city.

I claim the combination of the nozzle, F, and conical spout, E, either one or both of which may be made movable toward or from each other, with the suction pipe, C, and converter, A, substantially as and for the purpose herein shown and described.

84,334.—PROCESS FOR REFINING IRON AND MAKING STEEL.—John Absterdam, New York city.

I claim the within described process of refining iron and making steel by exposing the molten metal in the converter to the combined action of a current of air produced by suction, and of a current of air produced by force, substantially as and for the purpose set forth.

84,335.—APPARATUS FOR MAKING STEEL AND REFINING Iron.—John Absterdam, New York city.

I claim, 1st, The spark arrester, B, in combination with the converter, A, substantially as and for the purpose set forth.

2d, The tubular pivot, b, in combination with the spark arrester, B, steam pipe, d, and exhauster, C, substantially as and for the purpose described.

3d, The chamber, D, having a rising and falling motion in its socket, m, in combination with an air or gas-supply pipe, one or both, and with the converter, A, substantially as and for the purpose set forth.

4th, The arrangement of nipples, s, in the chamber, D, substantially as and for the purpose described.

5th, The movable plugs, t, in combination with rising and falling chamber, D, substantially as and for the purpose set forth.

6th, The pipe, r, connecting with an air-forcing apparatus, in combination with the converter, A, and exhauster, C, substantially as and for the purpose described.

84,336.—PROCESS FOR INTRODUCING GAS FUEL INTO A Converter for Making Steel and Refining Iron.—John Absterdam, New York city.

I claim the process, herein described, of introducing fuel into the molten metal in a converter by suction.

84,337.—FOLDING BEDSTEAD.—Calvin P. Alling, Jr., Sylvan, Wis.

I claim an improved folding bedstead, formed by the combination of the hinged posts, A, hinged side bars, C, cross slats, D, jointed longitudinal bars or slats, E, hinged or pivoted elbow straps, F, and hooks, G, with each other, said parts being constructed and arranged substantially as herein shown and described and for the purpose set forth.

84,338.—CULTIVATOR.—T. Arndt (assignor to himself and E. L. Flowers), Mount Joy, Pa.

I claim, 1st, The ring or ring plate, D, in combination with the central or main beam, A, of the cultivator, and with the hooked forward ends of the side or adjustable beams, E, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the curved and slotted bar, H, slotted bolts, I, clips, J, and nuts, K, with the central beam, A, and with the adjustable side beams, E, substantially as herein shown and described and for the purpose set forth.

84,339.—HARROW.—Moses Atwood, New Sharon, Iowa.

I claim, 1st, The pivoted or hinged bar, E, having notches or catches, e', formed upon its lower side, and the cams, F, in combination with each other and with the frame, A, and toothed shafts, B, substantially as herein shown and described and for the purpose set forth.

2d, The combination of the arms or teeth, D, with the shafts, B, and teeth, C, substantially as herein shown and described and for the purpose set forth.

3d, An improved harrow, formed by the combination of the frame, A, shafts B, teeth, C, arms or teeth, D, pivoted or hinged bar, E, having notches or catches, e', upon its lower side, cams, F, and lever, G, with each other, substantially as herein shown and described and for the purpose set forth.

84,340.—HARVESTER.—John Blue, Trumansburg, N. Y.

I claim, 1st, The combination of the lock, consisting of the curved plate, C, bolt, h, and spring, d, or their equivalents, with the staff, B, joint, I, shaft, K, and pulleys, f and l, when these several parts are arranged for operation, substantially in the manner described for the purpose specified.

2d, The combination of the toggle joint, F, with the slide, E, and pulleys, f l and g, when these several parts are arranged for operation, substantially in the manner described for the purpose specified.

3d, The combination of the lock, consisting of the curved plate, H, bolt, k, and spring, e, or their equivalents, with the toggle joint, F, slide, E, and pulleys, f l and g, when these several parts are arranged for operation substantially in the manner described for the purpose specified.

84,341.—METHOD OF PREVENTING THE ALTERATION OF Numbers on Bonds, etc.—G. W. Casilear, Washington, D. C.

I claim printing numbers in parentheses, or between any other marks or forms, on a fugitive ground or background, tint, or color, thus effectually preventing alteration of the figures or numbers, as substantially set forth.

84,342.—HARROW.—John Chase, Farmington, Pa.

I claim the arrangement and combination of the several parts, B D E, substantially as herein shown and described.

84,343.—RESERVOIR COOK STOVE.—Sarah M. Clark, Beaver Dam, Wis.

I claim the arrangement, with reference to the stove, A, of the flanged top frame, B, rotating top, C, whose upper surface is a plane, the stove hearth, M, extending along both sides of the stove body, at both ends of the fire box, the concavo-convex reservoir, J, and the oven, L, as herein described for the purpose specified.

84,344.—FOLDING CHAIR.—Adam Collignon, Closter, N. J.

I claim, 1st, In combination with a folding chair, the straps, i, connecting the arms with two of the legs of the chair in such a manner as to allow the chair to be folded, substantially as described.

2d, The arms, G, hinged to the back, and connected with the legs, B, substantially as specified.

84,345.—GRAIN SCREEN.—J. J. Crider, Greenfield, Ind.

I claim, 1st, The head, c', provided with cups, H, and apertures, h, adapted to collect and deliver the grain, substantially in the manner shown and described.

2d, The worm or spiral conveyer, I, in its application to the feed end of a rotating grain-screen, and adapted to feed the grain in regular quantity, substantially as described.

84,346.—POUNCE HOLDER.—Robert Cushman, Pawtucket, and J. R. Dennis, Central Falls, R. I.

We claim, as a new article of manufacture, a paper smoothener consisting of the handle and bag, substantially as herein shown and described.

84,347.—REVOLVING PUDDLING FURNACE FOR TREATING Iron and Steel.—S. Danks, Cincinnati, Ohio.

I claim, 1st, The hollow ribs, L, and protuberances, M, either or both, in the metal shell of the rotary refining cylinder, I, forming, on the outside, troughs or pockets for the reception of water, in the manner and for the purposes set forth.

2d, The shiftable piece, P, employed, in combination with a rotary refinery, for the double purpose of a door and a flue, as described.

3d, The arrangement and adaptation, substantially as described, of the water bridge, G H, in combination with the fire chamber, A, and rotary puddling chamber, I, for the purpose set forth.

84,348.—HORSE POWER.—Milton Fisk, Sparta, Tenn.

I claim, 1st, The table, C C', arranged as shown, and provided with the adjustable spindles, D and G, and the operating shaft, E, and its wheels, in combination with the wheel, B, and bed, A, all substantially as and for the purpose described.

2d, The combination, with the movable table, C C', and spindle, G, of bed stone, H, substantially as and for the purpose described.

3d, The combination, with the spindle, G, of the socketed shaft, I, substantially as and for the purpose described.

84,349.—MILLSTONE DRESS.—James W. Gaines, Clarksville, Texas.

I claim the millstone dress, formed by the annular beveled furrow, a, the leading furrows, b, passing through the annular furrow, the radial furrows, c, connecting with the leading furrows at an angle, and the secondary furrows, d, all laid out in the manner herein shown and described.

84,350.—TENONING MACHINE.—William Gilmore, Hudson City, N. J.

I claim the combination of the pawl arm, d, vertically sliding rod, c, and pawls, d1 d2, with the vertical carriage, C, all arranged and operating as described for the purpose specified.

84,351.—COMBINED HAMMER AND NAIL HOLDER.—R. W. Green, Bradford, Pa.

I claim the jaws, A and C, secured to the hammer handle by the plate, L, constructed and arranged to operate as and for the purpose set forth.

84,352.—DEVICE FOR HOLDING DOORS OPEN.—W. W. Green, Jr., (assignor to himself and E. Brown), Janesville, Wis.

I claim the holder having the bifurcated end, d d, adapted to fit within the plate, e, attached to the door, and with a shoulder at the inner end of the bifurcation, by which the knob, A, is held to the washboard, B, as constructed and shown.

84,353.—DRILLING JARS.—Edward Guillod, Titusville, Pa., assignor to Bryan, Dillingham & Company.

I claim the within described drilling jars, consisting of a single link and bolt, constructed of wrought iron and steel, combined and applied substantially in the manner represented, and for the purposes set forth.

84,354.—DOG POWER.—A. W. Hager, and John H. S. Grove, Waverly, Iowa.

We claim the combination of the extensible working beam, I J, weight, H, connecting rod, K, crank, L, drums, C C', rollers, D, adjustable bearings, S, and the endless belts, consisting of the transverse slats, O, and the pivoted buttons, e, arranged to break joints with each other, all operating as described, for the purpose specified.

84,355.—PUMP.—Thomas Hansbrow, deceased, Sacramento, Cal. (Lucy A. Hansbrow, and B. B. Redding, executors.)

I claim, 1st, The valves, F, when their pivots, a, are adapted to fit in recesses formed in the walls of the valve chamber, whereby the heel of said valves has a vertical play while swinging upon said pivots, as herein described for the purpose specified.

2d, The pump barrel, A, water chest, B, and valve chest, all cast in one piece, and arranged as described, for the purpose specified.

84,356.—HOT AIR FURNACE.—S. J. Hare, Louisville, Ky.

I claim the described arrangement of the annular outer drum, H, formed by the cylinders, I J, and supported above the combustion chamber, C, by the short pipes, K, the central chamber, L, containing the perforated plate, m, the air pipe, N, and pipe, O, connecting the chamber, L, and drum, H, the damper, S, combustion chamber, C, and fire chamber, B, all constructed and operating as described, for the purpose specified.

84,357.—SNOW PLOW.—Hiram Harris, Circleville, Ohio.

I claim the snow plow, B, the mold boards, b', of which are constructed substantially in the form and manner herein shown and described, and which is detachably secured to the pilot, A, by the bar or plate, C, shackle bar, D, and side arms or bars, E, substantially as and for the purpose herein set forth.

84,358.—MACHINE FOR CLEANING ENTRAILS.—John Adam Huss, Louisville, Ky.

I claim, 1st, The rounter revolving rollers, A B, armed with scraping edges, a a a, or the equivalent thereof, all substantially as shown and described, in combination with any curved surface or surfaces, D E, all as set forth.

2d, The feed rollers, H H, in combination with the scraping rollers, A B, substantially as described and for the purpose set forth.

3d, The gear wheels, J K and L, and crank wheel, M, substantially as described, in combination with the rollers, A B, scraping edges, a a a, and surfaces D E, all as and for the purpose set forth.

84,359.—METHOD OF CONSTRUCTING CHAINS.—J. George Jung, Newark, N. J.

I claim, as a new article of manufacture, a chain, constructed of links having two heads and two apertures, in the above described location to each other, and the links being interlinked, substantially as specified.

84,360.—HORSESHOE.—Lucien H. Kellogg, Monroe, Ohio.

I claim the described construction of the horseshoe, having the flange, B, extending entirely around its under side, forming a rest for the front end of the toe calk, C, and adapted to receive the dovetailed heel calks in such manner that they shall rest upon the flange, longitudinally of the same, as herein shown and described.

84,361.—SWAGE FOR SAWS.—William A. L. Kirk (assignor to Owens, Lane, Dyer, & Company), Hamilton, Ohio.

I claim the swage, consisting of jaws, d and f, and annular or movable die, E, all constructed and arranged as shown and described, for the purpose set forth.

84,362.—DOOR FASTENING AND ALARM.—A. F. Kitchen, Shelton Depot, S. C.

I claim an improved door fastening and alarm, formed by the combination of the hinged plate, F, bar or plate, E chain, G, or equivalent, lever, I, and spring, K, with each other, and with the hasp, C, attached to the door frame, B, and staple, D, attached to the door of the outhouse to be protected, and with the gun or pistol, J, placed in the dwelling, substantially as herein shown and described, and for the purpose set forth.

84,363.—COVER FOR CIRCULAR VESSELS.—John Kline, Rochester, N. Y.

I claim a rotating semicircular cover for pails, etc., moving in a groove, and pivoted to a fixed semicircular cover, substantially as described, for the purpose specified.

84,364.—FRAME FOR TRAVELING BAG.—Samuel Lagowitz, Newark, N. J.

I claim a traveling bag frame, made of sheet metal, each jaw having one edge doubled up, and the other provided with a wire, the ends of which form the joints on which the jaws open and close, substantially as shown and described.

84,365.—DRESSING SAW TEETH.—John Lough, Buckingham Village, Quebec.

I claim, 1st, Widening the saw tooth at its under side, in such a manner that the expanded cutting face thereby produced is parallel sloped, or in the form substantially as shown in fig. 19, and as in herein above described, for the purpose set forth.

2d, The plates, c c, when united by the bolts, d d, and provided with the projections, e e, and the arm, b2, and having between the space, f, and the space for the compression bar, substantially as described.

3d, In combination with said plates, c c, constructed as above described, the lever, h, pivoted at h1, the strap, h3, the compression bar, i, and the die, k, all operating together in the manner and for the purpose set forth.

4th, In combination with said plates, c c, constructed as above described the wedge, g1, lever, g2, strap, g3, key or equivalent, g4, eccentrics, g5, and pivots, g6 g7 g8, all operating together substantially as and for the purpose set forth.

5th, The improved saw dressing machine, herein described, consisting of the bed plate, o, top plate, o, top plate, p, clamp, q, plane, r, iron strap or file holder, s, adjustable strip, v, and adjusting screws, v', all arranged and working together substantially in the manner and for the purpose described.

84,366.—REMOVABLE HEAD FOR BOXES, ETC.—Samuel Macferran, Philadelphia, Pa.

I claim the combination of the lever D having an elliptical or wedge-shaped projection, c, with one end of the tightening strap, C, and the slotted piece, F, with the other end of the strap, substantially in the manner above described, and for the purpose specified.

84,367.—THRESHING AND GRAIN SEPARATING MACHINE.—Miller, Canton, Ohio.

I claim, 1st, In combination with the straw carrier, the toothed beater, D, revolving in a direction contrary to that of the motion of the straw carrier, so as to lift up and throw over the straw, substantially as and for the purpose described.

2d, Also, in combination with the straw carrier and the cylinder, D, for throwing over the straw, the perforated board, c, to prevent the straw from driving into or between the slats of the carrier, and to carry and deliver the grain to the screens, substantially as described.

3d, Also, in combination with the straw carrier, the double pickers, or beaters, h i, at the upper end thereof, as and for the purpose substantially as described.

4th, Also, the construction of the picker or beater, i, namely, of the central shaft, the heads, and the rods or wires, as described and represented.

5th, Also, supporting the lower end of the straw carrier upon adjustable journals, and without a cross shaft, as and for the purpose described and represented.

84,368.—DROPPING PLATFORM FOR HARVESTERS.—Jacob Miller, Canton, Ohio.

I claim the combination of the pivoted platform, the flexible apron, and the traveling belts, united to each other, as herein described, so that the tipping of the platform shall bring the holding apron into action, and the returning of the platform into its receiving position, move the apron out of action, substantially as herein described.

84,369.—COMPOUND OF RUBBER OR GUTTA-PERCHA.—J. B. Newbrough, N. Y.

I claim, as a new composition, gutta percha, or india rubber, combined with clay, iodine, and wolfram or tungsten oxide, substantially as described.

84,370.—EXHAUST NOZZLE FOR STEAM ENGINES.—John Sanders, Harrisburg, Pa., administrator of the estate of Richard Norris, deceased.

I claim the arrangement of the valves, c c, rods, d d, springs, e e, partition b, and exhaust pipes, b b, constructed as described.

84,371.—ROTARY STEAM ENGINE.—Ferris Ogden, Meadville, Pa.

I claim, 1st, The two halves, A A, the ring, m, the arm, j, and the piston, C, constructed as described.

2d, The abutment, D, constructed as described.

3d, The thimble, h, and the plug valve, G, constructed as described.

4th, The steam chest, I, constructed as described.

5th, The arrangement of the parts designated in the foregoing clauses of the claims, constructed as described.

84,372.—BAGGAGE CHECK.—Enoch Haile Paine, Louisville, Ky.

I claim the baggage check, attached to the ticket, and corresponding in number with the number of the ticket, as herein set forth.

84,373.—BREECH LOADING FIREARM.—William Rochester Pape, Newcastle-upon-Tyne, England.

I claim the cartridge extractor, a, provided with rabbets, a', guide rods, d d', and beaded or flanged tongue, b, substantially as and for the purpose described.

84,374.—ROOT CUTTER.—G. S. Perfater, Camp Point, Ill.

I claim, 1st, The revolving cutter, A and fixed cutter, G, when constructed and operating substantially as described.

2d, The pivoted plate, E, and curved shank, H, having a slit, d, in combination with the revolving cutter, A, and fixed cutter, G, substantially as described.

84,375.—SEED SOWER.—Gottfried Rank, Greenleaf, Minn.

I claim, 1st, The seed or wind protector and scatterer, K, in combination with the cylinder, G, flanged rod, H, and hopper, D, substantially as described for the purpose specified.

2d, The combination and arrangement of the perforated slides, E h, cylinder, G, and rotating rod, H, provided with cavities, d, substantially as and for the purpose set forth.

84,376.—EXTENSION POLE AND HOLDBACK FOR CARRIAGES.—W. W. Rexford, Loch Sheldrake, N. Y.

I claim the sliding tube, C, holdback, D, and spring catch, E, E b, in combination with the perforated tube, B, affixed to the end of the pole, said tubes being prevented from turning one upon the other, by means of the feather, a, all constructed and operating as described, for the purpose specified.

84,377.—FORK BLANK.—J. C. Richardson, Ilion, N. Y.

I claim the blank, A, formed by punching or otherwise severing it from a bar of suitable width, with the space, e e" slits, c, and shoulders, f, substantially as and for the purpose described.

84,378.—CARRIAGE SPRING.—Benjamin H. Roberts, Fall River, Mass.

I claim, 1st, In combination with the elliptic springs, B B, the C springs, F F, formed by an extension of the ends of the elliptic springs, substantially as described.

2d, In combination with the C springs, F F, formed by an extension of the elliptic springs, the braces or brackets, G G, for connecting the C springs to the body of the carriage, substantially as described.

3d, The arrangement of the axle and rocker between two parts of the elliptic springs, substantially as described, and for the purposes set forth.

84,379.—SLEIGH BRAKE.—Milton Satterlee, Richland Center, Wis.

I claim the combination of the arm plates, e e', with the spur wheel, w, and the means for raising or depressing it, when used as a brake in connection with a sleigh or sled, in the manner described.

84,380.—REVOLVING COULTER FOR PLOWS.—Marshall Sattley, Taylorsville Ill.

I claim, 1st, The slotted upright, D, constructed substantially as herein shown and described, and for the purpose set forth.

2d, The wrist or swivel bolt, C, constructed substantially as herein shown and described, and washers, E, in combination with the slotted upright, D, and slotted end of the swiveled arm, B, as and for the purpose set forth.

84,381.—INSECT NET.—Charles B. Seaman, Honesdale, Pa.

I claim the frame, A, having bows, a, or rods, d, and provided with a netting, which is secured by rods, c, and eye bolts, b, all substantially as described, as a new article of manufacture.

84,382.—REVERSIBLE LATCH.—George H. Seaver, N. Y. city.

I claim the flexible tail piece, e, constructed and arranged substantially as described, and for the purpose specified.

Also, in combination with a reversible latch and flexible tail piece, the application of the spring, e, for the return of movable followers to their proper position.

84,383.—PILE DRIVER.—Thomas Shaw, Philadelphia, Pa.

I claim, 1st, A suitably guided hammer, G, in combination with a cylinder, R, all constructed, arranged, and operating in the manner and by the means described, and for the purpose set forth.

2d, The rack, C, pawl, K, and spring, L, in combination with the hammer, G, all constructed and arranged as described, and for the purpose specified.

84,384.—BOTTLE FILLING APPARATUS.—Peter M. Sherwood, New York city.

I claim, 1st, The valves, as arranged on the interior and exterior ends of the siphon, E, said siphon being combined with a reservoir, substantially as described.

2d, The valve, I, arranged as described, on the delivery end of the siphon, H, with the collars m o, spring, p, and yoke, n, substantially as and for the purpose specified.

3d, The bayonet fastening, z, in combination and arranged with the tapering valve, v', the spiral spring, and the sleev, w, having the enlarged portion, y, and the flange, x, adapted to fit upon the mouth of the bottle, all operating as described, whereby, as the bayonet catch is released, the sleeve, w, is thrown outward, to close the orifice, i, in the valve, v', as and for the purpose specified.

4th, The valve, arranged on the interior end of the siphon J, in such a manner that the operation of the siphon moves its end from the packing, v, affixed to the reservoir, and allows the liquid to flow, substantially as described.

5th, The adjustable bar, a, and shell, B, constructed and arranged substantially as shown and described, in combination with the reservoir, A, for the purposes specified.

6th, The faucet, y, embracing the tapering valve, v', sleeve, w, and the bayonet fastening, z, substantially as described, and for the purposes set forth.

84,385.—ELEVATOR.—Thomas B. Simonton, New York city.

I claim, 1st, The combination of the scroll wheels, J, K, the platform shaft, G, inclined plates, H, and racks, L, substantially as herein shown and described, and for the purpose set forth.

2d, The combination and arrangement of the racks, L, inclined plates, H, flanged or scroll wheels or pulleys, J K, shaft, G, platform, N, band or chains, M, pulleys, E and F, shaft, D, sliding guide bars, C, ways, R, endless bands, T, and guide pulleys, P Q, pulleys, S, and band, R, with each other, substantially as herein shown and described, and for the purpose set forth.

3d, The arrangement of the mechanism, by means of which all the operating parts of the hoisting apparatus may be raised and lowered with the platform, substantially as herein shown and described.

84,386.—COMBINED CRUSHER, HARROW, AND ROLLER.—John Simpson, Charleston, Ill.

I claim the rollers, E, fitted in the frames, D, attached to the frame, A, as shown in combination with the toothed cylinders, C C, all arranged substantially as described, for the purpose specified.

84,387.—HATCHWAY.—James D. Sinclair, Brooklyn, N. Y.

I claim, 1st, The arrangement of the pulleys, a b, the cord or chain, H, and the hatches, B D F, whereby the latter are opened successively, substantially as described, for the purpose specified.

2d, In combination with the pulleys, a b, cord or chain, H, and hatches, B D F, the hooks, d, and cord, e, whereby the hatches are released simultaneously, substantially as described, for the purpose specified.

84,388.—FRAME FOR PROTECTING WATCH WORKS.—William Borthwick Smith, Coventry, England.

I claim, 1st, The means employed for facilitating the separate detachment of the escapement, to wit, the bars, L L' M', arranged and applied in the manner substantially as set forth.

2d, The bow Ax, applied to the bar, M', and in relation with the balance staff, substantially as and for the purpose set forth.

3d, The projecting cap, Bx, when arranged and applied, in relation to the pillar plates and regulator, substantially as shown and described.

84,389.—SEWING MACHINE.—M. R. Smith, Armonk, N. Y.

I claim the pivoted self-adjusting block, H, in combination with the lever, D, and the presser roller, C, substantially as described, for the purpose specified.

84,390.—PAPER RULING MACHINERY.—William C. Smith, Brooklyn, N. Y., assignor to Henry Satcliff and John E. Tucker.

I claim, 1st, The combination of the blocks, i, supports, J, and bars, M, with the smoothing plate, H, and frame, A, of the machine, substantially as herein shown and described, and for the purpose set forth.

2d, Smoothing the paper, as it passes beneath the ruling pens, by means of a smoothing plate, H, adjustably attached to the frame of the machine, substantially as herein shown and described.

84,391.—COMBINED LATCH AND LOCK.—Arnold Sprague, Poland, N. Y.

I claim, 1st, The combination of the slotted vibrating latch, A, a2, provided with a stop, b1, and the eccentric, B, with stops, D E, arranged and operating substantially as described.

2d, In combination with the said eccentric, the spring tumblers, C, and stops, D E, arranged and operating substantially as described.

84,392.—SAW COTTON GIN.—William Sutton, Washington, Ga.

I claim the hopper, A, constructed as described, with its sides inclined, for the purpose of supplying the cotton to all the saws equally, as herein shown and described.

84,393.—WATER WHEEL.—William E. Tate, Cambridgeport, Mass.

I claim the top plate, E, with its channel or passage, in combination with the suspended or pivoted pendant buckets, c, of the wheel, B, the groove, dx, in the case, A, the abutment, e, within said groove, and the induction and eduction pipes, C D, all arranged to operate in the manner substantially as and for the purpose set forth.

84,394.—WATER WHEEL.—S. J. Thomas, Dawson, Ga.

I claim the wheel composed of sections or segments, A, with buckets, B, the segments joined by means of the projections, a e c, fitting into the recesses, b f d, all constructed and arranged in the manner set forth.

84,395.—WASH BOILER.—C. Arthur Totten, Hudson, N. J.

I claim, 1st, The braces, B, when arranged to strengthen the corners and provide a channel for the rising water also, substantially as and for the purposes specified.

2d, The flange, D, the brace, B, and short tube, E, in combination with the boiler sides substantially as described and set forth.

3d, The porous cover, L, when provided with the hinges at its center, in connection with the grooves, M, substantially as and for the purposes specified.

84,396.—GOVERNOR FOR STEAM ENGINES.—Samuel Trumbore, Easton, Pa.

I claim the float, D, provided with the tumbler extension, F, and guide rollers, G, and arranged with reference to the vessel, E, and the tube, H, substantially as described.

84,397.—BOOK COVER PROTECTOR.—A. Van Patten, Weyauwega, Wis.

I claim a metallic protector for book covers, hinged and constructed substantially as and for the purpose herein described.

84,398.—CONSTRUCTION OF SCHOOL GLOBES.—Edward Weissenborn, Hudson City, N. J.

I claim a school globe made of two layers, A, of pasteboard, cut out to form arms, a, and placed together and united by the aid of the mold, B, all as shown and described.

Also, the strip, f, pasted to the inner surface of one hemisphere, and serving to fasten and retain the second hemisphere, substantially as set forth.

84,399.—HARVESTER.—William N. Whiteley, Springfield, Ohio.

I claim, 1st, The double pivoted crank wrist box, moving upon axes at right angles to each other, as set forth, so that the wrist pin will not be cramped in its box by any irregular movement of the pitman, as set forth.

2d, The pitman joint at the heel of the cutter bar, formed by the conical or conoidal points, and the plates, o o, secured by the bolts, p q, and stay plate, s, in the manner set forth.

3d, Jointing the inner shoe of a harvester's cutting apparatus to a rocking shaft, located transversely to and extending across the main frame, so that by moving said shaft upon its axis, the points of the guard fingers and cutters may be "set" high or low, as desired, substantially as shown and described.

4th, In combination with the shoe, R and rocking shaft, Q, the lever, q', and the standard rack, x, for the purpose of permitting the adjustment and retention of said shoe and shaft in the desired position, as set forth.

5th, Mounting the driver's seat upon two notched rails, w w, so that said seat may be shifted forward or backward when slightly raised at the back, substantially as set forth.

6th, Pivoting the platform, U, at the tops of the posts, n n, and adjusting its forward end at any desired hight by the adjusting bar, V.

7th, Arranging the two unequal sized driving wheels, C and F, with their axles about in the same vertical plane, so that neither wheel will drag when the machine is being turned, as at the field corners.

8th, The wedge-ended clutch lever, M, constructed, and operating as set forth.

9th, The notched bar, z, and lever, y, constructed and operated as set forth.

84,400.—ICE SPUR.—C. F. Wieland, Darmstadt, Ill.

I claim the combination, in a spur or creeper, of the two U-shaped plates, A and B, pivoted together by pintles, d d', and actuated by a spring within a case, C, with the spring catch, E, and pin, b, all arranged and operating substantially as shown and described, and for the purpose set forth.

84,401.—RAILWAY RAIL.—Henry Zahn, Toledo, Ohio.

I claim the hollow elastic base, B, having inwardly-inclined sides, terminating in the vertical parts, a a, between which the tongue, b, of the rail, A, is bolted, whereby the rail, B, is depressed by the weight of the passing train, causing the parts a a, to pinch the tongue, b, thereby lessening the effect of percussion and vibration in proportion to the downward pressure of the rail, as herein shown and described.

84,402.—BOOT CRIMPER.—Oliver M. Adams, Milford, Mass.

I claim the jaws, b b, with serrated or segmental rows of teeth, in straight lines, at right angles to the jaws, as described, in combination with plate, d, and clamp, a, screw, c, and screw nut, e, constructed and operating as and for the purpose set forth.

84,403.—PRINTING PRESS.—Samuel J. Baird, Staunton, Va.

I claim, 1st, A flexible frisket, to be used in combination with a flat form and cylinder impression press, substantially as and for the purposes set forth.

2d, The roller, smooth or grooved, for protecting the frisket from the ink rollers and directing its ascent, as above described.

3d, The grooved frame above described, whether fixed or made movable, so as to be adjusted to any desired breadth of frisket, holding it firmly extended, as above described, and for the purposes specified.

84,404.—PROCESS OF RECOVERING PIGMENTS, OILS, AND GUMS FROM CLOTHS USED BY ENGRAVERS.—Haydn M. Baker, New York city. Antedated November 7, 1868.

I claim, 1st, The manufacture of paints from the material contained in cloths or fibrous substances (used by engravers for wiping their plates), in the manner or by the process herein described.

2d, Also, the use of the solvents herein enumerated, or their equivalents, for the purposes set forth in the specification, *i. e.*, the manufacture of paint.

3d, Furthermore, the process herein described for the separation and recovery of oils and gums, or resinous matter.

84,405.—OIL CAN.—B. F. Barnes, Boston, Mass.

I claim the nose, C, made in two parts or sections, D and E, in combination with the wire, J, secured at one end in section, D, and extending by its other therefrom into the oil passage, through part, E, substantially as and for the purpose specified.

84,406.—LAMP BURNER.—Alfred Bliss, New York city.

I claim the combination with the burner of a kerosene or other lamp, of a removable cone or deflector, so constructed, that when the chimney and cone or deflector are in position for use, the chimney will rest upon the head or ring and retain the cone in place, substantially as described.

84,407.—GAGE FOR MORTISING WINDOW SASH.—W. P. Boyd, Thorntown, Ind.

I claim the combination of the adjustable blocks, B B, stops or bars, C C, and slotted or grooved bar, A, all arranged as described, and operating substantially as and for the purposes herein set forth.

84,408.—SCREW PRESS.—Jonathan S. Buell, Buffalo, and Willard B. Buell, Pompey, N. Y.

We claim, 1st, The ratchet wheel, lever, pitman, and crank, in combination with the press screw, when arranged and operated substantially as and for the purpose set forth.

2d, The combination of the diagonal brace, M, with the oscillating lever, F, and screw, D, arranged so as to support the former, and permit the necessary movement of the parts, as set forth.

3d, The combination of the triangular pointed spring pin, i, and arms, b, with the double pointed pawl, G, arranged to operate substantially as and for the purpose set forth.

84,409.—HAY SPREADER.—William H. Butterworth, Trenton, N. J.

I claim, 1st, Eccentric, H, provided with a slot, c, so as to be adjusted as desired, substantially as herein described and for the purpose set forth.

2d, The combination of the adjustable eccentric, H, the rotating ring, G, and the reel, having its rake bars journalled therein, and connected by cranks, b, to the ring, G, all arranged to operate as and for the purpose described.

84,410.—NUT PLANER.—John T. Campbell, Altoona, Pa.

I claim, 1st, The combination of one or more tools, m m', and a revolving mandrel, G, all constructed, arranged, and operating together, substantially as and for the purpose set forth.

2d, The combination and arrangement of the revolving mandrel, G, sliding tool rest, E, edge planing tool, n, and the double edged tools, m m', all constructed and operating substantially in the manner described.

84,411.—SCREW TAP.—Samuel J. Mills Clark, Brookline, and John L. Farrell, Boston, Mass.

We claim the improved compound tap, made as before described, that is, having its cutting surface or series of teeth disposed in graduated sections, substantially in the manner and for the purposes shown and specified.

84,412.—GLASS MOLD.—E. W. Cooper, Williamstown, assignor to himself and Lukens Cooper, Blackwoodtown, N. J.

I claim, in a mold for forming glass vessels with screw tops, a detachable ring, D, having screw threads on its inner edge and being applied to the mold substantially in the manner described.

84,413.—CULTIVATOR.—William F. Coulter, G. F. Trabue, and W. A. Lowrey, Hardinsburg, Ind.

We claim, 1st, The V shaped brace pendants, S S, adjustable beams, G G, stiff pendants, H H, and staple guides, p p, arranged together in a cultivator, substantially as herein described.

2d, The hooked spring goose necks, F, applied to axle B, and adapted to serve for holding up the shovel carrying beams out of action, substantially as described.

84,414.—GATHERING ATTACHMENT FOR SEWING MACHINES.—John Crandell, Chicopee, Mass., assignor to Lamb Knitting Machine Manufacturing Company.

I claim the within described gathering attachment consisting of the plates, a b, constructed in the manner explained and represented, provided with the screw, d, and projection, f, and adapted for operation in conjunction with the feed and presser foot of a sewing machine as and for the purpose set forth.

84,415.—BEE HIVE.—Samuel Cuplin, Iowa Falls, Iowa.

I claim, 1st, The removable boards, F F, held in place by the strips, f, f', and used for the purpose of retaining firmly in position the comb frames and facilitating the removing of the same.

2d, The comb frames, E E, constructed, arranged, and operating substantially as described.

3d, Casing, A, cover, B, honey boxes, G G, ventilating lid, I, comb frames, E E, removable or adjustable boards, F F, strips, f and f', horizontal and inclined bottom, C, inclined board, G, and door, J, all constructed and arranged substantially as and for the purpose set forth.

84,416.—CLOVER HARVESTER.—Paul Dismukes, Gallatin, Tenn.

I claim, 1st, A machine for gathering clover or grass seed, having the adjustable fingers, C, reel, E, and cutter, D, all constructed and combined substantially as set forth.

2d, The combination of the adjustable fingers, C, and the rotating cutter, D, when said parts are constructed and arranged to operate as herein described.

84,417.—UNIVERSAL JOINT.—Alfred Duvall, Baltimore, Md.

I claim the combination of devices substantially as shown in the drawings and set forth in the foregoing specification.

84,418.—ARMOR-PLATING FOR VESSELS.—Gustav Julius Günther, London, England. Patented in England, October 25, 1867.

I claim, 1st, The combination of two or more armor plates with each other by back flanges and bolts, substantially as described.

2d, The combination of two or more armor plates with each other, by means of back flanges and bolts, and tongues and grooves, substantially as described; and this I claim both when the tongues are attached to and separate from the plates, as described.

3d, The method, substantially as described and represented, of fastening armor plates which are combined with each other by flanges and bolts, to a backing structure by means of T-shaped plates, substantially as specified.

84,419.—CORN HUSKER, SHELLER, AND STRIPPER.—Friedrich Häfelfinger and Robert N. Eagle, Washington, D. C.

We claim, 1st, The sectional bars, B B, connected by transvere bars, C C, substantially as and for the purposes set forth.

2d, In combination with the aforesaid bars, B B and C C, the spring, D, for the purpose stated.

3d, The hood; E F G G, in combination with the sectional frame, B B C C, substantially as set forth.

4th, The loops, K, for the attachment of the straps or bands of any suitable form.

84,420.—COMPOUND FOR HARDENING AND UNITING IRON AND STEEL IN THE MANUFACTURE OF PLOWS, ETC.—William Howell and N. W. Browning, Webster City, Iowa.

We claim the solution herein described, or its equivalent, when used for the purposes specified.

84,421.—COMPOUND FOR ROOFING AND PAINTING.—Nathaniel Irish, Rochester, Minn.

I claim a compound, consisting of the above-mentioned ingredients, and used substantially as and for the purpose herein set forth.

84,422.—MACHINE FOR MAKING BOXES.—Eben James (assignor to himself and W. B. Brinley), Tyngsborough, Mass.

I claim the combined arrangement of the two gangs of cutters, h h and i i, one being adjustable toward and from the other and the table, q, movable between the said gangs of cutters by means of the crank, t, pinions, v v, and racks, w w, all substantially as and for the purpose herein specified.

84,423.—LOOM.—Barton H. Jenks, Bridesburg, Pa.

I claim, 1st, The combination of the tension device, G, arranged and operating substantially as described, with heddles which are held down or suspended by means of a cord and a system of sheaves, substantially as and for the purposes described.

2d, The combination of the twilling cam, K, hub, L, which is grooved circumferentially, and as described, diametrically opposing feathers, y y, on cam shaft, and the swivel, n, substantially as and for the purpose described.

3d, The combination and arrangement of the system of loom treadles, the twilling cam, the circumferentially-grooved hub, which is grooved as described, and slides, the cam shaft with two feathers, y y, and the swivel, n, substantially as and for the purpose described.

84,424.—REELING MACHINERY.—Barton H. Jenks, Bridesburg, Pa. Antedated November 14, 1868.

I claim, 1st, The combination of the folding reel bars, G G, shaft, E, circular bearing, J, with a break, P, in its rim, and groove or flanges, i i, substantially in the manner and for the purpose described.

2d, The bearing, J J p p, constructed in the manner shown and described, in combination with the groove or flanges, i i, and pin, s, for the purpose set forth.

3d, The arrangement, consisting of the oscillating bearing, J P, reel, E G, groove or flanges, i i, intermittent longitudinally-reciprocating oar, C, sizing box, B, and gearing, shown for operating the bar and reel, all substantially in the manner and for the purpose set forth.

84,425.—STEAM ENGINE WATER HEATER.—William Ashley Jones, Dubuque, Iowa, and James L. Sherman, Cassville, Wis.

We claim a valve or valves, E, applied to the several sections, D 1, of worm or coil, or pipe, which is arranged within a heater, A, substantially in the manner and for the purposes herein described.

84,426.—CORN PLANTER.—C. A. Kellogg, Elyria, Ohio.

I claim 1, The slide, L and spring, M, as arranged in combination with the lever, D, for the purpose set forth.

2, The lug, E, as arranged in combination with the chutes, I, F, and G, and operated in the manner as and for the purpose described.

84,427.—STEAM GENERATOR.—John C. Kilgore, Philadelphia, Pa.

I claim the foam-cap, c, combined with the siphon, H, and tubes, C, substantially as herein specified.

84,428.—BLOWING ENGINE.—Alexander Carnegie Kirk, Glasgow, Great Britain.

I claim the cylinder, I, with its openings and valves, in combination with casings, 7 7, and with a hollow piston-rod or trunk extending through both heads of the cylinder, open at each end, and communicating with a hollow piston, A, having openings and valves arranged as described, the whole being constructed and operating as set forth.

84,429.—SAD-IRON HEATER.—David H. Lowe, Boston, Mass.

I claim a sad-iron, heated substantially in the manner described by gas from naphtha.

84,430.—CULTIVATOR.—Thomas E. McDonald, New Brunswick, N. J., assignor to P. P. Runyon, Johnson Lester, and George J. Janeway, same place.

I claim, 1st, A machine, having a series of cultivator-teeth arranged on a rotatory shaft, in combination with a swinging or hinged frame, pivoted in rear of the cultivator, when the latter is operated by its progressing over and in contact with the ground, substantially as described.

2d, The employment, in combination with the cultivator, hinged frame, of the chains, or their equivalent, and a suitable moving and holding-mechanism for retaining the adjustable frame while the cultivator is at work, substantially as and for the purpose set forth.

3d, Arranging the teeth on each hub, or each set of teeth, spirally, as and for the purpose specified.

4th, Method, shown and described, of constructing and combining the teeth and their retaining-arms and hubs.

5th, A divided cultivator-shaft, whereby the machine is rendered capable of straddling a row of plants, and cultivating each side, as hereinbefore set forth.

84,431.—DISH-WASHER.—Charles Messenger, Cleveland, Ohio.

I claim the grate, I, radial angular arms, C, as arranged, in combination with the spindle, D, bow, G, and case, A, and operated in the manner as and for the purpose set forth.

84,432.—HARVESTER.—Lewis Miller, Akron, Ohio.

I claim, 1st, The combination of the changeable gears with the adjustable crank-wrist, so that a fast motion and short stroke, or a slow motion and a long stroke, may be given to the cutters, as the work to be done may require, substantially as described.

2d, Also the arrangement of the gear pinion, j, with regard to the pinion, k and rake-driving gear H, so that a long coupling may be used, and a change gear and change of speed attained or given to the rake, as and for the purpose described.

3d, Also in combination with the device by which the tongue may be made fast or loose, the double hook, l 2, or its equivalent, by which the coupling bar may be suspended to the main frame, and to the lifting lever by the same or another chain, x, as and for the purpose described.

4th, Also in combination with a detachable platform, the rearward projecting arms, O P, on the main frame, for connecting said platform to, and carrying it upon, when the machine is being transported to or from the field or elsewhere, substantially as described.

5th, Also, hanging the rake and beaters or reel, and operating them upon or from two centres, remote from each other, and to which they are connected, so that the beaters shall have their rising and falling and horizontal position, without the use of guides, ways, or cam-ledges, substantially as described.

6th, Also, in combination with a combined rake and reel or beaters, having the motions herein described, the encased spring for raising the rake after it has cleared the platform, substantially as described.

84,433.—MACHINE FOR MAKING HARVESTER-GUARD FINGERS.—Lewis Miller, Akron, Ohio.

I claim, in combination with the rolls, B C, projecting beyond one of their housings, the pairs of changeable die-rollers, with their dies for rolling out irregular, shouldered pieces, F I, as and for the purpose set forth.

Also, in combination with a pair of rolls projecting beyond one of their housings, a pair of welding and shaping rolls and dies, and a pair of clamping and shaping tongs or holders, operating together to hold, weld, and shape a guard or finger, substantially as described.

84,434.—WINDLASS AND HORSE-POWER.—Simon B. Minnich, Landisville, Pa.

I claim, 1st, The construction of my hub or drum, C, with its lower flange and open chamber, Y, when the upper flange is provided with cog-like stops, n, on its upper face, arranged and operated substantially in the manner and for the purpose specified.

2d, Independent rings, D M, provided with cog-like stops, n, in combination with the drum, C, arranged in the manner and for the purpose set forth.

3d, The adjustable sliding hooks, L, on the radiating arms, K, in combination with the chambered hub or drum, C, when operated in the manner and for the purpose described.

4th, The arrangement of the sweep head, E, when provided with slots, i 2

and 3, for the reception of the rod, J, click bolt, I, and hook bolt, G, in the manner and for the purpose specified.

5th, A loose, wooden clock bolt, I, beveled and operating in combination with the cog-like steps, b, in the manner and for the purpose set forth.

6th, In combination with the hub or drum, C, radiating arms, K, and hooks L, the arrangement of the trunk, Q, with its vertical roller, S, and horizontal pulley, t u r v, all arranged in the manner and for the purpose specified.

84,435.—HAND CORN PLANTER.—John H. Morris and Thos. B. Harrison, Magnoketa, Iowa. Antedated Nov. 18, 1868.

We claim, 1st, The seed box, A, of sheet metal, cast box, B, blocks, C' C'', springs, E E, plunger, D, in combination with the chamber or mortise, H, regulating slide, R, and brushes, I I, constructed, arranged, and operating as and for the purpose set forth.

2d, The seed box, A, in combination with the opening and glass sliding door, X, the strap, L, screws, M and N, and plunger, D, constructed, arranged, and operating as described.

3d, The combination of the stop block, O, plunger, D, blocks, C' C'', and seed box, A, constructed substantially as and for the purpose specified.

84,436.—ELEVATOR AND CONVEYER.—Lewis Y. Myers (assignor to himself and Emanuel Raber), Roanoke, Ind.

I claim the rail, A, conveyer frame, D, latch, b2, catch, b3, pulley, g, cord, h, weight, h', cord c1, pulley, d, and block and pulley, f, all combined, arranged, and operated substantially as set forth.

84,437.—CORN AND POTATO-PLOW.—Walter Notman, Deerfield, Ohio.

I claim the mold boards, G, of the twisted and bent form, as shown, combined and arranged with the V-shaped frame, A, cross pieces, B, uprights, D, and braces, C I, I, which parts are firmly secured to each other, as herein represented and described and for the purpose specified.

84,438.—PATTERNS FOR STOVES AND HOLLOW WARE.—John Owen (assignor to himself, Henry L. Brown, and A. Barr Irwin), Dayton, Ohio.

I claim patterns for casting stove plates and hollow ware made of paper, substantially as set forth.

84,439.—BEER-COOLER.—A. D. Puffer, Somerville, Mass.

I claim the arrangement of the cooler with respect to the movable drip plate, as and for the purposes specified.

Also, the opening, e, protected by the plate, f, as and for the specified purpose.

Also, a base draft waste constructed and arranged substantially as described.

84,440.—PRINTING-PRESS.—Leolf Reese and Harry Reese, (assignors to themselves and William Mellenry), Philadelphia, Pa.

We claim, 1st, The box, A, having a recess in the top for the reception of type, and to which it is jointed by yielding hinges, a lid, F, containing a movable plate, H, faced with rubber, or its equivalent, and bearing on springs, I, all substantially as and for the purpose described.

2d, The arrangement of the springs, k, on the rods, h, between nuts on the latter and the projections, i, through which the rods slide, as and for the purpose specified.

84,441.—COMPOUND FOR TREATING PILES.—Martin Rinehart, Lockport, Ill.

I claim the medical compound, consisting of the ingredients substantially as herein described, as a remedy for the piles, as set forth.

84,442.—CONSTRUCTION OF WASTE-WATER PIPES.—Adam C. Smith, Philadelphia, Pa.

I claim a water pipe, consisting of a strip of metal coiled spirally, and so that one edge shall overlap the other, as set forth.

84,443.—CURTAIN FIXTURE.—Lewis Smith and Samuel Foster, Jr., Des Moines, Iowa.

We claim in combination with the roller, D, and its reel, F, the elongated journal, a, provided with an indentation, i, within which the bend in the curved spring rod, I, is rested, all as herein shown and described.

84,444.—LOW WATER AND HIGH STEAM INDICATOR.—L. F. Smith, Philadelphia, Pa.

I claim, 1st, The combination of the cylinder, A, tube, B, and cylinder, E, the latter provided with openings, a a, and suspended, by means of levers, G H, and rods b c d, from the valves, J, of the steam whistle, D, all substantially as herein set forth.

2d, In combination with the valve, e the circular cap, f, fitting in the groove, i, on the valve seat, b, substantially as herein set forth.

3d, The arrangement of the levers, U W, weight, T, and rod, V, as set forth.

4th, The arrangement of the cylinder, A, and the inner vessel, E, with its perforations, a a, with the steam generator, C, and whistle, D, all substantially as specified.

84,445.—CASE FOR PRESERVING FLOWERS, ETC.—E. M. Stigale, Philadelphia, Pa.

I claim the rubber band, e, applied to the edge of the glass, fitting a recess in the base, and protected by a flange, i, on the glass all as set forth.

84,446.—CARRIAGE SPRING.—William F. Vernier, Philadelphia, Pa.

I claim, 1st, In combination with the axle and frame of a carriage, the lever, D, having its fulcrum at a, and the gum-elastic spring, G.

2d, In combination with the above, the cross levers, D', with their gum-elastic springs, arranged substantially as and for the purpose set forth.

84,447.—PNEUMATIC STREET RAILWAY CAR.—C. W. Wailey (assignor to New Orleans Pneumatic Propelling Company), New Orleans La.

I claim the combination of a street railroad car with a pneumatic engine, when the latter is operated by compressed air that is contained in tanks composed of paper or its equivelent, and which are carried on the car, substantially as herein described for the purpose set forth.

84,448.—CURTAIN CLASP.—B. F. Watson and Albert Shepard, Bridgeport, Ill.

We claim the metallic band, a, open at the top, forming small rolls, C C, from which project the handles, c c, for operating it, all as herein shown and described.

84,449.—CULTIVATOR.—Seth Way, La Porte, Ind.

I claim, 1st, the swiveling joint, 2 8, secured to the tongue of the carriage, substantially as and for the purpose described.

2d, The construction of the lever, 1, and its combination with the plow beams, substantially as shown and described.

3d, The arrangement of the stirrups, 4, with reference to the two diverging portions of the plow beams, substantially as and for the purpose described.

4th, The socket, 3, and its combination with the axle 7, and tongue, A, substantially as shown and described.

84,450.—SAFETY HORSE HITCH.—Theophilus Weaver, Harrisburg, Pa. Antedated September 22, 1868.

I claim, 1st, The base, R R', substantially as herein set forth.

2d, The holder, F, with tread, h i, and bars, s t u, substantially as shown and described.

3d, The arrangement of the base, R R', and holder, F, for the purposes specified.

4th, Inserting a hitching strap, plicated to form a release hitch, substantially in the manner herein set forth.

84,451.—MECHANICAL MOVEMENT.—Milo Webb, Chenango Forks, N. Y.

I claim the arrangement of the frame, A, with the cylinder, C, chain, D, cylinder, E, spring, H, wheels, F, I, shaft, G, dogs, o o, bar, h, shaft, i, spring, m, regulator, R, and its screw, S, wheel, N, bar, L, and rod, O, all, with their various parts, constructed and operating substantially as herein set forth.

84,452.—DUNG DRAG AND HOOK.—Henry W. Weiss, Quakertown, Pa.

I claim the improved dung drag, consisting of the rolling bar, D, with teeth, a, and standard, E, the pivoted stop bar, F, lever, G, guard, d, frame, A B B', C C', and swivelled roller, H f, all constructed and arranged to operate substantially as herein described.

84,453.—COVER FOR HAY AND GRAIN COCKS.—E. R. Whitney, Plattsburg, N. Y.

I claim as a new article of manufacture, the herein-described cover for grain and hay stacks and cocks, when the same is constructed of water proof paper, and provided with holes for the guys, substantially as and for the purposes herein set forth.

84,454.—HEMMER FOR SEWING MACHINE.—Elihu Wilder, and John Crandell, Chicopee, Mass.

We claim, 1st, A hemming attachment for sewing machines, composed of the stationary plate, B, and the slotted sliding plate, A, having the curved surfaces, b and c', for forming the folds, substantially as described, and the whole constituting an adjustable hemmer, as set forth.

2d, The movable plate, A, of an adjustable hemmer, having thereon lips, b c', and the elongated loop, a, constructed and applied substantially as set forth.

3d, The slotted and jointed guide, G G', in combination with a hemming attachment for sewing machines, and constructed substantially as set forth.

84,455.—MANUFACTURE OF ALCOHOLIC SPIRITS FROM TOMATOES.—Joseph S. Williams, Cinnaminson, N. J.

I claim the process, herein described, of producing spirits, by first separating the juice of tomatoes from the pulp, then mixing molasses, or other saccharine matter, and yeast, and afterwards fermenting and distilling the compound liquid thus obtained.

84,456.—COFFEE POT.—William M. Williams, St. Louis, Mo.

I claim the vessel, A, with tubes, a', strainer, B, and condenser lid, C, the strainer being located centrally in regard to the tubes, and the whole being combined and arranged as and for the purpose set forth.

84,457.—UMBRELLA.—George L. Witsil, Philadelphia, Pa.

I claim an elastic tip, in combination with the handle of an umbrella or cane, substantially as shown and described.

84,458.—CONSTRUCTION OF ICE PITCHERS.—Wm. C Wood, Washington, D. C.

I claim, 1st, A self-operating vent valve, substantially as shown and described, for the purpose specified.

2d, A self-operating bolt, arranged and operating substantially as described, for the purpose specified.

3d, The combination of a self-operating vent valve, and sliding bolt or latch, arranged, and operating substantially as described, for the purposes specified.

84,459.—BREECH-LOADING FIRE-ARM.—Andrew Wyley, Birmingham, England. Patented in England, March 23, 1867.

I claim the combination of a longitudinal plunger with a locking bolt of T-form, which, when raised, acts as a handle for manipulating the said plunger, while performing its various functions of ramming and drawing the cartridge (where the cartridge requires to be drawn), and of cocking the lock, the whole constructed and operating substantially as herein set forth.

84,460.—GAS MACHINE.—E. Hall Covel and William H. Covel, New York city.

We claim, 1st, Mixing atmospheric air and any of the inflammable gases, and then adding to the mixture certain further proportions of the gas, before passing the same over or through the carbon supplying materials.

2d, Mixing atmospheric air and any of the inflammable gases, and then adding to the mixture certain further proportions of the gas, after the said mixture has been passed over or through the carbon supplying materials.

3d, Pumps, A and B, in combination with an enclosed space or carbonizer, I, fluid or chemical tank, L, and feed pipe or opening, N, or their equivalents, when used to add new constituents to the mixture of air and gas produced by the action of pumps, A and B, and to keep up the supply of such new constituents.

4th, Pump, A, pump, B, tank, L, feed pipe, N, ventilating pipe or pipes, O, and enclosed space, I, or their equivalents, with the usual couplings and connections known in the business, when combined for the purpose of mixing air and gas, supplying new constituents to such mixture, and keeping up, automatically, the supply of such new constituents.

5th, The combination of filling pipe, M, feed pipe, N, ventilating pipe or pipes, O, and tank, L, with inclosed space, I, constructed and operating substantially as and for the purpose hereinbefore described.

6th, Pump, A, pipe, E, and carbonizer or inclosed space, I, or their equivalents, in combination with a lamp or any other heating device, operating substantially as and for the purpose described.

7th, The pumps, A and B, in case, C, tank, L, and an inclosed space or carbonizer, as arranged.

8th, Pump, A, pump, B, pipe, H, and an inclosed space or carbonizer, combined with a regulator, valve, cock, or other device for checking or regulating pressure, or their equivalents, operating substantially as and for the purpose hereinbefore described.

9th, Pump, A, and pipe, E, or their equivalents, combined with a regulator, valve, cock, or other device placed in upon pipe, E, when so constructed that, either automatically or otherwise, pipe, E, shall or may be closed when the pump, A, is not in action, for the purposes hereinbefore described.

10th, Pump, A, and pipe, e, or their equivalents, an l lamp, W, or other heating device, combined with a regulator, valve, cock, or other closing device, placed in or upon pipe, E, when so constructed that, either automatically or otherwise, pipe, E, shall or may be closed, when the pump, A, is not in action, and the hot air generated by the heating device, W, or its equivalent, instead of passing up pipe, E, shall be forced to discharge itself into the air.

11th, Pump, A, and pipe, E, or their equivalents, in combination with a heating device, operating substantially as and for the purpose hereinbefore set forth.

12th, Gas service pipe, X, pump, A, pump, B, pipe, D, and their equivalents, in combination with a regulator, valve, cock, or other device for checking or regulating pressure, and space, G, for the purpose of adding a further supply of gas to that already furnished by pump, B, and controlling proportions of gas and air in space, G.

13th, Gas service pipe, X, having in or upon it a regulator, valve, cock, or other device for checking or regulating pressure, in combination with pipe, H, and carbonizer or inclosed space, I, for the purpose of controlling proportions of gas and air caused to enter the inclosed space or carbonizer, I.

14th, The combination of gas service pipe, D, gas supply pipe, K, and cross pipe, R, having in or upon it a regulator, cock, valve, or other device for checking or controlling pressure, or their equivalents, when substantially constructed and arranged as described, and for the purpose set forth.

15th, Forming channels, and bisecting the same, within the carbonizer or inclosed space, I, by means of partitions and sheets of porous substance, when constructed and arranged substantially as shown and described, and for the purpose set forth.

16th, The combination of the pumps, A and B, pipe, H, tank, L, pipe, N, pipe, O, heating device, W, pipe, E, and a carbonizer or inclosed space, or their equivalents, when arranged to substantially operate in the manner and for the purpose hereinbefore described and set forth.

17th, The improvement in combination gas machines, constructed and operating substantially as hereinbefore described and set forth.

84,461.—TOY TARGET.—G. F. Fessenden, Arlington, Mass.

I claim a toy target constructed to operate substantially as described.

84,462.—HORSESHOE.—Wm. C. Whitmore, Macon City, Mo., assignor to Abijah Richardson, Boston, Mass.

I claim, 1st, My improved horseshoe, constructed with the single continuous rib, c, one or more bevels or inclined inner faces, d e, a continuous groove, b, and nail holes, a, arranged as described, the rib, c, under such arrangement, being made to project down below the groove, b, or the part in which such groove is made, the whole being substantially as specified.

2d, Further, a horseshoe having a continuous groove in which are the nail holes, and surrounding a single continuous rib or calk, when constructed in the manner substantially as described.

REISSUES.

70,447.—BLAST FURNACE.—Dated Nov. 5, 1867; reissue 3,204.—George Asmus, New York city, assignee of F. W. Lürmann.

I claim, 1st, A blast furnace with a closed breast where the slag is discharged through an opening or openings cooled by water, substantially as set forth.

2d, The slag discharge piece or cinder block D, constructed and arranged substantially as described.

3d, The cinder-block D in combination with the plate C, to which it is attached, substantially as described.

4th, The shape of the discharge-opening or openings of the cinder block D, being made flaring at its ends, and of diminished diameter in the middle or central part, substantially as described.

5th, The combining of the slag discharge piece or cinder block with a series of water channels or pipes, substantially as and for the purpose above set forth.

6th, Combining with the metallic plate C, a series of water channels or pipes, substantially as and for the purpose set forth.

7th, The method of controlling the discharge of slag from blast furnaces by regulating the temperature of the slag-discharge piece or cinder block, substantially as described.

82,082.—CARRIAGE SPRING.—Dated September 15, 1868; reissue 3,205—Azro Buzzell, West Fairlee, Vt.

I claim my improved arrangement of the three springs, A, B, C, as described, without any connection, extending from or about from the middle of one spring, B, to or about to that of the spring C, the whole being as shown in the drawings.

48,495.—GRAIN ELEVATOR.—Dated June 27, 1865; antedated June 12, 1865; reissue 3,206—Lewis S. Chichester, George H. Nichols, and Clark W. Mills, Brooklyn, N. Y., assignees, by mesne assignments, of Francis Taggart, Lewis S. Chichester, and Clark W. Mills.

We claim, 1st, A floating elevator, formed by two vessels or floats, connected together, and leaving a space for a boat or barge, in combination with an elevating apparatus.

2d, An elevator, d, fitted to be raised or lowered, in combination with the floats, a a, and platform connecting said floats and supporting the elevator, substantially as set forth.

3d, A grain elevator fitted upon a float, and arranged so that the axis of the elevator drum is at right angles, or nearly so, to the float, in order that the elevator may act longitudinally of the vessel to be discharged, substantially as specified.

79,553.—VELOCIPEDE.—Dated July 7, 1868; reissue 3,207—Benjamin P. Crandall, New York, N. Y.

I claim, 1st, The combination, with the operating lever J, of a tubular support, K K, and the independent screw L, substantially as described.

2d, As an improvement in the mode of operating the steering apparatus of velocipedes, the pivoted rods E, in combination with the yoke, F, and the steering wheels D, substantially as described.

3d, As a new article of manufacture, the detachable cast metallic plates, N, when applied to the spokes of the wheels, for the purpose described.

4th, As an improvement in the patent granted to Crandall & Conover, dated April 2, 1861, the connecting rods, M, bent at both ends, in combination with the wheels, B, substantially as described.

79,674.—WOODEN PAVEMENT.—Dated July 7, 1868; reissue 3,208—Duncan McKenzie, Brooklyn, N. Y.

I claim the wooden pavement, constructed, as described, of the blocks A, secured together by means of the beveled strips attached to the opposite sides of said blocks, so as to form either a single or double dovetail or lock, substantially as herein set forth.

76,510.—MACHINE FOR THE MANUFACTURE OF GUNPOWDER.—Dated April 7, 1868; reissue 3,209—Paul A. Oliver, New York city.

I claim, in the manufacture of gunpowder, the employment of one or more pairs of rollers, substantially as herein described,

Also, the combination with the said rollers of a pair of toothed rollers, substantially as herein described.

Also, as an improved article of manufacture, a machine for making gunpowder, consisting of a series of rollers, operating substantially as described, so as to deliver the ingredients from one pair of rollers to the next pair, and so on, as herein set forth.

21,034.—SEED PLANTER.—Dated July 27, 1858; reissue 3,210—J. H. Thomas and P. P. Mast, Springfield, Ohio.

We claim, 1st, The combination of a grass-seed sower with a grain seeder, in such a manner as to distribute the grass seed behind the tubes or hoes of the grain seeder, substantially as described.

2d, The combination of the grain hopper, G, and the grass-seed hopper, H, when constructed and arranged to operate substantially as and for the purpose set forth.

3d, The combined hoppers, G and H, having their ends, at each side of the machine, formed of a single plate, substantially as and for the purposes herein described.

30,045.—BREECH-LOADING CANNON.—Dated September 18, 1860; reissue 3,211.—Charles F. Brown, Warren, R. I.

I claim, 1st, Exploding the cartridge of a breech-loading firearm by means of a reciprocating plunger held within the hollow breech pin, said plunger being detained by means of a lever, released by means of a cam actuating said lever, and forced forward by means of a spring held in the breech pin, substantially as set forth.

2d, Locating and exploding a cartridge in a breech loading firearm by the action of one rotating shaft, I, and by means of an eccentric, K, and cam, u, mounted on said shaft, substantially as specified, the shaft being arranged transversely through the body of the gun, as set forth.

3d, The arrangement and combination with each other of the barrel, A, breech pin, B, plunger, C, spring, i, lever, L, cam, u, eccentric, K, and shaft, I, all made and operating substantially as herein shown and described.

4th, The wheel, J, applied in combination with the eccentric, K, or its equivalent, for the purpose of producing the rotation of said eccentric to effect the firing of the ordnance during the motion of the gun carriage, as specified.

64,663.—FLOAT VALVE.—Dated May 14, 1867; reissue 3,212.—J. H. Guild, Rupert, Vt.

I claim, 1st, The arrangement of the fulcrum of the clamping lever, e, in such manner as that, on disconnecting the float from gear with said lever, the latter drops, to effect closure of the tube, substantially as shown and described.

2d, The arrangement, in the perforated vessel, A, of the float, B, having the perforated or notched vertical rod, b, engaging with the pivoted oscillating lever, c, connected by the link, d, to the lever, e, pivoted to the opposite side of the vessel in such a manner that, as the float, B, is elevated by the water, the projection, f, upon said lever, e, presses against the elastic pipe, C, effectually closing the same, substantially as described, and for the purpose specified.

30,010.—HORSE RAKE.—Dated September 11, 1860; reissue 3,213—Daniel Strock, Chambersburg, Pa.

I claim, 1st, The combination of the rake head and straining frame, when arranged and operating substantially as described for the purpose set forth.

2d, The employment of the rubber or other suitable springs, L, adjustable rods, l, tightening nuts, H, straps, I2, and quadrant levers, I, for holding the rake teeth and regulating their tension, substantially as and for the purpose described.

3d, The combination, with the rake head, G, and the rake teeth, of the quadrant levers, I substantially as and for the purpose described.

12,233.—SEWING MACHINE.—Dated January 16, 1855; reissue 3,214.—Jotham S. Conant, Hackensack, N. J., assignee, by mesne assignments, of himself.

I claim an endless rotary cloth feeder, substantially such as herein described, in combination with a reciprocating eye pointed piercing needle.

22,990.—MOP HEAD.—Dated February 15, 1859; reissue 3,192, dated November 10, 1868; reissue 3,215.—Luke Taylor, Springfield, Vt.

I claim, 1st, In a mop head in which the cross head or stationary jaw is attached permanently and immovably to the handle operating the movable jaw or binder by means of a tubular screw or socket fitted on the handle, and having its screw thread on its exterior, in combination with a nut encompassing the screw, and connected with the movable jaw, so as to operate substantially in the manner as shown or described.

2d, Operating the movable jaw by means of the loose screw collar, C, revolving between the nut, D, and the handle, A, substantially as described.

DESIGNS.

3,263.—CHAIR SEAT BOW.—Henry C. Knowlton, Gardner, Mass.

3,264.—TRADE MARK.—B. B. Wilcox, New Haven, assignor to J. W. Nash, Madison, Conn.

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U. S. PATENT OFFICE,
WASHINGTON, D. C., Nov. 19, 1868.

Thomas C. Ball, of Bellows Falls, Vt., having petitioned for an extension of the patent granted to him on the 27th day of February, 1855, for an improvement in "Screw Jacks;" it is ordered that said petition be heard at this office on the 8th day of February next.

Any person may oppose this extension. Depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Nov. 23, 1868.

Chas. Cunningham, of Nashua, N. H., having petitioned for an extension of the patent granted him on the 13th day of March, 1855, for an improvement in "Benzole Vapor Apparatus," it is ordered that said petition be heard at this office on the 15th day of February next.

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

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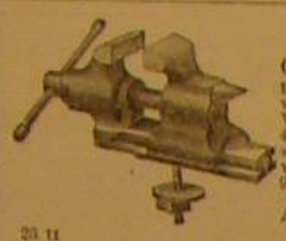

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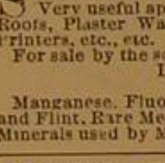

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