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Improved Horse-Power Saw-Mill.

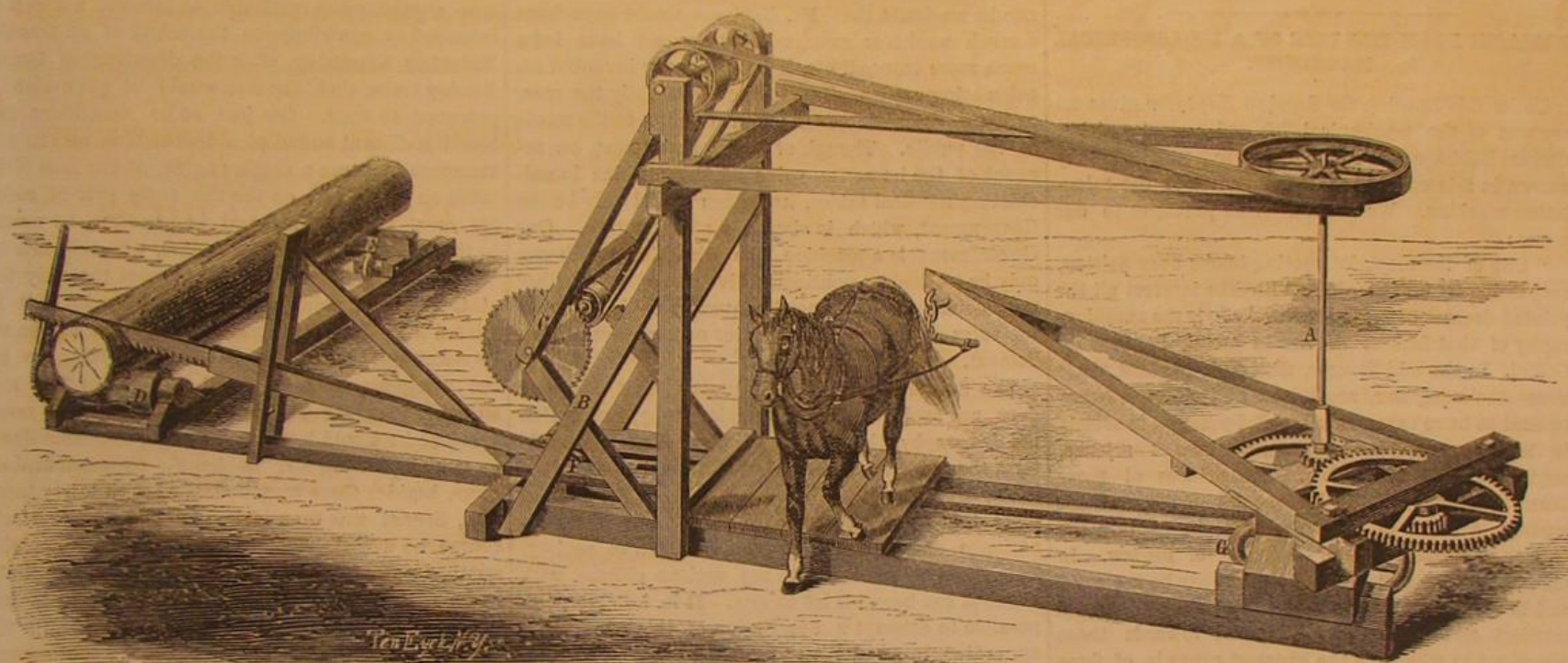
Wood-sawing is not such a delightful relaxation from care that men eagerly seek it as an amusement, and we therefore find that individuals are extremely contented when it can be deputed to some one else. Moreover, modern generations find that time is money, and that it is poor policy to saw one's own wood by hand when it can be done more cheaply and much quicker by machinery. We know of some in-

The Last Rebel Ram.

The *Stonewall* is a trifle more than two hundred feet in length over all, and has thirty-three feet breadth of beam. She draws, with two hundred tons of coal on board, sixteen feet six inches aft, and twelve feet forward. She is plated with three and a half inch iron, backed inside with about three feet of teak or African oak, supported by diagonal iron braces of great strength, into which the bolts are securely

and cleanly, and all the rules of the best regulated naval vessels are observed.

But the most formidable feature of the *Stonewall* is the ram which forms her bow under water, and which projects about twenty feet beyond the bluff of the bows. As we stood on the forward turret we looked directly down upon this instrument. The bows of the steamer, which are iron-plated, slope insensibly down to the water's edge, and gradually disappear away



TOTMAN'S HORSE-POWER SAW-MILL

stances where individuals have bought steam engines and gone about sawing wood publicly for a small sum. This brings us to the remark that the engravings published in connection with this article show an arrangement of a horse-power with circular and cross cut saws, for the purpose set forth.

The artist has delineated the machine so plainly that we could add nothing that would make it clearer. The reader will see that the circular saw is caused to revolve by belting carried from the upright shaft, A, to a counter shaft, and that wood to be cut by it is laid in the horse, B. By taking hold of the swinging frame, C, the saw can be brought up against the log in the horse, quickly sundering it.

For cutting up large logs a carriage and reciprocating or cross-cut saw is used. The log rests on a spiked pillow or roller, D, at one end, and on a common carriage, E, at the opposite extremity, and is fed along at regular distances by a lever and ratchet-wheel at the front. The saw receives motion from the cross-head, F, which is driven by a wheel and crank, G.

It is obvious that the horse-power can be used for a variety of purposes on a farm, apart from the machine that it is attached to, and it can be conveniently used to cut limbs, brush, or other lumber. It saws from twenty to thirty cords of wood per day with the cross-cut saw, and is easily run by one horse.

This invention was patented through the Scientific American Patent Agency by Edsell Totman, of Columbus, Pa., on March 14, 1865. For further information, address him at that place.

NEARLY 300,000,000 of our 5-20 bonds, or over half the whole issue, are now owned in Europe.

fastened. Inside this again is a second plating, I should think about an inch in thickness. This structure extends up to the plank-shear and waterways, which are of heavy oak. Above that comes an iron bulwark, bullet-proof, and made to fall in-board on hinges, in such a way as to present no obstruction in action. These bulwarks are about five feet high. The steamer is brig rigged, with bright lower masts; short mastheads, and spars painted black. She has only a small boom for a bowsprit, which rigs out through an iron neck, without stays or supports of any kind.

The *Stonewall* is armed with three guns—two seventy-pounders in her after and one three hundred pounder in the forward turret. These turrets are of African oak, stationary, and about eighteen inches in thickness, with a plating of iron one and three-quarter inches. There are five openings or port holes, to reach which we were told the guns could be turned by crews of fourteen men with great celerity, and that, in fact, they could be served as easily and quickly as howitzers. The great gun in the forward turret is served by eighteen men—the entire crew of the steamer, officers and men, amounting now to about seventy, but twenty more are to be shipped. Within the turrets are racks of cutlasses, fire-arms, pikes, etc., probably for repelling boarders. The three guns are marked "Sir William Armstrong," in large raised letters. An old sea-dog who was with us felt sure that they were not of English manufacture, but had been so marked for some special purpose. I think, however, that they are undoubtedly Armstrong guns. They are not black, like the American great guns, but streaked like the surface of a stub and twist shot-gun. They are kept beautifully polished, and, indeed, the whole ship has the appearance of being under rigid and perfect discipline. Every part of her is neat

forward under water in a huge round backed point, sharpened and curved as it descends under the water line, and presenting a sharp steel edge to the object of her attack. We were told that this does not sensibly affect the speed or maneuvering qualities of the ship, serving rather as an improved cutwater, and easing her motions in a head sea. Directly above is a port-hole, towards which the big gun was pointed; and, on butting an antagonist, this gun is always shell-loaded and fired directly ahead, thus breaking in the side of a ship under water and crashing at close range a two-hundred-and-fifty-pound shell into her simultaneously. The shot and shell of the big gun are elongated or conical, and claimed to be the most destructive yet invented. This ram is made smooth, so that upon hitting a ship she can instantly withdraw, retreat a short distance, and repeat the assault.

The disposition of the magazine, coal bunkers, provision and store rooms does not materially differ from that of other vessels of her character, being, of course, arranged with reference to economy of space and the engines and boilers. Altogether, below, she is a curious sight, and displays great constructive ingenuity.

It will be well for our Navy Department not to despise the destructive qualities of this nondescript. She combines all the qualities of our rams for harbor defense and attack with the seagoing advantages of an ordinary ship. That she has these latter none can deny, for she has steamed quickly and easily across the Atlantic, making fully an average passage, and arriving in these waters in good condition. The chief engineer admitted that the story given out in Ferrol that she was leaking was a mere ruse to gain time; and that in reality, she is tighter than any iron-clad he is acquainted with.

I should say that the *Stonewall* was vulnerable, if anywhere, on her decks. These are of wood, though iron-plated beneath. The descent of a series of plunging, heavy shells upon these decks would break them through, as was the case with one of the monitors in 1862, when attempting to pass Fort Darling. She might also be vulnerable to a determined and numerous boarding party. Attacked by two or more vessels at once, while engaged with one the other could range alongside and sweep her decks, which, unlike those of the famous *Merrimac*, are unprotected by any roofing. The man at the wheel is also quite uncovered. By driving the crew inside the turrets, the decks at least could be taken possession of. But leaving such speculations to abler and more experienced heads, I can but agree with all who have visited her that she is the most formidable engine of destruction that has yet been set afloat. Viewed bows on, with her great submerged snout rising and falling in the swell, her rounded lines of massive iron, and the grim, defiant aspect of the whole ship, she looks like some marine monster suddenly risen from the deep, breathing vengeance to all enemies. This appearance is not lessened by the two hauser-pipes, serving as eyes, in the high and slanting bows.—*New York Herald Correspondent*.

PASSAGES FROM THE LIFE OF A PHILOSOPHICAL MACHINIST.

Under this heading the *London Engineer* gives an account of the mechanical life and pursuits of Mr. Charles Babbage, M. A., F.R.S., etc., who is chiefly known in this country as the inventor of the calculating machine. We transfer some passages to our pages:—

"One of the most interesting books ever written, surpassing by far in vivid and life-like interest all the printed dreams of sensation novelists, is the autobiography of that famous worker in metal, Benvenuto Cellini. In the middle ages, the leading artists of the time—the sculptors, architects, and painters—may be said to have taken up a parallel position in society to that now occupied by practical men of science, engineers, and machinists. The princes of those times then occupied the foreground of life, and the leading intellect of that age was drawn into the service of ministering to the luxury of the few. In different shapes and forms it will always be the case, and in all countries and times, that the most powerful intellect and energy are attracted towards those directions in which lie the greatest rewards of fame and wealth. With the modern increase in importance of the masses, the leading spirits of this age thus rather apply their energies to usefully ministering to the wants of the many. Instead of the development of the arts of luxury, the higher rewards, in every sense, to be found in success in the useful arts, accordingly impress in the service of the pure and applied sciences those leading minds who, in less happy times, might have devoted their energies elsewhere. In fact, the successful inventors, the engineers and chemists of our time, form an aristocracy of intellect similar to that in which figured the names of the Leonardo da Vincis, the Raphaels, or the Titians of the middle ages. Indeed, Da Vinci and Michel Angelo were both men furnished with all the scientific lore of their period, and both gave proofs of high constructive talents, while Cellini himself, if he now lived, would doubtless prefer to work in iron instead of in gold and silver, and his autobiography, instead of being an account of his adventures in fulfilling the luxurious behests of mediæval princes, would be rather the history of a modern man of science or of an engineer. Allowing for many obvious differences, it is probable that the general tone of this autobiography would be very like that of a similar work recently published by one of our most eminent men of science. Much allowance must indeed be made with parallels of this kind, but we should say that there is a considerable likeness between Mr. Babbage and the celebrated Italian. Both show the same self-consciousness, egotism, and intense pugnacity, and the written passages from their lives are so absorbing in interest that the books of both must be read through before they can be put back on the shelf.

In his relation toward our profession Mr. Babbage belongs to a generation which is now fast passing away. The things for which he is known in the world of science were achieved many years ago, and

those who may have never even heard of the calculating machine, or who may have never read "The Economy of Manufactures," only know his name as a persistent prosecutor of Italian organ grinders. In this age of decorous mediocrity, when everybody is very much like everybody else, the irritation of a nervous *savant*, who perhaps cares but little for the opinions of newspaper readers, is put down to unreasoning eccentricity.

The remarkable combination of both the mathematical and constructive faculties required from the inventor of the calculating engine is very rare indeed, and the intimate union of these faculties undoubtedly raises their possessor to the rank of a man of genius. Invention and judgment combined cannot fail to achieve much; but without judgment you have the mere schemer—while judgment, however high, without invention, seldom results in more than a lifetime of judicious copying. Accordingly as the inventive powers are combined with scientific judgment is the amount of scientific success; but to make money—and even, perhaps, durable fame—knowledge of the world, worldly cautiousness and judgment are also required. The faculty of invention, like the gift of beauty, is not seldom a fatal gift; and often misleads its possessor with a Will-o'-wisp light. There can be no doubt that Mr. Babbage would have been a much wealthier man, while he would have led a much more tranquil life, if he had never invented his calculating engine. This is more especially the case, as his works could never appeal directly to the wants of the public. Though of national interest, on account of the immense value of the machine in calculating nautical tables, its patron could only be the Government, which is always a sorry patron. Our Government is a machine, the wheels of which can only be worked by political motive power, and neither the calculating engine nor its inventor could influence the votes of either constituencies or members of Parliament.

The author tells us, in his preface, that his book does not aspire to be an autobiography, but rather the biography, the history of what Germans would term the genesis, of his calculating machines. It is in order to render the book palatable to the popular taste that Mr. Babbage gives an account of his experience among the very varied strata of society, from the highest down to the artisan classes, with which it has been his lot to mix. It is, however, impossible to attempt a description of this remarkable apparatus, in its different forms and in its progress, without the help of drawings. This is not, indeed, aimed at in the work before us. Its history during the last twenty years, the account of the development of the calculating machine into the analytical engine, and of the varied complicated and unpleasant relations of the author with the Government, are scarcely less intricate. We understand that another work by Mr. Babbage, more especially devoted to these matters, is in the press. Of more direct interest to ourselves are other points in this very remarkable book. For years a member of the highest social and scientific circles, the author, even when not a worker, has been an intimate spectator behind the scenes of most of the different mechanical and scientific achievements that have given the color to the present time.

BABBAGE ON RAILWAYS.

An extremely interesting chapter in Mr. Babbage's autobiography is that on "Railways." The inventor of the calculating machine and the author of "The Economy of Manufactures" naturally took a great interest in the development of the railway system. He was present at the opening of the Manchester and Liverpool Railway in 1829. Just previous to the fatal accident which happened to Mr. Huskisson, the author saw him "but a few minutes before standing at the door of the carriage, conversing with the Duke of Wellington." The Duke is stated to have wished to at once return back to Liverpool, but the Borough-reeve of Manchester pressed upon him and Sir Robert Peel "the necessity of continuing the journey, stating that if it were given up he could not be answerable for the safety of the town." The popular agitation among the inhabitants of Manchester and the neighborhood was so great in consequence of the disaster caused by a novelty, the first introduction of which had been so much opposed, that "for several miles before" the trains reached their destination "the sides of the railroad were

crowded by a highly-excited populace shouting and yelling." At a dinner at the house of one of the great Liverpool merchants, during a discussion of the new mode of locomotion, the great danger of obstacles placed accidentally on the line was pointed out. Mr. Babbage observes that he proposed the contrivance now employed in America under the name of "cow-catcher." His other suggestion of "a strong leather apron attached to a powerful iron bar," is not, however, in use, as he seems to think. There can be no doubt that the ordinary vertical guard plate, generally attached to the engine "has a tendency to throw the obstacle straight forward upon another part of the rail." In fact more than one accident caused by slight obstruction has been traced to its use. There is, however, a goddess of fashion ruling the use of guard bars as well as the crinolines. Mr. Babbage is a strong adherent of the broad gage, having, in 1838 and 1839, during the "Battle of the Gages," made some elaborate experiments in order to determine its value in producing steadiness of running.

In the course of his experiments on the *Great Western* he had a very characteristic adventure with the late Mr. Brunel. He found it necessary to conduct his investigations on Sundays, as being the only safe days, and with all the less impropriety as the task was anything but profitable to himself, while it was intended to contribute to the safety of all travelers. Naturally expecting, after the departure of the only Sunday train, that the line would be quite clear, he prepared to start. But just as he was doing so he heard a distant sound of a locomotive, and in a few moments up came a single engine, at the rate of fifty miles an hour, and on the same pair of rails as his own. Having stopped just in time, he went up to this, on which he found Brunel, who told him that "he had posted from Bristol to meet the only train at the farthest point of the rail then open, but had missed it." Having, however, found this engine with its steam up, he had ordered it out, driving up in it the whole way to London, at the rate of fifty miles an hour. Having told him that but for the merest accident he would have been met on the same line by an engine driving Mr. Babbage's experimental carriage, besides three wagons loaded with thirty tons of iron, Brunel was then asked by the author "what course he would have pursued if he had perceived another engine meeting him upon his own line?" Brunel replied that "in such a case he should have put on all the steam he could command, with a view of driving off the opposite engine by the superior velocity of his own."

Here is another very good story, and this time about George Stephenson:—Happening to sit next to the "father of railroads" at a large public dinner during the meeting of the British Association at Newcastle, in 1838, he determined to extract a candid opinion from Mr. Stephenson as to the respective merits of the broad and narrow gages. Remembering the great truth that *in vino veritas*, he waited till after the second glass of champagne—having previously paved the way by some conversation on other questions connected with railway economy. He then asked George Stephenson to suppose for a moment that no railways whatever then existed, and that he had to begin their entire construction by the light of his acquired experience. "Under such circumstances," asked Mr. Babbage, "if you were consulted respecting a gage of a system of railways about to be inaugurated, would you advise a gage of 4 feet 8½ in.?" "Not exactly that gage," replied George; "I would take a few inches more, but a very few"—a reply which is likened to the celebrated excuse of the young lady who had had an illegal, "but very small" baby. The author makes the very good proposal that the building of the next International Exhibition should be provided with a railway for taking passengers from end to end, and thus avoiding the crowd. Indeed, it is more than likely that much crowding could be thus prevented.

HIS PROFESSIONAL ABILITIES.

While it is impossible to term Mr. Babbage a mere amateur mechanic, he does not seem to have professionally worked in any other direction beyond that of his calculating machines. He has, however, devoted more philosophical attention than anybody else we know to manufacturing generally, and the use of tools. A work by which Mr. Babbage's name has become known among practical men is that on "The

Economy of Machinery and Manufactures." In his analysis of the great principle of the division of labor, first discovered by Adam Smith, he pointed out an omission, the importance of which will be well understood. The advantages of the division of labor do not merely consist in the increase of dexterity in every particular workman, in the saving of time otherwise lost in passing from one kind of work to another, and in the division of labor rendering possible the adaptation of more or less special machinery—which are the principles pointed out by Adam Smith. There is another most effective source of economy. This consists in the possibility, through the division of labor, of "dividing the work to be executed into different processes, each requiring different degrees of skill or of force." By this means the employer "can purchase exactly that precise quantity of both which is necessary for each process." If, on the contrary, the whole work has to be done by one workman, he must have sufficient skill for the most difficult, and must possess "sufficient strength to execute the most laborious of those operations into which the art is divided." A conclusion very interesting to patentees is arrived at with respect to monopolies. He states that he is able to demonstrate "that, even under circumstances of the most absolute monopoly, the monopolist will, if he knows his own interest and pursues it, sell the article he produces at exactly the same price as the freest competition would produce." We regret to say that if this demonstration has been published at all, it has only made its appearance in Italian, as the author says that he only devoted a chapter to this subject in one edition, prepared several years ago, for a new Italian translation of "The Economy of Manufactures." We believe that many enlightened patentees have, indeed, arrived at a similar conclusion from practical experience. It is clear that the cheaper the price of any manufactured article, the greater the demand for it; while the monopoly obtained by means of a patent absolutely precludes competition. There are, besides, other reasons why, in most cases, it is the safest plan to demand as low royalties as possible. Such is the diminution of the chance that the patent may be attacked in a court of law.

HOW TO BREAK A HOLE IN GLASS

Scattered through the work are a number of practical little receipts and descriptions, very interesting to the amateur and even professional workman. Under the nomenclature of "hints for travelers" we thus find described a very ingenious way of punching a circular hole in glass. This is done by scratching a cross (X) upon the given spot by means of the point of a file, and then turning the plate round, in order to form a similar and opposite cross. The glass, at the spot thus marked, is, thereupon, so to speak, gently punched out by means of two center punches, one of which is fixed in the vise, while the other is in the hand of the operator—an assistant holding the plate of glass in the meanwhile. The glass plate is occasionally turned round until the hole appears right through, which is then gradually enlarged with the pane of the hammer.

The principles on which the hole is formed are, that though glass breaks with a conchoidal fracture in every direction, the vibrations caused by the blows, and otherwise producing fracture, "are checked by the support of the fixed center punch in close contiguity with the part to be broken off." He offers other and higher results of his reflections on the manufacture of complicated mechanism, though we do not think that, in this generation at least, much attention will be paid to them in practice. In the course of his progress with the *Difference* engine and its complicated mechanism, involving an enormous number of drawings, Mr. Babbage elaborated what he terms a system of mechanical notation. An ordinary set of drawings of any machine, of course, ought to show the actual shape and relative position of every piece of matter of which the machine is composed, but his system of mechanical notation also affords facilities for ascertaining "the actual time and duration of every motion throughout the action of any machine," and "the actual connection of each movable piece of the machine with every other with which it acts." It is more than probable that if such a system of notation were taught in schools, it would be very useful to machinists. Its value could, however, only be really felt when it was universal currency, and its general in-

troduction would have to encounter the same difficulties as the introduction of short-hand as a substitute for ordinary handwriting. With ordinary drawings of complicated mechanism referring to a description, Mr. Babbage recommends the adoption of a system in the choice of the lettering. One or two of his rules for the selection of letters are that "all upright letters, as a, c, d, e, h, B, represent framing; all inclined letters, as a, c, d, e, A, B, represent movable parts—all small letters represent working points." He states that one of the most obvious advantages of these rules is that they enable the attention to be more easily confined to the immediate object sought.

Purple Dye from Theine.

A German chemist is said to have produced most splendid purple and scarlet dyes, almost surpassing in beauty the finest of the aniline dyes, from "theine," the alkaloid to which tea and coffee owe the refreshing and stimulating properties which have brought them into such general request all over the world. As the kinds of Chinese tea which are richest in theine do not contain much more than two per cent of that substance, the new dyes, however valuable in themselves, could scarcely come into extensive use if Chinese tea were the only available source of the alkaloid from which they are derived; but, fortunately, there are other sources of that body. Not to speak of the kola-nut of West Africa, which has just been discovered to contain theine, the leaves of the *Paulina Sorbilla* contain nearly five per cent of that alkaloid, and those of the *Ilex Paraguensis* are also very rich in it. The *Paulina Sorbilla* is a Brazilian tree, belonging to the same family of plants as the English horse-chestnut. The locality in which it chiefly flourishes is the great valley of the Amazon. Its fruit, when ripe, is dried and pounded to powder, and the powder is made into a thick paste with water. This paste is molded into cakes, which are baked by the heat of the sun, and then constitute the famous "Guarana bread." A spoonful of the powder obtained by scraping one of these cakes, added to a pint of boiling water, makes a very refreshing beverage, which is largely used throughout the Brazils. Still more largely used, however, both in the Brazils and in other parts of South America, is an infusion of the leaves, etc., of the *Ilex Paraguensis*, or "Paraguay tea-plant,"—a plant belonging to the same order as our English holly. In the forests of the Brazils and Paraguay this plant grows wild in enormous abundance. The natives gather its leaves, buds, and young branches, dry them, and reduce them to a coarse powder, which powder they then use much as we use Chinese or Indian tea. This powder does not contain so large a percentage of theine as is contained in the Guarana bread, but it contains nearly as large a proportion as the best Chinese tea, and as it is calculated that fully two millions of pounds of the leaves of the tree from whose leaves and twigs the powder is made fall to the earth and rot every year, in the forests of Paraguay alone, if theine dyes should prove to possess, intrinsically, any real advantages, it need scarcely be difficult to produce them cheaply enough.

On the Mechanical Principles of the Action of Propellers.

At a late meeting of the Institution of Naval Architects, London, Prof. W. J. Macquorn Rankine made an interesting address on the above subject, of which the following is an abstract:—

After remarking that the ordinary theories, based upon the assumption that the reaction of a paddle float or screw is equivalent to the resistance of a surface of the same size and figure advancing through the water, lead to results very much in defect of the actual performances of these propellers, Professor Rankine pointed out that the true condition of propelling instruments is different, seeing that the propeller is continually laying hold of a series of new masses of water, so that the quantity of water on which it acts in a given interval of time depends mainly on the speed of the vessel. Mr. Rankine remarked that the only previous author that noticed this fact seems to have been Mr. Bourne, who, however, did not work out the consequences. The object of the paper was to point out what, in the author's view, appeared to be the correct theory of the action of propellers, in a shape adapted for practical application, and to illustrate it by examples founded

on actual ships—the *Admiral* for feathering paddles, and the *Warrior* for the screw. The whole of the mathematical investigations and numerical calculations were added in an appendix, the body of the paper containing an account of the principles. Throughout the greater part of the investigation, one constant only is taken from experiment, viz., the mass of a cubic foot of sea water, being its weight in pounds, divided by the accelerating effect of gravity in a second. In that part of the investigation which relates to the friction of screws, one more constant only is taken from experiment, viz., the co-efficient of friction of a disk rotating in water.

The following general results with regard to the efficiency of propellers, neglecting friction, were stated to be applicable to all kinds of propelling instruments:—1. When the propeller works in previously still water there is a loss of work simply proportional to the slip of the propeller; 2. When the propeller works in water previously set in motion by the ship, there is, in the first place, a loss of work proportional to the real slip of the propeller relatively to that moving water, and then a further loss of work, proportioned to the square of the previous velocity of the water.

The probable effect of the friction of a screw was also investigated. When calculated by the formulæ obtained in the paper, the power expended in actually driving the paddles of the *Admiral* was found to be 77 per cent, and in driving the screw of the *Warrior* 77½ per cent of the actual indicated power, while the efficiency of the propelling instruments themselves is found to be 0.78 for the paddles of the *Admiral*, and 0.773 for the *Warrior's* screw. Combining these data, the resultant efficiency of engines and propeller, for both ships, is found to be 0.6, or 60 per cent of the indicated power. When the effective thrust of the paddles or screw was calculated theoretically, and compared with the resistance of the ship computed according to the principle laid down in the paper read before the Institution, by Prof. Rankine, in 1864, the difference in the case of the *Admiral* was found to be 1.224th, and in that of the *Warrior* 1.70th part of the whole resistance; both these differences being within the limits of errors of observation. Prof. Rankine added the remark, that, for such comparisons to be made in a satisfactory manner, it is necessary to have the lines of the vessel.

Velocity of Electricity.

Of the velocity of the spark discharge some notion may be formed from the brief duration of its light which "cannot illuminate any moving object in two successive positions, however rapid its motion. If a wheel be thrown into rapid rotation on its axis, none of its spokes will be visible in daylight, but if the revolving wheel be illuminated in a darkened room by the discharge of a Leyden jar, every part of it will be rendered as distinctly visible as though it were at rest. In a similar manner, the trees even when agitated by the wind in a violent storm, if illuminated at night by a flash of lightning, appear to be absolutely motionless.

By a very ingenious application of this principle, Wheatstone has shown that the duration of the spark is less than the one-millionth part of a second. The apparatus is the same in principle as the revolving wheel.

By a modification of the apparatus, Wheatstone was also enabled to measure the velocity with which the discharge of a Leyden jar was transmitted through an insulated copper wire. He estimated the rate of its passage at 288,000 miles in a second.

A PHILADELPHIA distillery is kept clear of rats by baiting fish hooks about half an inch long and a quarter of an inch across the hook with dried beef. The hooks fasten in their mouths and throats, and speedily every rat disappears.

[That is to say, the rats swallow hook and all.—Eps.]

To preserve entomological specimens, M. Gerber employs an ethereal solution of carbolic acid with ten per cent of the latter, which he finds to effectually protect the insects even in a place infested with ants. He recommends the solution especially therefore to entomologists making collections in hot countries.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening May 10, 1865, the President, S. D. Tillman, Esq., in the chair.

EXPANSION OF WATER.

Dr. Rowell exhibited the apparatus usually employed to observe the expansion and contraction of water with changes of temperature. It was simply a large thermometer tube with a bulb as big as an egg; the bulb and part of the tube being filled with water. The bulb is surrounded by some freezing mixture; a thermometer is employed to measure the temperature of the water, and the changes of volume are indicated by the rise or fall of water in the tube.

Dr. Rowell remarked that when the water was at about the freezing point, if the bulb were grasped in the hand it was surprising to see the water in the tube continue to sink by the warming of the liquid till it reached 39.2°—the temperature at which water reaches its maximum density. When the liquid reaches the freezing point and begins to crystallize, the water rushes right up the tube, and the bulb must be taken instantly from the cooling mixture, or the glass will be broken by the rapid expansion of its contents.

EXPANSION OF OTHER SUBSTANCES.

The President observed that it would be very interesting to know whether iron and other substances follow the same law as water, in having their maximum density a few degrees above their temperature of solidification.

Dr. Parmelee suggested that it would not be easy to measure with precision either the temperature or specific gravity of molten iron.

Professor Seely suggested that the specific gravity of molten iron might be measured by means of a mass of solid cast-iron, fashioned in the form of a hydrometer.

Dr. Rowell offered an objection to this, that a coating of molten iron would chill about the mass, and operate as a raft to float it at the surface.

Mr. Fisher proposed that the hydrometer should be made of wrought iron, and heated to the temperature of the melted iron before it was immersed.

BUTTON MAKING.

The President announced that the regular subject of the evening was the manufacture of buttons, and said that Mr. Miller was expected to read a paper on it, but that he had received a note from Mr. Miller excusing himself on the ground of ill health. He therefore called for remarks on the subject from any one present.

Dr. Rowell said that when he was a boy it puzzled him to think how the eye could be fastened in a button without coming through; after many years he received an explanation. A recess is sunk in the back side of the button, and this recess is cut under or enlarged at the bottom. Then the eye is soldered to the convex side of a saucer-shaped piece of metal which is just small enough to enter the recess, when, by a blow or press, it is flattened and spread so as to fill the recess in the lower and enlarged portion.

Mr. Bartlett stated that a Frenchman had invented a button distinct from the eye, so arranged that the eye can be readily fastened to the cloth by means of a peculiar needle without any sewing, and then the button can be attached to the eye by simply pressing it down and giving it a quarter turn. The speaker is acquainted with some gentlemen belonging to the company who have purchased the patent, and they say that the sum paid for it in cash was \$125,000.

Mr. Blanchard remarked that the town of Waterbury, in Connecticut, has the most varied and extensive manufacture of brass articles of any place in the country, or perhaps in the world; and all sprang from one man making a set of brass buttons for his own wear. He was rather an ingenious man, and he thought he could make a set of brass buttons cheaper than he could buy them. He punched out the blanks from a piece of sheet brass, turned them up very nicely in a lathe, soldered eyes to them, and had them sewed upon his coat. Some of his neighbors then requested him to make sets of buttons for them, and he was thus drawn into the manufacture. His example was followed by others, and from this small

beginning have grown up the extensive brass manufactures of Waterbury.

GILBERT'S COAL AND ASH SIFTER.

All economical housekeepers sift their coal ashes, for a large proportion of the quantity daily carried out is fit to burn over. In addition to the coal which lodges in the corners of the grate and at the back, where it is only half burned, a great deal of green fuel falls into the ash-pit which, if not extracted, is

Fig. 1



a dead loss. But little more than half the coal is burned in a stove or range, for fully half a scuttle of cinders may be taken out of double that amount of coal.

The sifter here shown is well arranged to perform a disagreeable duty. Ordinary sifters are heavy, throw ashes all around, and make a mess generally. In this sifter, however, we have a very good arrangement for the purpose. No heavy lifting is needed; no straining of the arms occurs, and the ashes are entirely separated from the cinders and confined in the cylinder. In Fig. 2 the internal arrangement is shown; it is merely a sieve, A, hung on rods, B,

Fig. 2



across which it slides by pushing the handle, C, back and forth. The bottom is inclined so that the ashes separate easier and the cinders roll off to the chute, D, from which they drop into the scuttle below, while the ashes are contained in the drum, E. The cover, F, fits tight over the sieve, but can be taken off at any time, and the hopper, G, is for an obvious purpose. A patent was issued on this machine through the Scientific American Patent Agency on the 21st of March, 1865; for further information address Emery & Hutchinson, assignees and manufacturers, 57 Canton street, Boston, Mass. [See advertisement on another page.]

The Wear and Tear of Steam Boilers.

In an elaborate and highly interesting paper on this subject, read before the Society of Arts, recently, by Mr. F. A. Paget, C.E., it was observed that it is clear that, subjected as a steam boiler is to many destructive influences, the precise effects of which can scarcely be accurately known, the working tension should be only one-eighth of the ultimate bursting strength. But when boilers, as is too often the case in England, are bought by the weight, when cheaply-paid labor is employed in their management, when inspection of the progress of wear and tear necessarily happening even with good

boilers and good attendance, is procrastinated for the sake of gain, there is then a suit of expense *versus* risk, in which parsimony too often gains the day. At any rate, a number of painful accidents in all parts of the world have, at different times, pointed to the fact that every man picked at hap-hazard cannot be safely trusted with steam-power. In fact there is probably no civilized country in which the legislature has not more or less interfered in the management of steam boilers. In the States of America the frequency of boiler explosions has in some localities produced a more despotic interference than perhaps anywhere else. In the city of New York boilers are under the supervision of the municipal police; they are tested periodically, and, as a result, many are condemned every year. By an enactment of Congress, applicable to all the States, steam passenger vessels are subjected to Government inspection. The 13th section of this Act shows a very acute perception of the real cause of a boiler explosion, "which," it states, "shall be taken as full *prima facie* evidence" of negligence on the part of the owner, upon whom is thus put the onus of disproof. The law of Louisiana is particularly severe, requiring the application of a hydraulic test threefold that of the working pressure. There are three distinct plans for the management of steam boilers:—1. There is the continental plan. 2. The free English and American mode. 3. What may be termed the Manchester system. The continental mode consists in a strict supervision, sometimes ruled by formulae of the original construction, and there its action may be said, for the most part, to end. It does not, and cannot, without periodical inspections, take into account the effects of wear and tear. It may even be doubted whether the old French law, for instance, did not do more harm than good as regards construction. The official formulae, according to which were calculated the thickness of the plates, founded, as it was, upon the assumptions that a cylindrical boiler formed an exact circle, and that a plate, however thick, conducted the same amount of heat to the water, was obviously incorrect. What may be termed the ordinary English and American plan throws the onus of proof of the negligence of the owner on those damaged by an explosion. This system is subject, besides other difficulties, to all the objections that exist against the trial of scientific questions by a jury, not composed of experts, and unaided by scientific witnesses. The continual occurrence of explosions in those cities and States of America in which boilers are used without any supervision by the authorities, and their undue occurrence in England with boilers not subjected to systematic inspection, sufficiently prove steam boilers cannot be worked at hap-hazard. On the other hand, the system of organized inspection by the English boiler companies, and the similar system, according to which the passenger vessels are inspected by Government officers, have given universal satisfaction. A proper estimate of the value of the Manchester and Board of Trade system could only be well based on numerous statistics. Unfortunately, such do not appear to have been formed. It is stated, however, that in an average of 277 boilers, there were two explosions in the French department of the Haut-Rhin within ten years; and, from 1856 to 1861, or within five years, there were only two explosions in an average of 1371 boilers, under the care of the Manchester Association.

THE oil wells in Burmah, India, it is estimated, have been yielding their present supply of 800,000 barrels per annum at least 100 years, amounting during that period to about 80,000,000 barrels, English measure. These, if arranged, would form a continuous line of oil barrels 27,300 miles long. Oil wells also exist in Persia, and, it is said, have lately been discovered near the Sea of Azof, while on the island of Samos they existed 500 years before the Christian era.

THE Russian railway, between the Black and Caspian seas, is progressing rapidly—20,000 forced laborers being employed. It is to be finished next year.

It is stated that there were 1,300 acting appointments conferred on engineers in the navy during the late war.

Improved Aerovapor Blower.

It has long been known to persons familiar with the arts that jets of steam directed into a furnace promote combustion by creating a draft and keeping the burning fuel free from ashes, which tend to choke it so that air cannot pass through. The apparatus illustrated herewith is designed to accomplish this object, and has another novel feature which we shall describe. This feature is the introduction of air with the steam, or, as it has been called, "cloud steam," so that the blower also answers the same purpose as a common fan blower, with the additional advantage of the steam jet.

This blower is designed to set in the casing of the furnace below the grate, and is externally a cast-iron box, A, with doors, B, opening outward. Inside the

made of steel in constant use on the line, and they have given the greatest satisfaction. These have not, however, been sufficiently long in operation to enable a comparison to be drawn between them and the ordinary iron portions of the locomotives; but there is reason to believe that the saving in point of wear will be equal to that effected by the substitution of steel for ordinary iron tires. The ordinary eccentrics are expensive to keep up, but those which are made of hardened steel do not require any looking after for ten years, not even to the slackening of a bolt, so far as regards repairs. The experience obtained on this, and we believe on some other railways, points to a very important mode of saving in one of the largest items of cost in the working expenses of railways. The subject will, we have no doubt, receive

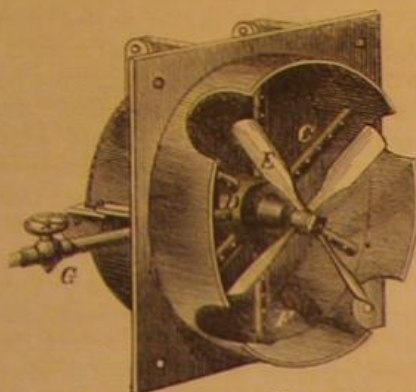


Fig. 2

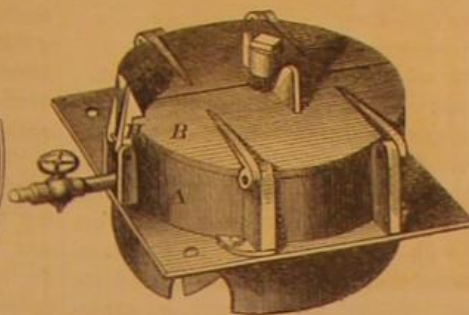


Fig. 1

STRANGE AND HUNTLEY'S AEROVAPOR BLOWER.

box there are pipes, C, Fig. 2, which support a hollow bearing, D, Fig. 2, in which the shaft of the wind wheel, E, Fig. 2, runs. These pipes are perforated with small holes, F, through which steam is forced against the wheel, E; this causes it to revolve rapidly, creating a current of air through the box when the doors, B, are open. The steam, which may be supplied directly from the boiler or the exhaust, is admitted by the globe valve, G, and the doors are closed and held so, when desirable, by catches, H, Fig. 1.

The inventors claim that the combined effect of the air and steam is better than steam alone, and that the decomposition of the steam by the heat of the furnace adds to the efficiency of the fuel, so that it is economical to use. When the air is not required, the outer doors may be kept shut, and the wheel locked or allowed to rotate at will. This blower may be applied to steamboats, locomotives, stationary boilers, or forge fires when a supply of steam can be had, and is noiseless and economical in action.

The invention was patented through the Scientific American Patent Agency on March 11, 1865, by E. C. Strange and G. R. Huntley, of Taunton, Mass., and is manufactured by the Taunton Steam Fan Blower Co., Gilbert W. Pratt, Agent; also for sale by Leach Brothers, No. 86 Liberty street, New York. For further information, address either party as above.

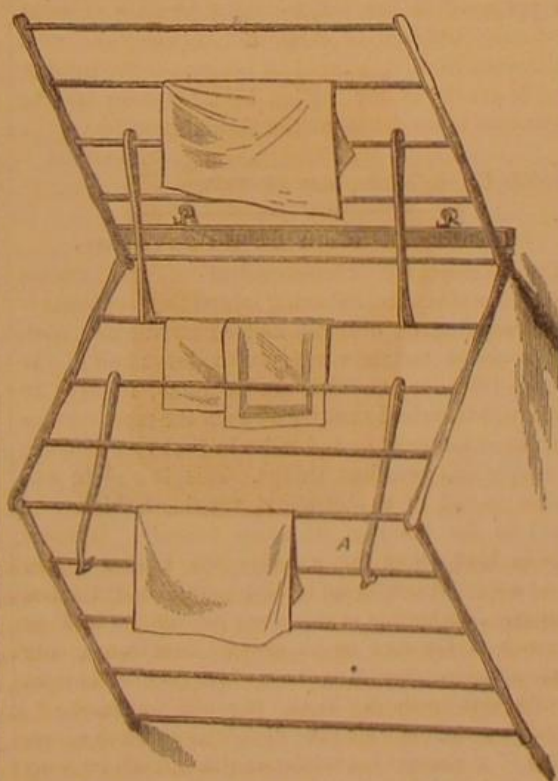
Steel Locomotives.

The Maryport and Carlisle Company have for some time past employed steel to a great extent in substitution of ordinary iron for the working parts of locomotives, and, as we are informed, with the most satisfactory results. The traffic on the line is principally coal and mineral. It has been found that with the ordinary iron tires on the engine wheels, the distance run was not more than 90,000 miles—in many cases not more than 60,000 miles—and the wheels require to be taken from under the engine for every 20,000 or 30,000 miles run, for repairs and "turning up." In the case of the steel tires, however, the wheels will run 100,000 miles before they require "turning up" or repairing. The *Railway News* states that the result of a very careful examination of the effects of wear leads to the opinion that these wheels will run from 350,000 to 500,000 miles, or equal to some twelve or fifteen years' work of a daily average of about one hundred miles. The difference of cost as between the two metals is not great; in the one case it ranges from £40 to £45 per ton, while the steel is about £55, the cost of labor in placing the tires on the wheels being nearly the same in each case. The company have a number of boilers, axles, cranks, and eccentrics,

careful consideration from the managers of railways. —*Mechanics' Magazine.*

SIMS'S CLOTHES HORSE.

Considering expense, utility and convenience, the clothes horse here illustrated is a desirable piece of



furniture for family use, and will prove satisfactory for the purpose required. It consists of three sections of bars, as represented, which are suspended by hooks to the wall of the house, either in or out of doors, as may be thought desirable. When not in use it may be hung suspended against the wall of the room, occupying no space available for other purposes. When wanted it is easily adjusted by the braces, A, one set of which hooks over the bottom set and holds it up, and they can be taken down, folded into small compass, and put away until another occasion.

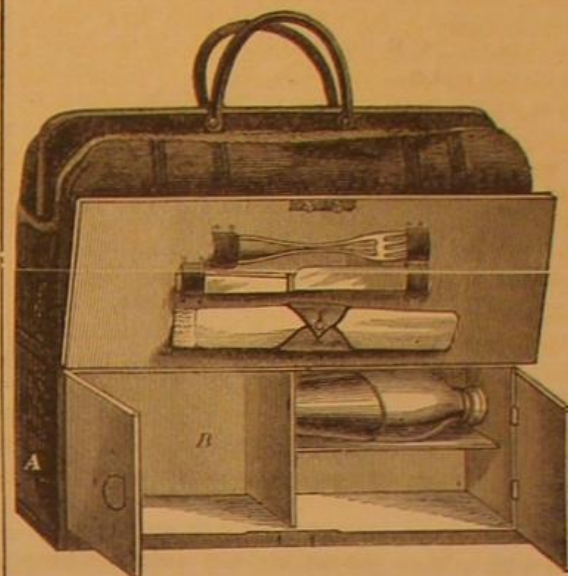
The patentee is induced to believe, from numerous testimonials he is daily receiving from those who have tested its merits, that his invention is a great acquisition to the laundry. This invention was patented through the Scientific American Patent Agency, Jan. 31, 1865, by Elbridge Sims; for the purchase of the

article or other information, address him at Antwerp, N. Y.

NOYES'S TRAVELER'S LUNCH BAG.

Tourists and travelers generally know what dyspepsia-engendering things railroad restaurants are. The food is not only poor in quality but is kept cooked so long that its flavor is lost and its wholesomeness much impaired; withal, the prices asked are as high as those at first-class city hotels.

We think the lunch bag for travelers, here illustra-



ted, a useful thing, for by the employment of it one can always be sure of lunch when it is wanted, and if prepared at home, be certain of its cleanliness and good quality. Outwardly this bag is a handsome Russian leather traveling case, with a compartment, A, at the bottom, wherein are several tin cases, B. One of these is intended for the special reception of a cologne (!) bottle, and the others are designed to hold divers and sundry appetizing dainties of whatsoever name and nature individuals may fancy.

Respecting further details the inventor says:—"The method of using this bag is too simple to need explanation. Lay it flat on your knees, and open it by the keyhole at the bottom, and it will tell its own story. Fill it at home, and it will last you for any ordinary journey. If your trip is long, replenish at the groceries, bakeries or cook-shops. In this way you will save money enough in a few journeys to pay for your bag, and at the same time keep your health and enjoy your food better than ever. Provisions of the fluid or semi-fluid sort cannot well be carried in this or any other bag, unless inclosed in tight cans or bottles. But many soft articles—such as pies and even compact puddings—can be carried safely and without care to keep them 'right side up.' Dry provisions with fruit, and something in the flask to wash them down, are the best outfit for general travel. The knife, fork and napkin are held in place by clasps on the cover.

"In the latest patterns of the lunch bag, the movable tin box is a square cylinder; that is, it is as deep as it is wide, so that it can be inserted with the lid facing upward or sideways at pleasure. A ring on one side is provided for the purpose of drawing out the tin when it is inserted with the lid uppermost. This arrangement obviates the objection to carrying provisions in a box lying on its side. When the bag is to be carried in the hand, the tin may be inserted so that it shall be right side up; and on sitting down to lunch, it may be drawn out by the ring, the bag laid on its side, and the tin inserted the other way with the lid opening upward still. In this way articles more or less fluid may be carried with a little care. The tins should be taken out to be cleaned, and may be removed altogether if, on particular occasions, the whole room is wanted for clothing. These bags, though designed especially for railroad travel, will be found very desirable accompaniments of pic-nics, fishing and hunting excursions, and all sorts of pleasure jaunts; and, with some modifications, will suit soldiers, trappers and school boys."

A patent was procured on this bag through the Scientific American Patent Agency, by J. H. Noyes, on the 18th of April, 1865. For further information address "Oneida Community," Oneida, N. Y., or at their Agency, 335 Broadway, New York.



A New Rubber Cement.

MESSEES. EDITORS:—I have purchased rubber cement of different makers but have found none so inexpensive or that dries so rapidly as a kind made with benzine in the following manner:—Cut virgin or native rubber with a wet knife into the thinnest possible slices, and with shears divide these into threads as fine as fine yarn; the finer it is divided the better the cement and quicker made. Put a small quantity of the shreds (say one-tenth or less of the capacity of the bottle), into a wide-mouthed bottle, and fill it three-quarters full with benzine of good quality, perfectly free from oil—such as may be procured at any paint shop for about 60 cents per gallon. The rubber will swell up almost immediately, and in a few days, especially if often shaken, assume the consistence of honey, with a thick sediment at the bottom, which does no harm. Of course it must be kept well corked except at the time of using. If it incline to remain in undissolved masses, more benzine must be added; but if too thin and watery it needs more rubber. A piece of solid rubber of the bulk of a walnut will make a pint, more or less, of the cement of proper consistency.

This cement dries in a few minutes, and by using three coats in the usual manner, will unite leather straps, patches, rubber soles, backs of books, etc., with exceeding firmness. It succeeds perfectly if benzine free from oil is used in making it; while chloroform is twenty times more expensive, and cannot result in a better product. X.

Boston, May 10, 1865.

Effect of Combined Steam and Air.

MESSEES. EDITORS:—The following experiments may interest your readers, and show them that there are many unknown facts about steam worthy of research and examination. I made a small steam boiler and heated it by a gas jet, so as to supply a steady and equal flow of steam through a quarter inch pipe. I also made an air pump similar to a gas receiver, by inverting a vessel over water, and conveyed the air into the pipe of the steam boiler, so that the mixed air and steam should issue from the same orifice against a light wheel, and cause it to revolve. At first air only was thrown against the wheel and the revolutions noted; next steam alone was used, and then steam and air mixed, thus:—

Inches of air per minute.....	41	60	81	120	150	200
Corresponding revolutions of wheel.....	9	13	18	27	33	45
Volumes of steam or inches per minute.....	432	432	432	431	432	432
Corresponding revolutions of wheel.....	60	60	60	60	60	60
Inches of mixed air and steam (1 and 5).....	475	492	515	552	582	632
Gave this number of revolutions.....	73	10	91	123	165	164
The sum of those made by air and steam separately would be (2 and 4).....	69	73	78	87	90	105
Showing a gain when they are mixed.....	105	123	147	137	161	156

Newburgh, N. Y., May 3, 1865.

A Water Ram Wanted.

MESSEES. EDITORS:—I wish to use brook water to operate a ram to throw spring water to my house. I remember seeing a notice in your paper a few years since of a hydraulic ram, operated by impure water to throw pure water. This is the ram for which I inquire of you. What the ordinary hydraulic ram will do I am conversant with. I think the ram alluded to was Benson's; am not sure about it. I would like to know if the ram for which I inquire has ever been successfully used. A. M. PERKINS.

West Winsted, Conn., May 16, 1865.

[It seems to us that a machine for throwing pure by the force of impure water could not with propriety be called a water ram. The thing can, of course, be done by means of water engines, or water wheels in great variety, provided there is water and fall enough in the brook to furnish the requisite power. The simplest and cheapest plan for our correspondent would probably be to attach a plain force pump to a small undershot water wheel.—Eds.]

\$10,000—Machine for Peeling Willow.

MESSEES. EDITORS:—Will you permit me to call the attention of inventors to a machine for which there is an urgent demand, and which has not yet been made to work satisfactorily. It is a machine to peel basket willows or osiers. Several such machines have been made, but they are either too expensive or do not

work well. The man who will invent and perfect a machine for that purpose that will work right will be a public benefactor, and make his fortune at the same time. But I would warn inventors before they undertake the job that to make a good willow-peeling machine is a more difficult thing than has yet been accomplished, and no one had better undertake it unless he has an unlimited stock of patience and perseverance, and some money or credit.

If it will be any inducement to encourage inventors, I will offer *ten thousand dollars* for the patents covering the rights for the best willow-peeling machine that may be got up within three years.

GEO. J. COLBY.

Waterbury, Vt., May 18, 1865.

[Mr. Colby incloses us one of the cards of his firm, which reads as follows:—Colby Brothers & Co., manufacturers of "Colby's Patent Clothes Wringer," children's carriages, cabs, cab wheels and willow ware, Waterbury, Vt.—Eds.]

The Floating of Solid on Molten Metal.

MESSEES. EDITORS:—In No. 20, current volume of the SCIENTIFIC AMERICAN, appears a report of the proceedings of the Polytechnic Association upon "Metals, Melted and Solid," in which Mr. Norman Wiard observes "that every foundryman knows that if lead be mixed with molten cast iron an explosion follows." Now, according to our experience, and, we think, of all other practical foundrymen, an explosion does not follow mixing lead with molten iron. In fact, we are now engaged in experiments upon mixing iron and lead, as "every foundryman" knows that lead is often mixed in small quantities with "dull" iron to make it flow readily. Perhaps Mr. Norman Wiard was thinking of the effects of zinc upon molten iron.

Again, Dr. Parmelee observes "that, if the experiment be properly and fairly tried, it will be found that solid lead or iron will always sink in the same metal melted." Our experience, and we have been experimenting "properly and fairly" over six months, proves that solid iron will *always* swim—why, we are not prepared to say, but we think because of some repulsion, electrical or otherwise, between the solid and molten iron. It cannot be because of the greater specific gravity of the molten iron, for upon cooling it becomes more dense, as the shrinking shows.

MOLDERS.

Battle Creek, Mich., May 15, 1865.

President Lincoln as an Inventor.

The Washington correspondent of the *Boston Advertiser* gives the following interesting account:—"Occupying an ordinary and common-place position in one of the show-cases in the large hall of the Patent Office, is one little model which, in ages to come, will be prized as at once one of the most curious and one of the most sacred relics in that vast museum of unique and priceless things. This is a plain and simple model of a steamboat roughly fashioned in wood by the hand of Abraham Lincoln. It bears date in 1849, when the inventor was known simply as a successful lawyer and rising politician of Central Illinois. Neither his practice nor his politics took up so much of his time as to prevent him from giving much attention to contrivances which he hoped might be of benefit to the world and of profit to himself.

"The design of this invention is suggestive of one phase of Abraham Lincoln's early life, when he went up and down the Mississippi as a flatboatman, and became familiar with some of the dangers and inconveniences attending the navigation of the Western rivers. It is an attempt to make it an easy matter to transport vessels over shoals and snags and sawyers. The main idea is that of an apparatus resembling a noseless bellows, placed on each side of the hull of the craft just below the water line, and worked by an odd but not complicated system of ropes, valves and pulleys. When the keel of the vessel grates against the sand or obstructions, these bellows are to be filled with air, and thus buoyed up, the ship is expected to float lightly and gaily over the shoal which would otherwise have proved a serious interruption to her voyage.

"The model, which is about eighteen or twenty inches long, and has the air of having been whittled with a knife out of a shingle and a cigar box, is built without any elaboration or ornament, or any extra

apparatus beyond that necessary to show the operation of buoying the steamer over the obstructions. Herein it differs from very many of the models which share with it the shelter of the immense halls of the Patent Office, and which are fashioned with wonderful nicety and exquisite finish, as if much of the labor and thought and affection of a lifetime had been devoted to their construction. This is a model of a different kind; carved as one might imagine a retired rail-splitter would whittle, strongly but not smoothly, and evidently made with a view solely to convey, by the simplest possible means, to the minds of the patent authorities, an idea of the purpose and plan of the simple invention. The label on the steamer's deck informs us that the patent was obtained—but we do not learn that the navigation of the Western rivers was revolutionized by this quaint conception. The modest little model has reposed here sixteen years—and since it found its resting place here on the shelf, the shrewd inventor has found it his task to guide the ship of state over shoals more perilous, and obstructions more obstinate than any prophet dreamed of when Abraham Lincoln wrote his bold autograph on the prow of this miniature steamer.

"In the adjoining hall of the Patent Office rest the camp-chest, the uniform, the staff of Washington, the printing-press of Franklin, the mantle of Jackson. There hangs the Declaration of Independence. To this final and fitting resting-place, and out of its present surroundings of impractical dish-washing machines, amazing arrangements for stopping runaway horses, and original ideas for the improvement of children's rattles, we may trust this specimen of the handiwork and ingenuity of the man who saved his country and gave up his life in the fruition of the task, may presently be removed."

An engraving of Mr. Lincoln's apparatus for buoying vessels appeared in the SCIENTIFIC AMERICAN, December 1, 1860. The author's skill in buoying the great vessel of state over dangerous breakers has made his name honored throughout the whole civilized world.

Transmission of Heat Through Screens.

Bodies that are transparent to light are by no means equally so to radiant heat. This arises from two causes, which require to be carefully distinguished from each other, and which may be separately illustrated by a parallel action on the rays of light. A glass containing pure water absorbs very little light, and transmits almost all that it does not reflect; if the attempt be made to measure its transparency by ascertaining the distance at which a page printed in small type is legible when the vessel of water is interposed, and afterward, when it is removed, the difference in the two cases is hardly appreciable. If a few drops of a mixture of Indian ink and water be added, the transparency will be diminished, and the characters will be legible at a smaller distance; a further addition of ink will diminish the transparency more and more, until the letters can be no longer discerned. The light that is transmitted, however, although diminished in quantity, possesses the same character as the incident light; and a prismatic analysis shows that both consist of the same colors in the same proportion; if in this experiment indigo be substituted for Indian ink, the legibility of the page is diminished to an extent nearly equal; but the prism shows that certain of the rays have been absorbed more completely than others. Similar effects are produced with the rays of heat. There are, however, a number of substances which are almost perfectly transparent to light, viz.: among solids, glass, diamond, Iceland spar, ice, and a great number of crystals; among liquids, water, spirit of wine, ether, turpentine, and a multitude of other bodies; and among aeriform bodies, atmospheric air, and the greater number of gases. For heat, on the contrary, there is only one known solid that approaches perfect diathermancy, and that is rock salt; many colorless gases possess the property also in a still higher degree, but no liquid has yet been discovered which is free from absorptive action on the thermic rays.—Prof. Müller.

From a Melbourne journal, the *Australasian*, we learn that there is a silk-worm native to the Australian continent. It feeds on the leaves of the gum trees, and its silk is said to be exceedingly fine and lustrous.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Revolving Fire-arm.—This invention consists in the employment of two or more cylinders, one behind the other, and arranged in such a manner that both are fired by one and the same lock and hammer, the charges in the front cylinder being first fired and those in the rear cylinder afterward. During the time the front cylinder is being fired both cylinders are coupled together and rotated by the action of a dog connected to the hammer in the usual manner. The caps of the front cylinder are exploded by a slide which passes over the rear cylinder, and is so shaped that it prevents the hammer coming in contact with the caps of the rear cylinder. One chamber of the front cylinder is bored clear through, and if it is desired to fire the charges of the rear cylinder, said open chamber of the front cylinder is brought in line with the barrel, and the slide is pushed forward and locked. By doing so the slide presses back the pin which couples the two cylinders together, and enters a recess, so that the front cylinder is held stationary while the rear cylinder is allowed to rotate and to be discharged in the usual manner. The ramrod is made of two parts and hinged together so that it serves for both cylinders. George H. Gardner, 20 Beaver street, New York.

Clothes Wringer.—A great objection to the use of wringers for laundry purposes is the necessity which exists for altering the rollers so that they will take thick or thin goods with equal facility and squeeze them dry. Where cog wheels are used it is usual to make the teeth of them very long so that as the rollers raise they will still be in gear; in some cases only one side of the rolls is raised so that very uneven work is the result. At all times the necessity of slackening off or tightening the adjusting screw is troublesome, and should be obviated. This has been done in the device here alluded to; by a simple change of form, involving but one extra piece in the mechanism, the rolls are made to adjust themselves and always raise parallel or the same width all the way across. This does not in any way interfere with the action of the gears, which always remain in the same relation with each other and at the same depth of mesh. We regard this as a useful improvement in clothes wringers, and one that will improve the character and lessen the labor of using such machines very much. J. N. Pease, of Panama, N. Y., is the inventor.

Gentleman's Saddle.—This invention relates to an improvement in the construction of that class of gentlemen's riding saddles which have their skirts provided with projections to partially support the calves of the legs and thighs. These projections have been hitherto made by pads attached to an inner skirt or lining and covered by pig skin—a rather expensive mode of manufacture. This invention consists in forming the projections by swaging the leather skirts, whereby the labor and expense of forming the projections by pads attached to the skirts in the usual way is avoided. G. H. Meeker, Bridgeport, Conn., is the inventor.

Ventilating Mines.—This invention consists in a new mode of ventilation to be applied to mines of coal, iron or other subterranean workings, in which an exhausting fan or equivalent apparatus is to be used in connection with a system of air courses and air cut-offs, for the purpose of freeing them from noxious and dangerous airs and gases, and supplying fresh atmospheric air to the breasts and other parts of the mines. J. Lowden Beadle, Ashland, Pa., is the inventor.

Transfer Paper.

Transfer paper is prepared thus:—Make a mucilage with $\frac{1}{2}$ oz. of gum tragacanth, strain, add 1 oz. of glue, and $\frac{1}{2}$ oz. of gamboge. Mix French chalk, 4oz., old Paris plaster, $\frac{1}{2}$ oz., starch, 1 oz.; run them through a sieve, grind with the mixed mucilage, add water to reduce to the consistence of oil, and apply it with a brush to thin sized paper. The drawing made on this prepared side of the paper is wetted at the back and placed on the stone, which is warmed to 125° F., the whole is then strongly pressed in the

lithographic press, and the stone receives the impression, which may be printed from as usual. When two impressions are required, a red composition is made of wax, 2 parts, soap, 1 part, and vermilion to color, all melted in a saucepan, and ground with water to the consistence of cream. This is spread thinly on the second stone, an impression from the first stone is next applied, and the second drawing is thus made to correspond with the first exactly. If, in printing, the drawing becomes smutty, mix equal parts of water, olive oil, and oil of turpentine, shake till they froth, wet the stone, throw this froth on it, and rub it with a soft sponge. The printing ink will be dissolved, and the drawing will almost disappear, but, on rolling it, it reappears as clear as at first. When the stone is laid by for future use, a preserving ink is applied, to prevent the surface printing ink becoming too hard. Thick varnish of linseed oil, 2 parts, tallow, 4 parts, wax and Venice turpentine, of each 1 part; melt; add by degrees, lamp-black, 4 parts, mix thoroughly, and preserve in a tin case. This must be rolled on the stone each time before laying it aside for future use. When the whole of the impressions are completed, and the stones required for other drawings, two of the stones are laid face to face and ground with sand and water until the surfaces are clear. They are, finally, more or less polished with pumice stone, according to the required fineness, and are then prepared to receive other drawings.

Explosive Compound of Magnesium.

Mr. J. N. Hearder, of Plymouth, Eng., in experimenting with this new metal has discovered some explosive compounds of tremendous power and striking peculiarities. He ignited a small portion (about 20 grains) of one of these compounds during a lecture which he gave at the Plymouth Mechanics' Institute, the instantaneous and dazzling effect of which upon the audience was like that of a flash of lightning, causing the room to appear for some seconds afterwards to be enveloped in darkness, though it was at the time brilliantly lighted with gas. On causing two bars of magnesium to form the terminals of a powerful voltaic battery, which was prepared to exhibit the electric light, a most intense combustion ensued, one of the bars speedily became red hot, entered into ebullition, and then burnt spontaneously so furiously that it became necessary to plunge it into water to prevent its falling on the platform. In this process portions of the burning metal detached themselves, and floated blazing on the surface of the water, decomposing it after the manner of potassium, and liberating hydrogen, which also burned. The experiment had never been tried before, and the result possesses much scientific interest.

Tracing Paper.

Open a quire of double crown tissue paper, and brush the first sheet with a mixture of mastic varnish and oil of turpentine, equal parts; proceed with each sheet similarly, and dry them on lines by hanging them up singly. As the process goes on, the under sheets absorb a portion of the varnish, and require less than if single sheets were brushed separately. The inventor of this varnish for tracing paper received a medal and premium from the Royal Society. It leaves the paper quite light and transparent, it may readily be written on, and drawings traced with a pen are permanently visible. Used by learners to draw out lines. The paper is placed on the drawing, which is clearly seen, and an outline is made taking care to hold the tracing paper steady. In this way elaborate drawings are easily copied.

Test papers are prepared by dipping unsized sheets into a solution or infusion of the test. The substances used are Brazil wood, Buckthorn, acetate and diacetate of lead, cherry juice, dahlia leaves, elderberry, litmus, mallow flower, protosulphate of iron, starch, turmeric, indigo, cabbage, iodide of potassium, manganese, rhubarb, etc. They are used to distinguish acids, alkalies, poisons, gases, etc.

Court-plaster should be thoroughly soaked on both sides before it is applied, and should be pressed on with a soft, dry cloth; then it will adhere so firmly that washing with soap and water will hardly remove it.

MISCELLANEOUS SUMMARY.

MELON BUGS.—Charles Thompson of St. Albans, Vt., says:—"To prevent the ravage of the melon bug, it is only necessary to place a box, without top or bottom, around each hill of plants. The bug will fly against the box, and fall down on the outside of it, and if it be well bedded in the earth, so that no entrance can be found beneath it, the plants will be secure. It is the practice of some to cover the top of the box with muslin, but this is altogether needless." [This may do when the vines are just up, but how will it answer when they are ten feet long?—Eds.]

TORPEDOES RESEMBLING COAL.—A Mr. Ripley, of Rutland, Vermont, has in his possession an ingeniously contrived torpedo, made to exactly resemble a large lump of coal. This was the artful contrivance employed with much success by the rebels on the Mississippi, and it is suspected that the awful disaster to the *Sultana* was accomplished by one of these diabolical things. The one in possession of Mr. Ripley was sent to him from Richmond by his son, Gen. Ripley, and was found in the private cabinet of Jeff Davis after his flight from the city.

ONE of the signs of returning peace was brought to our notice recently in the case of an inventor in Richmond applying for a patent through the Scientific American Patent Agency. As fast as the territory of the United States is reclaimed, and the flag reinstated, we receive intimations that our friends have not forgotten us. It is gratifying to notice that inventors generally have been true to the Union. Those who deserted the cause conferred but little luster upon the one they espoused.

THE Linen Company, at Willimantic, have introduced a machine which greatly facilitates the manufacture of spools. The turning is done by a single process. The timber for them is birch, comes from Maine, is sawed into square pieces, which are supplied to the machine and come out perfectly finished spools. It is curious that the wood can be brought from Maine at less expense than it can be obtained there.—*Commercial Bulletin.*

[This is certainly curious.—Eds.]

EXPERIMENT WITH STEEL SHOT.—Some experiments recently tried in England to determine the value of steel shot as projectiles resulted as follows:—The shot were fired at $5\frac{1}{2}$ -inch rolled plates, supplied by the Millwall Iron Company; the plates were fixed vertically, without backing, against a wooden frame. The greatest amount of penetration was obtained by Sanderson Brothers & Co., viz., 3,275 inches. The shot were 8 inches in diameter.

So successfully does the money-order office work that it is to be greatly enlarged. One hundred and thirty-nine offices were established on the first of November last. On the first of June two hundred and eighty more will be established. The amount of money orders issued last quarter was \$588,462 24, on which Government received about \$5,000. There are about \$40,000 constantly lying in the hands of postmasters, subject to call.

BOOKS AND PUBLICATIONS.

DERRICK AND DRILL, arranged and edited by the author of "Ten Acres Enough," is a small book of 276 pages, published by James Miller, 522 Broadway, New York, (successor to C. S. Francis & Co.) It is a compilation of facts and speculations in relation to petroleum, presented in a very interesting and readable form.

OUR LATE PRESIDENT.—Messrs. J. Gurney & Son, the celebrated photographic artists, No. 707 Broadway, have just issued a large-size and very finely executed photograph of the late President Lincoln. The likeness is admirable, and if any of our readers desire to possess a good picture of the great and good man, we can recommend the picture of Messrs. Gurney.

SPECIAL NOTICE.

ISAAC M. SINGER, Yonkers, N. Y., has petitioned for the extension of a patent granted to him on the 12th day of August, 1851, for an improvement in sewing machines.

Parties wishing to oppose the above extension must appear and show cause on the 24th day of July next, at 12 o'clock, M., when the petition will be heard.

Improved Water Wheel.

These engravings represent an improved water wheel, for which the inventor claims special advantages. Fig. 1 shows the wheel and case, Fig. 2 the wheel isolated, or by itself, and Fig. 3 a section. The general configuration and plan of the several principal parts being thus shown, we give the inventor's description and claim for novelty. He says:—

"I claim for my wheel a greater percentage of the water power, and freer escape after it has been used. To this end the invention consists in having the scroll

He was at one period Chief Engineer of the Navy, and during the retention of his office, and since, has been foremost in suggesting and applying improvements to steam machinery. Mr. Sewell is widely known through his surface condenser, the only apparatus of the kind in general use throughout the country; in making this statement we are not ignorant of the fact that many others exist and are in daily use. The combined hand and steam pump is a recent invention of Mr. Sewell, and is highly spoken of by engineers.

Mr. Sewell's ingenuity was not so much manifested in

so that when it is necessary to fill the lamp the burner is unscrewed from the same and turned over, as shown in the engraving. The spring, A, holds the burner on the lamp and at the same time draws the wick to the opposite side of the neck of the lamp, thereby leaving an ample opening for the admission of oil. The spring is also sufficiently flexible or elastic that it may be withdrawn from the lamp if necessary and again replaced.

This novel and simple invention was patented on the 7th of March, 1865, and further information may

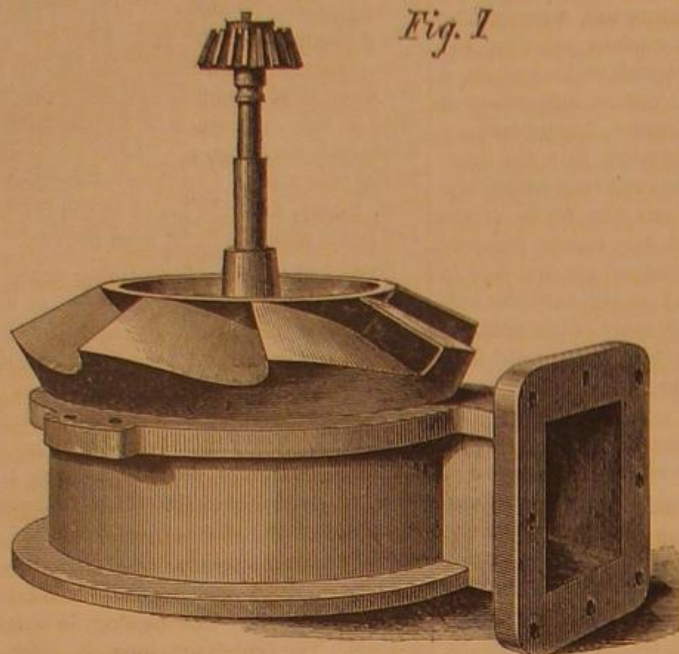


Fig. 1

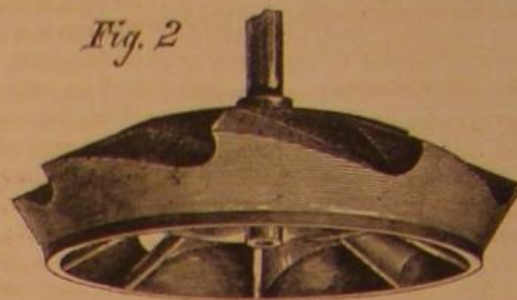


Fig. 2

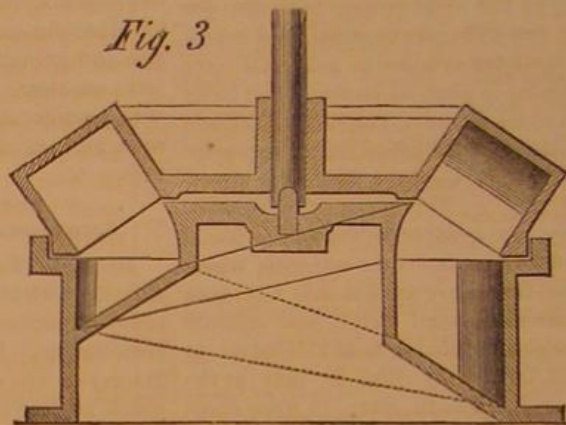


Fig. 3

LETELLIER'S WATER WHEEL.

and buckets arranged angularly in such a manner that the water will act upon the wheel nearer the edge or periphery than hitherto. By the peculiar construction of the wheel and the water acting upon or near the periphery of the same, it works under or with a greater leverage than is usual in wheels, which, of course, increases the power or percentage to the increased amount of leverage. By this arrangement, also, the water is allowed to escape more readily from the wheel, owing to its centrifugal force, and having a tendency to pass in the direction allowed it by the buckets, hence the water will not be restricted or retarded in its flow or passage through the wheel, consequently loses no power from that cause. Another advantage of the wheel is, that it can be placed in any position and work equally well." The whole patent or any territory is for sale. It was patented through the Scientific American Patent Agency on the 14th of February, 1865, by Joseph F. Letellier, whom address for further information at Grand Rapids, Mich.

Knowlton's Ship-timber Sawing Machine.

One of the best machines used in ship construction that has come to our notice for a long time is the timber sawing machine of J. L. Knowlton, of Philadelphia, an engraving of which may be found on page 128, Vol. X., SCIENTIFIC AMERICAN. It is applicable for sawing either heavy or light timbers to curves or irregular forms. It is coming into general use in our largest and best yards.

In a recent notice of Mr. Lynn's shipyard, in Philadelphia, we inadvertently alluded to him as the inventor of the machinery used in his yard. We should have stated that the improved sawing machinery used by Mr. Lynn was the invention of Mr. Knowlton; it was the latter gentleman we had in mind when stating that we have had at our office a number of his inventions, all of which possessed ingenuity and utility.

DEATH OF WILLIAM SEWELL.

It is with regret at the loss of an able, skillful and thinking member of the engineering profession that we announce the decease of Mr. William Sewell.

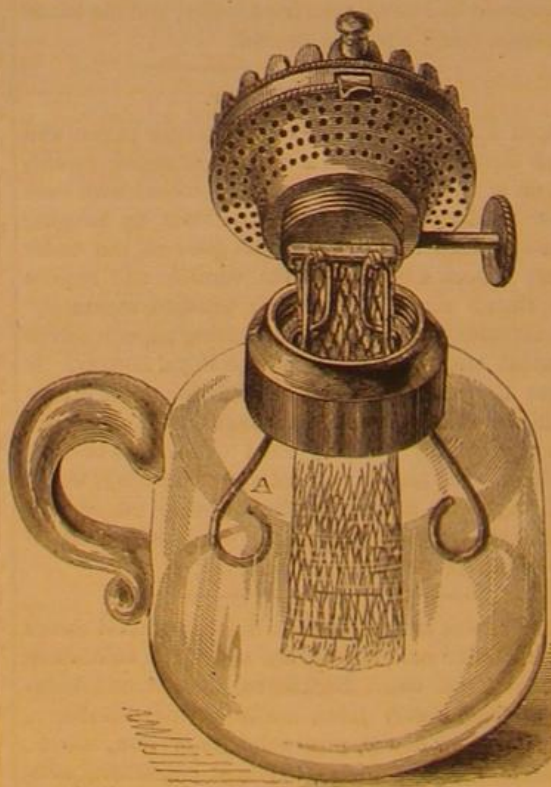
This gentleman died at his residence in Lexington avenue, this city, on the morning of the 12th inst.

machines as in the faculty he possessed of suggesting improvements in plans and systems already in force. Conservative in his views he yet willingly accepted anything that seemed really advantageous.

Mr. Sewell was quiet and unobtrusive in his manner and won the respect and esteem of his associates, who will long remember him with feelings of regard.

MOORE & COLE'S SUSPENDER FOR LAMPS.

The present mode of filling kerosene lamps is attended with many inconveniences. In unscrewing



the burner it is necessary to hold it in a position to pour the oil into the lamp, and at the same time prevent the wick from besmearing the same. The desired end is successfully accomplished by the accompanying device. The invention consists in providing a spring, A, hinged at the lower portion of the burner,

be had by addressing the patentees, Moore & Cole, Northville, Fulton Co., N. Y.

Launch of a Huge English Iron-clad.

The iron ram frigate *Bellerophon* was safely floated out of the dock at Chatham, in the presence of a large concourse of spectators. She was laid down in April, 1864, on lines supplied from the Comptroller's office, for a frigate of 14 guns, 4,246 tons, and 1,000-horse power. When the ship left the dock the tide had risen to 20 feet 4 inches, which was a remarkable high flow, and the *Bellerophon* was very quickly along the sheer hull, where she is to remain for one month to get her boilers, engine, gear, and masts on board. At present she is almost a skeleton, and her armor-plating fixed is only in the center of midships of her starboard and larboard sides. The plates are said to be of the best rolled iron, each plate being 16 feet in length, and 6 inches in thickness, weighing nearly seven tons; the inner skin plating is only 1½ inch in thickness, which is about an inch in excess of the inner plates of the *Achilles*; the latter being worked to 9-16th of an inch in thickness. The teak timber backing to which the armor plates are attached is only 10 inches in thickness, and they are well secured by 2½-inch ordinary bolts. It will be some months before she is completely finished. She has a projecting ram of about 18 feet; her present weight is 3,085 tons; she has been built at the rate of 60 tons of material per week. On the ship being placed at her moorings opposite the dockyard, her draught of water was found to be 9 feet 6 inches forward and 17 feet aft. Her dimensions are as follows:—Length between perpendiculars, 300 feet; length of keel for tonnage, 254 feet 6½ inches; extreme breadth, 56 feet; depth of hold, 17 feet 3 inches; burden in tons, 4,246.

TRIAL OF A DUMMY ENGINE.—A dummy engine inclosed in a compartment of an elegant car, filling a space not much larger than that of the platform occupied by the driver of horse cars, made a trial trip in Chelsea, recently, on the Lynn and Boston Horse Railway. The trip was highly successful. The engine was built at an expense of \$6,000, and weighs five tons. The Lynn and Boston Horse Railway intend to use the dummies on the journey to Lynn.

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THE DIFFERENCE BETWEEN NATIONAL BANKS AND STATE BANKS.

A bank is an association of individuals who have clubbed a portion of their capital in a joint-stock company, in order to loan it with less liability of losing the whole.

When such an association has provided itself with strong iron boxes and stone vaults, for keeping the money it has on hand safely, various individuals in the community who chance to have sums of money in their possession which they do not wish to use at present, take them to the bank for safe keeping. Experience has shown that there is no danger that all of these deposits will be called for at the same time, and that consequently the banks may venture to loan a portion of them and pocket the interest.

Experience has also shown that when a bank has established its credit, its own notes will pass from hand to hand in the community as money. Banks accordingly exchange their notes not on interest for the notes of business men drawing interest.

These are the two principal sources of profit to banks—the interest which they obtain by loaning their deposits and their circulation. If a bank be shrewdly managed these profits will usually more than pay the rents, salaries, and other expenses of the establishment. Many banks while loaning their means at 6 per cent interest have divided more than 8 per cent to their stockholders.

The temptation to make these profits as large as possible frequently seduces directors of banks to loan a larger portion of their deposits than is prudent, and if circumstances cause a more than usual demand for payment by depositors, the banks find themselves unable to comply, and are forced to suspend payment. The banks having paid away their cash on hand to depositors are without means to face the call for payments of their own notes in circulation, and thus the community finds a large portion of its money suddenly changed from notes worth their amount in gold into a mass of irredeemable paper.

The great loss and inconvenience resulting from the frequent failure of banks to pay their own notes have led to many attempts by the legislatures of different States to provide a remedy for the evil. The plan finally adopted by the State of New York seems to be the most effectual of any yet suggested. By this plan, all banks are prohibited from issuing any notes for circulation as money until they have deposited with an officer appointed by the State the full amount of the notes and something more, in mort-

gages, State bonds or other valuable and saleable property. Then, if the bank fail to pay its notes, the State officer holding these securities belonging to the bank is directed to sell them immediately, and apply the proceeds to pay the notes.

The national bank law is simply the application of the New York banking law to the whole country, with a few modifications. A national bank delivers to the Treasurer of the United States a certain amount of United States bonds, for which the bank has paid. The Treasurer gives a receipt for the bonds and lays them away in a strong vault; he also delivers to the bank 90 per cent of the amount of the bonds in "national currency" notes, which the bank may loan on interest. If the bank refuse to pay any of these notes on demand, the Treasurer of the United States will pay them, and the deposited bonds belonging to the bank will be sold or canceled to an equal amount. The law also provides that these notes shall be received at par in payment of all taxes and dues to the United States except duties on imports. These provisions make the notes of the national banks the best paper currency that we have ever had, excepting the legal-tender treasury notes, which would have been a perfect currency if they had not been issued in excessive amount.

Our State banks are gradually entering upon the national system, and we think, before many months have elapsed, that the whole State banking system of the country will be based upon national securities—a result which we regard as very desirable to the community.

THE "STONEWALL."

The latest sensation in this hour of sensations is the appearance at Nassau of the rebel ram *Stonewall*, alias *Olinde*, alias several other titles not necessary to mention.

This vessel was designed to break up the blockade of our coast, but coming in too late for the fray has been disappointed, and will probably go back, we are sorry to say, without a battle. We regret this, for we have already so many specimens of English iron vessels in our possession built for speed that we should like to have one French ship, built for strength, so that we may see what their claims to invulnerability are based upon.

In another part of this journal we have reprinted a graphic and clear description of this vessel, from a correspondent of the *Herald*. It will be seen in this account that the ram is armed with 70-pounders, and a 300-pounder. As we are not supposed to run away from the fearful appearance of the exterior, the guns and armor are all we need take into account.

"What man has done man may do," and we have already encountered an enemy much more formidable than this two-keeled, two-wheeled nondescript, and vanquished it with ease, so that, not unreasonably, we may hope to repeat the performance when occasion serves.

The *Stonewall* has stationary turrets of oak, 18 inches thick, plated with iron two inches thick. To this remarkably stanch structure the safe keeping of the crew, guns and machinery for working them, is committed. Of the side armor it is not necessary to speak; let it be ten feet thick if necessary, there is no occasion to waste powder in attacking or in describing it, when the vulnerable points are placed above it.

The *Atlanta* rebel iron-clad had 4½-inch iron plating, backed with two feet of Georgia pine, and the *Tennessee* had 5-inch plates, backed with two feet of oak. Both of these vessels were attacked by monitors with 15-inch guns, and surrendered to them, only after being compelled to by having their sides broken in. The rebel vessels were armed with heavy rifles 7½-inch bore, re-enforced by wrought-iron bands, but failed to injure our iron-clad vessels in the slightest degree, while the 15-inch shot burst in the sides of the *Tennessee* and *Atlanta* when they struck her fairly.

These are simple facts that it may be well to bear in mind when the ram fever prevails. We do not commit the folly of underrating an adversary; we have fought and conquered better ships with heavier metal, both on the broadside and thrown from it, than the *Stonewall*, and we are not to be appalled by the presence of an inferior ship or the boasts of her off-

cers. They know only too well that prudence is the better part of valor and will never come within range of the 15-inch guns. If they do they will be as certainly smashed as thunder is to follow lightning.

INEFFICIENT MACHINERY.

Twenty years ago, when machinery was just beginning to be appreciated, and mobs having ceased to destroy, learned to respect it for its usefulness, any tool that would do more than a man could was to be commended; but in a quarter of a century we have made some progress in the arts, and those machines which were once economical are no longer so.

We see clanking, rattling, jerking chains instead of screws, on iron planers; miserable feed arrangements and worse accommodations for tool holders in lathes; chucks that are good for nothing but to jam men's fingers, and have to be taken to pieces for every new job; bolt cutters that cut had threads and strip half of them at that; taps of no pitch and no shape to the thread; nuts that are not alike on any two sides and that no one wrench will fit; and many other minor matters unnecessary to detail at greater length, but all vexatious, and obstacles in the way of improvement.

That these simple things exercise a great influence on the profits of any concern is not to be denied, for to do a given amount of work either greater motive power is consumed or the proprietor and all hands must work harder. We believe that it would be true economy for shops that own a stock of poor and old-fashioned machinery to close it out immediately for what it will bring, and stock the works with the newest and most approved kinds. There is to be a busy time shortly, and shops ill fitted for work will suffer—"the weakest must go to the wall."

WATER AS FUEL.

On Monday evening, May 15th, the Association for the Advancement of Science and Art held a meeting at Room 24, Cooper Institute, and after some formal business, the President, Dr. John H. Griscom, read a paper on Water as Fuel. It was by far the ablest and most intelligent argument yet presented in favor of Hagan's stove.

It will be remembered that this stove has a vessel of water suspended in the upper portion, and as the water is evaporated the steam is conveyed downward in a pipe to the fire-box, where it is superheated and then blown directly among the burning coals. It is claimed that the steam is decomposed, giving up its oxygen to the coals, and that the hydrogen thus set free is then burned by the atmospheric air which enters through the grate, causing a great increase of heat.

The chemical changes may be illustrated by a few simple figures. The portion of anthracite coal that burns is carbon. Let a single atom of carbon be represented by a star (*) and let us follow it through the stove. Atmospheric air consists of one-fifth oxygen and four-fifths nitrogen gas, mechanically mingled. The nitrogen performs no part in combustion, the burning being the chemical combination of the oxygen with the carbon. Let an atom of oxygen be represented by a small o. When the air passes through the grate, two atoms of oxygen combined with one of carbon, o*o, to form an atom of carbonic acid—the heat of the fire being developed in this act of combination.

An atom of water is formed by the combination of one atom of oxygen with one of hydrogen. As the atom of hydrogen, though only one-eighth as heavy as the atom of oxygen, is twice as large, let that be represented by a large O, and the atom of the water by Oo.

Now, if a jet of superheated steam be thrown upon a bed of coals at a sufficiently intense heat, the steam will be decomposed, each atom of carbon combining with the two atoms of oxygen in two atoms of water, and setting free the two atoms of hydrogen.

Then if the atoms of hydrogen thus set free are brought in contact with two atoms of the oxygen of the atmosphere, they enter into combination with them, forming again two atoms of water.

When coal is burned directly by the atmosphere, each atom of carbon, (*) combines with two atoms (oo) of the oxygen of the air, forming an atom (o*o) of carbonic acid. But if the atom of carbon takes

its two atoms of oxygen (oo) from two atoms of water, (Oo Oo) it sets free two atoms of hydrogen, (OO) which, in burning, combine with two atoms of atmospheric oxygen to form two atoms of water again. Thus the oxygen taken from the water by the carbon is restored from the atmosphere, producing the same effect on the carbon and on the air as if the water were not employed, while just as much water as is decomposed is formed again before it leaves the stove. The burning of a pound of hydrogen generates a larger quantity of heat than the burning of a pound of any other substance known.

The claim for Hagan's stove is that it furnishes hydrogen, the most efficient of all combustibles, and thus causes a great increase in the production of heat. The reply is, that it costs just as much heat, or other equivalent force, to separate the two atoms—oxygen and hydrogen in one atom of water—as is developed by their recombination when the hydrogen is burned.

The point to which we would especially direct attention is, that the employment of water does not vary the original substances, or the final products. The water goes in as water and comes out as water. In both cases, when water is employed and when it is not, the oxygen and carbon enter the stove as separate elements, and emerge as carbonic acid.

To suppose that we can increase the production of heat by a variation in chemical changes which start from the same substances and result in the same products, would be regarded by all who believe in the conservation of force, as a proposition perfectly analogous to perpetual motion—as an attempt to get out of something more than there is in it.

BURNING WATER.

The following is the substance of Prof. Seely's remarks in reply to Dr. Griscom's paper on "Water as Fuel," which was read before the Association for the Advancement of Science and Art at its last meeting:—

Mr. President:—There is no substance more important than fuel; it is of the first necessity in all arts. Any discovery or invention that would effect an economy in fuel would be of the very highest value. If any one can actually accomplish a saving of one per cent in the general use of fuel, the community will very willingly pay him a large fortune for it. If Hagan's stove produces, as is claimed, a given heat with twenty or thirty per cent less fuel than other stoves, I should like one-millionth part of the patent.

The idea of decomposing water, and then generating heat by recombining the elements—burning the hydrogen—is not new. It has come up at brief intervals in some modified form for the last forty years. I have been repeatedly assured that some one of these plans actually effected a saving of fifty, or thirty, or twenty per cent of the fuel, but in every case that I have examined the observations were not thoroughly made. It is not enough to say that when he used one of these stoves he consumed a ton of coal less than he did the previous winter, when he used some other kind of stove. Our senses are very poor measures of temperature; we are not thermometers.

There is no doubt that hydrogen is an excellent fuel, but the important point that was not discussed in the admirable paper which has been read is the cost of decomposing the water. Water may be decomposed by heat, but it is deducible from general laws, and has been ascertained by direct experiment, that just as much heat is consumed in decomposing it as is generated by the recombination of its elements. See how absurd it would be to suppose otherwise. If we had a jet of steam coming in at a point where it was decomposed, and then by carrying the two separated gases to a second point and recombining them we could produce more heat than was expended in their separation, we might accumulate heat, and from a single pint of water in time obtain sufficient heat to supply the whole world. It is a scheme for perpetual motion.

Being thus satisfied in my own mind that there is no gain of heat by using water as in Hagan's stove, I am satisfied that there is a loss. All heat that is put into the water, and is not recovered from it, is wasted. Water is the most efficient substance that can be employed for carrying away heat. To raise

the temperature of a pound of it a given number of degrees—requires four times as many units of heat as to raise the temperature of a pound of air the same extent; and then to turn a pound of it into steam will require 1,000 units heat more—as much as would heat a pound of water, were it not evaporated, 1,000 degrees—or a pound of air, which is fifteen cubic feet, 4,000 degrees, and air is usually warmed in our dwellings only twenty or thirty degrees.

What evidence is there that in this stove there is any decomposition of water? Some time since there was a water-gas apparatus in operation in Boston, and I went there to examine it. Superheated steam was thrown upon burning coke, and afterward mixed with tar gas; and it was supposed that the water was decomposed, furnishing hydrogen to the gas. The parties held perfect faith in the scheme, and the apparatus was put wholly under my direction to examine and test. I avoided introducing the tar from which the gas was being made, and allowed the steam after passing over the hot coke to enter the gas pipe alone. It was immediately apparent that at the temperature at which the work had been going on decomposition of the water did not take place. In fact, there was not a drop of water decomposed until the coke was raised to a white glowing heat—so intense indeed as to damage the apparatus. When I saw Hagan's stove in operation, the temperature of the coal was not sufficiently high to effect the decomposition of water.

It may be said that I am prejudiced. Admit it if you please; my thermometers are not prejudiced; my figures are not prejudiced. Give me a chance. Let the heat produced by this apparatus be carefully measured. If there is an economy of heat in the decomposition of water and the recombination of its elements, I will not only admit it—I will proclaim it as the greatest and most valuable chemical discovery of the century—indeed the most wonderful discovery ever made.

Change of Plan in English Iron-clads.

The discussion reprinted below recently took place in Parliament, and set forth, as will be seen, a change of plan in some of the English iron-clads to be built:—

Lord C. Paget said that he had stated, on introducing the navy estimates, that they were going to build vessels on the twin-screw principle, about that tonnage, of considerable speed, of light draught of water, plated at the water line with 6 inches of iron on 10 inches of wood, besides an inner skin of $\frac{3}{4}$ inch of iron, which they hoped would be able to carry eight 12-ton guns. Assuming that they succeeded in doing that, he wanted to know whether anything that foreign governments were about to build offered a prospect of greater efficiency?

Mr. Laird—What is the speed in such vessels?

Lord C. Paget was of opinion that it would be about twelve knots, but if he was mistaken he should have an opportunity of correcting that mistake. It was said that the *Alabama* was built for the particular purpose of being a sea-goer, and that speed was not of so much importance.

Mr. Laird—I beg to correct the noble lord. I said she had sea-going qualities together with sailing qualities.

Lord C. Paget said that was just what the Admiralty proposed to do with their cruisers. The duty of those ships was to go to foreign ports, and it was undoubtedly of great importance that they should have sailing qualities as well as sea-going qualities. They proposed to arm the *Amazon* class with 200-pounder 6½-ton rifled guns, and in all the ships they were building they were giving heavier guns and fewer of them. They would carry four guns on a broadside, which would throw 900 pounds of iron, whereas the old ships, although they carried more guns, threw only 296 pounds. They were always hearing of what foreign nations were doing, but they had not yet found that foreign nations were able to do more than themselves.

The National Bereavement.

Our European exchanges come to us filled with expressions of profound grief at the death of President Lincoln. The *London Star*, in its notices of the various meetings of condolence held in the principal towns of England, says:—"Throughout the whole of yesterday the front of the extensive premises of Mr.

Charles Pomeroy Button, American merchant, of Cheapside, was draped with black cloth, edged one inch deep with white. Black cloth also depended from the fascia, above which were crossed the American flags, covered with black crape. Business was entirely suspended, and every article in the interior of the shop covered with the same somber colored drapings. Among the latest demonstrations was one by the workmen of London, who, in addition to resolutions of condolence, adopted one rejoicing at the recent Union successes and the destruction of slavery."

RECENT ENGLISH PATENTS.

WORKING THE SLIDE VALVES OF STEAM AND OTHER ENGINES.

This invention consists in using but one eccentric, fast to the shaft, to work the slide valve of an ordinary steam or other engine, so that the engine will move backwards or forwards while the necessary lap and lead for expansion is preserved.

PREVENTING LEAKAGE OF THE TUBES OF TUBULAR BOILERS AND OTHER TUBULAR STEAM AND WATER APPARATUS.

This invention consists in the employment of short split tubes or rings which are cylindrical outside and conical on the inside. The external diameter of these short tubes corresponds with the interior of the tubes of the boiler or other apparatus, but the short tubes are yet capable of being readily inserted into the ends of such tubes. The longitudinal splitting of the short tubes or rings is in an inclined direction through the metal, so that the edges overlap each other, and so that the split will not be opened when a tube or ring is somewhat expanded to cause it to fit closely within the end of a boiler or other tube. In addition to these short split tubes, other short tubes are used, which are cylindrical inside and conical out, and they have each a flange at their outer ends. These tubes fit within the split tubes at their inner end, and their flanges extend over the outer ends of the tubular flues or other tubes fixed in the plate. In order to stop the leak of a tubular flue or other tube fixed in a tube plate, a screw bolt and screw nut are used. On the end of the screw bolt is a cross bar or instrument pin jointed to the screw bolt. This cross head or instrument can pass through the short tube introduced into the end of a tubular flue when in one position, and then when opened out the ends of the cross heads come against the end of the split tube. There is a second cross bar or cross head or plate used which rests against the outer surface of the flanged end of the second or inner short tube above described. In using this apparatus the two short tubes are to be introduced with the screw bolt into the end of the tube, and then the screw nut is to be turned till the split tube is drawn upon the inner short tube, and has by it been caused to expand to the requisite extent, when the screw bolt, nut, and cross heads are to be removed.

MACHINERY FOR PROPELLING.

This invention relates to double-action steam propellers, the steam being produced by evaporation, or by the combustion of a gas capable of producing it without condensation, and differing from other motive propellers either terrestrial, marine, or aerial—first, on account of the draught from the furnace not being produced by steam injection, but being the result of the efflux of some part of the air which the vehicle containing the motive power rapidly displaces or compresses by its progressive forward movement. This air is introduced into the furnace through openings properly prepared on the fore part of a closed ash-box, set under the grate, and, in case of need, on some part of the fire-box. Secondly, on account of the steam being capable of being disposed of after having worked as motive power to ordinary machinery, by being conducted out by passing through the chimney stack up to its orifice, more or less bent backwards by means of a tube entirely closed, terminating outside with one or several orifices made in a direction exactly opposite to the movement of the apparatus, and so prepared as to increase the forward impulse produced by the mechanism by means of the reaction still sufficiently energetic which the half-distended steam produces when coupling its condensation with the atmosphere. This propeller will not only give to boats and locomotives on railways a greater speed without increased expense, but will

admit of easily transforming engines such as those used for agricultural and other purposes, by the addition of plate board and tender, into small locomotives, capable of running on public roads or streets, for moving every kind of vehicle, for ascending mountains however steep, for working agricultural and other implements, and for other purposes.

APPARATUS FOR HEATING STEAM BOILERS.

This invention consists in communicating the heat to the boiler for raising steam through the medium of a substance which is fluid at the working temperature, but which does not readily evaporate or become decomposed, while it is capable of supplying the necessary heat without being so hot as to injure the boiler shell. Lead is a suitable and convenient substance for the purpose in view, and in carrying out the invention the patentee applies that substance between the fire and the boiler proper, putting it in a bath jacket or shell of a form adapted to whatever class of boiler may be used.

A CURIOUS CLOCK.

Some time since there was exhibited at a watch-maker's window in Montgomery street, in San Francisco, a clock, in which, at first sight, there seemed no possible means of making the hand revolve. The dial was a simple plate of transparent glass with a small, smooth pin in the center, which passed through a plain hole in the hand. The clock had but one hand—an hour hand light and slender—and upon the short end of this was formed a small box of thin metal. There was no contact of the hand with the dial except at the pivot, and there was nothing touching the pivot except the hand and the glass in which it was embedded, yet the piece kept perfect time. This clock was a mechanical puzzle that attracted a constant group around the window.

We have never received any explanation of the construction of this puzzle, but imagine that the works were in the small box on the short end of the hand. Suppose within this box watch-work driven by a spring and regulated by a balance wheel, so that it would cause a little hand to revolve once in twelve hours, in a plane parallel with the dial. Then let this little hand carry a small weight—say a pistol bullet on its end, and let the large hand be made very light, and be so nicely poised that when the weight was furthest from the fulcrum, it would bring the short end of the large hand down, causing the long end to point directly upward and indicate 12 o'clock; but when the weight was nearest the fulcrum the long end would overbalance and point downward to 6 o'clock. Then as the weight revolved it would cause the hand to balance in the several positions around the dial, depending upon the time of day as kept by the watch-work within the box.

If this explanation is correct, the hand might be laid away in a drawer, and on taking it out at any time and slipping it upon the pivot, it would swing to the exact hour of the day.

Device to Prevent Candles from Guttering.

An English journal thus remarks of a new invention for preventing candles from guttering:—

"Many contrivances have been brought out at one time or another to prevent candles from guttering when being carried about or standing in a draught.

"For the information of the trade, we may say that this article is nicely finished in polished brass and glass and is retailed at the small price of one shilling English money. It most effectually prevents the candle from guttering; while the brilliancy of the flame does not suffer from want of air, a good supply of which is secured by perforations in the lower extremity of the Nozzle; while the protector is kept free from grease by an occasional dip in scalding water, the candlestick requires less trouble to clean it than when the grease is allowed to run into the crevices."

The entire length of the railroad between Vera Cruz and Mexico will be 315 miles; the highest summit level, 8,300 feet above the sea, being double the height of any other railroad in the world; it will have an incline of 23 miles, and a grade of 212 feet per mile, on which the curves have a radius of 500 feet. There is one bridge to be built 290 feet high, beside several tunnels, etc.



ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MAY 16, 1865.

Reported Officially for the Scientific American.

32 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.

47,688.—Metallic Cartridge.—Ethan Allen, Worcester, Mass.:

I claim, First, Making the base of the cartridge shell with an opening and a flange, b, in combination with grooving out the base, B, whereby the body of the cap, as well as the flange which contains the fulminating powder, are well supported, and a sure explosion insured, substantially as described.

Second, The combination with the case, A, of a base, B, provided with three flanges, a, b and c.

47,689.—Making Sheet-metal Boxes.—George Anderson, Salem, Oregon:

I claim the mold, A, in combination with the form, C, the latter being composed of the plates, a, f, g, g, connected by hinges, e, h, and the mold being attached to the plate, a, of C, by a hinge, 3, all arranged substantially as and for the purpose set forth.

Second, I also claim the spring, D, in the described combination, with the hinged block, A, for raising the same automatically, as explained.

Third, I further claim the arms, k, k, in the described combination, with the hinged plates, F, F, for the purpose specified.

[This invention relates to a new and improved machine for constructing or forming the bodies of sheet-metal boxes, whereby the work may be done rapidly and in perfect manner.]

47,690.—Snap Hook.—Jonathan Bailey, East Troy, Wis.:

I claim the combination of the sliding bolt with the snap hook and spiral spring coiled around the bolt, as described, for the purposes set forth.

47,691.—Harvester.—Stephen S. Bartlett, Providence, R. I.:

I claim the combination with the shoe, D, of the pivoted spring brace, E, fixed spring brace, G, lever, H, and rack, F, all arranged in relation to the main frame, as and for the purposes described.

47,692.—Mowing Machine.—Stephen S. Bartlett, Providence, R. I.:

I claim the use of the socket, f, cast with the pole plate, in combination with the adjustable standard, K, for supporting and adjusting the seat, substantially as herein described.

47,693.—Cultivator.—Wm. E. Bates, Elmore, Ill.:

I claim the swinging levers, Q, Q, connected substantially as described, with the forward and rear shovel standards, which are pivoted in such relation to the frame and laterally-moving mechanism that the two shovels thus connected are caused by the action of the treadle to approach to or recede from the corn in concert, as described and represented.

47,694.—Ventilation of Mines.—J. Lowden Beadle, Ashland, Pa.:

I claim the use of the fan as an exhaustor of the impurities of mines, or for the purpose of creating a partial vacuum in the working parts thereof, in combination with the system of air courses herein represented and described.

47,695.—Crutch.—August Bickel, Philadelphia, Pa.:

I claim the employment of a removable buffer, D, in combination with the spur, B, fixed rigidly in the lower part of the crutch staff, A, as described, the said buffer being constructed so as to be applicable over the spur, in the manner described and for the purpose specified.

I also claim the employment of the removable guard thimble, C, in combination with the spur socket, E, on the lower end of the crutch staff, A, as described, the same being constructed so as to be applicable, in the manner and for the purpose set forth.

47,696.—Constructing Boots and Shoes.—Lyman R. Blake, Boston, Mass.:

I claim the new process of constructing a shoe, substantially as set forth.

47,697.—Machine for Measuring and Counting Shingles.—M. Bonney, Mantua, Ohio:

I claim as my improvement the measuring wheel, F, and recording index, I, K, in combination with the slide, G, books, m, and c, c, dog, g, and adjustable arms, D, D, arranged and operating as and for the purpose set forth.

47,698.—Clothes Dryer.—Edward Bucklin, Jr., Pawtucket, R. I.:

I claim the longitudinally sliding rod, E, forming the guide for the revolving sleeve or swivel, D, in combination with folding arms, C, hinged braces, b, ring, B, and post, A, constructed and operating substantially as and for the purpose set forth.

47,699.—Cultivator.—James Brewer, Albany, N. Y.:

First, I claim securing the central pair of cultivator standards to the plow beams by means of swivel hinges, for the purpose of admitting them to be moved in a vertical as well as in a lateral direction, substantially as and for the purpose specified.

Second, In combination with the laterally movable standards, O, adjustable stirrups, r, substantially as and for the purposes specified.

Third, In combination with the laterally movable standards, O, the extension pieces, p, and knee stirrups, s, for the purpose of enabling the plowman to operate the plows by hand or foot, substantially as and for the purpose specified.

47,700.—Railroad Car Brake.—Ferdinand E. Canda, Chicago, Ill.:

First, I claim the belt, a, when used for distributing the pressure on the wheel, b.

Second, The combination of the eccentric wheel or cam, b, and the belt, a, with the connecting rod or chain, c.

Third, The arrangement of the shaft, m, eccentric wheel or cam, b, belt, a, and the ratchet and pawl, i and h, all being arranged and operating substantially as set forth and specified.

47,701.—Device for Heating and Conveying Petroleum.—Joseph Casey, Washington, D. C.:

First, I claim the combination of steam generators, tanks, the conduit pipes and the steam pipe, and their various connections, for conveying the oil or petroleum from the wells to the receiving, heating and heating tank, for raising it there to the proper temperature, and from thence conveying it to any required distance in the conduit pipes into other tanks, and maintaining its temperature while passing through the same, by means of the small steam pipe and its connection with the generators.

Second, I claim also the arrangement of the small steam pipe or tube within the conduit pipe, whereby the introduction of steam into the small pipe will apply and communicate such an amount of heat directly to the oil, petroleum or other substance in its flow and passage through the conduit pipe as will keep it in a fluid and flowing state, and prevent the deposit and accumulation of the sedi-

ment or residuum of the oil or petroleum in the conduit pipes, it being held in solution by and carried off with the petroleum.

47,702.—Guard Fingers for Harvesters.—Salem Cope-land, Worcester, Mass.:

First, I claim coiling out the rear of the guard finger, in combination with fastening the steel plate by a short rivet to secure lightness and greater uniformity in the metal thickness of the guard, in the manner herein described.

Second, Coiling out the rear of the guard finger, in combination with supporting the bridge, g, by an inclined brace, h, substantially as and for the purposes described.

47,703.—Horse Hay-rake.—J. Crellin, Marshalltown, Iowa:

First, I claim the constructing of the teeth of two longitudinal parts, a, a, attached to opposite sides of the rake head, A, and connected at their ends by metal tips, b, substantially as described.

Second, The oblique braces, C, attached to the draught bars, D, and arranged to rest or bear upon the cylindrical portions, c, of the rake-head, A, as set forth.

Third, The arrangement and combination of the frame, I, pivoted to the outer part of the bars, E, E, and the pendant frame, G, the two frames aforesaid being connected by a rod, H, and the frame, G, connected by springs, h, h, with the bars, E, E, substantially as and for the purpose set forth.

[This invention relates to a new and improved horse hay-rake, and it consists in a peculiar construction of the teeth, an improvement in the draught pieces, and also in the mechanism employed for holding the rake in working position and liberating the same, in order that it may discharge its load, whereby it is believed that several advantages are obtained over the generality of rakes now in use.]

47,704.—Machine for Making Clasps from Sheet Metal.—John H. Doolittle, Ansonia, Conn.:

I claim the combination of two or more sets of rotary dies, to cut out and form the blanks, when constructed, arranged and operating substantially as described.

I also claim making the sets of dies adjustable, substantially as described, for the purpose of registering differently and adapting the machine to different kinds of work, as hereinbefore described.

I also claim making one or both sets of the above-described dies adjustable in the direction of their axes, substantially as described, for the purpose of setting the dies in line, one set with another, as set forth.

I also claim the employment, in combination with the female die, b, of a sustaining and disengaging guide plate, W, as its equivalent, substantially as and for the purposes set forth.

I also claim, in combination with the rotary dies, c, d, the series of clearing figures, 4, 5, 6, the whole arranged and operating as specified, for the purpose set forth.

I also claim, in combination with the cutting-out dies, a, b, the cleaver and chute, h, and deflector, i, arranged to operate substantially as set forth.

47,705.—Siphon Bottle.—G. W. Doty, Ravenna, Ohio:

I claim the tubes, B and D, in combination with the tube, E, and bottle, when connected and arranged substantially as described.

47,706.—Heating and Cooking Range.—Eben Edwards, Boston, Mass.:

I claim the above-described arrangement of the lateral conduits, M, M, the radiating drum, K, the air-heating chamber, P, the fireplace, A, the smoke chamber, B, the oven and its flue space, G, connected with the fireplace and the radiator, as specified.

I also claim the combination of the tubes, V, V, leading out of one end of the fireplace and through the air chamber with the grate shaft, the fireplace and the journal bearings, x, x, at the opposite end of the fireplace, the whole being substantially as specified.

47,707.—Cylinder Pin of Revolving Fire-arm.—Wm. H. Elliot, Plattsburgh, N. Y.:

First, I claim locking the cylinder into the frame by turning the base pin upon its axis, substantially as set forth.

Second, Providing a base pin, which locks the cylinder by being turned upon its axis, with a catch, d, to prevent it from being turned back by accident, substantially as described.

47,708.—Mangle.—Thos. Farnsworth, Cleveland, Ohio:

I claim, First, The arrangement of the hanger, J, and rollers, A, B, in combination with the spring, m, screws, d, and gearing, G, H, substantially as and for the purpose specified.

Second, I claim the springs, P, and rollers, k, in combination with the tables, O, P, and apron, R, when arranged and operating in the manner and for the purpose described.

47,709.—Sash Supporter.—William C. Fisher, Charlestown, Mass.:

I claim the levers, D, and notches, d, operating substantially as described for the purpose set forth.

I also claim the presser blocks, e, when used as an adjunct to the levers, D, operating substantially as described for the purpose specified.

47,710.—Corn Huskers.—E. F. French, New York City:

I claim the employment or use of the plates or scrapers, G, in connection with the rollers, F, F, arranged and applied to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and improved machine for husking corn of that class in which rollers are employed to effect the object. In the original machine of this kind the corn husks are liable to wind around the rollers while the latter are stripping the husks from the ears, and thus render the machine very inefficient—a difficulty which is fully obviated by this improvement.]

47,711.—Shutter Fastening.—Jacob Frick, Philadelphia, Pa.:

I claim the plate, B, its arm, D, spindle, E, its head, g, and inclined shoulders, x, x, in combination with the plate, A, and its slot, X, the whole being arranged, operated and adapted to shutters, substantially as and for the purpose herein set forth.

47,712.—Revolving Fire-arm.—George H. Gardner, New York City:

I claim, First, The employment or use of two or more cylinders presented in the same direction, one behind the other, and arranged in combination with one and the same hammer, substantially as and for the purpose set forth.

Second, The slide, I, applied in combination with the two cylinders, C, C, and hammer, H, constructed and operating substantially as and for the purpose described.

Third, The spring catch, k, applied in combination with the two cylinders, C, C, and slide, I, substantially as and for the purpose specified.

Fourth, Firing the charges of the rear cylinder through the front cylinder, substantially as herein specified.

Fifth, The grooved headed button, f, of the slide, I, constructed and adapted to operate as a sight, as herein explained.

47,713.—Cooking and Heating Stove.—Milton Gilmore, Morning Sun, Iowa:

I claim, First, The flues leading from fire pot, F, around ovens, O, O, and between the plates forming the sides and top of the hood, to exit pipe, in connection with dampers, h, h and p, p, in the manner and for the purpose set forth.

Second, I claim the manner in which the fire pot is placed with grate and pot, as described.

Third, I claim the combination and arrangement with fire pot, F, of apertures, 2 and 4, and dampers, p, p, substantially in the manner and for the purposes described.

Fourth, The hood of the stove constructed and arranged with the flues wholly extending around side and top, in connection with the dampers, h, h, substantially in the manner and for the purposes described.

Fifth, The apertures, A', in the top of a stove, with side and top flues, and an illuminated sliding shield, D' D', in combination with the fire pot, F, in the manner and for the purpose set forth and described.

47,714.—Centrifugal Draining Machine.—Alexander N. Glass and Henry W. Bartol, Philadelphia, Pa.:

We claim, in centrifugal draining or drying machines, the thickening of the primer of the bottom plate of the revolving cylinder, and forming a groove, recess, or shoulder therein, so that the bottom of the wire gauze cylinder may rest therein, and below the surface over which the instrument is moved in scooping out the sugar, by which means it is protected from injury, substantially as herein described.

47,715.—Combined Implement for Detaching and Replacing the Parts of Small Arms.—Alexander Grillet, Philadelphia, Pa. Antedated May 1, 1865:

I claim, First, The two arms, A and B, hinged to each other, and provided with the studs herein described, or the equivalents to the same, the whole being arranged for acting on the main spring of the fire-arm, substantially as described.
Second, The two arms, A and B, in combination with the movable stud, b, its screw for carrying the wiper, and ball screw, and the tumbler punch, c.
Third, The combination of the two arms, A and B, with the cone and apple wrench, a, at the end of the arm, A.
Fourth, The screw driver, C, and band punch, d, hung to a pin on the arm, B, as set forth.

47,716.—Bread Slicer.—George Hall, Morgantown, West Va.:

I claim an implement or device for cutting or slicing bread, meat, and other substances, composed of levers and links applied to or connected with a knife and bed piece, in the manner substantially as described.

[This invention consists in a peculiar arrangement of levers and links, combined with or applied to a knife, and used in connection with a bed piece, whereby the knife is made to work or operate with a drawing cut and a very simple, efficient and economical device for the purpose specified is obtained.]

47,717.—Motive Power.—William H. Hartman, Fostoria, Ohio:

I claim, First, The special arrangement of the arms, E, F, and plates, I, J, in combination with the pinions, m, n, gear, P, and disks, H, when arranged and operating conjointly, as and for the purpose set forth.
Second, I claim the combination with the above plate, b, pendulum, C, springs, d, in combination with the wrist, a, and arms, E, F, when operating conjointly, as and for the purpose set forth.

47,718.—Tire Fastener.—Robert Hatrick, Paterson, N. J.:

I claim, First, The arrangement of the felly, A, tire, C, and bolt, E, as described; that is to say, the bolt passing or extending into a notch in the edge or cheek of the tire, and extending obliquely through the felly of the wheel, thereby securing the tire in position, as hereinabove set forth.
Second, So constructing the tire, C, and the head of the bolt, E, that the latter shall be dove-tailed into the former, so as to resist lateral pressure in either direction, as set forth.
Third, The combination of the longitudinally wedge-shaped section of the bolt, E, with a wedge-shaped recess in the tire, substantially as and for the purpose set forth.
Fourth, The combination of a dove-tailed recess in the felly, A, with a dove-tailed recess in the tire, C, and with a head so formed upon the bolt, E, as to fit both of said recesses, substantially as and to the effect above stated.

47,719.—Ambulance.—John M. Hayward, Boston, Mass.:

I claim attaching the stretcher, C, to the saddle by means of the wedge-shaped legs, b, and corresponding sockets, a, substantially as set forth.

47,720.—Anchor Tripper.—B. H. Heilmann, Hoboken, N. J.:

I claim the anchor-tripping device above described, consisting of the rotating bar or keeper, D, with its troughs, f, f, and the latches, c, c, constructed and operated substantially as above set forth.

[This invention consists in certain devices for tripping the anchor of a vessel, whereby much time and labor is saved in throwing it off from the rail, it being only necessary to raise a lever which rests upon the rail in order to disengage both the shank painter and the ring-stopper at one and the same moment.]

47,721.—Blow Pipe.—Joshua Hendy, San Francisco, Cal.:

I claim the combination with the pipe, A, of the valve, F, tube, C, and elastic air chamber, D, all constructed and arranged as and for the purposes specified.
Also, the combination with the pipe, A, of the valve, F, tube, C, and elastic air chamber, D, and stop cock, H, when constructed and arranged as herein described.

47,722.—Starting Horse Railway Cars.—William Henderson, and J. W. Fowle, Boston, Mass.:

We claim the combination of the ratchet pawl, ratchet lever, foot rod and lifting spring, when arranged to operate together, substantially as set forth.
We also claim the combination of the rod, l, spring, n, rocker plate, k, and rod, l, for effecting the engagement and disengagement of the ratchet and pawl.

47,723.—Railroad Car Axle.—C. P. Hewett, Kingston, Wis.:

I claim the combination of the axles, A, A, with their circumferential grooves, c, c, the sleeve, B, the pins, d, d, with their set screws, e, e, and the lubricating orifice, f, substantially as described and represented.

[The object of this invention is to obviate friction in the running of cars over curves and over imperfect tracks. The invention consists in constructing the axle of two separate or distinct parts, connected by a sleeve, in such a manner that one part of the axle, with its wheel, may rotate independently of the other.]

47,724.—Boring Wells.—Lawrence Holmes, Paterson, N. J.:

First, I claim in a machine for drilling oil wells, or other drilling operations in which a jumping motion is given to the drill, so as to raise and apply the driving wheel or other wheel or device through which power is applied to produce the jumping motion, that it rotates about a hollow shaft or axle through which the drill-rod passes, substantially as herein described.
Second, I claim the combination of the sleeve, M, or its equivalent, fitted to slide upon the drill-rod, or bar, D, or the tube, E, from which it is suspended, the grippers, L, L, the shafts, I, I, and the cams, K, K, the whole arranged and operating substantially as herein described.

Third, I claim the employment, for lifting and jumping the drill or boring tool by means of a rope and grippers, or a tube, E, clamped to the rope but adjustable lengthwise thereon as the tool descends, substantially as herein specified.
Fourth, I claim in combination with the longitudinal groove, h, in the tube, E, from which the drill or boring tool is suspended by a rope, a pawl, i, so applied to the driving wheel, G, or other device from which the rotary motion of the tool is obtained, as to provide for the release of the said rod, bar, or tube, to allow the rope to relieve itself or be relieved of excessive twist, substantially as herein described.

Fifth, I claim the combination of the hollow, central shaft, C, internally toothed driving wheel, G, shafts, I, I, pinions, J, J, cams, K, K, sleeve, M, or its equivalent, and grippers, L, L, the whole arranged and operating substantially as and for the purpose herein specified.
Sixth, I claim the arrangement of the standard, B, the fixed hollow upright shaft, C, through which the drill-rod passes, and the driving wheel, G, substantially as herein described, whereby a clear space is left all around the said wheel to permit it to be operated by means of beams or capstan bars, as herein set forth.

47,725.—Packing Projectiles for Rifled Ordnance.—B. Hotchkiss, New York City:

I claim the employment of the soft disk or cushion, D, in combination with a Hotchkiss projectile and arranged to operate in connection therewith, substantially in the manner and for the purpose herein set forth.

47,726.—Movable Joint for Tables, Etc.—Henry M. House, Washington, D. C.:

I claim the combination and arrangement of the parts, which consist of the plate, A, with the morticed stud, B, attached, a hooked flange, D, and a tapering key, C, the same being applicable for fastening all movable joints, in the manner described, for the purposes herein set forth.

47,727.—Boring Apparatus.—S. R. & Wm. S. Hunter, Cortland, N. Y.:

We claim the combination of a boring or drilling tool, a, with the lower end of a cylinder or tube, A, B, and with a detachable drilling-rod, E, for the purpose of boring and bottoming a well, when said cylinder or tube is smaller in diameter than the upper end of the rod, a, and is made to rest thereon, substantially in the manner herein set forth.

We also claim the combination of the hand lever, G, with the frame work, M, N, the drill-rod, E, and tubing, B, of our improved apparatus, arranged and constructed substantially in the manner and for the purpose herein set forth.

47,728.—Corn Planter.—William H. Hunter, Ridgefield, Ill.:

I claim, First, Adjustable slide, B, constructed, arranged and operated substantially in the manner and for the purpose described.
Second, Jointed or hinged lever, T, reel, P, and vertical standard, N, constructed and operated substantially in the manner and for the purpose set forth.
Third, The blocks or cams, L, L, attached to the spokes of the wheels by set screws when said cams are made adjustable and removable in combination with the hinged lever, T, rod, P, and vertical standard, N, as specified.

47,729.—Boring Wells.—Walter Hyde, New York City:

I claim, First, The combination of the reserve rope drum, L, the sheave, J, the vibrating lever, G, and its pulley, F, the upper pulley, C, the rope, D, drill stock and tripping cams, so that all the motions of the drill stock are governed through the medium of a continuous rope.

Second, I claim attaching the end of the drill stock to a continuous rope which is paid out as is required by the setting of the drill in the well in connection with devices by which the rope is swayed or retracted to give the reciprocating motion to the drill stock, and with devices by which the drill stock is withdrawn without detaching the rope or stopping the motion of the prime motor.

Third, I claim the lever, U, in combination with the plate, V, or other detail for arresting the motion of the vibrating lever.
Fourth, In connection with the subject matter of the second claim, I claim the lever, W, as a means of changing the action of the motor frame a drill, operating mechanism to a drill with drawing mechanism.

47,730.—Mop.—Melvin Jinks, Danville, N. Y.:

I claim the bars, d and g, the handle, A, the sleeve, b, and the rods, C, C, the whole arranged as and for the purpose herein specified.

47,731.—Fruit Jar.—Josee Johnson, New York City:

First, I claim inclosing the inner or tin can, A, within a casing, G, H, I, wider than the can, A, so as to protect it from the pressure of the adjacent cans in being filled without the necessity for closing the remaining faces of the casing, all substantially as and for the purposes herein set forth.

Second, I claim the screw, D, or equivalent mechanical device in combination with a detachable and protecting case and adapted to compress the cover, C, and the can, A, firmly together and to release the same as described, substantially in the manner and for the purposes herein set forth.

Third, I claim in combination with a protected can, A, locking together the parts of the protecting envelope, by inserting the ends of the cross pieces, G and H, into channels in the parts, I and J, at a considerable distance from the ends of the latter so as to strengthen the envelope and protect the head of the thumb screw, D, or its equivalent, by the projecting ends of I and J, substantially as herein set forth.

47,732.—Flour Sifter.—W. J. Johnson, Newton, Mass.:

I claim combining with a common hoop-sieve a rotating scraper, D, actuated and guided by the shaft, E, crank, F, and bar, C, or their equivalents, substantially as and for the purpose described.

47,733.—Portable Lantern.—Henry S. Kassebaum, New York City:

I claim the folding sides, in combination with the top and bottom and handle for carrying the same; whereby I am enabled to make a cheap and portable lantern, substantially as described and for the purposes set forth.

47,734.—Window Shade.—Gibbons L. Kelty, New York City:

I claim manufacturing muslin window shades, with paper or other suitable material attached to the surface of such shade and forming the ornaments to the same, or receiving printed or embossed designs as specified.

47,735.—Hames Fastening.—W. W. Kithleman, Bloomfield, Iowa:

First, I claim the link, D, with oblique slots through or in it, in the manner and for the purpose described.

Second, the combination of the groove, d, shoulders, e, and slots or holes, c, in the manner and for the purpose described.

Third, The loop catch, c, constructed as described for the purposes set forth.

Fourth, The combination of the hames loop catch and link, D, constructed, applied and operating, substantially as herein described.

47,736.—Horse Rake.—John Lacy, Chicago, Ill.:

First, I claim the arms, G, of the axle when provided with a projection and holes, i, i, for raising or lowering the axle.

Second, The foot rack, F, F, and a, when supported by braces provided with holes for raising and lowering it.

Third, The combination of the foot rack, F, F, braces, H, H, and treadle, E, with the axle, A, all being arranged, constructed and combined substantially as set forth and specified.

47,737.—Pump.—W. Barnett Le Van, Philadelphia, Pa.:

First, I claim the plunger, B, composed of the parts, J, K, L, M, N, O, and P, as described.

Second, The channel-way, D, E, and valves, F and G, arranged in relation thereto, as drawn and described.

47,738.—Hoop Skirt.—Judah Levy, Philadelphia, Pa.:

I claim the strip, D, of steel, or other elastic material, secured to the hoop, A, by the fastenings, E, or their equivalents, and arranged in respect to the tape, B, and its loop or pole, a, as set forth for the purpose specified.

47,739.—Rag Engine for Paper Making Machinery.—Thomas Lindsay, Montville, Conn.:

I claim giving an endwise reciprocating motion to the beater of a pulping engine in addition to its usual motion, substantially as above described.

47,740.—Construction of Ordnance.—Joseph L. Lowry, Pittsburgh, Pa. Antedated April 29, 1865:

I claim forming cannon or heavy ordnance of two or more cast-iron cup-shaped shells of equal thicknesses and different qualities of iron varying in degrees of density, placed one within the other, and secured in the manner shown, the inner and longest one being of very hard iron, (to prevent cutting by the shot), and least expandible, while the exterior and shortest one is of softer and very tough expandible cast-iron, to support the inner one and aid in resisting the explosive force of the powder.

Second, I claim forming a cavity or chamber around the vent tube so as to allow of its expansion without affecting the body of the gun.

47,741.—Spring Bolt Catch.—George M. Morris, Roxbury, Mass.:

I claim the spring bolt catch plate made with the bolt and roller recesses and having the friction roller and the extension for supporting it, the whole being arranged substantially as herein before explained.

47,742.—Machine for Cutting Tobacco.—Herbert A. Morse, Canton, Mass.:

I claim, as my invention, the combination of the single guide frame, A, guide bar, D, and its projections or guides with the knife, C, the lever, B, the toothed sector, e, and the rack, d, the whole being substantially as specified.

47,743.—Boot Leg.—A. Prescott Mash, Weymouth, Mass.:

I claim a boot leg when corrugated, substantially as and for the purpose specified.

47,744.—Bank Note Engraving.—Waterman L. Ormsby, Jersey City, N. J.:

First, The process by which lines for note engraving is formed, consisting in the repetition of a dot substantially as and for the purposes specified.

Second, I claim the process by which a circular figure, for note engraving is produced by the repetition of a number, figure or word to form each circle of a series of concentric circles, substantially as specified.

Third, I claim the process herein specified by which a geometrical or mosaic figure for note engraving is formed by the repetition of letters, words, designs or figures, around a series of separate centers, substantially as specified.

47,745.—Apparatus for Engraving Metallic Plates.—Waterman L. Ormsby, Jersey City, N. J.:

I claim, First, a circular hammer having several designs in relief

around its edge in combination with the dog, g, substantially as specified.

Second, I claim raising or lowering the back end of the design hammer, substantially as specified, for causing the design on the hammer to coincide with the surface of the plate, as set forth.

Third, I claim the plate, e, adjustable as specified, in combination with the plate, c, and design hammer, for the purposes of adjusting said hammer, as set forth.

Fourth, I claim the combination of two circular beds, o, w, with the right angled slides, s, u, forming a universal bed for adjusting the position of the plate to be engraved, as set forth.

Fifth, I claim the universal bed for carrying and adjusting the plate as aforesaid in combination with the design hammer, substantially as and for the purposes specified.

47,746.—Thrashing Machine.—Nelson Palmer, Hudson, N. Y.:

First, I claim the method herein specified, of thrashing grain transversely by the combined action of the feeding device, the corrugated cylinder and the curved rubber, as set forth.

Second, I claim a revolving cylinder armed with teeth or spikes, in combination with the guard, g, for feeding in the straw or stalks, transversely to the thrashing mechanism, substantially as specified.

Third, I claim the guard, g, in combination with the feeding cylinder, h, thrashing cylinder, b, and concave rubber, c, substantially as specified.

47,747.—Railway Chair.—William H. Peckham, New York City:

I claim the railroad chair herein described, for clamping and holding the contiguous ends of rails, the same consisting of a movable jaw or jaws made to form close bearings with the sides of the rail, by means of one or more screw bolts and nuts, arranged and operating as described.

[This invention relates to a new and peculiar construction of railway chairs, whereby the rails can be firmly clamped and held together, the advantages of which are evident.]

47,748.—Steam Engine.—Walter S. Phelps, Columbus, Ohio:

I claim the arrangement of the vertical cylinder connecting rods, crank shafts and propeller or form shafts, herein recited.

47,749.—Foot Stove.—Edwin H. Reynolds, Rising Sun, Md. Antedated May 9, 1865:

I claim the reservoir, E, burner, F, with its cylinder, G, and the partition, H, the whole being arranged in respect to the case, A, and the openings, a and b, in the latter, substantially as and for the purpose specified.

47,750.—Medical Compound.—Louis Schultz, Buffalo, N. Y.:

I claim a medical compound, composed of the ingredients herein mentioned, combined substantially in the manner and proportions herein set forth.

47,751.—Rotary Steam Engine.—John W. Simonton and O. T. Struble, Taylorville, Ind.:

We claim, First, The combination of the revolving valve, D, D', with the abutment, R, R, having induction ports through it, substantially as described.

Second, The arrangement of the chamber, C, A and B, and the induction passages, H and F, substantially as shown and described.

47,752.—Smoking Pipe.—Wm. T. Stocum, Philadelphia, Pa.:

I claim the stern, B, with its partition, a, projection, l, and openings, x and x', in combination with the detachable reservoir, F, and the bowl, A, substantially as and for the purpose specified.

47,753.—Plow Casting.—Francis F. Smith, Collinsville, Conn.:

I claim as a new manufacture, plow plates, made of semi-steel, or iron plated or faced with cast-steel.

47,754.—Packing Projectiles for Rifled Ordnance.—Wilson H. Smith, Birmingham, Conn.:

I claim the employment, in combination with a projectile, of a corrugated or grooved packing, and a follower or tail piece, the whole arranged to operate in the manner and for the purpose substantially as set forth.

47,755.—Breech-loading Fire-arm.—O. Edward Snider, Baltimore, Md.:

First, I claim the backward projection, A, of the charge chamber, constructed as described, to permit the ready removal of the cartridge shell with the thumb and finger, in combination with the chamber, D', inclosing the said projection, A, while in position for firing.

Second, In combination with the above, I further claim, in the pin or screw, d, employed to start the shell of the exploded cartridge during the opening movement of the gun, substantially as described.

Third, I claim the pin, G, in combination with the cam lug, F, the two operating in the act of turning the barrel to throw the hammer to the point at which the safety notch engages with the trigger to retain the hammer in a retracted position, and thus allow the exploding pin, I, to move freely to the pressure of the base of the cartridge during the closing movement of the barrel, substantially as set forth.

47,756.—Flour Sifter.—Howard Tilden, Philadelphia, Pa.:

I claim the combination of the case, A, the concave sieve, B, the cross beam, C, the horizontal cross arms, D, D, bottom, E, spout, F, base, G, slide, H, flange, I, the rubber scrapers, J, J, radial arms, K, K, K, the shaft and crank, L, as and for the purpose set forth.

47,757.—Bed Bottom.—Charles B. Tucker, Cambridge, port, Mass.:

I claim the improved spring bed bottom, so constructed of the springs, C, C, C, and the rollers, h, h, h, arranged and combined to operate with the frame, A, substantially in manner and so as to operate as hereinafter specified.

47,758.—Latch.—Edward A. Tuttle, Brooklyn, N. Y.—Antedated May 5, 1865:

I claim the beveled tongue, C, or its equivalent, applied to a lock or latch, substantially as shown and described, for the purpose set forth.

47,759.—Hot-air Engine.—Stephen Wilcox, Jr., West-erly, R. I.:

First, I claim, in combination with an engine in which the combustion is conducted under the working pressure, the employment of an adjustable cut-off mechanism, arranged to operate therewith, substantially in the manner and for the purposes herein set forth.

Second, I claim the controlling chamber, Q, orifice, q, and screw plug, l, arranged relatively to the piston, l, and to the induction valve, l, and its connections, substantially as and for the purpose herein set forth.

Third, I claim the combination of thermostat, R, T, or its equivalent, with the regulating valve, U, the two channels, H and H', and the engine, A, the whole being so arranged as to automatically control the proportions of air relatively to the gaseous products of combustion actuating the engine, substantially in the manner and for the purpose herein set forth.

Fourth, I claim the pump, V, and pipes, v, and G, or their equivalents, arranged relatively to the compressing parts, A, a, and heating parts, B, etc., or their equivalents, substantially as herein described, so that I can cause the water to perform the several functions in the manner herein set forth.

Fifth, I claim the arrangement of the inhaling valve, F, and lever, W, or its equivalent, substantially as and for the purpose herein set forth.

Sixth, I claim connecting the circular door, X, to the hinged bar or arm, L, by the hollow bolt, x, and stem, x', or their equivalents, so that the door may be readily released and ground, and again secured, in the manner substantially as herein set forth.

Seventh, I claim the guard lips, X' and Y', arranged relatively to the door, X, of the turnace, and to the ground surfaces on the same, and on the door frame, Y, substantially as and for the purpose herein set forth.

47,760.—Breast Pump.—C. H. Wilder, Argyle, Wis.:

I claim, First, The application to the mouth of a breast pump of a supporting screen, constructed and operating substantially in the manner and for the purpose set forth.

Second, The employment or use of an extension mouthpiece, D, applied in combination with the supporting screen and with the suction pipe of a breast pump, substantially in the manner and for the purpose described.

[This invention consists in the application to the mouth of a breast

pump of a supporting screen, in such a manner that the air is brought to act direct upon the end of the nipple, and upon every natural course through which the milk can be drawn, and all undue strain on any part of said nipple is avoided. The invention consists further in the employment or use of an extension piece, in combination with the supporting screen applied to the end of the suction pipe of a breast pump, in such a manner that the instrument can be accommodated to nipples of different lengths, by adjusting the extension piece, and that the pump can be operated without pain in all cases.]

47,761.—Hoisting Machine.—Morgan Willard, Cincinnati, Ohio :

I claim the hollow columns, G G, with the continuous thread or screw, D, and the continuous slots or openings in or through the sides of the said columns, G G, extending throughout their length, in combination with the bolt or worm, D, with the shaft or rod, C, all arranged, actuated and combined, substantially as set forth and described.

47,762.—Hames Fastener.—J. B. Woolsey, Bloomfield, Iowa :

I claim combining the spring, c, with the catch, C, in the manner and for the purpose as described.

47,763.—Churn Dasher.—E. M. Wright, Wilmington, Ohio :

I claim the stops, d d, arranged upon the lower surfaces of the dasher wings, substantially as and for the purpose herein specified.

47,764.—Snap Hook.—Charles B. Bristol (assignor to himself, William W. Hughes, William H. Andrews, and L. J. Bristol), New Haven, Conn. :

I claim the combination of the tongue, g, with the spiral spring (Fig. 4), when the spring works on the tension principle, and rests in a recess (as r) in the rear end of the tongue, substantially as described. Second, I claim the combination of the fulcrum pin, n, with the tongue, g, when the pin, n, is cast in one of the ears, and the recess or cavity is fitted to be closed, substantially as herein described.

47,765.—Metallic Thill Holder.—Ebenezer Brown (assignor to S. E. Brown), South Boston, Mass. :

I claim, First, Casting the tug-strap loop and the shaft-girth loop in one with the thill holder, substantially as and for the purpose described.

Second, Casting the tug-strap buckle in the metallic thill holder, substantially as set forth and for the purpose described.

47,766.—Steam Engine.—Robert H. Davies (assignor to himself, James W. Landell, and Thomas J. Young), Philadelphia, Pa. :

I claim, First, The heater, D, used as a bed plate, detached from the supports of the pedestals, E, and fixed to the boiler in such a manner as to prevent the expansion of the boiler from putting a strain upon the engine, substantially as shown and described. Second, I claim the arrangement of the saddle, F, cylinder, B, side bars, C, heater, D, and boiler, A, substantially as described.

47,767.—Machinery for Oiling Wool in Carding Machines.—James Eccles (assignor to himself and Robert Kershaw), Philadelphia, Pa. :

I claim lubricating wool by means of a strip or apron of suitable textile fabric, to which a continuous supply of lubricating material is transferred from a reservoir by means of a drum or roller, or its equivalent, all substantially as set forth.

47,768.—Coal Sifter.—John Martino (assignor to Stuart & Peterson), Philadelphia, Pa. :

I claim the sieve, G, its handle, h, and spout, f, arranged in respect to the ash chamber, B, and grate, a, of a cooking stove, substantially as and for the purpose herein set forth.

47,769.—Machine for Making the Spindles of Wagon Axles.—James M. Jay, Canton, Ohio, assignor to W. H. Alexander & Co. :

I claim a machine for turning the journal or spindle, for cutting the groove therein, and for boring the lynch pin hole of wooden axles, the same being combined and arranged to operate in the manner and for the purpose substantially as set forth.

I also claim, in a machine for cutting journals or spindles on axles, the revolving tapering cutter-head, with its cutters, e e, as and for the purpose described.

47,770.—Turned Shoe.—Gordon McKay, Boston, Mass., and Lyman E. Blake, Quincy, Mass., assignors to Gordon McKay aforesaid :

We claim, as a new article of manufacture, a boot or shoe made as a "turn," with the vamp and sole united with chain stitches passing entirely through the material both of the vamp and sole, and with the chain of the stitches upon the inside of the article when in its finished state.

47,771.—Riding Saddle.—George H. Meeker (assignor to Lacy, Meeker & Co.), Bridgeport, Conn. :

I claim the forming of the projections, or calf and thigh supports, on the skirts of a riding saddle, by means of swaging, substantially in the manner as herein shown and described.

47,772.—Grain Separator.—Joseph Montgomery, James Montgomery, and Evan Davis, Baltimore, Md. :

We claim the revolving rake shafts, C, in combination with the fan screen, e, substantially in the manner and for the purpose herein set forth.

47,773.—Steam Hoisting Apparatus.—Charles R. Otis (assignor to himself and Norton P. Otis) Yonkers, N. Y. :

I claim combining the stop valve of the engine of a steam-hoisting apparatus with the shaft, b, of the main drum, or with any other shaft or counter shaft of the hoisting apparatus, by means of a stop motion constructed, applied and operating substantially as herein specified.

47,774.—Clothes Wringer.—James N. Pease, Panama, N. Y., assignor to M. Harris and R. G. Bush :

I claim the two fixed gears, E F, in connection with the wrist, e, and slotted crank, G, or their equivalents, all arranged and applied to the rollers of a clothes-wringing machine, to operate in the manner substantially as and for the purpose herein set forth.

47,775.—Revolving Fire-arm.—John H. Vickers (assignor to himself and Lucius W. Pond), Worcester, Mass. :

I claim the application to the barrel of revolving fire-arms of a hinged stem, E, for supporting the thimble, and cleaning it when removed from the cylinder, A, substantially as and for the purpose described.

47,776.—Submarine Explosive Shell.—William W. Wood, Philadelphia, Pa., and John L. Lay, Buffalo, N. Y., assignors to Donald McKay, East Boston, Mass. Antedated Feb. 25, 1865 :

We claim, First, A submarine shell or torpedo composed of a casing of any desired form and of any suitable material, so charged with explosive compound as to leave air space within the shell, for the purpose specified. Second, The use within the shell of a yielding wad or diaphragm for separating the charge of the explosive compound from the air chamber, substantially as and for the purpose described.

Third, The employment for igniting the charge of a weight so arranged within or adjacent to the said casing, and so combined with the retaining and releasing device herein described, or any equivalent to the same, that the said weight can be released at pleasure, and be permitted to fall on any substance ignitable by percussion.

47,777.—Scroll Sawing Machine.—Lysander Wright (assignor to Wright & Smith), Newark, N. J. :

I claim the arrangement of lever, A, segmental wheel, B, pulleys, C C, strap, D, levers, G G, and hooks, E E, spring, I, connected to lever, G, by link, K, when operated by treadles, J and J', substantially as described and for the purposes set forth.

47,778.—Sextant.—Pierre Michel Albert Laurent, St. Nazaire, France :

I claim, First, Elongating perpendicularly to the plane of the reflecting instrument the apparent image from one of the heavenly

bodies or objects from which may be measured the angular distance, in the manner set forth.

Second, The elongating lens or glasses, combined according to the above-described conditions, and, in combination therewith, the above-described modification of the plane form of mirrors of reflecting instruments, as set forth.

47,779.—Stopper for Jars, Bottles, Etc.—Nathan Thompson, Abbey Gardens, St. John's Wood, Eng. Patented in England Jan. 4, 1865 :

I claim, First, Constructing stoppers of an elastic ring, interposed between two parts, which are so combined with the lever that the parts may be moved to or from each other by the lever, as above described.

Second, Forming the upper part of a stopper, so constructed with a projecting ring of larger diameter than the mouth of the bottle or other article to which the stopper is to be applied.

Third, I claim a recess in said top for the lever to lie in.

Fourth, I claim connecting the lever to the lower part of the stopper by a hook, as above described.

47,780.—Manufacture of Railroad Car Wheel.—John D. Murphy, Pottsville, Pa. :

I claim, First, Constructing the rim or tread and the spokes of wrought iron, and attaching the same to each other before the hub is cast, by riveting the spokes when hot to the rim, and casting the hub around the flattened and expanded opposite ends of the spokes, substantially as set forth.

Second, Pouring a stream of melted metal over the flattened and expanded ends of the spokes, and permitting it to pass freely away from them until said expanded ends shall have attained to a high degree of heat, and then allowing the mold to fill and the metals to unite with each other, substantially as specified.

REISSUES.

1,957.—Means of Operating the Valves of Steam Engines.—Nathan M. Condict and Dudley S. Steele, Jersey City, N. J., assignees by mesne assignments of Wm. J. Stevens, New York City. Patented July 23, 1861 :

We claim, First, When a main and secondary slide valve are employed on seats arranged side by side in the same steam chest and in the same plane, or parallel planes, as and for the purpose specified, so combining the said valves with each other and with mechanism through which they are both in part actuated by the main piston rod of the engine that there is a lost motion between the said valves, substantially as and for the purpose herein set forth.

Second, We claim the direct connection of the said main and secondary valves with the same operating rod, F, having attached to it the pistons, I I, for completing the movement of the main valve, and having a lost motion with respect to the main valve, but none with respect to the secondary valve, substantially as herein described.

Third, The crank, K, and forked lever, N, applied substantially as herein described, in combination with each other, and with the valve rod and main piston rod, substantially as and for the purpose herein set forth.

1,958.—Manufacture of Dye Colors.—Manley Howe and Henry R. Stevens, Boston, Mass. Patented Oct. 13, 1863 :

We claim a composition of coloring matter in powder with the requisite kind and quantity of mordant in powder, the whole thoroughly mixed together, as hereinbefore set forth.

Also coloring matter in powder mixed with metallic solution, dried off and reduced to powder, as hereinbefore set forth.

Also coloring matter in powder containing the requisite kind and quantity of mordant, the whole reduced from a pasty state of powder, as hereinbefore set forth.

Each constituting a direct and substantive dye and a new article of manufacture.

Also, the above-described compositions of coloring matters and mordants adapted to dye silk, woolen or cotton, or fabrics composed of any or all of the said materials.

1,959.—Manufacture of Dye Colors.—Manly Howe and Henry R. Stevens, Boston, Mass. Patented Oct. 13, 1863 :

First, We claim mixing with dye color in powder, mordants reduced to powder, to produce a color substantially as set forth.

Second, We also claim mixing dye colors and mordants when the latter is a solution of metal, and then drying and reducing the same to powder, substantially as set forth.

Third, We claim the combination with dye colors and mordants, when in a moist or pasty state, of stock or other similar absorbent, substantially as and for the purpose as hereinbefore set forth.

Also, the use of starch for treating the mixture thoroughly dry, substantially as and for the purpose as hereinbefore set forth.

Fourth, We also claim reducing coloring extracts to powder, substantially as hereinbefore set forth, and mixing them in powder with other coloring matter in powder.

Also mixing them in powder with other coloring matter and mordants in powder, substantially as and for the purpose as hereinbefore set forth.

1,960.—Preserving Fruits and other Perishable Substances.—Benj. M. Nyce, Cleveland, Ohio. Patented Nov. 2, 1868. Reissued Oct. 23, 1860 :

I claim, First, The insulated and cooled preserving chamber, J, provided with absorbents of moisture, as set forth, either with or without the agitator, K.

Second, I claim the above-described outside air-tight casings of walls, when used in combination with a chamber chilled by ice on a metallic floor on its upper part, with absorbents of moisture within said chamber.

Third, I claim the method of preserving fruit in a chamber whose walls, doors and floors are practically air tight, and so proof against the ingress of heat and moisture as to maintain by the aid of ice on metal floor above a uniform temperature from 34° to 25° F. throughout the year, and by the use of absorbents within said chamber producing any desired degree of dryness.

1,961.—Harvester.—Worden P. Penn, Belleville, Ill. Patented Sept. 10, 1861 :

I claim, First, The combination of the jointed frame, by which the sickle may be elevated, with the means for counteracting the angularity that would otherwise affect the operation of the sickle, and with a finger bar, which may be either flexible or rigid, the whole constructed and arranged in the manner described.

Second, Connecting the finger bar to the frame by means of the hinge joint and the upright, in the manner described, so that the connection with the said frame may be made either flexible or rigid, as specified.

Third, The arrangement of the transverse rocking beam, k, on the underside of frame, A', in combination with the finger bar, g, substantially in the manner and for the purpose described.

Fourth, Arranging the transverse rocking beam, k, on the under side of the frame, A', and pivoting the finger beam, g, to it thus arranged, substantially in the manner and for the purpose herein described.

Fifth, Applying the lever, m, to the machine in such manner that it will serve the double purpose of elevating the cutting apparatus, and also of tilting it forward or backward, substantially as described.

Sixth, The arrangement of the two castor wheels, o t, frame, A A', joined upon the axle, lever, m, serving the double purpose described, and finger beam, g, and rocking beam, k, in the manner and for the purpose herein described.

Seventh, Arranging the spur wheel, B, sliding pinion wheel, B', clutch, J, lever, W, lever clutch wheel, C, crank pinion, D, with the frame, A A', rocking beam, k, and jointed finger beam, g, all in the manner and for the purpose described.

Eighth, The draft pole, C, in combination with frame, A, the rear of which frame is pivoted to the axle tree, a, and with frame, A', also pivoted to the axle tree, a, and with the gearing and cutting apparatus, all constructed and applied substantially in the manner and for the purpose described.

1,962.—Sewing Machine.—Elmer Townsend, Boston, Mass., assignee of Sidney A. Turner, Westborough, Mass. Patented Aug. 22, 1864. Reissued March 25, 1866 :

I claim the combination in a sewing machine of an automatic feed, a work-supporting surface, and a needle, when the same is arranged to operate from below the table or work-supporting surface, and without the co-operation of a second thread (or a device carrying a second thread) above the table or work-supporting surface.

Also, the combination together of a needle and awl, when the same enter the work in opposite directions, and each withdraws in a direction opposite to that from which it entered.

Also, the combination in a sewing machine of an automatic

needle turner and automatic feed, by which the loop is kept in proper position with respect to the needle as the work progresses. Also, the method of effecting the rotation of the hook, substantially as specified.

DESIGNS.

2,066.—Trade Mark.—F. E. Covell, Portland, Me.

2,067.—Shoe.—Henry Hunt, Abington, Mass.

2,068.—Coffin Handle.—Charles L. Nelberg (assignor to Sargent & Co.), New Haven, Conn.

2,069.—Coffin.—William W. Roberts, Hartford, Conn.

2,070.—Coffin.—G. W. & W. P. Wooley, Hartford, Conn.

2,071.—Coffin.—G. W. & W. P. Wooley, Hartford, Conn.



PATENTS

GRANTED
FOR SEVENTEEN YEARS.

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for new inventions in the United States and in all foreign countries during the past seventeen years. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after seventeen years' experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers.

Yours very truly,
CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter.

MESSRS. MUNN & CO.—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,
J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business or inventions before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy.

Very respectfully, your obedient servant,
WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of \$5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the in-

vention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 2d of March, 1811 are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is \$10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention is susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is out little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is \$15. Other changes in the fees are also made as follows:—

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 Re-issue.....	\$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

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery Lane London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They thing they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO.'s Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for \$1.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort of extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give sixty days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting, or writing to, MUNN & CO., No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to

retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model, is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express, prepaid, should be addressed to MUNN & CO., No. 37 Park Row, New York.



E. B., of N. Y.—The steam in your vessel would condense, and the vessel would fill with cold water.

F. M., of Pa.—The most effectual protection for the iron in your safes would be a coating of zinc—galvanizing, as it is improperly called.

F. W. S., of Ohio.—We publish in another place a recipe for making blue ink, for your special benefit.

C. H. B., of Pa.—The oxide of zinc which you want for rendering castings malleable is the red oxide ore, which you can procure from the New Jersey Zinc Co., Newark N. J. It has been suggested that the zinc if employed for this purpose would form an alloy with the iron and injure its quality.

G. W. H., of U. S. N.—To compute the dimensions of a triangle at least three elements must be known, but you give only the angles. We presume this is an oversight, as you must know that triangles might be precisely similar in their angles and yet have sides of all lengths, from an inch to millions of miles. In the second problem it is manifest that the force required to raise the weight would vary with the angle of the cord.

X.—Yes.

G. & B., of Pa.—Compressed air is used for driving machinery at one of the mines in Scotland, and at the Mount Cenis tunnel, but we are not aware that it is in use anywhere in this country. It was employed at one time for driving a number of sewing machines in Centre street in this city. We should not suppose it would leak more than steam, and it would not be subject like steam to condensation in long pipes.

J. W. S., of Mo.—We do not know of any work on cutting box-wood or preparing it for market.

O. C., of R. I.—Ulysses Pratt, of Deep River, Conn., has a patent for bleaching ivory. You had better write to him for information.

J. A. H., of Me.—The answer which you criticize was precisely correct, as you will see when you have examined the subject more carefully.

W. L., of Conn.—It is generally supposed that the center of the earth is a mass of molten matter; as it cools it shrinks, allowing the hardened crust to settle down. Sometimes this settling in of the crust forces out a portion of the molten mass, in the form of lava, through the craters of volcanoes.

F. S. N., of Ky.—We do not see how any correct or useful comparison can be made between the performances of our Eastern boats and the proportions of their wheels and Western boats which run in shallow water. You will find practical rules governing the size of wheels, pitch of the buckets, width and length of same in Burgh's land and marine engines, published by H. C. Baird, No. 406 Walnut street, Philadelphia. Bourne, in his "Catechism of the Steam Engine," page 283, says:—To find the proper area of a single bucket divide the horse-power by the diameter of the wheel in feet, which will give the area in square feet. The area multiplied by 0.6 will give the length in feet. For fast vessels the proportions as given above are one-fourth part less, and the area must be multiplied by 0.7.

T. W. M., of N. Y.—We accept your correction of our statement that smokepipes do not rust from steam exhausting in them; doubtless cases occur where they do rust from this cause.

W. E. E., of Vt.—You will find statements of the laws relating to falling bodies in a late number of the SCIENTIFIC AMERICAN; we refer you to it for a decision on your bet.

J. B. C., of Ill.—India-rubber cement is best for sticking labels on minerals.

I. S., of Conn.—Make a varnish by dissolving shellac in alcohol; coat your strawberry basket bottoms with it and they will be water proof—neither shrinking nor swelling.

O. M. S., of R. I.—We know of no way of making mica green or straw color except by painting it.

G. W. P., of Mass.—In a patentable sense a hinge would be the equivalent of a pivot.

T. H., of Pa.—Your invention appears to us to be new and patentable. We advise you, however, to remit \$5 and have a Preliminary Examination made at the Patent Office. We will send you one of our pamphlets by mail.

H. B., of Wis.—The Polytechnic Association holds its meetings at the building in this city known as the Cooper Institute. S. D. Tillman, the President of the Association, resides in this city.

S. C. & Co., of Ohio.—The mineral which you sent to us we handed to Professor Seely, and he pronounces it native lodestone. Chemically it is the same as ordinary magnetic iron ore, unless there may be some slight variation in the composition which gives it its peculiar power of retaining magnetism permanently.

R. H. A., of Md.—When a spherical or other projectile rises perpendicularly in the atmosphere, the resistance of the air

prevents it from rising as high as it would in a vacuum, and then this same resistance diminishes its velocity during its descent. If the projectile passed through air only during its ascent, and fell through a vacuum, it would strike the earth with a velocity less than that with which it started upward, owing to the fact that it would not rise as high as if it moved without resistance.

C. B. R., of Me.—Leather belts are made up of several pieces, not cut in a continuous strip from the hide, as you seem to think. The best belts are cut out of the back of the hide.

S. L., of N. J.—It is a common practice to heat old coin in order to make the inscription more legible.

F. S. B., of Ind.—You will not be able to get 12 miles an hour out of your boat unless at a sacrifice of everything to obtain it, and at a cost exceeding its practical value. The resistance to motion of two hulls of a given midship section is much greater than one hull of the same aggregate area as the two combined, and it therefore follows that the engine which would propel the single hull at a given speed would not answer for the plan with double hulls. We recommend you to use if possible two cylinders, eight inches and a half diameter, or one cylinder 12 inches diameter all having 24 inches stroke. These cylinders have nearly the same cubic capacity but the mechanical advantage is in favor of the two small cylinders coupled.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to Messrs. MUNN & CO., stating the name of the patentee and date of patent, when known, and enclosing \$1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1833, to accompany the claim, on receipt of \$2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our receipt on of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

Back Numbers and Volumes of the "Scientific American."

VOLUME IV., VII. AND VOLUME XI. (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, \$3 00 per volume, by mail, \$3 75 which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. **VOLS. I, II, III, V, VI, VIII, IX, and X,** are out of print and cannot be supplied.

NOTICE TO SUBSCRIBERS.

The first five numbers of the present volume of the SCIENTIFIC AMERICAN being out of print, we shall commence the time of each new subscriber from the date of receipt of the order, unless the writer states specifically that he wishes such back numbers as can be furnished.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that eight words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

CHIEF QUARTERMASTER'S OFFICE, No. 1, 139 GIRARD STREET, PHILADELPHIA DEPOT, May 15, 1863.

SEALED PROPOSALS WILL BE RECEIVED AT this office until **TUESDAY, May 23, 1863, at 12 M.,** for immediate delivery at the Schuylkill Arsenal, in merchantable packages (cases to be made to conform to specifications at this office):

Burlaps, 40 and 50-inch.
4-4 Bleached Muslin.
Brown Holland.
Parties offering goods should make separate proposals for each article offered, the quantity they propose to furnish, the price (which should be written both in words and figures), and conform to the terms of this advertisement, a copy of which should accompany each proposal. Samples, when submitted, must be marked and numbered to correspond with the proposals; and the parties thereto must guarantee that the goods shall be in every respect equal to army standard. Otherwise the proposals will not be considered.

Bids will be opened on **TUESDAY, May 23, 1863, at 12 o'clock M.,** when bidders are requested to be present.

Each bid must be guaranteed by two responsible persons, whose signatures must be appended to the guaranty, and certified to as being good and sufficient security for the amount involved by some public functionary of the United States.

All proposals should be made out on the regular forms, which will be furnished on application at this office.

The right is reserved to reject any bid deemed unreasonable, and no bid from a defaulting contractor will be received.

Indorse envelope "Proposals for (here insert the name of the articles offered)" and address

Colonel WILLIAM W. McKIM,

Chief Quartermaster,

Philadelphia Depot.

CAUTION.—IMITATIONS OF "WINANS' ANTI-INCRUSTATION POWDER" flood the market. Beware of them. I will undersell anything offered. H. N. WINANS, N. Y. 22 3*

GILBERT'S PATENT COAL AND ASH SIFTER—A new and useful invention, of which a portion of the State Rights are for sale. Address EMERY & HUTCHINSON, Manufacturers, No. 57 Canton street, Boston, Mass. 22 10

BOLTS, NUTS, WASHERS, SET SCREWS, COACH Screws and Machine Screws, constantly on hand for sale by LEACH BROTHERS, No. 66 Liberty street, New York. 21 12*

WORRALL'S PATENT CHUCKS FOR SCREW MACHINE and Holding Wire Drills and other articles.—The cheapest and best chuck for drills in use. 1 1/2 inch in diameter, holding any size from 1/4 up to 1 1/2 inch. Perfectly true and reliable. Address THOS. H. WORRALL, Lawrence, Mass. 20 4

TRIP HAMMERS.

Parties using or intending to erect Trip Hammers are invited to call and examine the Hotchkiss Patent Atmospheric Hammer, made by CHARLES MERRILL & SONS, No. 556 Grand street, New York. They are run by a belt; occupy 2½ by 4 feet space; strike 200 to 400 blows per minute, according to size, and the hammer running in slides, each blow is square and in the same place. The work can be done under them more rapidly than under a drop, and for sawing it is unequalled. They are very simple in their construction, under perfect control, and require much less power than any other hammer. Send for a circular illustrating the hammer, which gives full particulars. 22 12

TREMPER'S CELEBRATED DROP CUT-OFF AND GOVERNOR COMBINED is the best cut-off and the best regulator in existence; will save 20 per cent or more of the fuel, or give 20 per cent more power. They can now be supplied at short notice, being now manufactured in this city; also at Buffalo, N. Y. Particulars sent free. Address JOHN TREMPER, No. 316 North Third street, Philadelphia, or E. Weston, Agent, Vulcan Foundry, Buffalo, N. Y. 22 3*

SAW GUMMERS, UPSETS, SWEDGES AND OTHER Saw Tools made by G. A. PRESCOTT, Sandy Hill, N. Y. 22 4*

THEYSON & OGG, NO. 39 GREENE STREET, N. Y. Grand, Machinists, Brass Finishers and Model Makers, Experimental Machinery. Indicators, Registers and Steam Gages of every kind accurately and promptly made. 22 12*

SCREWS.—COMSTOCK, LYON & CO., OFFICE NO. 74 Beekman street, N. Y., manufacture Turned Machine Screws (a superior article to a headed screw), of all sizes under ½ inch in diameter, 3 inches long. Also Steel, Iron and Brass Screws for Guns, Pistols, Instruments, Trusses, Artificial Limbs, Etc., of the finest quality, to order. 22 13*

FOR DANIELS AND WOODWORTH PLANERS AND other Wood-working Machinery, with the latest improvements, address the manufacturers, RICHARDSON, MERIAM & CO., Worcester, Mass. 22 6*

GRINDSTONES OF THE BEST QUALITY MANU- factured for Mechanics, Railroad Shops, Manufacturers and the trade. Address orders to E. M. STEARNS & CO., Berea, Cuyahoga Co., Ohio. 22 11*

THREE HUNDRED DOLLARS WILL BUY THREE useful Unpatented Inventions. One is a simple device for attaching and canceling stamps at one operation. All can be manufactured at small cost. For further particulars address J. H. MARTIN, Hartford, Washington Co., N. Y. 1*

AMES' IRON WORKS.—THIS ESTABLISHMENT IS for Sale or to Rent. It employs one hundred and thirty to one hundred and fifty men, and is now doing a large and profitable business. The buildings are brick, and with its extensive machinery, nearly new, large and convenient. Terms moderate. The poor health of the proprietor requires a relaxation from business. H. M. AMES, Oswego, N. Y. 22 2*

THE UNRIVALED ARTIFICIAL LIMBS OF DR. DOUGLASS, of Springfield, Mass., are superior in adaptability to all forms of amputations, strength, durability, and the most life like articulations of the natural limbs. Illustrated pamphlet sent free. Recommended by the leading surgeons. 22 2*

SALAMANDER FIRE-BRICK WORKS. (Established 1825.) Works at Woodbridge, N. J. Office and Depot foot of Hammond street, New York. 21 4*

PARTNER WANTED.—AN ACTIVE PARTNER, with \$8,000 to \$10,000, in a Machine Shop and Foundry, in the Oil Regions, now building. Address S. CABOT, Franklin, Pa. 21 4*

INVENTORS' EMPORIUM, NO. 37 PARK ROW, N. Y.—New and useful inventions manufactured, introduced and sold on commission. Agents wanted. (21 2*) RICE & CO.

TO RAILROADS AND MACHINISTS WANTING GOOD TOOLS.—For sale for immediate delivery, 336-in. Lathes, 18-ft. Shears, 1 Planer, 24-in. square, 6 ft. long; 1 Bolt-cutter. We have under way 2 Planers, 32-in. sq., 9 ft. long, and 4 8-ft. Shapers. E. & A. BETTS, Wilmington, Del. 21 3*

STEAM ENGINE FOR SALE—ONE 15-HORSE Power.—Root's Double Reciprocating. For engraving and description of which see SCIENTIFIC AMERICAN, Vol. X, page 193. Has been used about 3 months. Reason for selling now, use water power. Cost \$800. Price \$550. Address NELSON P. AKIN, Philmont, Col. Co., N. Y. 21 7*

UNFINISHED ENGINE FOR SALE.—I WILL SELL for \$20 the following parts of a new Steam Engine, all in good order: Cylinder 2½ by 6-in stroke; Steam Chest, Valves, Bed Plate, Cross-head, Piston and Rod, Cylinder Cover. E. P. WATSON, Box 773, New York. 21

TO AGRICULTURISTS AND SCIENTIFIC MEN.—For Sale—A complete set of the "Natural History of the State of N. Y.," 22 vols. and map, \$100; Annual Reports of "N. Y. W. Agricultural Society," complete, except 1841-3 and 4, 20 vols. Set Annual Reports of "American Institute," 19 vols. The above in complete order. Address G. J. G., Box 134, Syracuse, N. Y. 21 2*

MACHINISTS' SUPPLIES, OF ALL DESCRIPTIONS, on hand for sale by LEACH BROS., 85 Liberty st., N. Y. 21 12*

FOR SALE—ONE IRON PLANER—WILL PLANE 20 feet long, 4 feet wide, and 3 feet 8 inches high in clear; it has two sliding heads on cross bar, to work two tools at the same time; it will weigh about 12 tons; has been some used; is now in first rate working order; is of modern build; can be seen in operation at our factory, where all kinds of Machinists' Tools are made to order. Nos. 4 and 6 Hill street, Rochester, N. Y. A. M. BADGER & CO. 21 4*

SPOKE AND HANDLE MACHINERY.—THOSE DE- siring to purchase the best machine in the United States for making Spokes, Yankee Ax Handles, Plow Handles, and irregular forms generally, should send for cut and description to E. K. WISELL, Manufacturer and Patentee, at Warren, Ohio. 21 8*

PATENT AGENCY, NO. 47 HANOVER STREET, Boston, Mass. Patents and Patented Articles of merit bought and sold. Consignments solicited. SPENCE & CO. 21 4*

ALCOTT'S CONCENTRIC LATHES.—FOR BROOM, Hoe, and Rake Handles, Chair Rounds, &c.—Price \$25; and all other kinds of Wood-working Machinery, for sale by S. C. HILLS, No. 12 Platt street, New York. 21 6*

ANDREWS' PATENT OSCILLATING ENGINES.—Double and Single Engines, from ½ to 125 horse power, finished at short notice. These engines leave the shop ready for use, require no special foundation, are compact, light and simple, and require no special power. For descriptive pamphlets and price list address the manufacturers, W. D. ANDREWS & BRO., No. 414 Water street, N. Y. 19 4*

DAMPER REGULATORS—GUARANTEED TO EF- fect a great saving in fuel, and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms or flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, No. 5 Park Place, New York. 21 11*

TALLMAN & MERCHANT,

No. 71 Broadway, Room No. 55.
Pay particular attention to securing drawback (Internal Revenue Tax) upon all exports of American manufacture. 21 5*

TO ENGINEERS.—WANTED—A CONNECTION WITH an Engineering firm as First-class Bookkeeper. Has a valuable patent on steam machinery, an illustration of which will shortly appear in the SCIENTIFIC AMERICAN. Testimonials given. Address ENGINEER, SCIENTIFIC AMERICAN Office, New York. 20 3*

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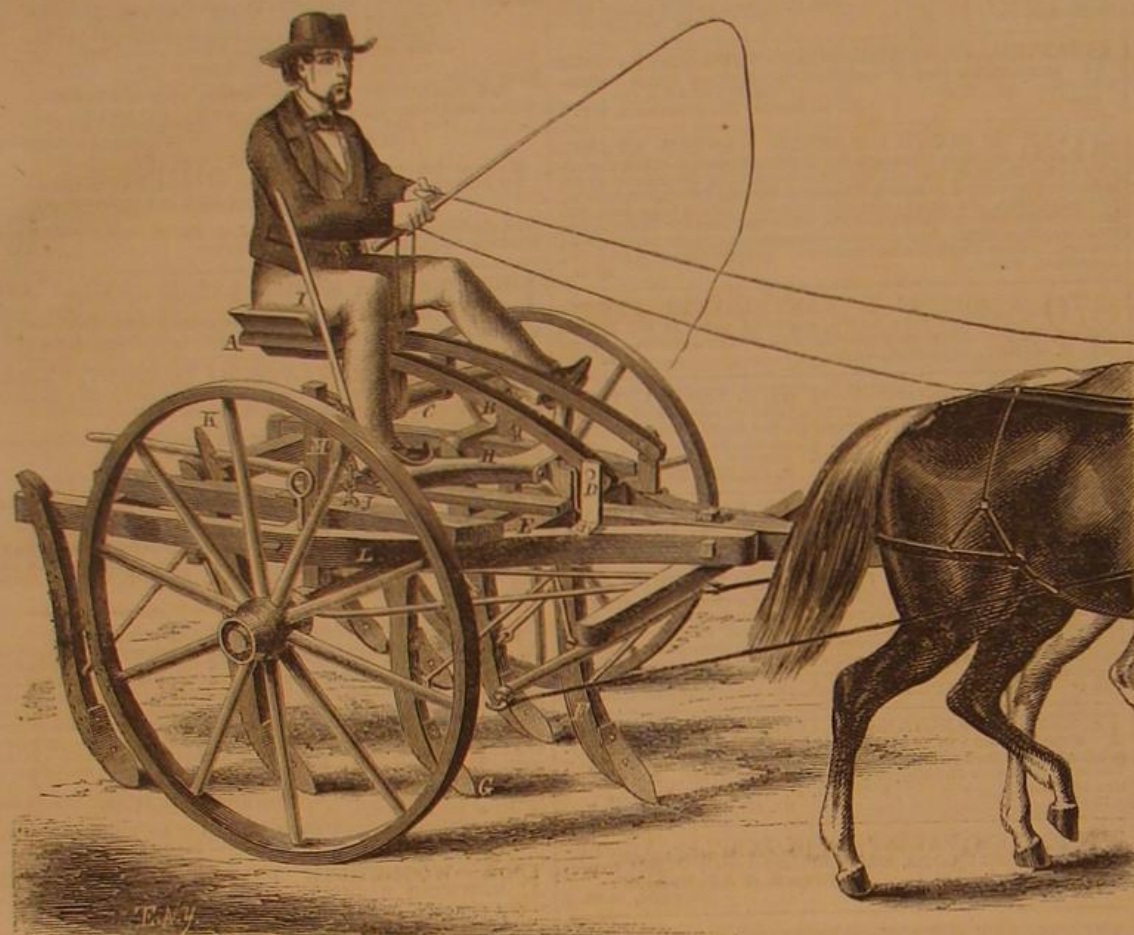
Improved Cultivator and Gang Plow.

This machine is an improvement on those agricultural implements which cultivate growing crops. They save an immense amount of hand labor and should be introduced wherever practicable. The chief thing to be provided in such machines is ease and certainty of management, so that the plows will go where they should, instead of destroying the plants by running over them. It is also important to be able to regulate the depth of tillage accurately, for many reasons obvious to the agriculturist. When the field is planted in regular rows it would not be difficult to drive a team straight through them, but emergencies arise in working when it becomes desirable to move the cul-

cases of wakefulness has possession of the mind. I always effect this by the following simple process:—I turn my eyeballs as far to the right or left, or upward, or downward, as I can without pain, and then commence rolling them slowly, with that divergence from a direct line of vision around in their sockets, and continue doing thus until I fall asleep, which occurs generally within three minutes—always within five at the most. The immediate effect of this procedure differs from that of any other I have ever heard, to procure sleep. It not merely diverts thought into a new channel, but actually suspends it. Since I became aware of this I have endeavored, innumerable times, while thus rolling my eyes, to think upon a

strong or Whitworth's "cups," but large enough to allow the shot and cartridge to pass through. The aperture at the breech is closed or opened by inserting or half-withdrawing a slightly taper, but perfectly plain piece of well-tempered steel. Mr. Broadwell has proved the victor in the competition, Mr. Kreiner's gun requiring the assistance of a hand-spike after forty-seven rounds, and Mr. Krupp's block sticking fast after ninety-five rounds, whereas Mr. Broadwell's gun showed no symptoms of gas escape after 180 rounds. The Russian Government has decided on altering forty pieces already purchased from Mr. Krupp according to Mr. Broadwell's designs. Government should do the same with the Armstrong guns.—*Mechanics' Magazine.*

BLUE INK.—Powdered Prussian blue, 1 oz.; concentrated muriatic acid, $1\frac{1}{2}$ to 2 oz.; mix in a glass bottle, and after 24 or 30 hours, dilute the mass with a sufficient quantity of water. The Prussian blue must be a pure article.

**GULICK'S CULTIVATOR AND GANG PLOW**

tivators laterally to and fro, and, as they are heavy, some method must be provided to do it quickly and properly.

The chief feature of this machine is its adjustable spring seat, whereby the weight of the driver balances that of the plows, thus causing them to run lighter with a more even draft, and affording ready means of lifting them wholly or partially, as may be required. This seat, A, is fixed on the bars, B. The bars have their fulcrum at C, and an additional joint at D, which connects to the beam, E, carrying the several gangs of plows or cultivators, F. The foremost and hindmost cultivators are immovable, but the set, G, are connected by rods to a foot bar, H, and through it they are moved to throw the soil against either side, or to steer clear of the plants. The driver, in proceeding to the field, must elevate the plows clear of the road, and to do this there is a lever, I, at his side, which, together with chains, J, and a catch, K, severally perform the end desired, and hold the plows up so that the team may be driven rapidly without fear of their falling. The plows, being fastened to the frame, L, rise and fall with it, and the standards, M, fastened to the axle, guide the frame in its working. Thus all the points of a desirable machine for this purpose are obtained.

This machine has been tested and found to work well both for cultivating corn and other plants, or working fallows, and is not apt to clog with weeds, corn-stalks or other rubbish. It was patented on the 14th February, 1865, through the Scientific American Patent Agency, by Samuel Gulick. Address the patentee at Kline Grove, Pa., for information in regard to purchase of rights or machinery.

How to Fall Asleep.

The great point to be gained in order to secure sleep, is escape from thought, especially from that clinging, tenacious, imperious thought which in most

particular subject, and even upon that which before kept me awake, but I could not. As long as they were moving around, my mind was blank. If any one doubts this, let him try the experiment for himself. I wish he would: let him pause just here and make it. I venture to assure him that, if he makes it in good faith in the manner described, the promise of "a penny for his thoughts," or for each of them, while the operation is in progress, will add very little to his wealth. Such being its effects, we cannot wonder that it should bring sleep to a nervous and wakeful man of a night. The philosophy of the matter is very simple. A suspension of thought is to the mind what a suspension of travel or labor is to a weary body. It enjoys the luxury of rest; the strain upon its faculties is removed; it falls asleep as naturally as the farmer in his chair after toiling all day in his fields.—*Anatomy of Sleep.*

Trial of Breech-loading Cannon in Russia.

A most interesting series of competitive experiments between various systems of breech-loading cannon have just been completed in St. Petersburg, before General Barantsoff, the Minister of War; General Majfiski, the President, and the members of the Committee of Artillery. At the end, only three competitors remained—the systems of Clay, Whitworth, Armstrong and others being rejected at the preliminary trials. The three favorites were:—The celebrated Prussian steel founder, Mr. Krupp; Mr. Kreiner, a well-known Berlin machinist, and Mr. Broadwell, an American engineer. Mr. Krupp's gun was almost the same as that he sent to Woolwich in 1863, the principal feature of it being an elastic ring in the movable block of metal forming the breech-piece. Mr. Kreiner's is the gun of the Prussian service, of Duppel celebrity. Mr. Broadwell's invention consists in an elastic self-adjusting ring in the bore of the gun, not to be removed after each round like Arm-

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Vol. XII.—No. 23.
(NEW SERIES.)

NEW YORK, JUNE 3, 1865.

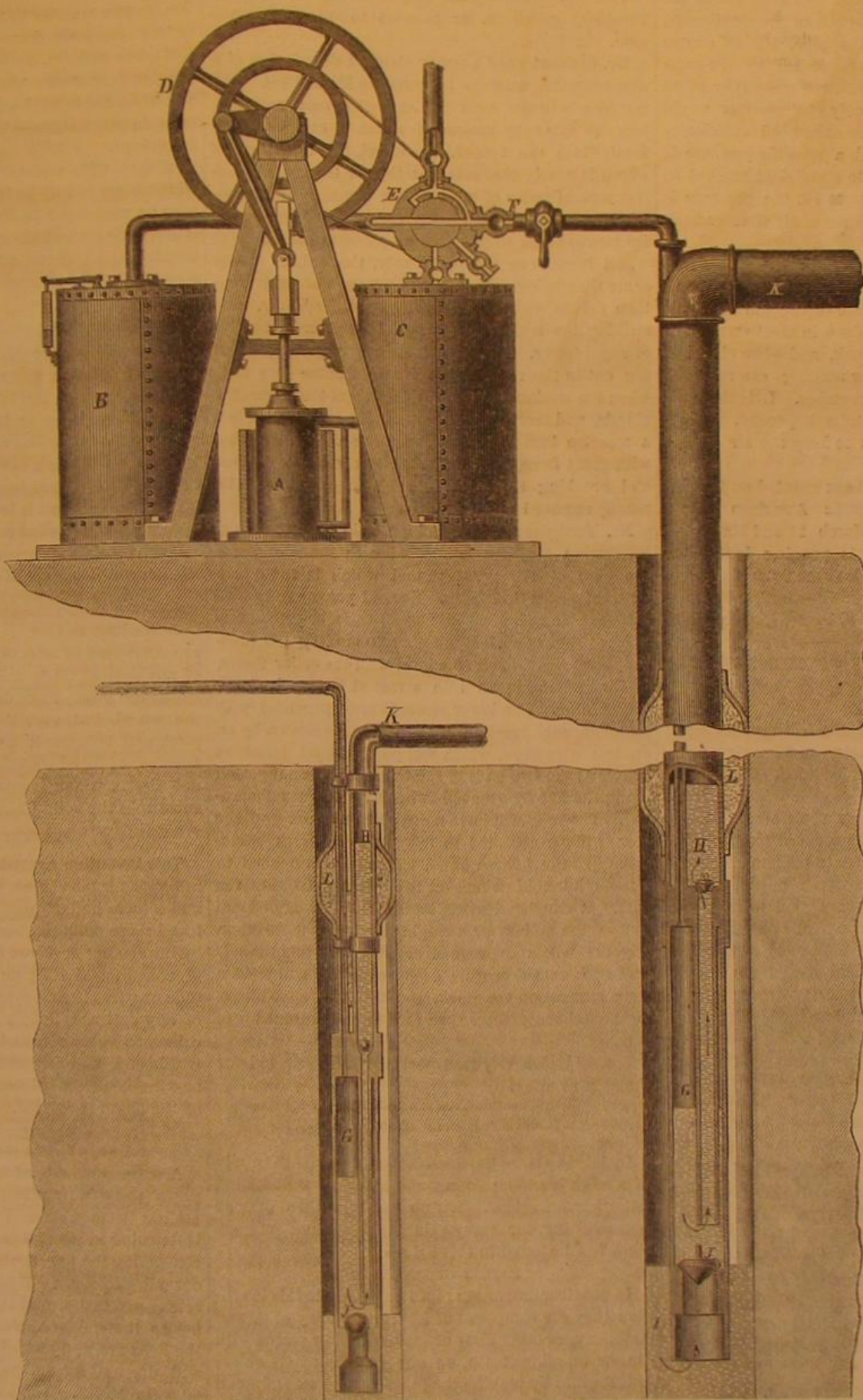
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Apparatus for Mines & Petroleum Wells.

There are many points of coincidence connected with obtaining the natural riches of earth which render a consideration of them not uninteresting. When coal was first discovered, it cropped out near the surface, and was for a time easily procured. When gold was first found in California, nuggets were often picked up on the surface, and "pay dirt," as miners call gold-bearing soils, was to be found on all sides. So, too, with petroleum, oozing from the soil, filling up salt wells, overspreading the surfaces of streams, it forced itself on the attention of men, almost demanding to be collected. When a drill was driven into the earth, spouting columns of oil rushed upward with violence proclaiming the great stores hidden below. But coal is now obtained only at the cost of much labor and money. Nuggets no longer lie around loose on the surface; flowing wells are the exception, and not the rule as formerly. Nature having done her part in revealing the secret stores laid up for ages, leaves the procurement of them to the genius and enterprise of man.

The discovery of petroleum has called forth more ingenuity and occasioned the invention of more machinery within a given time than any other article of commerce; and, from signs, it would seem that the attention of the inventive public has but just awakened to its importance.

The engravings published in connection with this article, represent the principle of a new apparatus or system for getting petroleum, also for freeing mines of water, which promises unusual results. It is well known that nearly every possible means for aiding and augmenting the flow of oil in wells has been tried with more or less success. Compressed air has been employed, hydrostatic pressure, steam blown in at high pressure, torpedoes exploded, exhausted receivers—these and other devices have been brought forward and are in daily use. In the present invention the action of the apparatus is analogous to that of the low-pressure or condensing engine. A stream of compressed air



PEASE'S APPARATUS FOR MINES AND PETROLEUM WELLS.

is forced into the well by suitable means hereafter to be described; this air, acting upon the surface of the oil in the bottom of the well tube, forces it up the tube into a chamber, where it is sustained or prevented from returning. This compressed air is then exhausted, leaving a comparative vacuum, which causes the oil in the well to rush up to fill the vacuum. The alternate action of the pressure and

the pipe-tube, chamber and displacement pipe.

The mechanical parts of this system are few in number and not complicated; a brief statement will enable all to comprehend them.

A represents an air pump which exhausts the air from one of the receivers; upon the opposite end of the shaft is another similar pump used for forcing air into the receiver, B. Both pumps are driven by a

exhaust causes a vibration or pulsation in the well tube, which results in filling the chamber at every pulsation, causing an enormous and rapid delivery of the precious fluid. The advantages of this system are, that there is no subterranean machinery—pumps for instance—to be operated at immense depths; there is consequently no delay in re-packing pump plungers, no defective operation through faulty valves.

The oil rises into a chamber of any given length, and is instantly elevated that length, whatever it may be. If an ordinary lifting pump has a stroke of thirty inches, the oil is raised that distance each stroke, but with this device, if the oil chamber is thirty feet in length, the fluid is raised so far each stroke, and at one half of a revolution of the valve. From this statement it is easy to see that the quantity raised by this system is far greater than is produced by half a dozen pumps. As the inventor says, it will take a good flowing well to supply it. One apparatus can be made to work a number of wells, it only requiring the arrangement in the well tube, and connecting the air pipe with the valve; any one well can work independently of the others, or all work together from one and the same power, of which there is always a surplus for contingencies. The lowest estimate of its capacity made by scientific and practical men who have examined it is, that it is equal to over two thousand and two hundred barrels per day from a two-inch pipe, and four thousand and ninety barrels per day from a two-and-a-half-inch chamber; and over eight thousand two hundred barrels per day from a 3-inch pipe—the amount varying with the size of

pulley and belt, D. The rotary valve, E, can be worked by a pulley on the shaft, or worked independent of the pumps. This valve is of peculiar construction and is covered by a separate patent. It opens and closes communication alternately with the well and the atmosphere and the vessels, B and C. The pipe, F, on which this valve is placed leads into both vessels. By the action of the valve, then, a charge of compressed air is forced down upon the surface of the oil in the pipe or chamber, G; the result is, that the oil takes the course indicated by the arrows, and rises into the chamber, H; by the continued actions of the rotating valve, E, the compressed air is exhausted immediately, so that the oil from below, at I, comes rushing up through the valve, J, to supply the vacuum, and thus raises the oil forced by the percussive action of the compressed air into the tank through the pipe, K. Of course the return of the oil is also prevented by the same valves. Where there is a sufficient amount or height of oil or water in the well, only one receiver would be in use until the water was exhausted sufficiently to require the other; in such a case the pressure is relieved, by the valve only, to a sufficient amount to allow the chamber or vacuum to fill, the pressure is counterbalanced, and the column of air vibrates back and forth.

For mines, or sluggish wells, or those rendered useless by the seams getting filled up, a chamber twenty or thirty feet, in a state of vacuum thirty or more times a minute, would draw in most everything but the rock. F is a stop-cock, and when closed it fairly seals the well up, for nothing can raise the valve or get into the lower chamber. L is the ordinary seed bag by which the tube is packed. M is a jacket to be filled with water to keep the air pumps cool.

Two patents have already been granted on this invention through the Scientific American Patent Agency, dated as follows—March 21 and March 28, 1865. Another application is pending before the Patent Office. Patents have also been secured through this Office in foreign countries. For further information address the patentee, F. S. Pease, Buffalo, N. Y.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening May 17, 1865, the President, S. D. Tillman, Esq., in the chair.

THE GEOLOGY OF NEW YORK CITY.

Dr. Stevens said that the Lyceum of Natural History had appointed a committee to examine the geology and mineralogy of Manhattan Island, and the geological examination was assigned to him. He then gave a detailed description of the appearance of the rocks as exhibited in the numerous excavations made in grading the streets, and stated the conclusion to which he had arrived.

The lowest deposit was a mud rock which has since been metamorphosed by chemical action into gneiss—stratified granite. Over this was a deposit of limestone. After the rocks were hardened, by one of those slow changes in the crust of the earth which are constantly going on, there came a very gradual pressure from the east toward the west, forcing the edges of the rock toward each other and bending the strata into folds. There are five of these folds between the Hudson and East rivers.

Mr. Ely remarked that this island is very rich in curious minerals. He had quite a collection gathered here; among them one that was a perfect plum.

Dr. Stevens said that that was doubtless a fossil which had been brought in by glacial action from the rocks above Haverstraw. The rocks of the island contain no fossils.

THE NEW THREE-CENT COIN.

Mr. Feuchtwanger presented for inspection one of the new three-cent pieces, and stated that it was composed of 75 per cent copper and 25 per cent nickel, which makes a very hard alloy. It takes 254 of the pieces to weigh a pound, and they cost the Government just half a cent apiece.

SOLID FLOATING ON MOLTEN METAL.

Dr. Parmelee observed that Mr. L. L. Smith was probably known to many persons present as a skillful electroplater of unusual scientific attainments.

Mr. Stewart:—He has made the finest electroplates ever made in the country.

Mr. Parmelee:—Yes. Well, Mr. Smith made an experiment to ascertain whether solid zinc will float on melted zinc, and he found that it would not. The kettle of melted zinc was 20 inches wide, and 12 inches deep; the melted metal within 3 inches of the top. The solid pieces of zinc were 6 inches long, 4 inches wide and 1 inch thick, and they would invariably sink.

Dr. Rowell:—If the solid zinc is of about the same temperature as the melted zinc it will always float; I have tried it twenty times. Perhaps Mr. Smith may have got a piece of metal cold enough to sink.

TUNNELING.

This being the regular subject of the evening, the President called on Mr. Stewart to open the discussion.

Mr. Stewart read a paper giving a description of a new tunneling machine invented by Major Plas. The machine is in the form of a car, with four radiating legs or arms by means of which it can be keyed firmly into the tunnel. A wheel, the diameter of which is nearly the same as that of the tunnel, carries several series of steel chisels disposed in concentric rings—these rings being two or three feet apart. By means of an engine driven by compressed air, the wheel is made to revolve slowly, the chisels at the same time being drawn back by means of cams, and then driven violently forward by stiff springs, thus striking the rock with their sharpened ends a series of rapid blows. In this way narrow circular grooves are cut in the rock to the depth of some two feet, when the workmen withdraw the wheel that bears the chisels, and insert steel wedges in the grooves. Then a massive iron ram is driven forward by the engine with great force, driving the wedges into the grooves and breaking the rock into blocks which can be readily removed.

Mr. Montgomery, of Brooklyn, said that the most interesting question connected with tunneling, was the plan of the great tunnel which is to be constructed under Broadway. Several years ago he filed a caveat for a plan which he still thought the best of any yet suggested. It amounts to sinking the present street right down to a level with the cellar floors, and constructing an iron street at the level of the present one. The lower street is to be provided with a double track railroad, with cars to be drawn by an endless wire rope, which will pass around immense drums at the two ends of the track, and be supported along the line by grooved wheels in the usual manner. The rope will have a constant motion, and the cars will be attached to it by an instrument something like the human hand, which can be opened to release its hold whenever it is desired to stop the cars. It can be demonstrated that the additional rent of the cellars for a single year will more than pay the whole expense of constructing this tunnel, that two cents fare from each passenger will yield a large interest on the stock, and that the speed may be three times greater than that of the present horse cars.

The subject of city transportation was selected for the next evening.

RECENT ENGLISH PATENTS.

By late mails we have received our usual full supply of foreign journals; from some of them we make the following selections. Let no one pass them over as uninteresting, for many valuable hints and suggestions can be found in this list:—

PATENT ORGAN PIPES.

In constructing organ pipes according to this invention they are composed of lead, or an alloy of it, and antimony, or other alloy of lead coated or plated with tin, or an alloy of tin, on one or both of its sides; this they do by making the pipes from sheets of metal made by coating a sheet of lead or alloy of lead on one or both of its sides with a sheet of tin or alloy of tin; or the plated sheets of metal from which the pipes are manufactured may be made by first coating an ingot of the alloy of lead with tin or alloy of tin, and rolling down such coated ingots into sheets of the required thickness for making into pipes.

PATENT DRESS FASTENINGS.

These improvements relate to buckles, clasps, hooks, and all kinds of fastenings generally, as also

to the methods of manufacturing and ornamenting such articles, and, consist, first, in a new method of manufacturing and uniting the tongues and frames of buckles by stamping in a die, and then uniting the parts by pressure without the aid of solder. Secondly, in an improved method of connecting the several parts of the buckles, hooks, or other articles by means of eyelets, which are formed of a single piece with the frame, and folded down or turned over to permit of the passage of the pin or rivets uniting the parts of the buckle. Thirdly, in a method of attaching or fixing a ribbon or waist belt to the buckle or clasp without sewing. This the inventor effects by cutting two slits in the frame of the buckle in which the ribbon is doubled over, in order to fix it in position. The connection of the parts is effected in this case in a similar manner to that above described. Fourthly, the ornamentation of the improved pins, buckles, and other articles, by means of rivets having facets, or otherwise ornamented, which he fixes in the article, and then rivets at back on a second plate of similar form, in which is made the eyelet forming the improved fastenings. Fifthly, the buckles may be further furnished with a plate in their interior, the edge of which is turned up in the form of a hook, whereby it may be connected to the frame of the buckle, which is similarly formed at one end; in this case the buckle is solid, and without any openings; the exterior surface may also be ornamented in any suitable manner.

PATENT CATCH FOR INK BOTTLES.

This invention consists in the use of an additional catch or fastener, so arranged and constructed as to lock with that on the ink-bottle or box, and thus prevent its becoming accidentally opened. The usual aperture made for the reception of the hasp, such as is in use on the ink bottles at present manufactured, the inventor causes to be carried right through the lid of the box, and it is up and down this opening—which is made smaller on the outside than the inside—so as to retain the fastener in its proper position, that the improved system of catch is applied.

PATENT TOOTHED CHAINS.

According to this invention the sides of the chain are composed of as many links as required, and made of any desired ditch and strength. The distance between the inner links depends upon the thickness of the wheel, but over the pins which constitute the pitch and hold the links together he places hoops or ferrules, so fitted that they can turn on the pins, but not shake, which hoops or ferrules, are intended to substitute the solid links or pins before in use.

PATENT FLAT CHAIN.

This invention consists in forming flat chain either in bands for pit chains, driving bands for machinery, and other similar uses, or in sheets for armor plating, bridge building, and various other like purposes, by interlacing or screwing together separate lengths of coiled metal rods or wires. Each of these metal rods or wires is first formed into an open twist or coil of any desirable length and thickness. Two of these coils are then screwed or interlaced together, coil within coil, and any additional number of coiled rods or wires is similarly interlaced until the length or area of the chain is formed.

Use of Waste Heat in Kilns.

A correspondent of the London Builder, who appears to be a practical man, referring to the gases arising from Portland cement, says that while it is burning in the kilns a great heat is obtained by consuming the gases, and then passing the same under a drying floor. When alight, the gases are like a rolling sea of fire, and this will travel a great distance before it requires a chimney-shaft; that is to say, if the flues are in a straight line, the heat from the gas will dry well for a distance of 120 ft. in length, and 60 ft. in width. The kilns he speaks of hold, when burnt, 150 casks. There is a greater improvement, however, which, our correspondent suggests, could be made; first, to let the heat work another set of flues while the men are taking off the stuff, and as soon as they have it off they could shut off another bay; or they might shut off nineteen flues out of twenty, and let the heat work up the one, which would be much better for men working on these hot flues. Secondly, by having a coke oven beside the furnace the gas from this would pass through the coke

fire, and the coke from the oven would supply the furnace and much more heat. This plan of furnace would consume but a small quantity of coke, and could be applied to any kind of works for drying, and for material of any description, and if properly constructed would, he thinks, be preferable to any other.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Boiler for Kitchen Ranges.—This invention relates to a very important improvement in the mode of securing the plate constituting the side or body portion of a kitchen boiler, to and upon the head plates of the same; it consists in so forming the head plates that when the body of the boiler has been soldered, or in any other proper manner fastened thereto, both the expansion and contraction of the metal composing the boiler shall be resisted in an equal degree—a result which has never before been accomplished in such boilers, and the importance of which as regards economy and safety is manifest to all. The inventor is Joseph H. Ash, of Brooklyn, N. Y.

Breech-loading Fire-arm.—The object of this invention is to convert, in an easy and simple manner, ordinary Springfield muskets to breech-loaders without disturbing the lock or any part connected therewith. The invention consists in the application of a tapering socket in the cone seat of a musket to receive a wedge-shaped projection, extending from the side of the breech block, which is hinged to the top of the barrel, and with a plunger passing through said wedge-shaped projection in place of the cone, in combination with the ordinary lock and hammer, in such a manner that a cartridge placed in the barrel can be exploded by the action of said hammer without disturbing its original position or changing any other portion of the lock; at the same time, by the wedge-shaped projection, a shoulder is formed which assists in holding the breech block in place when it is locked. A spring bolt, with a tapering head, which drops into a conical seat in the breech of the barrel, serves to lock the breech block; and a tongue or ridge, projecting from the inner surface of the breech block, and catching into a notch or groove in the barrel when the breech block is closed down, takes up the recoil and relieves the pivot connecting the breech block with the barrel from all strain. From the hinged breech block, or from its pivot, extends a spring arm which is applied in combination with an ejecter, in such a manner that, on throwing the breech block open, after a cartridge has been fired, the empty shell is withdrawn from the barrel, and a new cartridge can be introduced without loss of time. W. H. and G. W. Miller, of West Meriden, Conn.

Carpenter's Gage.—This invention relates to a gage which is provided with a stationary bead of the ordinary construction on one side, and with a movable slide provided with a band on the opposite side of its shank, in such a manner that the gage can be readily set for gaging the width and the thickness of a board. The head is adjustable by means of a wedge which can be readily fastened and unfastened without loss of time, and a set screw passing through the same serves to retain the slide for gaging the thickness. An additional adjustable band on that side of the chuck which contains the slide, acts in combination with the band in the said slide as a mortise gage. Martin Horton, of Brooklyn, N. Y., is the inventor.

Needle for Knitting Machines.—This invention consists in the application to the needle of a cam so shaped that when the needle is drawn back after having received the yarn, it is made to raise the point of the sliding latch, and to carry it over the point of the hooks, thereby allowing the old stitch to drop over the new stitch without the liability of catching; it consists, also, in a stop applied to the latch and operating in combination with a space in the edge of the needle, in such a manner that said latch is held in a proper position while the needle is being thrust forward to receive the yarn for a new stitch, and to allow the old stitch to slip back over the point of the latch which, in this position, is covered by a slot or groove in the needle; further, in making the additional latch of one thickness, so that they may be operated in the same slot of the needle bed; and, finally, in

the application to the latch of a stop and of a curved point, in combination with the cam of the needle, in such a manner that when the needle recedes the point of the latch is compelled to drop over the hook of the needle, and the operation of casting off the old stitch is rendered certain. L. L. Otis, of Florence, Mass., and Samuel L. Otis, Manchester, Conn., are the inventors.

Ore Grinder and Amalgamator.—This is an improved machine for grinding ores in a dry state and for amalgamating the precious metals contained therein to separate them from the foreign substances. The invention consists in an improved manner of attaching the shoes to the miller, whereby said shoes are enabled to adjust themselves to the bed or bottom of the pan, thereby compensating for the wear of the shoes and causing the bed or pan bottom to be preserved at all times, which adds greatly to the efficiency of the machine. This device is now in operation and works well. M. B. Dodge, of New York City, is the inventor.

Horse-power.—This invention relates, first, to a useful means for regulating the speed of the horse-power, whereby a steady and uniform motion of the same is obtained by an automatic mechanism. This speed-regulating mechanism consists of a ball-governor combined with a brake, the latter being arranged to operate against the balance or fly-wheel of the machinery. This invention relates, second, to a new and useful improvement in the construction of the endless platform whereby it is rendered rigid or inflexible in one direction, namely, under the downward pressure, due to the weight of the animal; and, at the same time, rendered flexible in the other or opposite direction, and the use of rollers in the platform dispensed with, the platform, being allowed to work on rollers and with much less friction than the ordinary platforms in use. Third, to a brake attachment for stopping the machine in case the belt of the same should break, a contingency of frequent occurrence, and which is liable to injure either the horse or the machine. Fourth, to an improved means for giving the machine and consequently the endless platform a greater or less degree of inclination as may be required. Fifth, to the manner of hanging the machine whereby the adjustment referred to may be made without affecting the belt by which motion is transmitted from the machine to the machinery to be driven. D. W. Hunt, San Francisco, Cal., is the inventor.

The Review of Sherman's Army.

The Washington correspondent of the *Times* says of the review of Sherman's army on the 24th:—

"The men who marched from the Ohio to the Tennessee under Buell, only to march back again; who first penetrated down into Alabama under the daring and nervous Mitchell; who fought at Perryville under McCook, and checked the advancing tide of the rebellion to again send it reeling southward, at Stone River, under the chivalrous Rosecrans; who toiled over the rugged passes of the Cumberland Mountains, and seized the great natural fortress of Chattanooga; who held the left with a tenacity that saved them from defeat at Chickamauga, under the ever-victorious Thomas; who stormed Lookout Mountain, and fought above the clouds with Hooker; who cut their way from Chattanooga to Atlanta, and from Atlanta to the sea; who swept the Carolinas as with a besom of destruction, and who gave the finishing blow to the great rebellion, in following the lead of Sherman, and Howard, and Slocum—these were the men who received to-day the enthusiastic plaudits of a hundred thousand spectators.

"The interest of to-day has exceeded that of yesterday. The Army of the Potomac is our old acquaintance, but the Armies of Georgia and Tennessee few people here had ever seen. The most eager interest was therefore exhibited to view the veterans of the West, whose marches can only be counted by thousands of miles.

"The magnificent physique of the men at once elicits the admiration of all; tall, erect, broad-shouldered, stalwart men, the peasantry of the West—the best material in the whole world for armies. The brigades move by with elastic, springing step, in excellent order, and fully equal to the marching of yesterday, save that the intervals between brigades and divisions were longer, though the regiments them-

selves were kept well closed up. At the head of each brigade was a battalion of black pioneers, the simon-pure contraband, in the garments he wore on the plantation, with shovel and ax on the shoulder, marching with even front, sturdy step and lofty air.

"The rear of Gen. Barnum's brigade was brought up by the first genuine pack-mule train ever seen in Washington. I will warrant Barnum had an eye to letting his friends see with what a degree of comfort he travels. It was a most nonchalant, grotesque spectacle—two very diminutive white donkeys bestrode by two diminutive black contrabands. If that is not a paradox, a dozen patient pack-mules, mounted with Mexican pack saddles, camp equipage on one side and boxes of hard tack on the other; half-a-dozen contraband females on foot; a dozen contraband males leading the mules; a white soldier or two on horseback, to see that everything was all right; the servants of the mess, and the mess-kit, and, scattered about on the panniers of the mules, reclining very domestically, half a dozen game cocks, a brace of young coons, and a sure-footed goat, all presenting such a scene as brought laughter and cheers from end to end of the avenue.

"To give an idea of the length of the column, it is only necessary to state that when the rear of the Fourteenth corps passed over Long Bridge the head of the Twentieth had already crossed the river on the pontoon bridge at the foot of Twentieth street, the route being from the first-named bridge along Maryland avenue to the Capitol, around the Capitol on the south side to Third street east, along that northwardly to Maryland avenue, thence westwardly to the Capitol, passing around on the north side to Pennsylvania avenue, up this avenue westwardly by way of Fifteenth street to Twentieth street, and thence south to the river. The entire distance of this column was fully seven miles. These two corps did not embrace more than half the entire force reviewed, which would make the whole column about fifteen miles long. It required a little more than six hours to pass any given point."

MISCELLANEOUS SUMMARY.

THE TUNNEL RAILROAD.—Gov. Fenton has vetoed the recent act of the Legislature authorizing a company to construct an underground railroad in this city. He objects to it on the ground that no limit is assigned in which such road is to be completed; and furthermore, that the bill authorizes the transfer of State and city property for the use of the company.

DUTCH GAP CANAL NAVIGABLE.—The Dutch Gap Canal, it seems, has not been altogether a failure, for the *Richmond Whig* says that General Mulford arrived there from Fortress Monroe, having passed through Butler's Dutch Gap Canal on the steamer *Clyde*. This is the first steamer that has passed through.

For some years to come, old iron will be plenty enough around Petersburg, Va., to supply several large foundries. East and south of the city, plowing is dangerous, as exploding shells are very likely to send horse and driver high in the air.

According to Dr. James Johnston, 800,000,000 of men smoke different sorts of tobacco; 400,000 smoke opium and its compounds; 300,000 hemp and hashish; 100,000 betel, and 40,000 the American plant coca.

The directors of the Oporto Crystal Palace Company and the exhibition committee have fixed Monday, the 21st of August, 1865, as the opening day of the exhibition.

Tuns upon tuns of used-up, worn out "hoops" are annually worked up in cannon, shafts for machinery, etc., at the iron works of Lazell, Perkins & Co., Bridgewater, Mass.

It is stated that George Cutler, Brattleboro, Vt., has apples sound and fresh, grown in 1863. He kept them in a cellar made in his garden, and packed in walnut saw-dust.

The two large reservoirs at East Killingly, Conn., built to supply water to several cotton mills, gave way one night last week, causing damage to the amount of \$30,000.

The very low price of wheat in England has induced farmers there to feed it to stock quite extensively. Sheep eat it at the rate of about a pint a day.

Improved Roofing Material.

There are many places where it is highly important that some expeditious method should be provided for protecting roofs from damage by fire and the weather, and also make it water-tight. This is particularly the case in new countries, or in temporary buildings which are to be put up and taken down again in a few months. To obtain this object many substances have been proposed, most of them being mixtures composed of bitumen and gravel. It has been found that the composition with which this fabric is coated is remarkably well adapted to shed water and resist fire, and it is now and has been for some time in use all over the country. The machine by which this fabric is prepared is here shown. Its arrangement is simple, and the chief merit lies in the article produced.

The reader will see that three thicknesses of cloth or felt are used, and that each thickness is carried on a roller, as at A, where the process of laying on the composition begins. The fire-proof substance is then applied and laid evenly by means of the scraper, B. A second roller, C, in proper position, gives off another layer, which is also coated in the same way; this is succeeded by a third, and the same coating repeated until the ends unite, when the finished fabric is wound upon a fourth roll at the end of the frame; two revolving cutters, D, trim the edges and leave the felt one width throughout, thus making it come fair and even when laid on the roof, and also greatly facilitating the process of applying it.

This method of manufacture gives a strong and durable coat that lasts for many years and can be applied in any climate, hot or cold. It is quickly and easily transported over mountains or in countries where there are no railroads, and is, for this reason, particularly adapted to the South American trade. It can be made in rolls of any length convenient to handle, and can be put on by any ordinary workmen.

This roofing material is the subject of a patent issued Sept. 13, 1864. For rights to make or for roofing, address Alfred Robinson, 73 Maiden Lane, New York.

Device for Plowing-in Cornstalks.

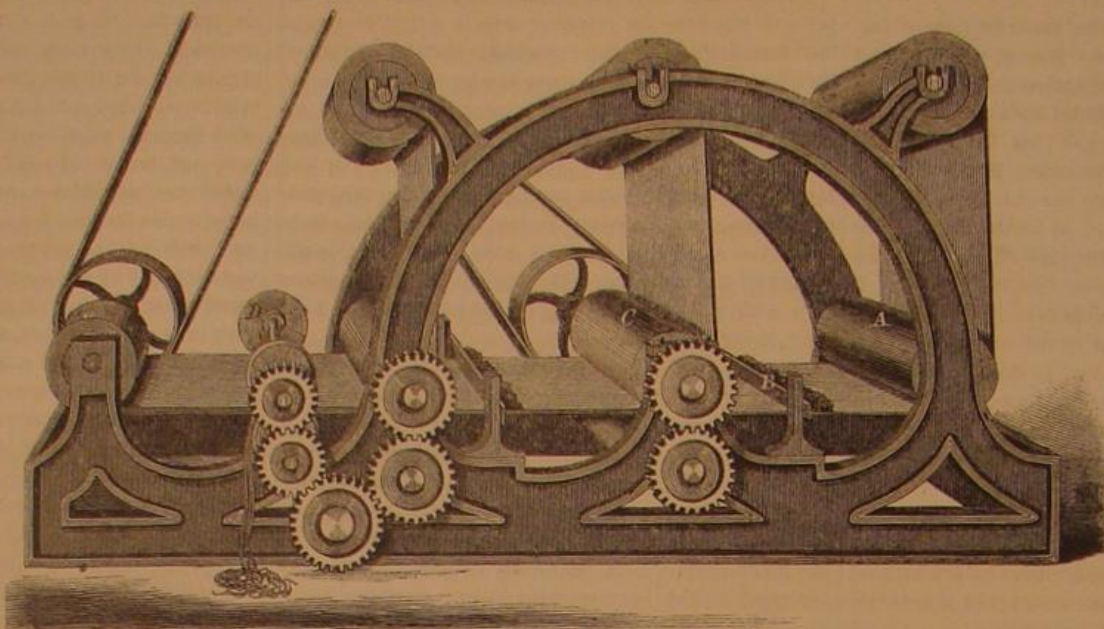
Men take from the soil more than they put in. While they greedily exact all it will give, they are unwilling to aid it by fertilizers. Weeds and cornstalks afford nourishment, if properly plowed under; in general they are left on the surface or sticking half out, and cursed as a nuisance.

This attachment to the plow, as shown in the engraving, is intended to facilitate and make the plowing-in certain, for by its aid all growth, of whatever kind, is caught under the advancing plowshare as waves roll under the bow of a ship; the plow rides over the stalks, and they are seen no more, but their influence on the soil is for a long time.

The attachment in question is merely a chain, A, connected to the plow beam and the double whiffletree, and provided with a rod, B, which is called a "regulator" by the inventor. This regulator makes a right or loop in the chain, so that the matter desired to plow under is caught by it and diverted toward the furrow, into which it is thrown and covered

up, as before explained. The exact shape of the rod is not adhered to in all cases, and the claim covers the use of a rope or its equivalent for the same purpose.

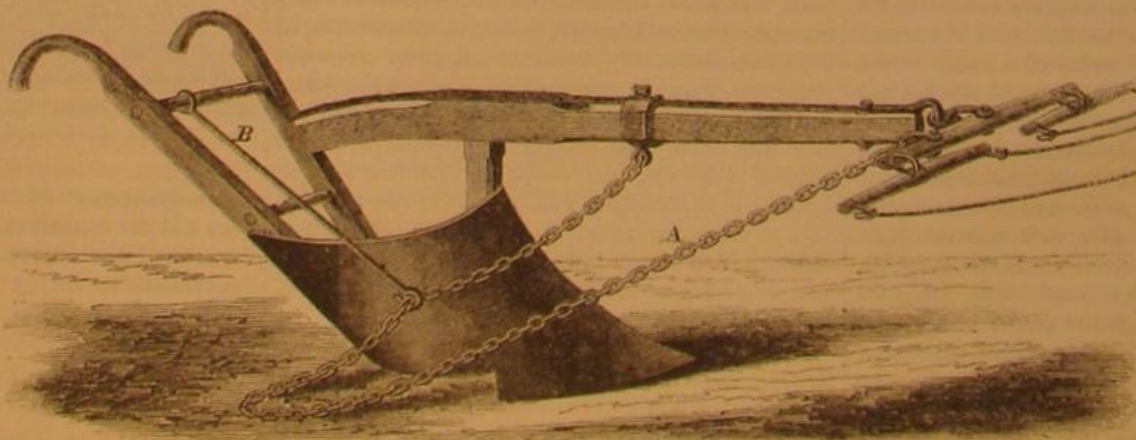
The inventors claim that this is a desirable and useful addition to a plow, and it was patented through the American Patent Agency on March 7, 1865, by

**ROBINSON'S ROOFING MATERIAL.**

Josiah Kilmer. For further particulars address, J. & A. Kilmer, Barnerville, N. Y.

The Public Debt of Great Britain.

In the budget recently presented by Mr. Gladstone to the British Parliament it is stated that on March 31, 1859, the total public debt was £825,934,000, and on March 31, 1865, it was £808,288,000—showing a decline of £17,646,000, or at the rate of about three millions of pounds sterling per annum. In 1859 the total amount of the trade with France was £26,431,000, and in 1864, £49,797,000, or nearly ninety per cent increase. The revenue for the financial year of 1864-65 amounted to £70,313,000. The expenditures were £65,957,000—showing a decrease as compared with those of 1860-61, the year of the highest expenditure, of £6,547,000 since the Russian war, but an increase of nearly twelve and a half millions as compared with the ordinary expenditures immediately antecedent to that period. The whole trade of the country, which last year was valued at £445,000,000, had increased during the year ending on the 31st of December, 1864, to £487,000,000, the imports being £274,000,000 and the exports £213,000,000. Those who argue that a preponderance of imports over exports is opposed to the commercial prosperity of a nation receive a practical refutation of their theory in these conclusive figures. The estimated income for

**KILMER'S DEVICE FOR PLOWING-IN CORNSTALKS.**

the financial year just entered upon is £70,170,000, and the expenditures, £66,139,000.

The manufactory of Saint-Gobain, France, has been engaged six years in fabricating a lens two feet in thickness, which it has now given as a present to the Observatory of Paris for the large telescope in course of being manufactured, the power of which will exceed that of the most powerful instruments known.

Velvet Factory to be Started.

The Paterson (N. J.) Press says that the business of that thriving town is to be increased by the establishment of a factory for the manufacture of silk plush velvet, which will be a novelty in the United States. It seems that a company of capitalists, mostly Englishmen, some time since obtained a charter from the Legislature of the State of New Jersey, and having imported the requisite machinery and brought over a number of workmen, commenced their work in Newark, but, considering Paterson a more desirable locality, they are now making extensive preparations for their works in that town. Thus are we from time to time rendering ourselves independent of foreign workshops and supplying ourselves with establishments that will produce every article required for the use of our people. Our cotemporary say: "We are informed that parties in England, who use the fabrics such as this company will make, expect to import

them from this country. Some Frenchmen will doubtless institute the manufacture of kid gloves, instead of our people taking hold of the enterprise. The leather-glove trade is one of the most valuable we have, but we do not know that any factories make kid gloves.

A New Enterprise in Buffalo.

The City of Buffalo is becoming famous for its manufactures, especially of steam engines, there being several large foundries and machine shops engaged in that business.

Recently, Mr. David Bell, one of the enterprising citizens of the place, has commenced building locomotives, and one named after him has recently been tried. The Buffalo Courier gives the following description of the engine:—

The David Bell is one of two locomotives which Mr. Bell started, on his own account and capital, to build last winter. The later stages of their construction were closely scrutinized by Mr. Grant, upon whose recommendation both were promptly purchased, at the highest ruling prices, by Wm. Scott, Esq., President of the Erie and Pittsburgh Road. The sum paid for the two is \$50,000, with the addition of the Government tax. The Bell is one of the largest class of locomotives, built as a "compromise" engine, and hence equally suited for freight or passenger work. Its cylinders are 16-inch bore and 24 inches stroke.—The driving wheels measure 5 feet 1½ inches.

The boiler is built for the use of either coal or wood, and is fitted with 150 two-inch copper flues. The engine and tender weigh together 40 tons. Both are finished with elaboration, durability and elegance. The gages and lamps were made by the Buffalo Steam-Gage Company. The model and working properties of the engine, as we have al-

ready intimated, have been found, so far, faultless. It ran ten miles in thirteen minutes, with ease.

THERE are, unhappily, at the present moment, in Paris, five strikes of workmen, viz.:—locksmiths, tailors, carriage builders, hatters and dyers.

ONE-POUND box of concentrated lye will cleanse a foul cistern.

ANOTHER APPLICATION OF DIALYSIS.

Perhaps some of our readers may not remember the beautiful discovery of dialysis, made a few years since by Dr. Graham, of England. He found that if substances which will crystallize be mingled in solution with others of a jelly-like character, such as gum, starch, dextrin, tannin, gelatin, albumen and caramel, which will not crystallize, and the solution be separated by a porous membrane, such as parchment paper or bladder, from pure water or other solvent, those that will crystallize pass freely through the pores, while the gums are retained. Those that pass through, Mr. Graham calls crystalloids, and those that do not he calls colloids, from the Greek, *kolle* (glue). This discovery affords a new means of separating substances mingled in the same solution, and is therefore called dialysis. At the last meeting of the British Pharmaceutical Conference, held at Bath, the following paper was read by J. Attfield, Ph. D., F. C. S., "On the Application of Dialysis in Determining the Nature of the Crystalline Constituents of Plants":—

Some two years ago (*Pharmaceutical Journal* for March, 1862), I published the results of an examination of the saline efflorescences which are occasionally found on medicinal vegetable extracts. These crystalline out-growths were found to be chloride of potassium or nitrate of potash. The former salt had often been observed, but the latter had not been noticed, although it is of common occurrence. From that examination, it seemed that nitrate of potash was a more frequent constituent of plants than had been suspected, and I then proposed the application of a method whereby the presence of it and of similar salts could be detected in the fresh plant. The suggestion was to dialyze expressed juices, concentrated decoctions or infusions of plants, and then to evaporate the diffusate to a small bulk, when it was to be expected that the nitrate of potash, or any other crystalline salt, would separate out in a solid and recognizable form.

* Since that time I have submitted a few plant-juices, the first that came to hand, to the process, and have obtained results which justify me in recommending the method as one likely to be of great service in the study of vegetable physiology. Crystalline salts can be thus obtained which would inevitably be destroyed in burning a plant for its ash. The following are the details of the experiments:—

SOLANUM TUBEROSUM.

A few pounds of potato tops were collected, and at once crushed and pressed and the juice dialyzed for twenty-four hours. On evaporating the diffusate and cooling, small prismatic crystals separated, having all the physical and chemical characteristics of nitrate of potash. Under the microscope they were found to be six-sided, and to twist a ray of plane polarized light, were not volatile, gave a violet tint to flame, and deflagrated on charcoal; the aqueous solution gave a yellow crystalline precipitate with bichloride of platinum, no odor on heating with caustic alkali, a black color with sulphate of iron and sulphuric acid, and yielded ammonia on heating with potash, zinc and iron. It was deemed desirable to apply all these tests in this and similar examinations, as a pound of vegetables seldom yielded more than a few grains of crystals, a quantity sometimes too small to purify crystallization, and always too small to admit of the production of strongly marked analytical reactions. In the case of potato, however, I went to the trouble of operating upon thirty or forty pounds of the tops, and thus obtained about the same number of grains of nitrate of potash, and the extra labor was rewarded, for the mother-liquor of the niter, after standing aside two or three days, yielded a small crop of beautiful little crystals, of which I can at present say but little more than that they were not nitrate of potash. They were perfect little hexagons, not much longer than broad, with flat heads; I suspect them to be a magnesium salt. Beside these constituents, the juice of potato yielded cubes, hollow pyramids, and prisms of chloride of potassium, much ammonia and sugar, even immediately after expression, and other matters the nature of which was not ascertained.

ATROPA BELLADONNA.

The leaves and soft parts of the Deadly Nightshade also yielded nitrate of potash by the above process.

But in addition some acicular crystals, single and in tufts, were obtained. These were carefully separated from the niter crystallites, and were recrystallized. They were then found to be prisms, neither deliquescent nor efflorescent, and containing magnesium as the sole inorganic constituent. The nature of the organic matter associated with the magnesium could not be ascertained; apparently it was not any of the ordinary organic acids. The juice of Belladonna also contains ammonia, a matter which reduced copper salts as sugar does, and other bodies not examined.

PISUM SATIVUM.

Several quarts of peas, in the shell, were similarly treated. The product was a thick sirup of light-brown color, yielding no crystals even after the lapse of several weeks. The ash of a portion of it gave a pure potassium tint to flame, and its solution a slight chlorine reaction. Ammonia was also evolved on heating the diffusate with potash, but no nitric acid could be detected. Apparently, therefore, the fruit of the pea contains no nitrate of potash, and only a minute quantity of any inorganic crystalline salt. The chief organic crystalline is obviously sugar.

LACTUCA SATIVA.

Half a dozen large garden lettuces were next submitted to the process. Here, again, the concentrated diffusate yielded nitrate of potash. The crystals were, however, mixed with many perfect tetrahedra, but in quantity insufficient to admit of chemical analysis. The mother-liquor contained sugar and ammonia.

CUCUMIS SATIVUS.

Several cucumbers were then operated on. They furnished a diffusate, of which the chief constituent was sulphate of lime, but it also gave reactions indicating sugar, and the juice, immediately after expression, and again after dialysis, yielded ammonia on warming with dilute solution of potash.

BRASSICA OLERACIA.

The juice of three or four cabbages, treated in like manner, also gave a diffusate, from which much sulphate of lime separated on evaporation. It also yielded ammonia when heated with fixed alkali, but beside sulphate of lime no crystals were obtained from it.

DATURA STRAMONIUM.

This plant, the Bitter Thorn-apple, I found to contain so much nitrate of potash that a dried portion quite deflagrated on being burned in a muffle.

From these few experiments, it is, I think, obvious that this application of Graham's beautiful process of dialysis promises to be of great service in investigating the nature of the crystalline constituents of plants. It may assist you in extending our knowledge of the natural state of combination of the alkaloids and organic acids; it may demonstrate the presence of salts previously unknown, and may show that salts, hitherto only occasionally met with, are of common occurrence. Moreover, by showing the presence or absence or variation in amount of a given crystalline constituent, it will help us in ascertaining the influence which variations in climate and soil have upon vegetables, will doubtless aid in determining more exactly the office of the various parts of plants, and, lastly, may throw light on the changes which go on at different periods of the life of a plant.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, May 23d, the President, N. C. Ely, Esq., in the chair.

FELTED YARN.

Professor Mapes exhibited a specimen of yarn made by a process of felting instead of twisting, and stated that the process was invented some five years ago in France, but had been improved in this country. The wool is formed into threads by being driven through numerous holes in a plate, by agitating the air above it. Coarse and fine wool are mixed in the same thread, and the process works the coarse wool into the middle of the thread, and distributes the fine upon the outside. It is also claimed that the yarn is stronger than twisted yarn.

PRESERVING POSTS AND TIMBER.

Mr. Johnson sent a communication asking whether kyanizing posts with coal tar would preserve them from decay.

Professor Mapes replied that coal tar will not kyanize them. The process of John Kyan was to soak the timber in a solution of corrosive sublimate, the effect of which is to coagulate the albumen. The process has been very extensively tried, and with the most satisfactory results. The Amboy Railroad had a number of sleepers prepared by soaking them in the solution for fifteen or twenty days, and these were laid down in alternation with sleepers not treated, and while the untreated sleepers have been renewed two or three times, those that were kyanized remain sound. Similar experiments were made at Woolwich, in England, and with like results. But corrosive sublimate is expensive, and various other substances have been suggested. The speaker had tried a number—common copperas, sulphate of zinc, and others, with good effects in degree.

The best plan practically for a farmer is to turn his posts with the little end down, charring the portion that goes in the ground.

Various other matters were discussed, but we select these only for our columns.

WESTERN CORRESPONDENCE.

(For the Scientific American.)

GREAT RAINS OF THE WEST.

All the Western rivers taking their rise in the Rocky Mountains and the great Valley of the Mississippi, and discharging their waters into the Gulf of Mexico through the various mouths and outlets of that river, inundate their banks about every seventh year, or periodically. These inundations overflow large tracts of river bottom and swamp lands in the States of Missouri, Arkansas, Tennessee, Mississippi and Louisiana, covering an extent of surface which, taken in the aggregate, makes a total equal to an inland sea of several hundred miles square. The evaporation from this immense water surface, stimulated by the tropical heat, is carried northward by the prevailing and usual warm south-west winds blowing from Mexico, until, meeting with the regular evaporation of the great Northern lakes, the atmosphere becomes overcharged with vapor, condensation follows, and the result is, that over a large portion of the Valley of the Mississippi, lying north of the mouth of the Ohio, copious and unseasonable rains prevail. This is the periodical year of the overflow; the season is unusually wet, and unseasonable rains may be looked for until the summer heats, acting on the excessive evaporation, rarifies it to such an extent that they check its descent in the form of rain, and all general overflows of the Mississippi and its tributaries are sure to be accompanied with spring and summer seasons remarkable for their wetness.

PROSPECTS OF THE CROPS.

The rains, while seriously retarding the planting of oats, spring wheat in Northern Illinois, potatoes, corn and other spring crops, have a beneficial influence on the grasses and winter wheats, and unless they should continue, and rust the wheats when ripening, the crop in Southern Illinois will be a fair average one in quantity, and of an excellent quality. From seeding up to the present time, the wheat crop has had everything to favor it—the fall was favorable for seeding; the winter was uniform; the spring cool, and the seed sown was fully matured by the warm summer of 1864.

Farmers of late years have adopted the pernicious practice of cutting their wheat some ten days before it has fully ripened, being made to believe that this unripe wheat outweighs the ripe, and the millers pay, or pretend to pay, more for such wheat—because it really does make whiter flour, with similar handling—than for that which is fully matured. In this way farmers have been gradually seduced into cutting and selling unripe crops, and of using seed of the same character; and the millers, to suit the vitiated public taste—by giving a fictitious whiteness to their flour—sacrifice from ten to twelve pounds of bread to the barrel of flour, that being the difference in favor of bread when the flour is manufactured from wheat that has been allowed to ripen.

Unless killed by intense cold, fruits, particularly peaches, are usually injured by a few warm days in the month of February causing the fruit buds to swell; this warm weather is always succeeded by cold weather of sufficient severity to put a stop to the further germination of the fruit for that season.

The past winter was of a uniform coldness, without being too severe, and the fruit having thus far escaped the spring frosts, which some seasons fatally assail it, our prospects for an abundant crop are quite promising.

METEOROLOGY.

The subject of meteorology is one that should attract more general attention than it does, its laws being comparatively unknown at the present time, and even the most trifling observations, suggestions and experiments made with reference to this important science should be recorded and carefully examined and preserved. We constantly meet with persons of but little general intelligence who can predict almost with certainty some of the approaching changes of wind or weather, by carefully noticing certain indications which are known from their own and the experience of others to be generally correct. Were all the weather philosophy of farmers, sailors, fishermen, hunters, shepherds, stage drivers, and others, collected, it would constitute a volume filled in a great measure with suggestive information; and like the unavailing search after "the philosopher's stone," or fruitless experimenting in the hopes of discovering "perpetual motion," though not resulting in positive success, the very failures and disappointments experienced by the alchemist and the mechanical experimenter have been the means of opening new channels of thought in the minds of others, terminating in the wonderful discoveries of the chemist and the magnificent mechanical contrivances of modern times.

The united historical evidence from the battle-fields and naval engagements of Europe since the commencement of the present century, and of our own battle-field during the rebellion, concur in sustaining the meteorological fact that cannonading affects the atmosphere to such an extent that thunder-storms and heavy rains, or rains alone, almost always accompany or succeed where it has been for many hours heavy and continuous. This war has also demonstrated, what is of more importance to us, that heavy and continuous firing affects the atmosphere not only in its own immediate vicinity, but at hundreds of miles west or north of it, by producing within a few hours sudden, and, in most cases, unseasonable changes of the winds, usually accompanied by cloudy weather or rain without thunder-storms; and in no instance at any season for the last three years has a general engagement been immediately succeeded in this latitude by severe cold weather, the cannonading appearing to have complete control over the currents of air producing cold.

If, then, the cannonading of this war, which was confined to certain lines of latitude and longitude, produced rain in their own vicinity, and at points more or less distant, what effect would cannonading from batteries arranged across the continent on different lines of latitude, and connected by telegraph so as to notify of approaching storms, have on the atmospheric currents? Would batteries, taking St. Paul's as the line of latitude, have dispersed the cold storm of January 1, 1864, thereby preserving from destruction so many valuable animals and fruit trees, or the August frost of 1863, which destroyed half the value of the growing crops of the West? or batteries, taking Chicago as the line of latitude, check the spring frosts that so frequently annihilate our fruit and damage our wheat, after they have escaped all the perils of winter? or at what points should batteries be worked this present season for the purpose of suspending for a short period the rains which are now retarding the planting of the staple crops of the West?

Surrounding the coast of Great Britain there is a system of signals warning mariners of approaching storms, the signal stations being connected by telegraph. If cannonading can disperse those storms, how much more advantageous would it be to the seamen and fishermen than to be compelled to remain in port waiting for the storms to disperse themselves.

These are all points of much interest, and are worthy of being experimented on under the supervision and control of an enlightened and unprejudiced meteorologist. Before the removal of the batteries from the vicinity of Richmond and other points it is the duty of the Government to institute a series of experiments bearing on this subject, which, if conducted systematically and honestly, will certainly, in this latitude, go to sustain the rain theory.

ROPER'S ENGINE.

Messrs. Butterfield & Haven, of your city have just furnished a printing office here, with one of the largest sized "Roper's Calorics." This beautiful piece of mechanism reflects the highest credit on the accurate workmanship of the builders, there being no tantalizing leaks, binding places or drawbacks to retard its erection or standing, the whole occupying but eight hours; its movement from the beginning being apparently as accurate as that of a well-constructed clock.

By connecting with the exhaust of these machines a hollow shaft, on which are placed at proper distances two sheet-iron disks formed like watch glasses, the concaves opposite each other, and similar in their general arrangements to the exhaust disks used by the "London Atmospheric Railway," it is very probable that a large percentage of power might be added to those calorics, this form of exhaust requiring comparatively but little power to operate it. A similar device might be applied to high-pressure engines with advantage; some of your enterprising mechanics should give this a thorough trial; it is entitled to it. Why not apply these machines especially to the heating of buildings, regardless of their power purposes?

The exhaust of the machine would furnish a large amount of heat, or it could be driven into a supplementary dome, and additional heat added before passing off; or an additional pump worked by the machine could drive air into one or more additional domes. The large amount of fresh air which these machines consume should make them the very best and cheapest appliances for heating that is now before the public.

J. T. D.

Springfield, Ill., May 15, 1865.

[We are pleased to give our correspondent a hearing, but do not indorse his views.—Eds.]

BOOKS AND PUBLICATIONS.

BODEMANN AND KERL'S ASSAYING.—This is a small book of 214 pages, published for the "Berzelius Society," by John Wiley & Son, 535 Broadway, New York. It is translated from the German by W. A. Goodyear, Ph. B., late Assistant in the Sheffield Scientific School, etc. It embraces only that portion of Bodemann's work relating to the assay of lead, copper, silver, gold and mercury. It is intended especially for proficients, and will be regarded by them as indispensable unless they possess the original. The incongruous weights of the German States are not reduced to the French standard, a labor which would have materially increased the value of the translation.

Benzoin as an Insecticide.

As our houses and gardens are always more or less infested with vermin, it is satisfactory to know that benzoin, an article well-known as a detergent, is efficacious as an insecticide. Two drops are sufficient to suffocate the most redoubtable pest, be it beetle, cockchafer, spider, slug, caterpillar, or other creeping thing. Even rats and mice decamp from any place sprinkled with a few drops of benzoin. A singular fact connected with this application of benzoin is, that the bodies of the insects killed by it become so rigid that their wings, legs, etc., will break rather than bend, if touched. Next day, however, when the benzoin has evaporated, suppleness is restored.—*Boston Cultivator*.

[This must be benzine; benzoin is a gum.—Eds.]

Rate of Emigration.

The whole number of immigrants who arrived at New York City in the first three days of the week ending the 20th of May, was 4,681. Two steamers arrived subsequently, swelling the total to about 6,000. Another ship was expected, and possibly a steamer, which may bring the figures to 7,000. This is at the rate of 28,000 per month, or 336,000 per annum, at a single port, when the season for large arrivals has not commenced. That begins in June, and usually continues to October and November. We have not seen a report of the arrivals at other places; but every European steamer brings fresh intelligence of the swelling exodus on its way hither, comprehending every nation from the Caspian to the North Sea—every occupation, and that physical ability we can measure from experience.

Correspondence

Are Copper Cartridges Unreliable in Cold Weather?

Messrs. Editors:—In your issue of May 20, I notice a letter from H. W. S. Cleveland, in which the statement is made that "copper cartridges are unreliable in cold weather." Now, this seems so strange and new to me that I am prompted to give my own experience in the matter. I have used a Wesson rifle nearly four years, and in all kinds of weather peculiar to this latitude. During this time I have used not less than one thousand cartridges—possibly nearly double this number—and they have never missed fire but twice. The first instance was a warm day in September, 1863; and, as it had never missed fire before, I was a little surprised; but on removing the cartridge and turning it around half way, it exploded on the first trial. The second instance was a very cold day in December following. After trying this cartridge till the end was full of indentations, I placed it in my pocket for inspection.

Now, what was the cause of these cartridges missing fire? I attribute the failure of the first to the absence of fulminating powder in the part first struck; but the failure of the second was not caused by cold weather, as a close examination proved. On opening this cartridge, I could discover no trace of fulminating powder! Both of these cartridges were taken from the same box. Now if cold weather destroys, for the time, the fulminate in the cartridge, why does it not also destroy the percussion cap? Before we accept this cold-weather theory, let us hear from others. What say you, riflemen?

L. H. PLAISTED.

Woonsocket, R. I., May 22, 1865.

The Trials of a Patentee.

Messrs. Editors:—Not feeling in a very amiable mood, I address you relative to the troubles of a patentee—myself, and others similarly situated. There appears to be an organized band of patent thieves in this place; their *modus operandi* is first to obtain, if possible, power of attorney to sell the patent. If successful the victim had as well engage in other pursuits, for he has given away his patent. If not successful, they try to buy portions of the territory, offering a very small sum, accompanied with the threat that they intend to sell it, with or without your consent, endeavoring to bully a poor fellow to accede to their demand. Both of these methods failing, then some one of the fraternity assumes to be the patentee, who commissions, with power of attorney, the others, and they go forth to victimize unsuspecting parties whenever and wherever they find an opportunity. The difficulty arising from their rascality to the patentee, is his liability to come in contact with persons buying of them, and having to satisfy them that they have been "sold"—to use a slang phrase—which is a serious one sometimes. Now, if there is no mode to bring these gentry to justice there should be. They are irresponsible parties so far as property "comeatable" is concerned.

I hope you will call attention to these pests through your valuable publication, for they are the cause of much of the deep-rooted antipathy to patent venders. I don't care how good a patent a man has to sell, he is looked upon as a swindler—making it a very disagreeable business to persons of sensitive natures. If a law of Congress could be obtained that might reach the offenders more direct, and without such enormous expenses, it would confer great favor upon many honest and poor inventors.

A. C. T.

Galesburg, Ill., May 12, 1865.

[We publish our correspondent's letter with the hope that it may lead to the exposure of the characters to whom it refers. If one or two of them could be tried and punished as swindlers, it would speedily break up the practice complained of. Patentees should be very careful not to commission unworthy men to sell their rights. The business of selling patents is just as reputable as any other sanctioned by law, and just as few swindlers are engaged in the business as in any other. There are plenty of rogues in all trades and professions.—Eds.]

Proposed National Monument to Abraham Lincoln, at Springfield, Ill.

Messrs. Editors:—About three miles from Springfield is situated "Oak Ridge Cemetery," one of the burial places of the city. Within the public tomb which is used as a place of temporary interment for the remains of those whose friends do not desire an immediate burial in the earth, in compliance with the wishes of his family, are, for the present, deposited the remains of Mr. Lincoln. Before the wishes of Mr. Lincoln's family had been made known to the citizens of Springfield they had purchased the family property of Mrs. Mather, containing eight acres of land, on which is a valuable house, and constructed a tomb thereon, the whole costing fifty thousand dollars. On this piece of ground they propose erecting some monumental structure of a national character, and are now actively engaged in soliciting, from all parts of the world, subscriptions—limited to not over five dollars—from such as feel disposed to contribute.

For many years to come Mr. Lincoln's remains will have to be guarded with sleepless vigilance, and immediate steps should be taken for their greater security, by enveloping them in masses of ponderous stone and iron, of such size and weight that even friends, with the assistance of the best mechanics, cannot get to them in less than twenty-four hours. At present there are one or two companies of soldiers guarding the tomb, but that is not sufficient security against the Booth sympathizers, many of whom, in retaliation for the unknown disposition of his body, would undertake and accomplish—unless every possible obstacle is presented to their villainous designs—the removal and concealment of Mr. Lincoln's remains. Somebody has acted unwisely in the disposition of Booth's body, and if it can be given up to his relatives sound policy would dictate that they should have it. The probability is that they would not take it, and that would be the end of the matter.

The erection of a testimonial in the form of a mausoleum, commemorative of such a great and good man as Mr. Lincoln, and of one of the most remarkable events in history—to be of a character corresponding with the fame, wealth and power of this nation—should be, architecturally, on the grandest scale, combining evidences for succeeding generations, in marble, stone, iron, brass, bronze and glass, of the skill and qualifications of our artists and artificers. In dimensions, it should be sufficiently spacious for the allotment to each State of the Union of ample room, whereon to erect monumental evidences of their sympathy, surrounding the principal testimonial with sculptural effigies of their noble sons who have made an immortal record during the rebellion. Foreign countries should also have their appropriate places for the expression of their silent regard, and the principal monument itself should be a pedestal on which is erected a statue of Mr. Lincoln—natural size. There is no monumental record that has, or ever will, preserve the memory of the great dead more than a few centuries. History, and their effigies stamped on coins and medals, are the only records to be relied on. Mr. Lincoln has made his history; the people of the United States, acting through their Government, should make the other part. Five millions of dollars worth of gold made into medals, impressed with Mr. Lincoln's effigy, and the suitable inscription, of denominations of five, ten and twenty dollars; one million dollars worth of silver made into medals of various denominations, and one hundred thousand dollars in bronze medals, should be minted at the United States mint and sold for double their value, the profit on their sale to constitute a fund for defraying the expense of erecting the National Testimonial. Those medals would be purchased by his friends, and, in course of time, would get into circulation at their value as money. Many of them would be lost and buried, and thousands of years hence would be brought to light and preserved in the cabinets of the curious.

J. T. D.

Springfield, Ill., May 18, 1865.

A Household Steam Engine.

Messrs. Editors:—May it not be profitable just now to examine the subject, and see if we cannot awake the attention of engineers to the importance of using far less water in boilers than the present system demands?

One cubic foot of distilled water weighs 62½ pounds, and contains 1,728 cubic inches; if we take a second of time as a unit of time, on the basis of evaporating 1,728 cubic inches of water to realize a horse-power per hour, one second is the 3,600th part of the time and also of the water, or 0.48 of a cubic inch, being in weight 121.53 troy grains, or a trifle less than a half cubic inch of water to be evaporated per second, to obtain during a second, one-horse power.

As air passes into a vacuum at about 1,800 feet per second, and steam, being specifically lighter, passes with greater speed, it occurred to me that, as we have many engines performing several revolutions in the second, and that as condensation practically takes place instantly, there should really be no serious difficulty in the way of making manageable household motor engines, worked from a boiler containing but a fraction of a cubic inch of water. After many experiments, I was enabled on a small scale to evaporate and condense at the rate of three revolutions per second, using the same water for steam and for a vacuum, thus practically obtaining a condensing engine. I also applied a modified plan to pump water and to drive a foot lathe. In working these motors I kept in view the need of maintaining uniform conditions. The result is hopeful for progress, and I trust the time is not greatly distant when small steam motors shall be as common as are eight-day clocks.

JOHN JOHNSON.

Saco, Me., May 23, 1865.

An Inventor's Letter.

Messrs. MUNN & Co.—Sirs:—My patent came to hand yesterday all right, and I embrace, with a great deal of pleasure, the earliest opportunity to tender my sincere thanks for the truthfulness and fidelity with which the business has been done on your part. I shall ever feel the greatest pleasure in recommending you to any one wishing to obtain patents, as gentlemen worthy of all confidence. When I first thought of patenting a horse-shoe I supposed I could go to Washington and do the business better than to employ any agent, relying on the old adage, "That if you want business done, send a man; if well done, go yourself." I think, in this case, the rule won't work, as no common man can obtain a patent any other way so cheap or quick as through your agency. Hence I must say I think your institution just the place for inexperienced men to apply who wish to obtain patents. Yours truly,

LORING M. GUTEAU.

Batavia, N. Y., May 12, 1865.

Copper Cartridges.

Messrs. Editors:—Noticing in your issue of May 20th a letter from Mr. H. W. S. Cleveland, stating that copper cartridges are unreliable in cold weather, I would state that for the last three years I have been in the daily habit of firing from 300 to 600 of these cartridges, and I never noticed any miss fire that I could attribute to the effect of cold. I have had some failures from defective manufacture. During the time referred to I must have fired at least 200,000 cartridges. My brother has had an experience almost equal to my own, and concurs with me in the opinion that the temperature has no injurious effect upon the reliability of this kind of ammunition. The cartridges we use are stored in a cold magazine, and are fired in a shed. No artificial heat in either place.

D. W. C. PERRY.

Boston, May 20, 1865.

Advantages of Publishing Inventions in the "Scientific American."

Messrs. Editors:—To show what inventors gain by having their inventions illustrated in your valuable paper, I will state that I have just received an order for one of my stove-dressing machines from Stockholm, Sweden; the parties ordering it having noticed the illustration therein. In fact I have sold a good many machines from the same cause. Hoping that all inventors will avail themselves of the advantage of having their inventions illustrated in your columns, I remain yours, truly,

JASON PALMITER.

Jamestown, N. Y., May 17, 1865.

A Generous Proposal.

Messrs. Editors:—I acknowledge the receipt of

two copies of the SCIENTIFIC AMERICAN, with thanks. I read them with pleasure, and would immediately subscribe but for poverty. Machinery has many charms for me—I love to reason and invent; for this I suffer. I have invented a machine that will work perpetually, and would like to give the invention to Gen. Grant, so that, without further trouble to me, the people of the United States could enjoy the benefit of a "Union Engine." All I ask is credit for the invention, which, for more than four years, I have believed to be the gift of God to man.

GEO. PARADOX HILL.

Davenport, N. Y., May 18, 1865.

Grafting Roses.

Grafting roses is not like grafting apples and pears; it is more of an intermediate process between budding and common grafting; the rose-grafters merely take a thicker slice of wood behind the bud than is done in budding—say a thicker and a little longer slice, and one bud only; then the stock needs only a like slice to be cut out of it, and the new bud and slice to be nicely fitted to the part without tonguing or wedging; nothing but to tie on the slice. Supposing you took a slice of bark and wood off a branch, and cut across the bottom to take it out fair, would it not be easy to stick on the same slice again, and tie it round with some soft binding? Of course it would; nothing was ever yet easier to learn in this world.

Rose-grafting is quite as easy, only you take the slice from a different branch, which is all the difference. But clever practitioners do it still easier. They cut off the head of the rose stock, and leave only a little stump out of the pot; from the top of this stump they slice off about 1½ inch down, and make a cut across the bottom of the slice, which leaves a notch there, and on that notch they rest or fit the bottom end of the graft slice, then cut the top end of the slice square with the top of the stock, tie, and clay; sometimes they do not clay at all, but it is usual for ordinary people to put on a little clay for all kinds of grafts.

The best way to clay a rose graft and all pot grafts is, to put a lump of clay in a pot saucer and as much water as will make it into a soft paste, like very thick paint, and with a little brush paint the stock and graft all round, then dust it over with sand, which will keep it from cracking, and all is finished. Gardeners make their own brushes for this work; a bit of soft matting tied on the end of a stick like a pen-holder is all they require. When you hear of people grafting roses in-doors, the plan is still more easy. There is no pot or mold, only so many rose stocks lifted out of the ground on purpose, and any of the ways of grafting will do.—*Journal of Horticulture.*

Subsidence of the Earth's Crust.

The commune of Buonanotte, in France, is hourly menaced with utter destruction. Five manufactories have already been overthrown, and sixty-four more are threatened with imminent ruin. The inhabitants have fled in the greatest consternation to the neighboring villages. The cause of the disaster is a sudden and violent depression of the soil, which is at the present time accounted for by one of two reasons—either the fall of an immense mass of earth in the west of the district, or the yielding of the roof of an extensive subterranean cavern. But in reality nothing certain is yet known as to the cause of this most deplorable event. A number of civil engineers have hastened to the spot, and prompt measures are in course of adoption to prevent still greater disaster.

Life-saving Apparatus.

Signor Vallo, of Philadelphia, informs us that he has just patented an invention to prevent the wheels of railway cars from running over persons, who, from accident, may fall on the track. It is to be thoroughly tested on Tenth and Eleventh streets, of that city, shortly, and if successful he is to receive \$25,000 for the right for the United States. He intends having the invention illustrated in the SCIENTIFIC AMERICAN, with a full description.

In the dwelling houses lighted by gas, the frequent renewal of the air is of great importance. A single gas-burner will consume more oxygen, and produce more carbonic acid to deteriorate the atmosphere of a room, than six or eight candles.

Improved Hollow Auger.

Hollow augers are generally used by wagon makers and wheelwrights for tenoning the end of the spoke where it enters the felly; they may be used, however, on any other work requiring similar treatment.

This auger is remarkable for the celerity with which it can be accurately adjusted to any desired size. This is done by turning the plate, A, Fig. 2. This plate is also shown in Fig. 1. The ends of the jaws, B, are received in the scroll grooves, C, and the jaws themselves are forced in or out by turning the plate in one or the other direction. Two of these jaws have cutters, D, while the other two are guides to prevent the cutters from taking hold too rankly. When the cutters are set properly they are held fast by turning the nut or collar, E, at the back. This auger is intended to be used with a brace or power, and has a square shank or rod on one end to adapt it for either purpose. Mechanics using these tools will find this one convenient. One especially for chairmakers' use is now in course of manufacture. It is made by the Douglas Manufacturing Company; address them or Sargent & Co., at 70 Beekman street New York.

GRAPERIES AND HORTICULTURAL BUILDINGS.

One of the most delightful objects of interest to be met with in the city of Paris, in the month of June, is the extensive exhibition and sale of rare and beautiful flowers. The art of flower and fruit culture has attained much greater perfection in France and England than in this country. We are a bustling, money-getting people, and, as a general thing, consider the time given to mere flower culture as so much wasted. This taste, however, we are happy to observe, has greatly improved within a few years, and the business of the nurseryman in this department is now quite large. An extensive grower of hot plants, from information carefully gathered among his fellow nurserymen, estimates that the plant trade of the vicinity of New York reaches nearly the sum of \$200,000 annually. One cultivator has stated, that during the fall of 1863 and winter of 1864, he cut and sent from his establishment 230,000 blooms of the various flowers he cultivates.

Small greenhouses or conservatories attached to dwellings are now frequently met with, both in city and country, and when joined to the dwelling to be entered from some one of the principal rooms, forms a feature of great attractiveness and pleasure.

The culture of choice varieties of exotic grapes is also rapidly increasing, both in hot and cold graperies. The luscious Frontignac and the Hamburg will repay the care and expense of a well-constructed glass-house for their propagation. There is no great mystery in regard to their culture, for any person of ordinary capacity can soon learn how to manage them. One of the most important things connected with the cultivation of rare grapes and flowers is to have a thoroughly-constructed glass-house. Information upon this subject is fully supplied in a recent volume entitled "Woodward's Graperies and Horticultural Buildings," just published by Geo. E. and F. W. Woodward, No. 37 Park Row. It contains twenty designs, and supplies a great amount of practical information hitherto difficult to be obtained except from professional men.

The Oil Regions.

A disgusted newspaper correspondent in the oil regions writes to a Cincinnati paper from Oil City:—"It is really astonishing to what indignities the people who are hunting oil will submit. The hotels are crowded and dirty. The street is one sea of diluted mud, which the struggling horses splash and splatter all over the houses and people. It is worth the price of a good suit of clothes to promenade Main street in Oil City for two days. But oil seekers

do more than this. They go on foot up the creek to the 'oil diggings,' over such roads as they never before walked on. And here, too, they are subjected to the same splashing process that prevails on the streets of the city. The road is but a continuation of the streets in all respects, and the pedestrian finds every tired horse or mule on the way just in the act of stumbling over some hidden rock, at the critical moment when his blundering foot can scatter most of the diluted mud. The result of this state of things

with two brass heads, A, one of which is connected to it, while the other—the top—is movable on it. The springs, B, are fastened to these heads at the top and bottom, and when rotary motion is applied to the shaft the balls on the springs fly out, precisely the same as with the old-fashioned governor; this causes the top, A, to move down on the shaft and depress the valve stem, which runs through it, thus regulating the flow into the steam chest of the engine. The valve itself is balanced, and is a cylinder with circular openings.—The speed at which this size runs is 475 revolutions per minute.

Large numbers of them are in use in various parts of the country, and in a recent visit to this office the inventor informed us that he was much behind his orders. It is very reliable, not apt to get deranged, and, in other respects, suitable for the purpose required of it.

This invention was patented through the Scientific American Patent Agency, Oct. 7, 1862, by Thos. R. Pickering, of New York; for further information address Pickering & Davis, No. 144

Greene street, New York City.

New Apparatus for Compressing Air.

An English journal thus speaks of a new method of compressing air, lately designed abroad:—

An improved apparatus, by means of which atmospheric air or gases may be compressed in volume to a far greater degree than has yet been accomplished by other means, such highly compressed air or gas being applicable to various useful purposes, has been provisionally specified by Mr. T. Conghin, of Bermondsey, England. He proposes a succession of pumps and receivers, the first pump receiving a supply of air from the atmosphere, and forcing the same into a receiver, whence it is conveyed to a second pump, already compressed; the second pump is then brought to bear upon the compressed air, which is then forced into a second receiver, and so on to a third or further series, and ultimately into a chamber or receiver of any kind or form, according to the purposes for which it is required. He proposes to make the diameter of the first pump larger than the second, and the second larger than the third, in order to compensate as far as possible the power required to actuate each according as the air or gases are more and more highly compressed in each. The pumps are to be set on a suitable foundation, above which, on standards, a shaft and fly-wheel are supported, to be turned by hand or steam power; on the shaft an eccentric or crank is keyed, in order to work the plunger of the first pump. The shaft is also provided with a cog wheel and pinion, on each side of which is a shaft and toothed wheel gearing with the central pinion, in order to actuate by similar eccentrics the other two plungers of the pumps. If more pumps are required they may be connected by similar gearing. The toothed wheel actuating the third pump should have a greater number of teeth than the second, in order that it may travel at a slower rate to operate upon the densely compressed atmosphere or gas; underneath, or at the side of each pump, is its receiver, connected by suitable tubes and valves, the whole series of pumps and receivers being thus in communication.

A METHOD has been discovered in Belgium to obtain a photographic groundwork for oil paintings. Fine canvas or silk, such as is employed for small and delicate works, is used. The process is simply to cover the surface with a preparation of collodion and chloride of silver, and expose and prepare it in the ordinary manner, just as in the case of paper.

THE King of Italy intends sending to the International Exhibition at Dublin a topaz weighing several pounds, and eight or nine inches long, having on it a beautiful engraving of "The Last Supper."

Fig. 1

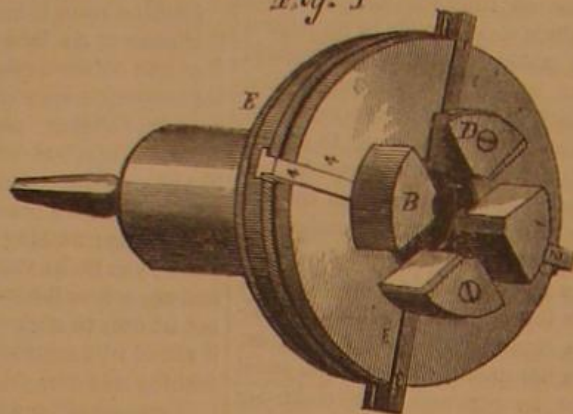
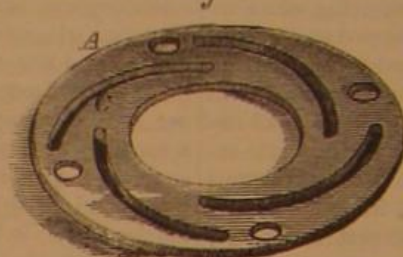


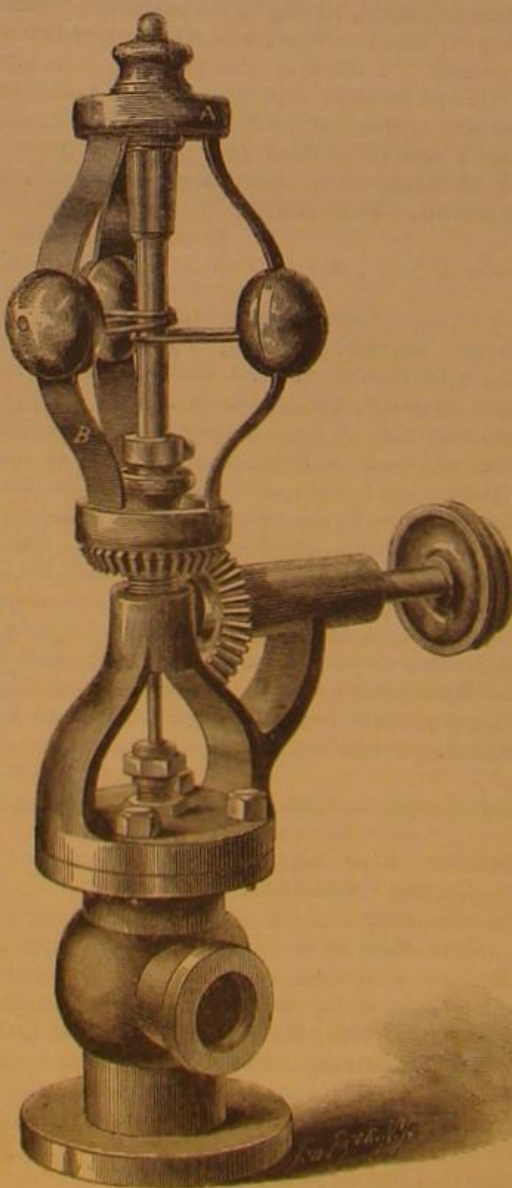
Fig. 2

**EXPANDING HOLLOW AUGER.**

is apparent. Thousands who come to see are satisfied—no, disgusted—with the first night, and rush away by the morning train. It requires the impetus of a sure prospect of gain to induce one to remain more than a day, while only those who are making a 'pile' will consent to live here."

PICKERING'S GOVERNOR.

A very noticeable feature in this governor is its simplicity. It is free from joints and pins that must



fit tightly to operate properly, and has the fewest possible pieces to obtain the desired end—a certain and rapid control of the motion of the engine.

In detail, this governor is merely an upright shaft

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LEATHER BANDS.

The horse-power of belting or the tractive force exerted by leather bands of a given width, at a certain speed expressed in foot-pounds, or in any other positive way, is not generally known. We do not know what it is, although we have some half dozen rules professing to give a unit for a horse-power, which are obviously incorrect. A horizontal belt of a given length will drive more than a vertical belt of a given length; a long belt more than a short one, and a twisted belt more than either, because in the case of the horizontal and the long belt, the sag and weight tend to produce closer contact and resist strain better than where the belt merely hugs the pulley by its tension; the same is true of the crossed belt, which embraces more of the circumference of the wheel driven.

Eight hundred feet per minute velocity for a one-inch belt is said to give a horse power; four hundred for a two-inch belt will give the same; but these statements appear so crude and unsatisfactory that we place no reliance on them, and we want more facts and less fancy when dealing with such subjects.

The dynamometer affords an easy, simple and cheap method of testing strains, or the transmission of power from one machine to another, and a few experiments by it would settle forever all doubts and uncertainty on this point. The dynamometer merely weighs strain as a butcher weighs meat, and with the same instrument—a spring balance. If a lever be made with a bearing, cap and bolts at one end, and the same fitted to a shaft, and if a spring balance be applied to the other, by weighting the lever until it balances the tendency to raise imparted to it by the shaft, we shall have an exact record of the actual number of foot-pounds of work or strain exerted by the machine tested, when the relations between the diameter of the shaft and the length of the lever are considered. Of course, with such a dynamometer there is great friction, and if the test is continued long, much heating on the shaft occurs, which would interfere with a correct result; one sufficiently correct for practical purposes may, however, be obtained if the experiment be made properly.

There are many other forms of dynamometers for weighing or observing the force of machines, but it seems unnecessary to consume space with details of them, when it is apparent to all persons, who would be likely to undertake the experiments here recommended, what such apparatus should be.

Some things relating to the action of belts are but imperfectly understood, for although Morin's experiments have demonstrated the relative resistances of belts on pulleys of different materials and surfaces,

such as rough cast iron, smooth cast iron, wood, etc., he has not informed us of their position, their nature, whether vertical, horizontal or twisted, and whether the ratio of resistance increases in regular progression from a belt one inch in width at 400 feet up to a belt 30 inches wide, at the same velocity. It is obvious that these matters exercise a great influence on the transmission of power by belting.

From an experiment at one of our largest machine shops, it was found that gearing absorbs less power than belts, and that the force required to work the latter is extremely variable, depending upon the tension, the condition of the surface of the pulley, and minor matters. This fact was deduced from observing the working of a fan blower, and is to be received with caution, for it has hitherto been supposed that gears consumed more power than bands, and these results may be due merely to the peculiar arrangement of this special machine. It is a fact, however, that the use of sawdust, resin, or similar substances, to increase the adhesion of the belts to pulleys, as also the employment of idler pulleys, or rollers suspended against belts to keep them up to their work, also the divergence of belts from right lines or carrying them at acute angles about rollers fixed in walls, add greatly to the expense of working them.

Since belts are so universally employed, a series of experiments on this subject would be invaluable, and we hope that those who have the time and the means, as well as others who possess experience derived from actual practice, will send us what information they may possess on this subject.

LETTERS FROM THE PEOPLE.

It is our custom to appropriate each week a liberal space in our paper to the publication of letters from our readers. These contributions we esteem of much value; they are always acceptable. The only complaint we have to make is that so few, comparatively, of the many thousands of readers of the SCIENTIFIC AMERICAN avail themselves of this open medium through which to make known their thoughts and experiences. In all the departments of science, art, and industry, there are practical subjects which ought not to be locked up from the reading public.

Many intelligent manufacturers and mechanics hesitate about writing to the editor of a newspaper for fear of some unfriendly criticism upon their productions; hence, under this mistaken idea, they withhold the expression of their views, and the people are thus deprived of much valuable information. We wish to urge upon our readers, of every trade and profession, to constitute themselves our correspondents. They need not fear captious criticism, but in all cases their contributions will receive careful and considerate attention, and if admitted to our columns the writers will not have to regret that their thoughts are not clothed in good apparel.

We especially urge our mechanics to send us communications, giving the result of their practical knowledge. By adopting this suggestion, they will not only benefit themselves, but will also assist their fellow-workers who may be following the same trades.

PETROLEUM FOR STEAM SHIPS.

The idea of using petroleum for generating steam has appeared to us from the beginning of the discussion so preposterous, that we have incumbered our columns with very little matter in relation to it; but our attention has just been called to it in a way that prompts us to give a statement of the few controlling facts that settle the question, some Spanish gentlemen having called upon us with a letter from a Spanish official requesting information on the subject.

Anthracite coal is worth at the present time about one third of a cent per pound, and crude petroleum is worth about four cents per pound—twelve times as much. For petroleum to be economical, therefore, for generating steam, it must be twelve times as efficient as coal.

According to the nice determination of Favre & Silberman, 1 pound of carbon in burning generates sufficient heat to raise the temperature of 8080 lbs. of water one degree of the centigrade scale. Twelve times this is 96,960, which is consequently the number of pounds of water that must be raised one degree in temperature by the burning of one pound of petroleum, in order to make that substance more

economical than coal. Now, the substance that generates in burning more heat than any other, is hydrogen gas, and a pound of this will raise the temperature one degree of only 34,462 lbs. of water.

We find no record of direct experiments upon the heating power of petroleum later than those of Count Rumford, and these gave a result of about 7,000 units; but, though he was a very careful observer, the later experiments of Andrews and of Favre & Silberman were made with so much better instruments, and with so much greater knowledge of the conditions, their determinations in relation to other hydrocarbons will doubtless be received as a better indication of the heating power of petroleum than Rumford's direct observations upon that substance. With five hydrocarbons, composed of the same elements as petroleum and in about the same proportions, Favre & Silberman obtained the following results, the figures being the number of pounds of water raised one degree, centigrade:

Olefiant gas..... C_2H_4	11,858
Amylene..... C_6H_{10}	11,491
Paramylene..... $C_{10}H_{20}$	11,303
Cetene..... $C_{16}H_{32}$	11,055
Metamylene..... $C_{20}H_{40}$	10,928

From the similarity of its composition with these substances, it is doubtless safe to infer that petroleum in burning will not raise the temperature of more than 12,000 times its weight of water one degree of the centigrade scale; that is, once and a half times as much as carbon. Therefore for it to supersede coal it must be sold at about one-eighth of its present price—four cents per gallon.

THE ART OF OBSERVATION.

No subject that has been broached in our columns has excited a wider interest among our readers than the question, whether a piece of solid metal will float on a mass of the same metal melted; and one of the most curious features in the discussion is the striking contrast in the result of experiments by different observers. In the report of the proceedings of the Polytechnic Association, published on another page, it will be seen that Mr. Smith, a remarkably capable observer, has just tried an experiment which convinces him that a piece of solid zinc will always sink in a mass of molten zinc, while Dr. Rowell, an observer not less competent, asserts that he has tried the experiment twenty times, and if the temperatures are nearly the same solid zinc will always float on melted zinc.

In a certain stage of intellectual development men are apt to conceive that the highest prerogative of genius is the construction of theories, but Agassiz says, that the last and most difficult acquirement in the culture and growth of the mind, is the art of observation. The longer any man lives and the more intercourse he has with the world, the more will he be impressed with the uncertainty of human testimony; not from the disposition of people to tell falsehoods, but from their carelessness of observation and of statement.

We shall, doubtless, some time receive a paper giving an account of a series of experiments undertaken by some experienced and wholly competent observer, which will settle this question in relation to the floating of metals. In such a paper we shall have a full description of the apparatus employed, a statement of the methods adopted to obtain the metals perfectly pure, and to test their purity, of the means for measuring the temperatures of both the molten and solid masses, and finally of all the conditions which could in any way vary the results. To give such a paper any value among men of science, it must be manifest that the observer's mind was not obscured by preconceived notions, but that he had singly in view to arrive at the exact truth, and that he had sufficient knowledge of the metals, and of the influence of changes in their physical conditions, to conduct his experiments in a way to lead to positive results.

It is impossible in one short article to point out all the numerous sources of error, but it is very certain that whoever enters the field of original research in physical science, will, at every step, discover new reasons for being cautious in regard to his conclusions, and will receive new lessons in relation to the importance of intelligence, method, care and thoroughness in making observations.



ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING MAY 23, 1865.

Reported Officially for the Scientific American.

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.

47,781.—Brush.—Albert Alden, New York City:

I claim the notched segmental plates, B, in combination with the head, A, handle, C, and with the pivot, a, and spring catch, b, all constructed and operating in the manner and for the purpose set forth.

47,782.—Hoisting Apparatus.—George Ambrose, New York City:

I claim, First, A hoisting apparatus which employs an elevator, C, adapted for receiving and holding in place rods, or other portable vessels, guideways, A, A, pulley rope, c, pulleys, a, b, and drums, e, f, g, together with a brake, all arranged and operating substantially as described.

Second, Providing the elevator, C, with racks, which are adapted for receiving and retaining in place portable rods, a, s, substantially as described.

Third, Spring latches, m, m, and levers, n, n, in combination with the guides A, A, and elevator or rod-rack, C, substantially as described.

47,783.—Kitchen Range Boiler.—Joseph H. Ash, Brooklyn, N. Y.:

I claim the improvement herein described in the manufacture of copper boilers, the same consisting in forming in each head of the boiler, a suitable groove or channel having parallel concentric walls perpendicular to the bottom extending entirely around the same, in which the body of the boiler is placed, and soldered in any proper manner, substantially as above described, and for the purposes specified.

47,784.—Machine for Lubricating Bullets.—Albert Ball, Worcester, Mass.:

I claim, First, The combination with a cylinder or proper receptacle for holding the bullet, of an opening to admit the lubricating matter to the groove in the bullet, and a vent hole for the escape of the air, substantially as described.

Second, The combination with a cylinder or chamber for holding the bullet of a reservoir or reservoirs for holding the lubricating substance, and a plunger or its equivalent for forcing the lubricating matter while confined into the groove in the bullet, substantially as set forth.

Third, The combination with the bullet cylinder, C, of the piston, D, and valve, H, substantially as described.

Fourth, The construction and arrangement of mechanism in such a manner that bullets may be sized, and their groove or grooves filled with a lubricating substance at one and the same operation.

47,785.—Shears for Marking Cattle.—Silas D. Baldwin, Chicago, Ill.:

I claim, First, The adjustable blade, I, when provided with a conical-shaped edge so as to give it a shear cut.

Second, The slot, h, in the back of the blades, I, and J, in combination with the screw, b.

Third, The combination of the conical edged blade, I, handles, A and B, with the set screw or guard, D, to regulate the width and depth of the incision.

Fourth, The plate, F, provided with the projection, G, and slots, c, d, or e.

Fifth, The conical blade, H, in combination with the projection, G.

Sixth, Placing two or more shear blades on a single arm of a pair of shears.

Seventh, In combination with the cutting devices herein described, I claim the adjustable blade or die, J, in the manner and for the purpose set forth.

Eighth, The lubricating depository or cup, C, when attached to the handle or arm of a pair of shears.

Ninth, The combination of the slotted plate, F, blades, I, or H, spring, E, and guard, D, with the handles, A, and B.

47,786.—Gas Burner.—John A. Bassett, Salem, Mass.:

I claim a burner for burning carburetted air or gas, having the parts arranged and constructed substantially as herein described and set forth.

47,787.—Gas Burner.—Herman Berg, Union Hill, N. J.:

I claim a gas burner provided with a chamber, c, containing pulverized carbon or other absorbent material, and with a spring valve, g, closing up on an aperture, f, by the pressure of the gas, substantially as and for the purpose set forth.

47,788.—Rendering Pan.—Andrew Black, New York City:

I claim, First, The radial openings, a, a, sliding dampers, b, b, and split horizontal circular flues, D, E, the whole arranged in relation with each other, and with the fire-place and pan, substantially as herein described for the purpose set forth.

Second, The combination of the perforated false bottom, G, and the rotary stirrer arranged between the said false bottom and the bottom proper of the pan, substantially as and for the purpose herein specified.

Third, Providing a melting pan with a cover, N, having an outlet to a drain or sewer, but otherwise closed, substantially as herein described.

Fourth, The employment in combination with the cover of a melting pan having only an outlet to a drain or sewer, of a system of collecting plates, R, R, gutters, n, n, or other equivalent surfaces for the collection of condensed steam or other vapors eliminated from the melted fat contained in the said pan, and the conveyance of the same to the outlet of the cover, substantially as herein specified.

Fifth, In combination with the cover of a melting pan having only an outlet to a drain or sewer, I claim a condenser arranged between the said outlet and the drain or sewer, substantially as and for the purpose herein set forth.

47,789.—Bed Bottom.—Charles D. Blinn, Port Hudson, Mich.:

I claim the bed bottom above set forth, constructed substantially as herein described.

[This invention consists in a novel construction of spring-bed bottom, the elasticity of which is produced altogether by wooden slats connected to each other and to the bedstead in a peculiar way, so that the frame of the bed bottom is affected by pressure on any part of it, and its different parts are made to bear a share of the load.]

47,790.—Steam Boiler.—Charles T. Boardman, Pawtucket, R. I.:

I claim, First, The arrangement of the two cylindrical boilers, A, A, the tubular boiler, B, and the laterally inclined connecting water legs, C, C, substantially as and for the purpose herein specified.

Second, In combination with the two cylindrical boilers, A, A, tubular boiler, B, and water legs, C, C, of their setting, I claim the pier, E, and connected parallel upright walls, F, arranged substantially as herein described.

Third, I claim the gas and air-mixing chamber, H, bridge wall, I, and air duct or ducts, b, in combination with each other, and with the bridge wall, J, pier, E, and ash pit, a, substantially as herein set forth.

Fourth, I claim the combination of the boilers, A, A, B, fireplace, G, mixing chamber, H, side flue, d, and return flue, g, the whole arranged substantially as and for the purpose herein specified.

47,791.—Automatic Boiler Feeder.—Joseph N. B. Bond, New York City:

I claim the expansible pipe, B, arranged in combination with the tank K, and boiler A, substantially in the manner and for the purpose set forth.

[This invention consists in the employment or use of a pipe made of brass or some other material, which expands greatly by the influence of heat, said pipe being secured in suitable rigid bearings at a level with the mean water line of a steam boiler, and made to communicate with the water and steam space of the same in combination with a tank, situated above the boiler, and supplied with water from a suitable reservoir, and also made to communicate with the steam and with the water space of said boiler in such a manner that when the water in the boiler sinks below the mean water-line the expansible pipe is exposed to the direct action of the steam and thereby caused to buckle up, and by this action a cock is opened and steam admitted to the upper part of the tank, causing the water contained therein to sink down into the boiler, and when the water rises above the mean water-line, the expansible pipe cools off and recedes to its original position, and the further supply of water to the boiler is stopped.]

47,792.—Steam-Engine.—George B. Brayton, Boston, Mass.:

First, I claim the variable and self-adjusting cut-off, arranged and operated by the governor as described, for equalizing and rendering uniform the action of steam-engines.

Second, The combination with the ordinary slide or D-valve of auxiliary steam ports and slide valves, under the arrangement and for operation in the manner substantially as set forth.

Third, The method herein described of connecting the oscillating arm with the slide or D-valve, affording yielding connection so as to admit of the valve reciprocating along the plane surface of, and in contact with, the valve face.

Fourth, The method herein described of operating the auxiliary valves, hung upon the end of an inlet balance beam by means of a rocking lever, yet so as to admit of traverse motion of the balance beam, together with the main valve, substantially as shown and described.

Fifth, Regulating the action of the auxiliary or cut-off valves by means of the cam, expandible by the action of the governor, substantially as set forth.

47,793.—Oil Ejector.—Abel Brear, Saugatuck, Conn.:

I claim in combination with my arrangement of the oil or discharge tube and the blast tube of an ejector, the lower socket, A, constructed with a central passage, a right through it, and with an annular cavity, by surrounding the said passage and communicating with the nozzle, c, arranged within the said passage, substantially as and for the purpose herein specified.

47,794.—Preventing and Removing Scale in Steam Boilers.—Jacob Buzby, Philadelphia, Pa.:

I claim the use of gambur for removing scale from steam boilers as described.

47,795.—Evaporator.—Wm. Canning, New York City:

First, I claim the construction of the rotating disk or disks of a rotary evaporator, of a conical or dish form, substantially as and for the purpose herein specified.

Second, The arrangement of such disks in such manner that they overlap each other upon a hollow central shaft, in which there are openings between the said disks, substantially as and for the purpose herein set forth.

47,796.—Ship's Defensive Armor.—Stephen D. Carpenter, Madison, Wis.:

I claim wrought-iron or steel perforated plates, with dovetail corrugations and the chilled cast-iron facing and backing, with the attached staples, all for the purposes and substantially in the manner herein described.

47,797.—Bed Bottom.—P. G. Chase, Berlin, Wis.:

I claim the improved spring-slat for bed bottoms or analogous purposes, consisting of a chamber slat, B, in combination with the spring tension rod, D, connected to the slat at or near its ends, for the purpose of increasing its power of resisting depression, substantially as described.

47,798.—Identifying Ticket for Railroads, Etc.—Anning S. Chittenden, Bergen County, N. J.:

I claim the combination of the several parts herein described to form an identifying railroad or other ticket, substantially as herein set forth and for the purposes described.

47,799.—Broom.—John M. Clark, Dayton, Ohio:

I claim the thin, elastic and yielding wrapper, represented in Figure 1, constructed and applied to the brush and handle of a broom, in combination with the ribs, e, e, in the manner substantially as, and for the purpose described.

47,800.—Baling Press.—F. F. Cornell, Jr., New York City:

First, I claim the formation of a close chamber in the press by means of the traveling sides of the chamber, substantially as described.

Second, I also claim the side slip, N, in combination with the traveling sides of the press, for facilitating the removal of the finished bale from the press, substantially as described.

47,801.—Iron Railing for Fence.—Sommers Crowell, Philadelphia, Pa.:

I claim constructing the railings, B, with the recesses, C, on each side, having the open side of the recesses on one side of the railings, alternating with those on the other side, thereby forming openings without the use of cores, for the reception of the horizontal bars, A, substantially in the manner hereinbefore described.

47,802.—Washing Machine.—Ephraim Culver, Shelburne, Mass.:

I claim the combination and arrangement of chest, O, and lid, B, with perforated division boards, c, c, and beater, D, and wheels, E E E E, and lever, I, and connecting rod, h, operating in the manner and substantially as above set forth, for the purpose specified.

47,803.—Percussion Fuse for Explosive Shell.—John A. Curran, U. S. Army:

I claim the combination of the plunger, h, spring, i, detent spring, j, weight, k, and arm, o, when constructed and arranged to operate as and for the purposes herein specified.

[This invention consists in so constructing a shell as to place the preponderance of its weight forward of the middle of its length, and in forming a groove in its forward part, and fitting a soft metal ring therein.]

47,804.—Boring Tools for Artesian Wells.—Henry H. Daniels, Philadelphia, Pa.:

First, I claim the instrument composed of the plates, A and A', levers, B and B', and guided bar, D, with its projections, I, the whole being constructed and arranged in the manner and for the purpose herein described, and illustrated in Figures 1, 2 and 3.

Second, The modified instrument composed of the plates, A and A', levers, B and B', guided bar, D, with its pins, g, g, or their equivalents, the whole being arranged and operating substantially as and for the purpose herein set forth.

47,805.—Rock Drill.—Julius C. Dickey, Saratoga Springs, N. Y.:

I claim the drill, A, with a circular cutting edge, in combination with the recess, C, for the purposes set forth.

47,806.—Saw-setting Machine.—Charles Diston, Philadelphia, Pa.:

I claim, First, In combination with the hammer and anvil of a saw-setting machine, the automatic mechanism herein described or the equivalent to the same, for supporting the back edge of the saw, and elevating and lowering the same to the manner and for the purpose specified.

Second, The feed lever, O, in combination with the cam, H, and spring, g, or their equivalents, whereby the within-described movement is imparted to the said lever, for the purpose specified.

Third, The ledge or projection, d, and plate, e, arranged in respect to the anvil as set forth, for the purpose described.

47,807.—Harvester.—John A. Dodge, Auburn, N. Y.:

First, I claim the main frame, A, when cast in one single piece in the form and manner described.

Second, In combination with the main frame, A, as described, I claim the arms, H and U, projecting from the front and rear inner corners, for the purpose described and set forth.

Third, In combination with the frame, A, I claim the combination and arrangement of the wheels, e and f, the geared wheels, g and h, and the shafts, c and d, when the shaft, c, is placed beneath the shaft, d, for the purpose of placing the pitman wrist as nearly in line with the center bar as possible.

Fourth, In combination with the arms, C, and the pulleys, J and a, I claim the lever, H, situated and operating as described.

Fifth, In combination with the main frame of a harvesting machine, and the lifting bar, b, I claim the stirrup, L, as described and set forth.

Sixth, I also claim the self-adjusting pulleys, pivoted at the foot of the reel post, substantially as and for the purpose set forth.

47,808.—Apparatus for Grinding and Amalgamating Ores.—M. B. Dodge, New York City:

I claim the attaching of the shoes to the miller by pivots, or in such a manner that they will work or adjust themselves from a center or from a hinged or pivoted point, with or without springs, substantially as set forth.

47,809.—Breech-loading Fire-arm.—William H. Elliot, Plattsburgh, N. Y.:

I claim, First, The combination of a hammer, d, with a swinging breech plate, e, and a brace, e, when these devices are pivoted together substantially as described.

Second, Attaching the main spring, k, to swinging breech plate, e, by means of a pivot, u, substantially as and for the purpose herein specified.

Third, So arranging the attachments of a main spring to a hammer and to a swinging breech plate that the power of the main spring shall tend to throw the breech plate forward when the chamber is closed, and to throw it back when the chamber is open, substantially as herein shown.

Fourth, Operating upon the point of the trigger to prevent it from catching into the full cock notch by means of cam, S, when both the breech plate and hammer are thrown back together as herein described.

Fifth, So constructing and operating the hammer and brace in combination with a swinging breech plate, that said hammer and brace cannot both be moved at the same time, substantially as and for the purpose herein set forth.

47,810.—Composition for Lining Petroleum Barrels.—John Fox, Philadelphia, Pa.:

I claim the composition made substantially as above described, for sealing barrels and other vessels as set forth.

[This invention is designed to make wooden vessels impermeable to liquids, and it consists in applying to its interior surface a composition which will fill its cracks and joints and fill and cover the pores of the wood of which the vessel is made, so that liquids of a highly penetrative character, such as petroleum, cannot pass through the vessel.]

47,811.—Manufacturing Watch Keys.—George H. Fuller, Pawtucket, R. I.:

I claim making a winding key or key pipe in the manner and on the principle substantially as herein described.

47,812.—Drill Bit.—Wm. W. Grier and Robert H. Boyd, Hulton, Pa.:

We claim a drill or bit having the notch or recess at its central point as above described, in combination with the serrated cutting lips, a' a', substantially as shown and described.

47,813.—Sheep Rack.—Benjamin Griffin, Lawrence, Mass.:

I claim the covers, C, the swing doors, E, and the trap doors, H, for the purposes herein set forth.

47,814.—Machine for Making Tobacco Pipes.—Martin R. Griswold, Watertown, Conn.:

I claim, First, The combination of the spindle, E, constructed and operating substantially as described, with the cutter, B, as and for the purpose specified.

Second, The carrier, L, constructed and operating substantially as described with the spindle, E, combined as and for the purpose specified.

47,815.—Toy Spring Gun.—Albert Hall, New York City:

I claim the receiver, K, spring, C, and trigger, D, constructed and arranged, and combined with each other and with the slatted barrel, B, substantially as herein specified.

47,816.—Blind Fastening.—Samuel Hall, New York City:

I claim the fastener, a, constructed substantially as described for the purpose specified.

In combination with the window sash, B, I claim the hasp lock or its equivalent, constructed substantially as and for the purpose specified.

47,817.—Lock.—Wm. Hall, Brookline, Mass.:

I claim, First, Fastening the hub by means of the right hand screw, H', through the case of the lock, and the left hand screw, H'', or vice versa, combined with the check nut, v.

Second, Making the stump in two parts, S and S'.

Third, The peculiar arrangement of the lever, L, and the key, T, so that at the time the cog-wheels are thrown out of gear the bolt shall be immovable.

Fourth, The hollow adjusting screws, g, g', g'', g''', all of which operate substantially as described and for the purpose set forth.

47,818.—Pulverizing Tailing from Gold Washers.—James H. Hanchett, Beloit, Wis.:

I claim, First, The grinding disk, C, constructed as shown, and provided with the shaft, B, having the feather, b, thereon as and for the purpose set forth.

Second, I claim the grinding disk, D, provided with the internally geared flange, d, constructed and operating as and for the purpose herein set forth.

Third, In combination with the disks, C and D, and shaft, B, I claim the gear wheels, F and E, E, E, when all the parts are arranged to operate as and for the purpose herein set forth.

47,819.—Drilling and Boring Machine.—Herman Haupt, Cambridge, Mass.:

I claim, First, The employment in machinery for drilling or boring rocks or other hard substances, operated by steam or other electric fluid, of a momentum feed, as described, i. e., a mechanism to finely connect the piston rod with the drilling tool or tool holder in such a manner as that the hold shall be suddenly and automatically released at or before the completion of its forward stroke, to allow of the self-adjustment of the tool in relation to the rock, in accordance with the penetrability and the progress of the work, substantially in the manner set forth.

Second, In steam drills, or drills operated by air or other elastic fluid, I claim the combination, with a hollow piston rod, when used as a tool holder, of a gripper box arranged in the rear of the cylinder and back of the piston rod, substantially as set forth.

Third, In a drill operated by steam or other elastic fluid, I claim the momentum feed, as described, when applied to the transitory movement in combination with a positive rotary feed of the drilling tool, and whether the two feeds are simultaneous, reciprocating or intermittent in their action with respect to each other, substantially as set forth.

Fourth, The arrangement concentrically with the drill or tool of the gripper box, containing a series of wedges held in place to firmly grasp the tool, through the agency of a spring in combination with a stationary anvil ring forward of the gripper box, for operation as set forth.

Fifth, In combination with the gripper box, operating as described, I claim the arrangement for driving the wedges home against the tool, to grasp the same with the full head of steam or the actuating power by, causing the rear end of the hollow piston rod to butt against the heads of the wedges, as described.

Sixth, In combination with the gripper box, constructed and arranged as described, I claim the follower to expand the wedges, for the purpose of releasing the drill tool or tool holder, substantially as set forth.

Seventh, Recessing the stationary check or anvil ring so as to leave projecting studs corresponding to similar studs in the forward end of the gripper box, in such manner as that the momentum feed shall be alternated by blows under full head of steam, substantially as set forth.

Eighth, In combination with the means described for producing rotary motion of the tool, I claim the auxiliary ratchet and dog or the mechanical equivalent thereof, for the purpose of preventing the tool from turning back after each rotation, substantially as set forth.

47,820.—Railroad Chair and Coupling.—Wells Hender-shott, Batavia, N. Y.:

I claim making a rail chair and coupling, with a base plate, g, g, with square flanges, f, f, for the side pieces to rest against, with side or spine pieces, b, b, having squared shoulders, h, h, said splices and base being bolted or spiked to the cross-tie through long slots in the flanges of each side of the rail or bolts may be secured by a key, all constructed substantially as described and for the purpose herein set forth.

47,821.—Embossing and Seal Press.—B. B. Hill, Chillicothe, Mass.:
I claim the employment of the fly, h, arranged between the die, n, and bed, a, substantially as and for the purpose described.

47,822.—Fruit Basket.—J. S. Hoard and C. M. Miles, Vineland, N. J.:
We claim the above described berry and fruit basket, constructed as above set forth, as a new article of manufacture.

[This invention consists in a fruit basket composed of any suitable thin material, such as paper, bark or veneers of wood, the body of which is made by interlocking the two edges which come together when the material is bent to a conical or circular form, the bottom being made by dropping a circular piece of suitable size down into the basket.]

47,823.—Apparatus for Cooling Beer.—Julius Hoefer, New York City:
I claim cooling beer, or other liquids, by causing the same to flow downward in the open hollow of the metal pipe, E, and by causing the cold water to rise upward in the closed space of said pipe, E, substantially in the manner and for the purpose described.

47,824.—Carpenter's Gage.—Martin Horton, Brooklyn, N. Y.:
I claim the adjustable brad, f, in combination with the brad, d, in the slide, c, arranged and operating substantially as and for the purpose described.

47,825.—Composition for Lining Barrels.—Benoni H. Howell, New York City:
I claim the composition specified for lining barrels for petroleum, etc.

47,826.—Apparatus for Japanning.—Geo. Wolsey Hubbell, Derby, Conn.:
I claim the plan of drawing off or removing the liquid japan from the articles japanned, keeping said articles stationary, whether this is effected by means of the mechanism herein before described, or by means of a pump, syphon or any mechanical process whereby the liquid japan is removed from said articles leaving them stationary.

47,827.—Device for Covering Rollers for Wringers.—R. B. Huginn, Cleveland, Ohio:
I claim the clamp plates, A, moving or folding blades, B B, and projections, C C, substantially as and for the purposes specified.

47,828.—Apparatus for Separating and Concentrating Ores.—Andrew Hunter, Solano Co., Cal.:
I claim the formation of the troughs, B B, with metallic bottom alternately inclining and level, as shown by line, a b c d, substantially as described, and for the uses and purposes set forth.

I also claim the combination of these troughs with the troughs, E E G G, stop-cock, H, hangers, D D', spring, S S, or their equivalent, by adjustable connecting rods, I, giving an oscillating and vibrating motion, all substantially as herein before set forth.

47,829.—Knitting Machine.—Edward E. Kilbourn, New Brunswick, N. J. Patented in France, Jan. 6, 1864:
First, I claim the combination of the carriage of a traveling needle in a knitting machine, with the mechanism for moving it past the other needles of the machine in such manner that it can be readily disengaged from said mechanism and re-engaged therewith, substantially as set forth.

Second, The combination of the instrumentality through which the pattern mechanism operates upon the traveling needle, or upon the instrumentalities for withdrawing or replacing the regular needles, with the carriage of said needle, or of said instrumentalities, substantially as set forth.

Third, The arrangement of the movable cam plates in a knitting machine above the devices which they operate upon, substantially as set forth.

Fourth, The arrangement of the pattern mechanism of a knitting machine above the needle carriage, substantially as set forth.

Fifth, The combination of the pattern barrel of a knitting machine with mechanism for changing its relationship to the device upon which its pins operate, substantially as set forth.

Sixth, The arrangement of the pins of a pattern barrel in two helical lines commencing at the opposite ends of the barrels, substantially as set forth.

Seventh, The combination of a cam for restoring the withdrawn needle with a carriage, substantially as set forth.

Eighth, A needle bed divided into divisions, which are so combined with the machine that a division may be displaced and replaced, substantially as set forth.

Ninth, The combination of a removable division of the needle bed with instrumentalities for counterbalancing its weight, substantially as set forth.

Tenth, The combination of a removable division of the needle bed with a needle holder, substantially as set forth.

Eleventh, The combination of a traveling needle with a needle bed divided into divisions one of which may be displaced and replaced, substantially as set forth.

Twelfth, The combination of a transferring prong with a needle bed divided into divisions, one of which may be displaced, substantially as set forth.

Thirteenth, The combination of a removable division of the needle bed with its support by devices which permit a transverse movement, substantially as set forth.

Fourteenth, The combination of a series of reciprocating needles with two thread guides, one of which can be thrown out of gear when a single strip of work is being knit, the whole operating substantially as set forth.

Fifteenth, The combination of the thread guide carriage with catches that connect and disconnect it with the mechanism for imparting motion to it, substantially as set forth.

Sixteenth, The combination of the needle carriage with two sets of bumpers for operating two thread guides, substantially as set forth.

Seventeenth, The combination of the sinkers at the inner side of a division of the needle bed which remains in place, with a lifter, substantially as set forth.

Eighteenth, The depression of the yarn between the thread guide and the last needle fed with yarn, by an instrumentality which is separate from the thread guide and effects the depression substantially as set forth.

Nineteenth, The combination of the thread guide carriage with devices for gripping the yarn which are independent of the thread guide.

Twentieth, The combination of the needle cam bar with a movable cam block operating to withdraw one of the needles to a less extent than the others, substantially as set forth.

Twenty-first, The combination of the under supports of the needles of a knitting machine, with devices which permit their adjustment laterally, as set forth.

Twenty-second, The combination of the stocks of the under supports with a rock shaft, substantially as set forth.

47,832.—Shears for Cutting Iron Bolts.—George W. Hyatt, Auburn, N. Y.:
I claim the shear bars, B B, pivoted to the bar, A, as shown for the purpose already described.

47,833.—Stove Pipe Drums.—Jacob B. Hyzer, Janesville, Wis.:
I claim, first, A heat radiator when constructed and arranged substantially as herein described and set forth.

Second, The combination of ascending and descending flues and an inner hot air space with a straight flue regulated by a single damper substantially as described.

Third, Constructing the radial plates with a series of orifices or holes, substantially as and for the purpose set forth.

47,834.—Fruit Jar.—Charles G. Inlay, Philadelphia, Penn. Antedated December 6, 1864:
I claim, first, The use of the metal screw cap, c, for the purpose of locking any form or variety of glass stopper upon a glass jar, as described.

Second, I claim the glass stopper and cap, v j, when fastened by screw thread to the jar in the manner described.

Third, I claim a metal cap, whereby inclined slots in the cap and by projections, or lugs or portions of screw thread in the neck of the jar, it locks a glass stopper to a glass jar, and the same when no glass stopper is used.

Fourth, I claim the use of the hollow tube plug, v k, and plug, v x (with two apertures at its base), for locking the aperture inside of the jar as described.

Fifth, I claim all and each of the described and figured stoppers, when used in combination with my locking caps.

47,835.—Artificial Arm.—Hiram A. Kimball and Andrew J. Lawrence, Philadelphia, Pa.:
We claim, first, The arrangement of the levers, b b' j j' and n, in combination with the spring, h, to open and shut the fingers in the manner substantially as above described.

Second, The lever, s, by means of which the motive power acts upon the fingers when the fire-arm is in any position, said lever being constructed and arranged, substantially as described.

Third, The bars, v v', in combination with the catch, y, and rest, A, whereby the fore arm is set and held in any desired position, the whole constructed and arranged substantially as described.

Fourth, The employment of the elastic strap, D, by which the artificial arm is held in position without chafing or confining other parts of the body, substantially as described.

47,836.—Shoulder Supporter.—J. W. Kimball, Boston, Mass., and John Mahady, Cambridge, Mass.:
I claim a combination of shoulder straps, with an attaching strap, substantially as and for the purpose described.

47,837.—Double Window.—T. S. Lambert, Peekskill, N. Y.:
I claim the combination of the convertible stop, F, and its molding, I, and the sashes, G and H, with the frame, A, in the manner and for the purpose substantially as set forth.

Second, The combination of the material, k, with the stop, F, the molding, I, the sashes, G and H, and the frame, A, in the manner and for the purpose substantially as set forth.

47,838.—Rotary Fan.—George Leach, Elmira, N. Y.:
I claim the combination of the fan shaft and the disk, with wings attached thereto.

I also claim the described taper form of wings in combination with the disk, substantially as described.

47,839.—Fanning Mill.—George Leach, Elmira, N. Y.:
I claim the slide board, k, whose front edges is adjustable and operative for the purpose described at all points longitudinally of the effective length of the sieve, g', in combination with the notched adjusting handle, l.

47,840.—Farm Gate.—Joel Lee, Galesburg, Ill.:
First, I claim the swivel guide and friction wheel, for the purposes set forth.

Second, The combination of the gate, A, the post, B, the stop, C, the block, H, and the cap, I, with the swivel guide and friction wheel, all arranged substantially as and for the purpose specified.

47,841.—Burglar Alarm.—Andrew J. Loomis, Madrid, N. Y.:
I claim the combination of the plate, A, the hammer with its axial shaft, E, and spring, F, the catch, G, the whole arranged substantially as described, and applied in the manner and for the purpose specified.

47,842.—Lock.—Walter K. Marvin, New York City:
I claim, first, The combination with the movable stump and movable tumblers, of a system of leverage, arranged substantially in the manner herein described, so as to prevent detection of the position of the gates or notches in the tumblers, as herein set forth.

Second, In permutation locks, having rotary tumblers or wheels, I claim the friction brake or brakes, in combination with the eccentric, arranged and operated substantially in the manner and for the purpose set forth.

47,843.—Button.—Edward Maynard, Washington, D. C.:
I claim a metallic collet or base, for the buttons having tongues or points stamped out centrally therefrom, substantially in the manner and for the purpose herein set forth.

And I claim, also, as a new article of manufacture, metallic fasteners for buttons, formed of a polygonal or cylindrical shank, having tongues or points projecting from the ends thereof, substantially in the manner as and for the purpose herein set forth.

47,844.—Process for Tanning.—B. H. McNulty and Wm. McKern, Mansfield, Ohio:
First, We claim the tanning process herein described, the same consisting in agitating the liquid by a rotary dasher, E, or equivalent mechanical means, while under pressure within the vat, substantially as and for the purposes set forth.

Second, The apparatus used in the above process, comprising the vat, A, lid, A', packing, a, nozzle, D, braces or retainers, C, and dasher, E, combined and arranged in the manner herein described and represented.

47,845.—Cook Stove.—Henry Mitchell, Richmond, Ind.:
I claim the combination and arrangement of the plate, C, containing the damper, B, at the upper front corner of the oven with the flues, I J and K, and the location of the guide plate, A, and of the pipe, H, by means of which the heat is taken by the shortest and most direct route entirely around the oven.

47,846.—Lighting Rod.—S. J. Mitchell, St. Louis, Mo.:
I claim the separator or division of the main point, A, into two bars connecting by means of branches, d, with the stem, B, of the rod, substantially as described.

[The object of this invention is to produce a lightning rod which will conduct the fluid with more certainty to the conductor or main rod, while it also presents a great number of attaching points or a large attracting surface without enhancing the difficulties of construction or the cost.]

47,847.—Device for Pulling on Boots.—F. H. Moore, Boston, Mass.:
I claim, first, Forming one or more apertures in the leg of boots or shoes, and providing the edge of such apertures or apertures with a convex border or flange, in the manner substantially as hereinbefore described, and for the purposes set forth.

Second, I claim as an article of manufacture, boot or shoe legs having, for the purposes set forth, one or more bordered or flanged apertures, substantially as herein described.

Third, I claim as an article of manufacture a boot or shoe the legs of which, for the purpose of pulling on said boots or shoes, are provided with one or more bordered or flanged apertures, substantially as described or set forth.

47,848.—Friction Match.—S. C. Moore, Boston, Mass.:
I claim putting the lighting or burning substance on one end or side of the splint or match and the lighting or igniting substance on the other end or side of the splint or match, substantially as described.

47,849.—Bed Plate for Paper-mill Engines.—Oliver Morse, Needham, Lower Falls, Mass.:
I claim so applying the grinding plates or knives to the bed as to allow of their being raised or lowered relatively thereto, substantially as hereinbefore set forth.

I claim the combination of the steel grinding knives with the grinding bar when the latter are constructed with a series of slots, substantially in the manner and for the purpose hereinbefore set forth.

47,850.—Rock Drill.—Joel Moulton, Boston, Mass.:
I claim, first, Causing the drill to revolve by means of the collar

C, carrying projections which traverse oblique grooves in the position to be rotated in combination with the ratchet teeth, D, and pawls, E, as described.

Second, The described dress to the face of the reamer, consisting of serrations or teeth which run in the reverse direction on the different sides.

47,851.—Musical Instrument.—Ira F. Munson, Washington, D. C.:
I claim, first, The use of glue, gelatin, or other analogous substance, in the manufacture of musical instruments, or parts of such instruments, for the purpose of obtaining increased volume of tone and sonority, substantially as described.

Second, Uniting parts of musical instruments together by means of the material of which such parts are composed, for the purpose of obtaining homogeneity, substantially as described.

Third, The use of a water-proof composition in the manufacture of musical instruments, or parts of instruments, substantially as described.

47,852.—Knitting-machine Needle.—John L. Otis, Florence, Mass., and Samuel L. Otis, Manchester, Conn.:
We claim, first, The recess, d, in the needle shank, to operate in combination with the stop, c, on the latch, substantially as and for the purpose set forth.

Second, Making the needle and latch of one thickness and operating them in the same slot of the needle bed, as specified.

Third, The stop, e and curved point of the latch, in combination with the cam, g, constructed and operating substantially as and for the purpose described.

47,853.—Machine for Ornamenting Jewelry, Plate, Etc.—O. S. Parmenter, Providence, R. I.:
I claim the machine for ornamental engraving, constructed and operating in the manner and on the principle substantially as described.

47,854.—Shafting.—Franklin P. Perego, Indian Valley, Cal.:
I claim the combination and arrangement of the guide blocks, C C C, with the set screws, G G, and the friction rollers, D D D D.

Also the manner of connecting the two sections by means of the slideways, H H, substantially as set forth.

47,855.—Seeding Machine.—S. M. Prentice, Southington, Ohio:
I claim the seed box or hopper, D, resting at its back end upon a spring, F, substantially as shown, and for the purpose of feeding and supplying the seed uniformly to the distributing wheel, C, as set forth.

[This invention relates to a new seeding machine designed for general use for planting various kinds of seed, and it consists in the employment of a self-adjusting hopper, in connection with a seed-distributing wheel, and adjustable shears or teeth.]

47,856.—Corset.—Clarissa Preston, Detroit, Mich.:
I claim a combined corset and supporter arranged with hooks or clasps, a, in front and made to lace in the rear, and provided with a bustle, B, and extension brace, g, substantially as and for the purpose set forth.

[This invention relates to a combined corset and supporter made to lace in the back and to clasp or hook in front, so that its width can be readily adjusted, and provided with an extension bustle, the brace of which is made to extend part way or all round the body, and which may be cut separate from the corset and attached to it or formed with the same, as may be desirable. The extension brace is adjusted to the requisite width by a hook catching in different slots or in any other suitable manner, whereby the same can be readily accommodated to the body of the wearer.]

47,857.—Horse Rake.—O. E. Randall, Lewiston, Maine:
I claim the combination of the bars, F, arms, I, shaft, E, and teeth, G G, all constructed, arranged and operating substantially as set forth.

[This invention consists in having the rake composed of a series of bars, constructed in a novel way and placed loosely on a shaft or rod with the teeth attached to each bar; the said rake being applied to a mounted frame having its wheels at a less distance apart than the length of the rake, so that the ends of the latter may project beyond the wheels, all being arranged in such a manner that all the advantages of the ordinary wooden and wire tooth rakes are retained while their disadvantages are avoided.]

47,858.—Mode of Propelling Railroad Cars.—S. G. Randall, New York City:
I claim the air-supply pipe, a, provided with suitable spouts, b, and applied in combination with the movable reservoir, C, and car, A, substantially in the manner and for the purpose set forth.

47,859.—Boots and Shoes.—T. K. Reed, North Bridgewater, Mass.:
I claim a boot and shoe having the construction substantially as specified.

47,860.—Adjustment for Optical Instruments.—C. B. Richards, Hartford, Conn.:
I claim the employment, in combination with the adjustable parts of an optical instrument, of one or more anti-friction wheels, and a friction roll, operating to effect the adjustment to focus, substantially in the manner hereinbefore clearly described, for the purpose set forth.

47,861.—Machine for Shaving and Nicking Wood Screws.—D. M. Robertson, East Boston, Mass., and Jason A. Bidwell, Boston, Mass.:
We claim the vibrating adjustable saw frame, R, in combination with the link, T, and cam, T, which operate the frame and move the saw, as described.

We claim the rotating saw, S, in combination with the right-and-left-hand screw nuts, arranged to adjust and hold the saw opposite the center of the arbor, E, substantially as described.

47,862.—Solar Camera.—Herman Roettger, Philadelphia, Pa.:
First, I claim a camera stand constructed with two adjustments at right angles to each other, for the purpose of following the path of the sun by a single motion, substantially as shown and described.

Second, The grooves, k k k m, in combination with a rigid camera box, as shown and described for the purpose set forth.

Third, The double chamber, S and B, when used to form a rigid camera box provided with slide grooves, as shown and described.

47,863.—Car Truck Frame.—D. B. Rogers, Pittsburgh, Pa.:
First, I claim the sustaining beam, made substantially as described and for the purposes set forth.

Second, The suspending or resting of car bodies, substantially as described and for the purposes set forth.

47,864.—Screw Propeller.—John B. Root, New York City:
First, I claim a screw propeller the blades of which have a curvature forward or in the direction of the revolution, combined with such a hollow curvature of the faces as is produced by a diminution of the pitch from the periphery toward the axis of the propeller, substantially as herein specified.

Second, The hollow rearward conical extension, C, of the hub attached to the body, B, thereof by being fitted into a groove, I, in the body and secured by a central bolt, F, which passes through the said extension and is screwed into the end of the propeller shaft, substantially as herein described.

47,865.—Machine for Cutting Leather.—J. F. Severance, East Bridgewater, Mass.:
I claim the combination of the presser bar, F, and its knife-holding opening, h, with the feed wheel, C, or the same and a knife, K, substantially in manner and so as to operate therewith, as specified.

I also claim the combination of the two sliders, E L, and their clamp screws or the equivalent thereof, with the presser bar, F, its knife-holding opening, h, and a stationary arm, D, arranged with respect to the feed wheel, C, substantially as hereinbefore set forth.

I also claim the combination of the gage, m, with the upper all

der, L, and the presser bar, F, when combined with a feed wheel in manner and so as to operate therewith and with a knife, substantially as hereinbefore explained.

47,866.—Water Meter.—John Sheffield, Pultneyville, N. Y.:

I claim the combination of the wings, a, a shaft, D, gate, h, and inlet passage, O, all arranged to operate substantially as specified.

[This invention consists in adopting the principles of construction of the ordinary central discharge water wheel to the purposes of a water meter.]

47,867.—Game Board.—John Smith and E. M. Nutter, Feltonville, Mass. Antedated March 3, 1865:

We claim the game board, as constructed, with the rotary cannon, the battery and the cavities, arranged substantially as described.

47,868.—Boring Well.—John Y. Smith, Alexandria, Va.:

First, I claim, in combination with a steam cylinder, whether arranged concentrically or eccentrically with said cylinder, a gripper box or other instrument, to intermittently hold and release the rope or cable, substantially as and for the purposes set forth.

Second, I claim the combination with a steam cylinder and gripper box, arranged as described, of a mechanism for intermittently rotating said box while firmly holding the tool, substantially as and for the purposes set forth.

Third, I claim a mechanism for producing intermittent rotation of the rope continuously in the same direction, in combination with a mechanism for simultaneously untwisting the rope, substantially as set forth.

Fourth, in combination with a gripper box or the mechanical equivalent thereof, for rotating the rope continuously in the same direction, I claim a drum around which the rope is wound, when said drum is hung in a frame revolving in the manner and for the purpose set forth.

Fifth, I claim the method herein described of producing a self-adjusting automatic feed of the rope.

Sixth, I claim the method herein described of regulating the force of the blow, substantially as set forth.

Seventh, I claim the means herein described, or the mechanical equivalent thereof, for producing self-adjusting automatic feed, which also serves to regulate the force of the blow.

Eighth, the method herein described of rotating the drum to withdraw the tools and return them with great rapidity, substantially as set forth.

47,869.—Safety-valve Rubber.—John Y. Smith, Alexandria, Va.:

First, I claim combining with a safety valve, constructed in the usual manner, as described, a metal disk of a resistance calculated to explode under a pressure exceeding that of safety.

Second, The construction of the valve of three parts, substantially as herein described and for the purposes set forth.

Third, in combination with a safety valve, constructed and operating as described, I claim the stop-cock for the purpose set forth.

Fourth, in combination with a valve and valve case, provided with a stop-cock, as described, I claim the pendant rod fast to the disk, substantially as set forth.

47,870.—Rock Drill.—John Y. Smith, Alexandria, Va.:

I claim, first, A rock drill composed of three or more cutting blades, when recessed in the center or at the point of intersection of said blades, substantially as set forth.

Second, Forming the cutting edges of a three or more bladed rock drill by bevelling one side of said blades in such manner as to tend to rotate the drill when striking a blow and to tighten the screw joint, substantially as set forth.

Third, Forming cutting edges upon the recessed portion of the blades, substantially as and for the purpose set forth.

47,871.—Oil Ejecter.—John Y. Smith, Alexandria, Va.:

First, I claim the combination with a suitable main tube and stationary valve seats of a central revolving steam or air cylinder provided with suitable valves constructed and operating substantially as hereinbefore described, so that the steam or air is ejected into the space surrounding said cylinder, in the manner and for the purposes set forth.

Second, In combination with the above, I claim the employment, at suitable intervals and interposed between the sections of the outer tube of valve chambers, for the admission and retention therein of the liquid raised by the injection of steam or other elastic fluid, substantially as set forth.

Third, in combination with the interior cylinder and surrounding valve chambers, I claim the slip joint attachment, so as to admit of the perfect yet easy vertical adjustment of the valves into their respective seats, substantially as set forth.

Fourth, in combination with two concentric cylinders, I claim making the valves and valve seats in the form of spherical caps or uniting the cylinder sections by ball joint attachment so as to yield to lateral adjustment, substantially as set forth.

Fifth, in valve chambers constructed as described, and in combination with hemispherical valves, I claim forming annular channels in the manner and for the purpose set forth.

Sixth, I claim the employment in an apparatus for raising liquid by direct action of steam and in combination with and as a lining of the steam cylinder of a hemp hose, whether or not boiled in linseed oil, substantially as set forth.

Seventh, I claim the combination of a steam cylinder closed at the base with a hinge trap or valve, operated by a cord or rod in the manner and for the purposes set forth.

Eighth, in combination with a spherical valve I claim the employment of a steam deflector shield operating substantially in the manner and for the purpose set forth.

47,872.—Horse Rake.—Moore Smith (assignor to himself and P. W. Wellington), Worcester, Mass.:

I claim the combination of the tilting rake head, A, with the clutch, G, clutch projections, g and d, clutch lever, E, and cam, I, when constructed and operated substantially in the manner and for the purposes stated.

47,873.—Apparatus for Treating Ores.—Robert Spencer, New York City:

I claim protecting metallic vessels, which are used in the process of roasting ores, by coating their exposed surfaces with a fire-proof enamel, substantially as described.

47,874.—Apparatus for Treating Ores.—Robert Spencer, New York City:

First, I claim applying a series of revolving or oscillating wings or paddles within a vessel, E, which is constructed with a central ridge, a, over which the currents of mercury are interrupted in their passage from one side of the vessel to the other, substantially as described.

Second, The use of a double concave bottom amalgamating vessel, having revolving agitators arranged within it, substantially as described.

Third, The receiving troughs, c, c, in combination with a perforated cover, b, to the amalgamating vessel, substantially as described.

Fourth, Conducting the waste water from the amalgamating vessel into the chamber, D, substantially as described.

Fifth, The feeding vessel, H, in combination with two or more movable cylinders, B, communicating with said vessel, substantially as described.

Sixth, The use of a water chamber, D, partially surrounding an amalgamating vessel, whether it is mounted over a furnace or not, substantially as described.

Seventh, The combination of one or more rotating or oscillating cylinders, B, with an amalgamating vessel and a furnace, C, substantially as described.

47,875.—Meat Cutter.—Le Roy S. Starrett, Newburyport, Mass.:

First, I claim the combination of the walking beam, I, pitman, B, crank shaft, E G, pawl, A, rack, P, and rotary bed, O, arranged and operating as specified.

Second, The combination of the horizontal plate, K, pendant rods, g, knives, L, rods, L L, and guide rod, M, constructed and arranged in the manner and for the purposes described.

47,876.—Lathe Fastening.—J. M. Stone (assignor to himself, G. L. Davis, and G. A. Wiley), North Andover, Mass.:

I claim clamping the piece, c, to the piece, b, and this to the way or frame, a, by one adjustment, the construction and operation being substantially as described.

47,877.—Method of Securing Bushes for Bungs to Barrels.—Thomas Summerfield, New York City:

I claim securing metallic bushes for bungs in barrels by means of nails clinched in the inner side of the stave by the lever anvil, substantially as set forth.

47,878.—Hoisting Apparatus.—Joseph A. Talpey, Somerville, Mass.:

I claim the improved tackle or hoisting apparatus consisting of two sprocket pulleys arranged, constructed and geared together, and operating in conjunction with the endless chain and the loose block, substantially as specified.

I also claim so applying the lower sprocket pulley that it may be disconnected from the upper one and keyed or fastened in position in the manner and for the purpose substantially as set forth.

47,879.—Keel for Ships and Other Navigable Vessels.—J. B. Tarr, Chicago, Ill.:

I claim the horizontal keel c, when constructed and applied as herein specified so that its upper surface will be nearly parallel with the ship's bottom and its edge on the lee side will present an acute angle to the water, while the ship is careened to any extent.

[This invention is designed for vessels navigating the lakes, and which are often compelled to sail in shallow waters, and consists in a keel which expands laterally on each side of the center of the vessel's bottom so as partially to inclose a large body of water on either side.]

47,880.—Car Truck.—Edwin Thurston and James R. Ledyard, Covington, Ky.:

First, We claim the construction and use of skeleton iron bolsters, B and C, which admit of great strength and durability and can be used either as center bearings or side bearings.

Second, The construction and use of the cast end piece, A, which serve to stiffen or brace arch bars and lower bolster, also serve as a guide for top bolster to work in, and in connection with bolster, forming a truck combining strength, durability and lightness with ease of access in all its parts for repairs.

47,881.—Base-burning Stove.—W. B. Treadwell, Albany, N. Y.:

First, I claim the fire pot, C, with the flaring lipped extension, e f d, in combination with a base-burning stove, which has a coal-supply magazine, G, substantially as and for the purpose set forth.

Second, The combination of the flaring lipped extension, e f with the beveled brick, E, substantially in the manner and for the purpose described.

Third, The arrangement of perforated valve, I, chamber, K, flues, J and H, and the branch flue, N, with a base-burning stove, constructed substantially as described, for the purpose set forth.

47,882.—Machinery for Coiling Springs.—G. L. Turner, New York City:

First, I claim, in machines for coiling steel springs, whether used for coiling volute spiral or other steel or metallic springs, the employment and use of the collars, b and b', on the mandrel, and the bushings, C and C', in the socket of the rotating arbor which receives the mandrel, in combination with the mandrel, E, and the rotating arbor, C, substantially as and for the purposes above described.

Second, I claim, in machines for coiling spiral springs, the employment and use of a base or head block, such as that shown at G, or its equivalent, with holding or gripping devices, such as those herein shown and described, or their equivalents, in combination with the mandrel, E, the worm, P, the guide, n, and the collar, M, when used for producing spirally-formed springs, with parallel ends on the said mandrel, substantially as and for the purposes above set forth.

Third, I claim in machines for coiling metallic springs of a spiral form, the employment and use of a movable collar, such as that shown at M, or its equivalent, in combination with the worm, P, the mandrel, E, and the guide, n, when used for the purpose of making that end of the spring which is next to the said collar perpendicular, to the axis of the mandrel, substantially as and for the purpose above set forth.

Fourth, I claim the employment and use of a guide such as that shown at n, or its equivalent, in combination with the mandrel, E, the worm, P, and the collar, M, when used for the purpose of suddenly checking the diagonal movement of the end of the bar and of keeping in its necessary vertical position, that is to say, at right angles to the mandrel and guiding it at right angles with the face of the mandrel preparatory to forming that end of the spring parallel, substantially as and for the purpose above described.

Fifth, The worm, P, or its equivalent, in combination with a coiling mandrel, when used for coiling spiral springs, substantially as above described.

Sixth, I claim, in machines for coiling spiral or other steel springs, the employment and use of a friction band, T, or its equivalent, in combination with the spring, T, the worm shaft, P, and the frame, P2 or their equivalents, when used for the purpose of coiling metallic springs, substantially as above described.

Seventh, I claim the employment and use of adjustable guides, such as those shown at W, W', S and S', or their equivalents, in combination with the sliding table, U, or their equivalent carriage, and when used for the purpose of keeping the width of the bar vertical and of guiding it diagonally between the threads of the worm and the face of the mandrel during the process of coiling the spring, substantially as herein set forth.

Eighth, The distance gaze, X, or its equivalent, applied upon the sliding table, U, or other equivalent carriage, to operate substantially as above described.

Ninth, I claim the employment and use of the cams, R R, in combination with the frame, P2, and the worm, P, the office of said cams being to elevate and hold in proper position the frame, P2, and the worm, P, during the operation of coiling spiral springs, substantially as above set forth.

Tenth, I claim the employment and use of the collar, 42, constructed as shown, and secured adjustably to the sliding arbor, D, in combination with the cap lever, Q, constructed as shown, for the purpose of holding the said arbor stationary during the operation of coiling volute, spiral or other metallic springs, substantially as above described.

47,883.—Cutting and Pressing Hay, Etc.—Rosewell Wakeman and Joseph L. Ballance, Port Deposit, Md.:

We claim the hay cutter, so combined with a hay press, and so arranged and operated as to discharge the cut hay into the pressing box, in combination with an automatic stamping or packing apparatus, substantially as and for the purposes herein set forth.

Second, We claim the manner of fastening the doors of the packing or pressing boxes, as herein described.

Third, We claim the combination of machinery herein described, for pressing cut hay into bales.

47,884.—Apparatus for Washing Ore.—James Watson, Cliff Mine, Mich.:

I claim the use of a long tie or trough, suspended so as to vibrate against a revolving cam or other device for giving to it a vibrating shock, in combination with a series of movable stops, constructed and arranged substantially as and for the purposes hereinbefore set forth.

47,885.—Attaching Cranks to Machinery.—Amos Westcott, Syracuse, N. Y.:

I claim a crank, constructed with the hole, c, and slot, D, Fig. 1, in the arm thereof, in combination with the flat-shanked screw, B, Fig. 1, by which it can be attached to the shaft, substantially as above described.

47,886.—Rolling Mill.—Elbridge Wheeler, Feltonville, Mass.:

I claim uniting the projecting ends of the rolls or shafts by means of a link or yoke, substantially as and for the purpose described.

I also claim the holding of the sections of dies or rings or their shafts, by means of screw threads cut upon the shafts, and a nut or nuts run up against them, substantially as described.

I also claim the fitting together of the sectional rings or dies, by means of countersinks upon one, and a projection upon the next adjacent one, to break the joint between them, and thus prevent the forming of a pin upon the article being rolled, substantially as described.

47,887.—Stovepipe Drum.—Thomas Whitson, Woodstock, Ill.:

I claim a heat-radiator for use in connection with a stove, consisting in a base, B, and top, E, provided with the partitions, C and F, connected by the flues, H and J, and return flues, L, and provided with the valves, D and G, and with or without the transverse pipes, K, substantially as described.

47,888.—Forming Tubes of Sheet Metal.—Moses G. Wilder, West Meriden, Conn.:

I claim the process of forming tubes of thin sheet metal, by compressing blanks of greater breadth than the development of the perimeter of the required tube into that perimeter, substantially as set forth.

47,889.—Valise for Artillery Harness.—Warren H. Wilkinson, Springfield, Mass.:

I claim as my invention the improved artillery valise, as made with the hollow or concavity, a, to fit and rest upon the seat of the saddle, substantially in manner as described.

I also claim the combination and arrangement of the bottom or girth straps, e, e, with the valise made with the arched or concave bottom, as described.

I also claim the combination and arrangement of the four side eyes, b b b, and their straps, e e e, with the valise, made with the arched or concave bottom, as described.

47,890.—Cooking Stove.—Charles J. Woolson, Cleveland, Ohio:

I claim a detachable curved iron plate, when arranged in relation to the oven and fire plate of cooking stoves, in the manner and for the purpose herein set forth and described.

47,891.—Curtain Fixtures.—Jacob B. Bailey, New York City, assignor to Samuel E. Bailey, Springfield, Mass.:

First, I claim the ring socket, c, receiving the end of the curtain roller, in combination with the clamping piece, d, introduced and actuated as and for the purposes specified.

Second, I claim a flanged spool, with an opening through its center for the curtain roller, the said spool being retained in place by attaching the cord, substantially as specified.

Third, I claim a contractile india-rubber band, applied substantially as specified, to create friction for preventing the weight of the curtain turning the roller.

Fourth, I claim a curtain roller, in which friction is applied to sustain the curtain in any position, in combination with two cord spools wound in opposite directions, for the purpose and as specified.

47,892.—Machine for Manufacturing Boxes of Sheet Metal.—George W. Bentley (assignor to himself and Charles S. Hine), New York City:

I claim, First, in combination with the frame, F, provided with the shafts, a and i, and lever, h, the burr wheels, e k p and q, when the same shall be constructed and operated substantially as shown, for the purposes specified.

Second, I claim the adjustable bearing, m, with its adjuncts, when the same shall be combined, substantially as shown, for the purposes specified.

47,893.—Water Meter.—Geo. F. Blake, Medford, Mass., assignor to himself, Peter Hubbell and Job A. Turner, Boston, Mass.:

First, I claim so constructing the plungers or pistons of water meters that they shall perform the function of valves, and thus do away with the necessity for independent valves and their connections, substantially as specified.

Second, in combination with the foregoing, I claim making the plunger at each cylinder control the supply and exhaust of its twin or opposite cylinder, in the manner described.

Third, Passing the supply water through the body of the plungers, by means of water ways, arranged and operating substantially in the manner and for the purpose set forth.

47,894.—Whiffletree Irons.—Wm. M. Bryant (assignor to himself, John B. Wheeler and John R. Evans), Washington, D. C.:

I claim constructing the ferrules, A, for swiggle or whiffletrees, with the stops or shoulders, J, e, and inclined or bevel, f, substantially in the manner and for the purpose described.

Second, in combination with the subject matter of the first clause of my claim I claim the turning stem, B, with its locking pin, j, substantially as described.

Third, in combination with the subject matter of my first and second clauses of claim, I claim the screw-fastening, k, substantially as herein described.

47,895.—Fire Pot for Stove, Etc.—William Ennis (assignor to himself and Osborne Macdaniel), New York City:

First, I claim the method of generating steam in the fire-pot retort itself, as and for the purpose herein described.

Second, The construction of the steam-generator, A, combined with the feed-pipe, a, leading into the steam chamber, m, and the escape pipe, b, leading into the superheater, B, as and for the purpose herein described.

Third, The combination of the steam generator, A, the superheater, B, and the distributors, C C, connected with the pipes, a b and c, as and for the purpose herein described.

Fourth, The construction of a retort, divided by partitions into chambers or sections, formed of one or more pieces as and for the purpose herein described.

47,896.—Oiler.—William H. Hart (assignor to himself and Gilbert Rogers), Meriden, Conn.:

First, I claim the construction of an oiler, substantially as described, having two oval sides, so that the double spring consequent upon the described construction of the same may be obtained, substantially as set forth.

Second, The construction of an oiler with the double spring in the two sides, as claimed, in combination with the use of the rubber in the top of the cap, and pressing upon the tube, substantially as set forth, using for that purpose any suitable metal or material to accomplish the desired result, or that will produce the intended effect.

47,897.—Well Boring.—Henry Howson (assignor to William Wharton, Jr.), Philadelphia, Pa.:

I claim, first, The combination of the crank, I, its pin and lever, Q, with the drill rod or rope of well-boring apparatus, the whole being arranged and operating substantially as set forth for the purpose specified.

Second, The arrangement substantially as described of the driving shaft, H, its winding barrel, J, the clutch, K, or its equivalent, cog wheels, L and M, or equivalent driving gear, the crank shaft, h, and beam, Q.

Third, The lever, T, adapted to the boring rod or drill rope, and constructed for grasping and releasing the same, substantially as set forth.

Fourth, The said grasping and releasing lever in combination with the bent or curved guides, V V, or their equivalents, whereby the said lever is caused to turn laterally to a limited extent, in the manner and for the purpose described.

Fifth, The combination of the said grasping lever with the chain or cord, g, or the equivalent to the same.

47,898.—Stocks for Holding Screw Cutting Dies.—E. C. Kellogg (assignor to himself and James E. Coleman), Hartford, Conn.:

I claim, first, The slotted plates, D D', and screws, e e e e', in combination with each other and with the stock and dies, substantially as and for the purpose herein specified.

Second, The cavity, b, in the handle, a', having a female screw thread, e'', at its mouth, in combination with the pin wrench, E, having a male screw thread, e'', near its head, substantially as and for the purpose herein specified.

47,899.—Tool for Opening Boxes.—E. C. C. Kellogg, (assignor to himself and James E. Coleman), Hartford, Conn.:

I claim the within described instrument, constituting a box opener and a scraper, having the parts arranged and combined as herein set forth.

47,900.—Machine for Polishing and Dressing Stone.—E. H. Lewis, (assignor to himself and N. Baldwin), Kingston, N. Y.:

I claim the slide, C, with adjustable clamp, D, and stops, d, in combination with the plate, A, and hand lever, E, or its equivalent, constructed and operating substantially as and for the purpose set forth.

47,901.—Casting Pipes.—Thos. J. Lovegrove (assignor to himself and Henry Baldwin, Jr.), Philadelphia, Pa.:

I claim, First, Making hollow castings by rolling the mold containing the molten metal down an inclined plane, substantially in the manner described.

Second, The combination of flanges on a rotating mold with a railway, for the purpose of giving the mold a parallel movement, as set forth.

47,902.—Breech-loading Fire-arm.—Wm. H. and George W. Miller (assignors to Edmund Parker), Meriden, Conn.:

I claim, First, The breech block, C, hinged to the top or sides of the barrel, A, and provided with a wedge-shaped projection, a, to fit in a

corresponding recess in the cone seat, all the said parts being constructed substantially as herein specified, so as to admit of a conversion of a muzzle-loading to a breech-loading gun without change in the construction or arrangement of the stock, lock, or hammer.

Second, The combination of the spring bolt, e, ridge, f, and groove, g, with hinged breech block, c, and barrel, A, constructed and operating substantially as specified, and employed to sustain the recoil in form.

47,903.—Thill Tug.—William H. Noyes (assignor to himself and Charles H. Wheadon), Homer, N. Y.:
I claim a metal thill tug composed of two parts, a, a, connected by a joint, b, and provided with a chafing ring, E, substantially as herein shown and described.

[This invention relates to a metal thill tug for harnesses, and it consists in constructing the tug of two parts connected by a joint, and providing the tug with a lining or inner ring of india-rubber or other suitable material, which will prevent the chafing or rasping of the thills; the chafing ring or lining, in consequence of the peculiar construction of the tug being capable, when worn by a horse, of ready removal from the tug and replaced by new.]

1,904.—Cultivator.—Edward Phifer, Trenton, N. J., assignor to himself and James M. Grover, Lawrenceville, N. J.:
I claim, First, The combination in a cultivator of longitudinal frame pieces, adjustable at both ends to cultivate any width of row, with an axle on wheels adjustable to any width of furrow, substantially as and for the purpose described.

Second, The combination of an adjustable frame, with one adjustment for the tooth, with a separate adjustment for the shank, when both are flexible when changing the position of the cultivator tooth, and rigid when the tooth is at work, substantially as and for the purpose described.

Third, The combination in the cultivator of one or more rigidly held teeth, or plows, with an adjustable mechanism, substantially as described, whereby the driver can control at pleasure the operation of the teeth, singly or in series, as set forth.

47,905.—Sewing Machine.—George Rehfuß (assignor to the American Button-hole Sewing Machine Co.), Philadelphia, Pa.:
I claim, First, The arm, I, with its notched projection, k, or its equivalent, when arranged to vibrate round the needle to operate on the thread held by the loop carrier, m, substantially as described.

Second, The sleeve, H, with its spiral opening, i, and arm, I, in combination with the needle bar, D, and pin, f, the whole being arranged and operating substantially as and for the purpose specified.

Third, The guard, n, arranged on the plate, L, in respect to the looper, m, substantially as set forth for the purpose described.

Fourth, The rod, E, and lever, G, in combination with the needle bar, D, and its spiral spring, a, the whole being arranged and operating substantially as and for the purpose set forth.

47,906.—Surveying Instrument.—Karl Schou (assignor to himself and G. H. Hull), Lafayette, Ind.:
I claim, first, A surveying instrument provided with a wheel, B, index, I, cylinder, E, and tracing device or pencil, substantially in the manner and for the purpose set forth.

Second, The method herein described of adjusting the speed of the paper cylinder according to the grade or formation of the ground over which the instrument is drawn, consisting of the pendulum weight, J, carriage, F, friction disk, t, wheel, r, and cog wheels, a, y, z, or any equivalent means.

Third, The method of regulating the motion of the pencil or tracing mechanism according to the formation of the ground, substantially as herein set forth, consisting of the wheel, s, friction disk, c, pinion, v, cog wheels, g, f, and toothed rack, a, or any other equivalent means.

Fourth, The combination of the pendulum weight, J, carriage, F, cog wheels, s, r, friction disks, c, t, paper cylinder, E, rack, a, with tracing device and index, k, all constructed and operating substantially as and for the purpose set forth.

Fifth, The elbow lever, o, o', in combination with the pendulum weight, J, and carriage, F, applied substantially as set forth, so that a motion of the pendulum weight in either direction causes the carriage to move towards the centre of the wheel, r.

[This invention relates to a surveying instrument which serves to record the distance between two or more points on the surface of the ground and also to trace on a strip of paper the distance and the general formation of the ground between said points.]

47,907.—Coupling Shafts of Boring Tools.—Albert A. Wilson, Green Point, N. Y., assignor to himself and Hoffman Atkinson, Rouseville, Pa.:
I claim providing the sleeve in connection with any two parts of the stem or shaft of tools, and arranging the same in combination with the key, substantially as and for the purpose described.

Second, The combination of the screw thread, g, shoulder, e, shoulder, a, and sleeve, C, in the construction of the coupling ends of well bored shafts or stems, substantially as and for the purpose herein described.

47,908.—Excavator.—James Hodges, of Penny Hill, Bagshot, England. Patented in England, June 17, 1865:

I claim, First, The excavating of peat or other substance by means of rotating screw excavators, one or more arranged with shield and scraper, or their equivalents, all placed on or connected with a floating vessel, or a carriage mounted on wheels, substantially as described.

Second, The squeezer composed of the rotating cylinder, provided with pockets and a series of pressure rollers, or their equivalents, when used in connection with the screw excavators, for the purpose specified.

Third, The pulping machine, composed of the perforated diaphragms and revolving knives, arranged within a suitable case to operate substantially as described.

Fourth, The combination of the screw excavators, endless elevators or carriers, squeezing device, and pulping mechanism, all arranged on or applied to a floating vessel, or a vehicle mounted on wheels, substantially as and for the purpose herein set forth.

47,909.—Printing Ink.—Anatole A. Hulot, Paris, France:

I claim, First, The manufacture of typographic ink, capable of being washed out when printed on movable adhesive and postage stamps, labels or designs requiring to be dated, signed, marked, or otherwise written upon with common ink, as hereinbefore described.

Second, The application of the said typographic ink to the printing of typographic or copper plate stamps of all kinds, either with delible black or with fast colors; and to relieve stamps with colored grounds and delible vignettes for envelopes, to bank notes and other documents, where it is required to prevent the printing from being washed out.

Third, The application of the said typographic ink to imitate water color pictures, with one or more colors, and printed on paper or vellum, and also to printing in tinctorial colors on silk, cotton, wool, and other textile fabrics.

47,910.—Telegraphic Posts.—Francis Webb Shields, No. 3 Delahay street, Westminster, England. Patented in England, October 6, 1864:

I claim the construction of telegraph posts of separate parts, one of which is suitable for being driven into the ground, while the other is provided with means for securing the insulator, and is suitable for being attached to the part in the ground, substantially as herein described.

REISSUES.

1,963.—Raking Attachment to Harvesters.—Robert D. Brown, Covington, Ind. Patented April 7, 1863. Reissued Feb. 21, 1865:

I claim the continuously revolving rake, B, carried forward over the platform and back beneath the same by means of driving chains, belts, or their equivalents, and elevated to its working position during its forward motion and retracted in passing beneath the platform by means of a crank arm, D, or its equivalent working in a slot, for the purpose specified.

Second, I claim governing the position of the rake teeth by the partial rotation of the rake head, which travels parallel with the cutter bar, by means of an endless belt or chain when the said rotation is effected by the traversing of a wrist attached to the rake head, in a slot of the required configuration.

Third, The intermittent cradle, F, operated as described, in combination with the continuously revolving rake, B, for the purpose set forth.

1,964.—Harvester.—Edwin Jones, Cleveland, Ohio, assignor of Charles Tinker and J. A. Sprague, Mantua, Ohio. Patented Aug. 4, 1857:

I claim, First, Arranging the finger bar, or beam in a mowing machine, upon the right hand side of the frame which supports the driver and gearing, and on a line, or nearly so, with the front of said frame, in combination with supporting it in such position so that the entire finger beam, or either end thereof, independent of the other end, and without twisting or straining the joints or connections, can freely rise and fall to conform to the inequalities of the ground independent of the up and down motions of the frame, substantially as described.

Second, The combination with the main frame of a mowing machine, of a narrow finger beam, for sustaining a reciprocating cutter bar and cutters so hinged and supported that the entire bar, or either end thereof, independent of the other end, and without twisting or straining the joints or connections, can freely rise and fall to conform to the inequalities of the ground, independent of the up and down motions of the main frame, while the front of the bar, and points of the guards are also free to rock or roll up, and then back again to the same horizontal plane, upon an axis of motion near the back of the finger beam, and independent of the up and down motions of the hinged support from which the finger beam derives its progressive motion.

Third, The combination in a mowing machine with the shoe which supports the heel of a hinged or floating finger beam free to rise bodily or at either end, as described, of a knuckle or stop, separate from the hinge, to prevent downward deflection when the beam is raised, substantially as described.

Fourth, The combination with the main frame of a mowing machine having a hinged floating finger beam free to rise entire or at either end, as described, independent of the up and down motions of the main frame, so combined therewith as that the driver from his seat on the machine can elevate at pleasure the finger beam and cutters in nearly a horizontal position, to pass obstructions.

Fifth, The combination in a mowing machine, with a floating hinged finger beam, free to rise bodily, or at either end as described, independent of the up and down motions of the main frame, of a mechanism so constructed and arranged that the driver from his seat on the machine can elevate not only the entire beam, but either end thereof at pleasure, to pass obstructions.

Sixth, The combination with a hinged finger beam in a mowing machine of a hinged lever and small ground wheel, in such a manner that the joint or outer end of the finger beam can be elevated above the heel to pass obstructions, and the weight thereof thrown upon the small wheel which serves as the fulcrum of the lifting lever.

Seventh, Hinging the shoe to which the heel of the finger beam is attached in a mowing machine, to a support which extends back and divides, and is in turn hinged to the frame which supported the gearing by its two forks or branches, whereby said hinged support is rendered more firm and secure.

Eighth, The combination of lever, X, wheel, Y, and rod, a, with hinged lever, Z, when applied to a hinged floating finger beam, substantially as and for the purposes set forth.

Ninth, The combination of the main frame, A, hinged floating finger beam, draft tongue and wheels, B and C, substantially as described.

Tenth, The combination of lever, X, wheel, Y, and rod, b, with hinged lever, Z, when applied to a hinged floating finger beam, substantially as and for the purposes set forth.

Eleventh, The arrangement of the pendulum, K, with the pitmen, I and L, as and for the purposes shown and described.

Twelfth, The combination and arrangement of the gears, C, D, D', and G, substantially as set forth.

1,965.—Magazine Fire-arm.—Edward Stabler, Sandy Springs, Md. Patented March 14, 1865:

I claim, First, Limiting or arresting the movement of the carrier block, in the class of fire-arms herein described, at any desired point, for the purpose of converting the arm from a repeater into a single loader, substantially as described.

Second, I claim the stop, b, or its equivalent, in combination with the rotating carrier block, of a magazine gun, operating as and for the purposes herein set forth.

1,966.—Ship Knee.—Robert Thomas, Buffalo, N. Y. Patented July 19, 1864:

I claim a ship knee, made partly of wood (as represented by the chuck, H), and partly of iron (as represented by the iron-plate piece, G), for the purposes and substantially as set forth.

1,967.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented April 17, 1855. Reissued April 26, 1859:

I claim, First, In a harvesting machine where the cutting apparatus is placed opposite or nearly opposite the center of the driving wheel, so constructing the main frame that the rear cross timber shall project inwardly at an angle towards the center line of the machine, substantially as represented by the cross timber, A3.

Second, A gear frame, C, having suitable bearings formed therewith for supporting the crank and bevel wheel shafts with the gearing mounted thereon, in a compact working position, substantially as described.

Third, A gear key, F, in combination with the gearing shaft, D2, constructed and used substantially as described.

1,968.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented April 17, 1855. Re-issued April 26, 1859:

I claim a hinged supporting piece, H, having sockets, H', formed therein for holding divergent fingers, thereby forming a skeleton track clearer, substantially as described.

1,969.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented April 17, 1855. Reissued April 26, 1859:

I claim, in combination with a cutting apparatus placed in rear of a line drawn through the front of the driving wheel, and a grain platform having a side delivery, a seat for the raker, supported upon or by the main frame, and located behind the line of the cutters and at the side of the grain platform, and so arranged that the raker may sit facing the falling grain and deliver the grain at the side of the platform in the rear of the main frame, substantially as set forth.

1,970.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented April 17, 1855. Reissued April 26, 1859:

I claim, First, Providing and using a strengthening bar in the construction of a removable grain platform, so as to give additional strength and stiffness to the platform, for the purposes and substantially as described.

Second, The combination of a removable grain platform, with a short finger bar and main frame of a mowing machine, substantially as described, for the purpose of converting a mowing machine into a reaping machine, without change of finger bar or cutters, the combination and connection being such that the strength of the grain platform is united with the strength of the finger bar to prevent the platform or finger bar from materially bending or springing when the machine is used for reaping grain, substantially as described.

1,971.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented April 17, 1855. Reissued April 26, 1859:

I claim, First, Forming a recess in the outside shoe in rear of the cutters, substantially as shown at K, and for the purpose set forth.

Second, The locks or catches, Z, Z', formed in the clamp, for the purposes set forth.

1,972.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented July 20, 1855. Reissued July 8, 1856, and again reissued April 19, 1859:

I claim, First, Connecting the cutting apparatus, having a short and separate finger bar to the main frame of the machine that it may be adjusted to different heights for reaping, or lowered to the ground for mowing without changing the position of the main frame, substantially as described.

Second, Connecting the finger bar to the grain side of the main frame and supporting it by one end only, by means of an adjustable device and the inwardly projecting ends of the cross pieces of the main frame, substantially as set forth.

Third, The slotted frames, K, K', and locking bolts, I, applied and used for the purpose and substantially as set forth.

1,973.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented July 20, 1855. Reissued July 8, 1856, and again reissued April 19, 1859:

I claim, First, Making the outer and inner shoes broader in front of the finger bar as shown at J and m, for the purpose of bracing the guard fingers laterally.

Second, So constructing skeleton guard fingers and arranging them on the finger bar that they will mutually brace and support each other forward of the finger bar, substantially as set forth.

Third, The bearing piece, z, placed between the outer shoe and guard finger for the support of the outer end of the cutter bar, substantially as described.

1,974.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented July 20, 1855. Reissued July 8, 1856, and again reissued April 19, 1859:

In combination with a short finger bar and a shoe by which it is connected to the main frame of the machine and a cutting apparatus located in rear of a line drawn through the front of the driving wheel, a quadrant-shaped platform so arranged that the cut grain may be delivered therefrom at the side of the platform and in rear of the main frame, substantially as set forth.

1,975.—Harvester.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignment of E. B. Forbush. Patented July 20, 1855. Reissued July 8, 1856, and again reissued April 19, 1859:

I claim, First, In combination with a cutting apparatus and a quadrant-shaped grain platform, and both located in the rear of a line drawn through the front of the driving wheel, a rake, supported by a pivoted connection on the main frame in rear of the axis of the driving wheel, and so arranged that it will sweep over the platform and deliver the grain in the rear of the main frame, substantially as set forth.

Second, A movable fulcrum upon which the rake is suspended, and operated in the manner substantially as described.

EXTENSIONS.

Machine for Arranging and Feeding Screw Blanks.—Thomas J. Sloan, New York City. Patented Feb. 25, 1851. Reissued March 29, 1853, and extended Feb. 24, 1865:

I claim the lifters which select and lift the blanks, etc., from the hopper, substantially as specified, in combination with ways or conductors, or the equivalents thereof, substantially as specified, into or onto which the blanks, etc., are transferred, as specified.

And I also claim giving the lifters, or to the inclined or their equivalents, a lateral motion, in combination with a stop or detector, substantially as specified, for the purpose of arresting the operation of the lifters until a further supply is required, as specified.

And, finally, I claim the sliding carrier, with its recess for receiving and holding the screw blanks, substantially as specified, in combination with the spring fingers, substantially as specified, for taking the screw blanks from the carrier and presenting them to the jaws, as specified.

Steam Engine Governor.—Junius Judson, Rochester, N. Y. Patented March 4, 1851. Reissued Feb. 28, 1865, and extended March 3, 1865:

I claim as my invention communicating the action of a governor to its valve or valves, gate, or equivalent regulating device, in such a manner that when the speed of the engine or motor becomes low, either from increase or resistance to overcome, or from diminution of pressure of the motive power, the said valve or equivalent will be accelerated or caused to move through a comparatively large space, to uncover or cover a comparatively large area of the valve or gate opening, so as to add to, or take from, the engine or motor, by a given change of its speed, comparatively large amounts of power; and, also, when the speed becomes high, either from diminution of resistance to overcome, or from increase of pressure of the motive power, the said valve or equivalent will be by a like change of speed retarded or caused to move through a comparatively small space to uncover or cover a comparatively small area of valve opening, so as to add to or take from the engine or motor comparatively small amounts of power, for the purpose of securing, as nearly as may be, uniform speed of the engine or motor, under all variations of the power of resistance, substantially as herein set forth.

Steam Drilling Machine.—Joseph W. Fowle, Boston, Mass. Patented March 11, 1851, and extended March 6, 1865:

I claim the combination of a direct action steam drill, in which both engine and drill are mounted on a frame, which slides in a swinging frame, capable of being adjusted in any required position with the apparatus, substantially as hereinabove described, which is connected with and actuated by the crosshead of the engine, for causing the sliding frame to move along the swinging frame toward the rock.

Design for a School Desk.—Wm. P. Uhlinger, Philadelphia, Pa. Patented Oct. 8, 1861. Extended March 20, 1865:

I claim the ornamental configuration of the cast-iron uprights, B, constituting, in combination with a table, C, back, D, and seat, A, a new and original design for a school desk, as above set forth and represented in the annexed drawing.

Window-curtain Fixtures.—Silas S. Putnam, Dorchester, Mass. Patented April 15, 1851. Reissued March 31, 1857. Extended March 28, 1865:

I claim attaching the curtain to its roll by a piece or strip, which fits into a groove in the roll, and is secured thereto by caps at the ends, in the manner substantially as herein set forth.

Compound Metallic Door for Vaults, Safes, Etc.—Ira L. Cady, New York City. Patented April 29, 1851. Extended April 29, 1865:

I claim a door or wall for a vault or safe, made by securing to each other, at a certain distance apart, two plates of sheet metal, provided with a rim or curb, and filling the vacant space between them with impenetrable cast-iron poured in while melted, substantially in the manner herein described.

Limekiln.—Richard E. Schroeder, Rochester, N. Y. Patented May 6, 1851:

I claim the flues, d, d, enclosing the cupola, and provided with apertures or flues, e, e, e, e, for admitting the heat and flame to the action upon the limestone from various points, substantially as described, in combination with the air chamber, k, enclosing the cupola, as described, and

I also claim the aperture, p, and passage therefrom, for saving the heat arising from the manufacture of lime while being removed, all operating conjointly in the manner and for the purpose herein fully set forth.

Manufacture of India-rubber.—Henry B. Goodyear, New Haven, Conn., administrator of Nelson Goodyear, deceased. Patented May 6, 1851. Reissued (No. 556) May 18, 1858. Extended May 5, 1865:

I claim the combining of sulphur and india-rubber or other vulcanizable gum, in proportions substantially as specified, when the same is subjected to a high degree of heat, substantially as specified, according to the vulcanizing process of Charles Goodyear, for the purpose of producing a substance or manufacture possessing the properties or qualities substantially such as described; and this I claim whether the said compound of sulphur and gum be or be not mixed with the other ingredients, as set forth.

Manufacture of India-rubber.—Henry B. Goodyear, New Haven, Conn., administrator of the estate of Nelson Goodyear, deceased. Patented May 6, 1851. Reissued (No. 557) May 18, 1858. Extended May 5, 1865:

I claim the new manufacture or substance hereinabove described, and composed of india-rubber or other vulcanizable gum and sulphur, in the proportions substantially such as described, and, when incorporated, subjected to a high degree of heat, as set forth, and this I claim whether the other ingredients be or be not used in the preparation of the said manufacture, as herein described.

Mode of Preventing the Entrance of Dust, Etc., into Railroad Cars.—Edward Hamilton, Chicago, Ill., assignor to Nelson Goodyear, deceased. Patented May 27, 1851. Reissued Feb. 15, 1853. Extended May 8, 1865:

I claim inducing outward currents of air through the windows of

railroad cars, to prevent the entrance of dust, etc. by the action of the surrounding air, and the device combined with the sides of the car substantially as specified, and operating on the principle set forth.

Coffin.—An Act for the Relief of the Heirs of Salmon D. Fisk, deceased. Approved Feb. 17, 1865. Patented Nov. 14, 1818. Released March 6, 1869.

First, Claims the manufacturing of coffins of cast or raised metal, when made substantially in the form and manner above described; that is to say, corresponding nearly with the human form, and making the coffin in two nearly equal parts or shells united by a flange, substantially as set forth.

Second, The manufacture of coffins of raised or cast metal, in two shells, formed with recesses of greater or less depth, which shall respectively constitute a portion of the receptacle of the corpse, thus approximating the coffin more nearly in shape to that of the human body than could otherwise be done.

Revolving Frame for Drying Fruit and other Articles.—J. C. Diekey, Saratoga Springs, N. Y. Patented June 3, 1851.

I claim the center, R, with three or more arms to support a cord, netting or other cloth, for the purpose of exposing cloths, clothes, gloves, fruits, seeds, etc., with facility to be dried; so constructed that the arms may be raised up and brought together, to expedite the collection of the articles dried, and so that it may be conveniently removed when not in use, substantially as described.



In connection with the publication of the **SCIENTIFIC AMERICAN**, have acted as Solicitors and Attorneys for procuring "Letters Patent" for new inventions in the United States and in all foreign countries during the past seventeen years. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after seventeen years' experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the **SCIENTIFIC AMERICAN** are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

Messrs. MUNN & Co.—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MARION.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1850, he addressed to us the following very gratifying letter.

Messrs. MUNN & Co.—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you furnished and I doubt not justly deserved the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

Messrs. MUNN & Co.—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant, W. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

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THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under

their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 24th of March, 1881 are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system except in cases of designs on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is \$10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.
Every applicant for a patent must furnish a model of his invention is susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is no little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.



J. J., of Me.—Your communication in relation to a very small household steam engine is interesting to us, but you can make one far more valuable for our columns when you get your ideas more fully developed and in more definite form.

E. A. H., of Ill.—Allotropic sulphur gradually returns to its normal condition. The new atomic weights adopted by Miller, we judge, are coming into general recognition.

A. M. D., of Mass.—Perhaps niter might be separated from maple sugar by crystallizing the sugar. The best plan would be not to put any niter into the sugar.

W. A. B., of Conn.—There is much difference of opinion in regard to the best kind of water wheel. In the cotton manufacturing of New England undershot wheels were in almost universal use, but they are now being superseded to a great extent by turbines. All the best turbines you will find illustrated in the **SCIENTIFIC AMERICAN**.

W. W., of Me.—Any substance which will coagulate vegetable albumen tends to preserve timber from decay. Corrosive sublimate is the most efficient, as it gives up its chlorine, which combines with the albumen to form muriate of albumen. Perhaps the chloride of zinc acts in the same way.

A. S., of Conn.—The only use of oil on a belt is to make it soft and pliable, when it gets dry and hard; besides, there is a certain glutinous consistency to coarse, heavy oils, which, in connection with the dirt adrift in the shop, cause the belt to adhere well to the surface of the pulley.

W. F. R., of Mass.—The training requisite for a person desiring to become a locomotive engineer or engine-driver, is to work for three or four years where such machines are built, keep his eyes open, his ears open, read and study all he can, ask questions, and, in short, become thoroughly conversant with his prospective business. If he cannot get a situation then he is not worth one, and will never be. We will add that the common way is to "fire" on an engine for six months; at the end of that time the man that never saw a locomotive before is supposed to be capable of running one.

A Reader, of Me.—We can only direct you to the columns of the **SCIENTIFIC AMERICAN** for a practical recipe on a tin dip.

W. A. S., of N. Y.—The beverage called soda water is water impregnated with carbonic acid. Water has the property of absorbing its own volume of carbonic acid gas at all pressures, and the beverage is prepared by compressing the gas with a force pump, thus multiplying the quantity in a given volume, or by simply generating the gas in a close vessel containing the water in such quantity as to produce pressure. Carbonic acid taken into the lungs produces immediate death, but in the stomach it is agreeable, and congenial to most systems.

F. S. B., of N. Y.—Pale lacquer for brass is, alcohol, 2 gals.; cape aloes, cut small, 3 oz.; pale shellac, 1 lb.; gamboge, 1 oz., or in that proportion.

M. S. F., of Mo.—We are informed by one of our large wool dealers that foreign wool is generally imported in bales pretty firmly pressed about the same as cotton; and that it is not injured in the least.

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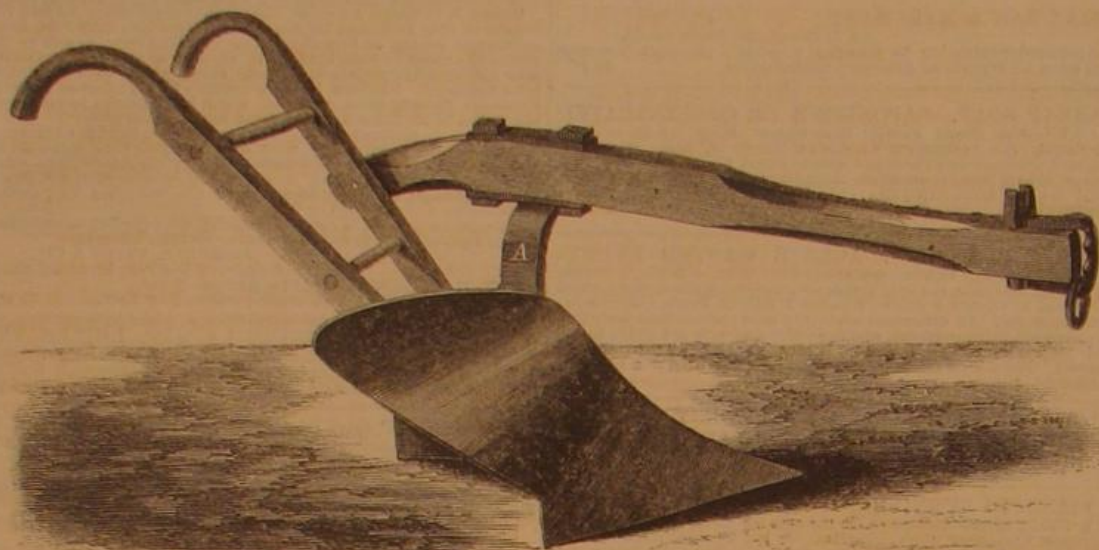
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Improved Plow.

The following description of the annexed illustration is furnished by the inventor:—

Time and experience have shown that, of all agricultural implements now in use, there is none of more vital importance to the farming community than a perfect plow; upon it, to a very great extent, depends the success of the farmer, and hence it has ever been his constant study to remedy its defects. Never has he been able to devise means by which the most serious objection to the ordinary plow—choking—could be obviated. This defect, however, is now completely overcome by the improvement herewith illustrated, and the farmer is enabled by this im-

**PIERPONT'S PLOW.**

provement to cultivate his worst land without suffering the annoyance heretofore met with. He is also enabled to convert the straw stubble, etc., to his own advantage by turning it underneath the surface, where it decomposes and thus adds fertility to the soil.

The practical eye will at once discover in the design of the bent standard, A, the impossibility of choking from the accumulation of rubbish; as fast as it collects it is forced to pass to one or the other side of the plow, and eventually pass under the surface.

This is not the only advantage which this plow possesses. The ease with which the plowman can regulate the width and depth of his furrow is another very important item; this is done simply by the use of the "slot" in the lower end of the standard and the "plate" on the top.

This standard, combining as it does, all the good qualities of the ordinary plow, and being so perfectly adapted to the wants of farmers in every locality, is now offered to the public by State, county, township or shop rights—confident in the belief that ere long this improvement will supplant all others and be universally sought after by the enterprising farmer.

Patented through the Scientific American Patent Agency, Oct. 18, 1864. For further information inquire of Joshua Pierpont, La Harpe, Ill.

Improved Fountain Pen.

Vigor of style and felicity in expression are often

**WELLER'S FOUNTAIN PEN.**

the result of a smooth-running, easy-working pen. Many a sermon, begun in zeal and with a brain overflowing, has degenerated into "bald, disjointed chat," from the sputtering of a villainous pen or the glutinous consistency of the ink. So poems have shared a similar fate, and in dipping his pen into the inkstand the poetaster has put out his rushlight. The pitcher which goes often to the well is broken at last, and the pen which goes constantly to the inkstand gets its point snubbed off, its nibs crooked, and is

frequently ruined by a single dip. It is moreover annoying to be constantly interrupted in the current of thought by the necessity to replenish the pen with ink.

Copyists, and, in fact, all persons who have much writing to do, find fountain pens useful for supplying ink continually to the pen, it being only necessary to fill the fountain once in a certain time, and the ink then flows out mechanically.

The article here illustrated is claimed to be an improvement on this class of pens, it being in a measure self-cleaning—at least so far as relates to keeping the ink passage open; it is easily managed and regular in its action. The details are as follows:—

The holder, A, is hollow, and contains the ink, except at a certain portion near the end, which is devoted to the simple mechanism which governs the ink-flow. This mechanism is merely a rod with a spring, B, slipped over it. The rod connects to a needle inside the guard, C, between it and the pen, and communicates a sliding motion to the needle when the bar, D, is moved with the fingers resting on it. This rod also actuates a small valve in the end of the fountain, so that ink is admitted to the pen when the bar, D, is moved; the needle, by its thrusting motion prevents the gum, which is a component part of all inks, from clogging up the passage to the pen point. In this way the pen is kept constantly supplied with ink, and more or less may be let on by working the bar, D, as aforesaid.

This is a simple and compact arrangement for the purpose, and will doubtless become popular.

Patented Sept. 29, 1863, by Jos. Weller. For information as to rights to manufacture in the State of New York, address Brougham & McKee, 48 Fulton street, Brooklyn, N. Y.; for all other places address Jos. Weller, Washington C. H., Ohio.

Concrete Buildings.

A correspondent of the *Country Gentleman* says:—I find that cobblestone packed in lime mortar between boards laid on the wall raised as fast as it sets, makes a cheap and substantial building. It is rough coated on the outside, blocked off and colored in im-

house for a keg-manufacturing company, 18 by 22 feet, by 10 feet high, at a cost of \$100. It has sustained a great heat, enough to fire a wooden building, and answers every purpose. Apples could be dried in such a house to good profit. The stones were gathered from the adjacent grounds, and were of all sizes to fit in a 10 and 20-inch wall. Farm hands can work on such walls, having a master mason to direct the laborer. Where stone are plenty, buildings of this material can be reared for one half the cost of wood. For dwelling houses strips of boards are laid up in the wall for lathing, to give an air chamber to avoid any dampness.

A TOAD lately found by some quarrymen at Hartlepool, Eng., and announced to be 6000 years old, is declared not a myth. The Rev. Robert Taylor, of St. Hilda's Parsonage, states that the toad is still alive, that it has no mouth, that it was found in the center of a block of magnesian limestone, 25 feet below the surface of the earth, and that it differs in many respects from all ordinary toads.

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will continue to receive careful attention, and all experiments and practical results will be fully recorded. WOOLEN, COTTON AND OTHER MANUFACTURING INTERESTS will have special attention. Also, Fire-arms, War Implements, Ordnance, War Vessels, Railway Machinery, Mechanics' Tools, Electric, Chemical and Mathematical Apparatus, Wood and Lumber machines, Hydraulics, Pumps, Water Wheels, etc.

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Vol. XII.—No. 24.
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NEW YORK, JUNE 10, 1865.

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Improved Paper-cutting Machine.

This machine will commend itself to mechanics and paper-makers by reason of its trim and neat appearance, and the judicious disposition of its parts to obtain the end desired. When we add that it is efficient, well made, and performs its work with ease and accuracy, we give it strong commendation.

To cut paper in bulk requires very much more power than most persons have any idea of. When screwed up in a mass so that it is firmly held under the knife, it is almost as dense as hard wood, and the cutter can only be driven through it by sheer force; consequently a great deal of ingenuity can be shown in designing such machines. They frequently have to be worked by hand power, and the mechanical combinations, therefore, to get the greatest effect with the least space and weight, are not unworthy of the time bestowed upon them. The details of this machine are as follows:—A is the knife bar; B is one of the slides in each of which one end of the knife bar works; C is the table on which the paper to be cut is placed, and D is the main shaft, the ends of which sustain the cams, E and F; these cams are connected with the slides, by means of which they give motion to the knife bar. They are so constructed that in moving down the bar they bring down the ends a short distance, alternately, thus giving a sawing or oscillating motion to the knife during its cutting stroke. G is a clamp by which the paper is held firmly down to the table. The shaft, D, is turned to the point which gives the knife bar its highest elevation, and the paper to be cut is then placed in proper position on the table, C, and fastened by screwing down the clamp, G; the shaft is then put in motion rotating the cams, drawing the knife bar downward making the oscillating cut already described, through the material to the table, C, then quickly elevating the knife bar again to the position at starting, when the operation may be repeated. This is a superior machine, substantially and thoroughly made. The cut being made by cams gives great power during the cut, and throws the knife up quickly to its stopping place. The cams always bring down the edge of the knife to the same spot and never gouge or split the strip of wood or lead, which is cut against, and the oscillating as well as sliding motion of the knife, makes it cut easier, cleaner and with less strain than when the ends of the knife move parallel. The edge of the knife holds well and is not liable to crack out in nicks. The cams run the knife down and up while turning in the same direction, and there are no slips, clutches, or reverse motions about it. The machines are built in the machine shop of the Cincinnati Type Foundry Co., 201 Vine street, Cincinnati, Ohio.

A patent is pending before the Patent Office, having been applied for through the Scientific American Patent Agency.

BRICK MACHINES.—C. F. Looney, Esq., Austrian Consul, No. 2 Hanover-square, this city, wishes to correspond with manufacturers of brick machinery.

Cheap Automatic Regulator of the Electric Light.

It is well known that during the action of the electric light, particles of carbon are carried over from the positive to the negative electrode, increasing the distance between the points, and thus diminishing or extinguishing the light. Various plans have been devised to regulate the distance between the points so as to keep the light constantly. Mr. Samuel

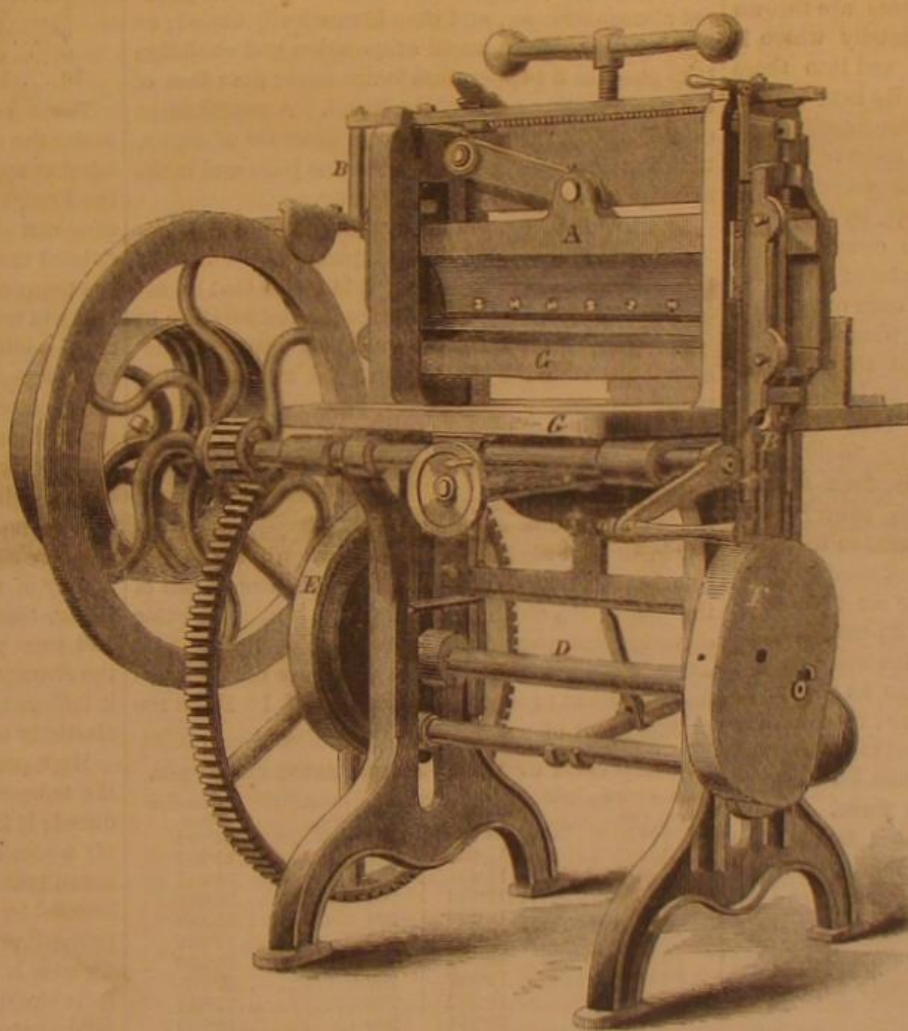
chamber by the column of water; the float sinks, bringing down the upper carbon into contact with the lower one; the current is thus again completed; the coil becomes magnetic, and pulls down the iron core, pressing the stop-cock wedge upon the upper tube. These operations are repeated sympathetically as the carbon burns away.

Double-rod Cornish Man Engine.

The rods are connected by link rods to the horizontal arms of a pair of levers, whose two limbs are bent at right angles to each other, which are supported on a braced timber framing placed above the mouth of the shaft. The ends of the vertical arms are firmly connected together by two flat wrought-iron rods. The motion of the driving crank is transmitted by a long wooden beam linked to the vertical limb of the left-hand angle lever. The rods are guided by broad rollers of cast iron, with projecting flanges at the sides in the model; these are placed alternately in front and at the back of the rods, which would necessitate changing the side on which the platforms are attached; this arrangement is not used in practice. A resting place or platform is provided at every 10 fathoms. The guide rollers are placed at 8 fathoms distance apart. The diameter of the path of the path of the crank is 10 feet. Two double-rod man engines have been built in Cornwall; the first was put up in the year 1843 at Tresavean, a mine which is now abandoned; the other, at the United Mines, was put up in 1845, and is still at work. The Tresavean engine was carried down to a depth of 290 fathoms; it was driven by a steam engine of 36 inches diameter of cylinder, and 6 feet stroke, making 15 revolutions per minute, which was reduced by spur gearing to one-fifth, or 3 strokes per minute on the rods; the latter were uniformly 8 inches square through-

out. The speed at which the men were lifted was 72 feet per minute, 24 minutes being requisite for the entire journey of 290 fathoms. The United Mines engine has the section of the rods tapered, varying from 7½ inches square in the upper 60 fathoms to 7 inches in the next length of 100 fathoms, and 6½ in. in the last 50 fathoms. The driving power is furnished by a steam engine of 32 inches cylinder diameter and 6 feet stroke, which also works a pair of crushing rollers; the speed is reduced by gearing wheels to one-sixth of that of the engine, which runs at 18 revolutions per minute, the rods making three oscillations during the same period. The time required for traveling the whole distance of 200 fathoms is 17½ minutes.

Messrs. Beck, of the Branksa Pottery, Poole, Dorset, are exhibiting in the West London Exhibition a patent perforated 24-inch drain pipe. The invention, which is due to Mr. Whitton, the foreman potter at the above works, consists in a series of longitudinal perforations in the substance of the pipe. This allows the heat to act upon the interior of the clay to a far greater extent than heretofore, and causes the clay to burn much harder, producing a better pipe.



WELLS'S PAPER-CUTTING MACHINE.

Highly communicates to the *London Athenaeum* the following description of a cheap device for this purpose:—The principle of this "Pneumatic Electric Regulator" was suggested to the author by Mr. Malden. The instrument is sensitive in action, and, from its simplicity, little liable to get out of order, and can be arranged for any length of carbon. The rod supporting the upper carbon is attached to a copper float, which rests upon a column of water, contained in a chamber communicating by an opening with an air chamber, from which a pipe, terminated by a flexible tube of vulcanized rubber, is carried under a wedge-shaped piece attached to the rod holding the lower carbon, and which passes through a stout coil of insulated wire. When the carbons are brought into contact the current passes through, and the coil becomes magnetic, pulls down the iron core, and separates the carbon, so as to produce the proper arc of light; at the same time forcing down the wedge upon the flexible tube, closing it as effectually as with a stop-cock. As soon as the distance between the poles becomes too great for the current to pass freely, the coil ceases to be magnetic, and the lower rod is raised slightly by means of a lever and counterpoise spring. Air is thus forced from the

VARIATIONS IN THE BOILING POINT.

The temperature at which any given liquid boils, although perfectly fixed under certain conditions, is nevertheless influenced by several circumstances, such as—1st, the nature of the vessel in which it is boiled; 2d, the presence of matters in solution in the liquid; and 3d, and most important of all, the variation of the pressure of the atmosphere upon its surface.

INFLUENCE OF ADHESION ON THE BOILING POINT.

Adhesion of the liquid to the surface of the vessel which contains it has a marked effect in raising the boiling point. In consequence of this action, water sometimes boils at 214° in a glass vessel, but the temperature falls to 212° , and continues to boil steadily at this point if a pinch of metallic filings be dropped in. If the interior of the vessel be varnished with shellac, the boiling will often not occur till a temperature of 221° is reached, and then will take place in bursts, the temperature falling to 212° at each gust of vapor. So again the presence of a little oil elevates the boiling point of water three or four degrees. The experiments of Donny have thrown light upon some of causes by which ebullition is facilitated. He has found that the presence of air in solution singularly assists the evolution of vapor. From the increased elasticity which the dissolved air acquires by the addition of heat, minute bubbles are thrown off in the interior of the liquid, especially where it is in contact with a rough surface; and into these bubbles the steam dilates and rises. By long boiling of the water, the air becomes nearly all expelled; in such a case the temperature has been observed to rise even as high as 360° in an open glass vessel, which was then shattered with a loud report, by a sudden explosive burst of vapor. In such circumstances the force of cohesion retains the particles of the liquid throughout the mass in contact with each other, in a species of tottering equilibrium; and when this equilibrium is overturned at any one point the repulsive power of the excess of heat stored up in the mass suddenly exerts itself, and the result is an explosion with the instantaneous dispersion of the liquid. The difficulty of expelling air completely, even from a small bulk of water, can be adequately conceived by those only who have attempted it; ebullition *in vacuo* for a very considerable period is not sufficient to effect it. In the slow freezing of water the air previously held in solution is perfectly expelled. In consequence of this absence of air, if a lump of ice free from air bubbles be immersed in heated oil, so as to melt it without allowing it to come into contact with air, the temperature of the water may be raised many degrees above its boiling point, and it will then be suddenly converted into steam with explosive force. Dufour finds that many liquids may be heated far beyond their normal boiling point, by suspending them in the midst of a liquid of equal density, but which can be heated sufficiently without itself beginning to boil. If the globule of suspended and superheated liquid be touched with any solid body it bursts into vapor with explosive violence.

Where the latent heat of the vapor is low, and the liquid has comparatively little adhesion to air, as is the case with alcohol, or ether, or sulphuric acid, frequent bumping or irregular boiling occurs, endangering the vessel and its contents.

INFLUENCE OF THE SOLUTION OF SOLIDS IN A LIQUID ON ITS BOILING POINT.

Any force that acts in opposition to the repulsive energy of heat produces a corresponding rise in the boiling point; so that the solution of a salt in water, by the influence of adhesion, always elevates the point of ebullition, and the more so the larger the quantity of salt added. Indeed it has been supposed that the quantity of salt required to produce a certain rise of temperature might be employed as a measure of the amount of adhesion between the liquid and the salt in solution.

INFLUENCE OF PRESSURE ON THE BOILING POINT.

Since ebullition consists essentially in the rapid formation of vapor of an elasticity equal to that of the atmosphere which is exerting its pressure on the surface of the liquid, any diminution of that pressure should be attended with a corresponding depression of the boiling point; and it is a fact that water which has long ceased to boil under the usual atmospheric pressure, may be at once made to enter into ebullition by placing it under the receiver of the air-pump,

and exhausting the air; by this means water may be made to boil at a temperature of 70° F. Indeed, liquids in general boil *in vacuo* at from 60 to 140° below their ordinary point of ebullition when under a barometric pressure of thirty inches. This result may be shown by boiling some water in a Florence flask, and corking up the flask while the steam is escaping rapidly. Upon pouring cold water over the upper part of the flask the steam is condensed, its pressure is removed, and the water begins to boil briskly; but in this case, the bubbles nearly all rise from the surface, not from the bottom of the liquid. A simple proof that steam from boiling water possesses an elasticity equal to that of the atmosphere is obtained by repeating the last experiment with a tin canister, instead of a globular flask. On corking up the canister, and pouring cold water over it, the steam within is suddenly condensed, a vacuum is produced, and the canister is crushed in by the pressure of external air.

The reduction of temperature at which boiling takes place is advantageously applied in the preparation of vegetable extracts, the medicinal properties of which would be impaired by the ordinary temperature of 212° , and by exposure to the air. The apparatus consists of a still and a receiver, which are connected by an air-tight joint, and are filled with steam to expel atmospheric air, and then hermetically sealed; on cooling the receiver, rapid evaporation and ebullition take place at a temperature much lower than that of the usual boiling point of the liquid. A modification of this process is used in the manufacture of sugar, both in the concentration of the cane juice and in the subsequent evaporation of the sirup.

MEASUREMENT OF HEIGHTS BY THE BOILING POINT.

As might be expected in consequence of the diminution of atmospheric pressure, it is found that on ascending from the earth's surface the temperature at which water boils becomes gradually lower. In descending a mine the effect is reversed, and the boiling point becomes proportionately elevated. De Saussure observed that on the summit of Mont Blanc, which is 15,650 feet (nearly three miles) above the sea-level, water boils at $185^{\circ}8$; and Wisse determined the boiling point upon Mount Pichincha, at an altitude of 15,940 feet, to be $185^{\circ}27$ while the barometer stood at 17.26 inches. The observation of the point at which water boils at any particular elevation furnishes an easy means of determining its altitude above the sea level; a difference of about 596 feet of ascent producing a variation of 1° F. in the boiling point of water.

BOILING POINT OF WATER AT DIFFERENT PRESSURES.

Boiling Point. Deg. Fah.	Barometer Inches.	Boiling Point. Deg. Fah.	Barometer Inches.
184	16.676	200	23.454
185	17.047	201	23.937
186	17.421	202	24.441
187	17.803	203	24.914
188	18.196	204	25.468
189	18.593	205	25.992
190	18.992	206	26.529
191	19.407	207	27.068
192	19.822	208	27.614
193	20.254	209	28.183
194	20.687	210	28.744
195	21.124	211	29.331
196	21.576	212	29.922
197	22.030	213	30.516
198	22.498	214	31.120
199	22.965	215	31.730

The preceding table shows the temperature at which water boils at the corresponding heights of the barometric column, calculated by Regnault, and confirmed by direct observation.

The necessity of attending to the height of the barometer at the time of making a careful observation upon the boiling point of any liquid will now be obvious. It has been ascertained that a variation of one-tenth of an inch in the barometric column makes a difference of more than a sixth of a degree F. in the boiling point; so that within the range of the barometer in this climate the boiling point of water may vary 5° .

HIGH PRESSURE STEAM.

As a reduction of the pressure lowers the boiling point, so an augmentation of the pressure raises it. To demonstrate this fact, an apparatus has been contrived, consisting of a small iron boiler furnished with three apertures in the lid, through one of which a thermometer stem is passed air-tight; through the second, a long glass tube, open at both ends, is inserted; the lower extremity of this tube plunges below the surface of mercury placed in the boiler, above

which a quantity of water is introduced; the third aperture must be furnished with a stop-cock. It will be found, on applying heat, that so long as free communication with the atmosphere is permitted through the open stop-cock, the temperature of ebullition will remain steadily at 212° ; but by closing the cock, the steam may be confined, and as fresh portions of steam continue to rise from the water, the pressure on the surface increases, as is shown by the rise of the mercury in the open tube; the boiling point also becomes higher; until when the mercury stands at 30 inches, and the pressure on the surface is equal to that of an additional atmosphere, the thermometer marks a temperature of $249^{\circ}5$. By continuing the heat without allowing the steam to escape, the boiling point rises still higher, and the elasticity of the steam increases with increasing rapidity as the temperature rises, as is shown by the following table founded upon the experiments of Regnault:—

TEMPERATURE OF STEAM AT HIGH PRESSURES.

Pressure in atmospheres of 30 inch mercury.	Rise in temp. for each addi- tional atmos- phere—Deg.	Pressure in atmospheres of 30 inch mercury.	Rise in temp. for each addi- tional atmos- phere—Deg.
1	212.0	11	364.2
2	249.5	12	371.1
3	273.3	13	377.8
4	291.2	14	384.0
5	306.0	15	390.0
6	318.2	16	395.4
7	329.6	17	400.8
8	339.5	18	405.9
9	348.4	19	410.8
10	356.6	20	415.4

These results differ but little from those obtained under the direction of Dulong and Arago, by a commission appointed for the purpose many years ago by the French Government. They found the temperature of steam of 20 atmospheres to be $418^{\circ}4$, and calculated that if the elasticity rose to 50 atmospheres the temperature would amount to $510^{\circ}4$.

It will be observed that the increase of elasticity, by equal additions of heat, is more rapid at high than at low temperatures, and this circumstance (in addition to the greater simplicity of construction of the machinery in high-pressure engines) is one of the principal reasons for the increased economy of power obtained in employing high-pressure steam as a motive power, when compared with that furnished by the use of low-pressure engines. But it is only when in contact with a body of water from which fresh steam is constantly rising, that the elasticity augments in this manner, and thus produces a force sufficient to rend asunder the strongest vessels. If dry steam alone be heated, it follows the law which regulates the expansion and elasticity of gaseous bodies in general.

High-pressure steam while confined is always of the temperature of the water from which it is produced; it is, therefore, often used in the arts to supply a steady temperature above that of 212° . It is found that the solvent powers of water are much increased by the elevation of temperature caused by preventing the free escape of the steam. Papin's digester is an apparatus designed to effect this object; it is simply a strong iron vessel, furnished with a safety-valve for regulating the pressure at which the steam is allowed to blow off. The water may thus be kept steadily at any required temperature above 212° as long as is requisite. The gelatin of bones may by this means be easily extracted from the earthy matter, although the bones may be boiled for hours in water at 212° without undergoing any such change.

—Prof. Miller.

Artificial Pearls.

Artificial pearls or beads are of various kinds; most generally they consist of solid masses of glass, with a hole drilled in them; or they are blown hollow, and then filled out with metallic luster grains, wax, or with the fine scales of the bleak fish, which have a silvery and pearly luster.

The art of imitating pearls is attributed to a manufacturer of beads, of the name of Janin or Jalquin, who lived at Paris in 1680; he was led to the discovery by seeing, one day, the scales of the bleak fish swimming in a trough, where the fish detached them by rubbing against each other, and he at once conceived the idea of applying these scales for imitating the orient of the pearls, by mixing them with a mucilage and filling the interior of hollow glass bulbs, and he gave this natural and wonderful production the name of Extract of Orient—a very singular name, but still significant of the meaning of its employment. It is

well known that this little white fish, the bleak, is found in abundance in the rivers Seine and Marne, in France, and in many small rivers in Sweden, Germany and Italy. The bleak fish fructify around water-mills, where they are caught by nets.

For the purpose of extracting the color of the scales of the fish, they are rubbed pretty hard in the fresh water collected in a stone basin, which settles down in the bottom of this vessel; the sediment is then pressed out through a linen rag, and they are then replaced again in fresh water and left there to settle for several days, when the water is drawn off and the precipitate is carefully collected; this is called the extract or essence, and it requires from seventeen to eighteen thousand fish to obtain five hundred grammes (a little over one pound).

The scales being animal matter are therefore liable to decomposition, and for their preservation numerous chemical agents have been employed by the different manufacturers, all of whom, who have succeeded, keep it a secret; it is, however, known that liquid ammonia is added to the paste of the scales.

The operation of the manufacture is very difficult, but an experienced workman can manufacture six thousand pearls a day.

The chemists have experimented for some years to imitate the extract of orient—as it requires such a large quantity of fishes to obtain any amount of the scales—and, according to Mr. Barbot, the following preparation has produced a favorable result: which is by distilling one part of oxide of bismuth and two parts of corrosive sublimate; the product is a species of butter, which on redistilling yields metallic quicksilver and a very fine powder; this is the substance used for orienting or coating the artificial pearls with the true gloss of an Oriental pearl.

The same scales are likewise used to coat beads of gypsum, or alabaster, which are soaked in oil and then covered with wax, to give them a pearly appearance. The Roman beads are made in this manner: the scales are dissolved either in liquid ammonia or vinegar, and the solution or liquid is used for covering those artificial beads. The Turkish rose-beads are made of an odoriferous paste and are turned afterward like those of coral, amber, agate, or other hard substances. The knitting beads are sold in meshes of one hundred and fifty, or twenty strings, of fifty beads each, of various colors; and the large glass beads in meshes of twelve strings. There are numerous manufactories in Germany and Italy of the various kinds of beads, which are used to a very great extent both in Africa and North and South America. Germany exports yearly from its different manufacturing places, such as Heidelberg, Nuremberg, Sonnenberg, Meistersdorf, in Bohemia, and Mayence, more than a million dollars' worth. In Venice are large establishments for the finest cut beads.

Nuremberg manufactures, besides glass beads, considerable quantities of amber beads. In Gablontz, in Bohemia, more than six thousand persons are engaged in the manufacture of beads, that are made of pure glass, or of a composition. From the glass-houses, which are very numerous in Bohemia, the rods of different sizes are delivered to the glass mills for cutting, which is performed by water power or by hand. In 1828 there were in that neighborhood one hundred and fifty-two mills in operation; a number of glass-blowers were likewise engaged, who possessed great dexterity in blowing the small beads with the assistance of a small blow-table. In the manufactory of George Benedict Barbaria, at Venice, six hundred varieties of beads are constantly making; and that of Messrs. Gaspari and Moravia manufactures, besides the beads, every article of jewelry from the same material.

The rose beads of Steffansky and Tausig are made of bread crumbs, which are beaten up with rose water in a wooden mortar, until they become a uniform mass, to which is added some otto of roses and drop-lake, when it is made into beads with dissolved gum tragacanth; for the black rose beads, Frankford black is substituted in the place of the drop-lake.

Lamaire, of France, manufactures beads equal in luster and beauty to real pearls. He adds to 1,000 ounces of glass beads, 3 ounces scales of the bleak-fish, $\frac{1}{2}$ ounce fine parchment glue, 1 ounce white wax, 1 ounce pulverized alabaster, with which he gives them an external coating.

Rouyer manufactures his beads, also in France, from opal, which he covers with four or five layers of dissolved isinglass, and then with a mixture of a fat oil, spirits of turpentine, and copal, so as to prevent their becoming moist. In order to render them of the peculiar luster of the Oriental pearls, they are covered with a colored enamel. The opal is fused into rods by a lamp, over which is laid a brass wire to support it; the wire is held in one hand and the opal in the other, and the wire is then kept turning until the bead has the desired size and roundness; if a colored enamel is to be applied, the beads are made but half the required size, which being done, they are once more covered with the opal, then the solution of isinglass is used, and lastly the varnish. Beads made in this manner are with difficulty distinguished from the Oriental pearls.

The best method of making artificial pearls, is certainly by means of pulverized real pearls. Either the smallest, or the deformed large specimens, may be reduced to a fine powder, and then soaked in vinegar or lemon-juice, and the paste made up with gum tragacanth; they may then be cut out with a pill machine, or a silver mold, of any desired size, and when a little dry, inclosed in a loaf and baked in an oven: by tin amalgam, or by the silver of the scales of young fish, the proper luster may be given.

The shad fish, as well as the white fish of our lakes, must yield an extract of orient, of as good a quality as the bleak fish of the Seine, and it is to be hoped that some enterprising mechanic may take an opportunity of preparing the white matter adhering to the scales of the fish just mentioned, either for export or for the purpose of imitating pearls, which may be done as well in this country as anywhere else.

Notes on New Discoveries and New Applications of Science.

DR. VOGEL'S RESEARCHES ON THE CHEMICAL ACTION OF LIGHT.

Some experiments upon the chemical action of light which have for some time past been occupying the attention of Dr. Hermann Vogel, of Berlin, have resulted in a discovery which cannot but have an important influence upon the art of photography. Scarcely any phenomenon has more puzzled chemists than the fact that, whereas light has no action whatever on pure iodide of silver, the presence with that salt of a little nitrate of silver renders it exceedingly sensitive to the action of light; and the puzzle was only increased by Poitevin's discovery that iodide of silver can be similarly "sensitized" by tannin. Dr. Vogel's researches leave no doubt as to the *rationale* of these facts. He shows that there is an exact analogy between the chemical action of light and that of heat. Heat, for example, will decompose oxide of gold or oxide of silver without any other body being present, but can decompose oxide of iron or of manganese only when such oxide is in contact with some substance, such as carbon or hydrogen, which can combine with the oxygen of the oxide as fast as it is liberated. The similarity between the action of heat upon the oxides of the noble metals and that of light upon certain haloid salts, and especially chloride of silver, has long been recognized; and now Dr. Vogel shows that there is as close a similarity between the action of heat upon oxide of iron in contact with carbon and that of heat upon iodide of silver in contact with either nitrate of silver or tannin. Chemists have long been aware of an important difference between the results of the action of light upon chloride of silver and those of its action upon sensitized iodide of the same metal. They have long known that, whereas free chlorine is given off when light acts on chloride of silver, free iodine is not evolved by the action of light on sensitized iodide of silver; but no one, until Dr. Vogel, seems to have suspected this non-evolution of iodine to be due to what Dr. Vogel shows to be its true cause—viz., the absorption by the sensitizing substance of the iodine which the light separates from the sensitized iodide. Dr. Vogel proves conclusively, not only that this absorption takes place, but also that it is simply by virtue of their power of absorbing iodine, or rather of combining therewith, under the influence of heat, that the presence with iodide of silver of either nitrate of silver or tannin enables light to decompose that compound, just as it is by reason of the power of carbon to combine with oxygen, under the influence

of heat, that the presence of that element enables heat to decompose oxide of iron. Dr. Vogel moreover shows—and it is herein that the practical value of his discovery consists—that, so far from nitrate of silver and tannin being the only bodies which will sensitize iodide of silver, that salt is rendered sensitive to light by *any* substance capable of readily absorbing iodine. The number of substances which can be used as sensitizers for iodide of silver is thus very great, and an excellent authority anticipates that some of those which have not hitherto been employed in this capacity must be "capable of application in modes which will give new powers to photography." He looks to Dr. Vogel's discovery "inaugurating a new era, in which dry-plate photography shall entirely supersede wet processes."

CHEAPEST ARTIFICIAL LIGHT FOR PHOTOGRAPHY.

The Council of the Edinburgh Photographic Society recently appointed a committee to inquire into the respective advantages, for photographic purposes, of the various kinds of artificial light, and this committee has reported that the artificial light by means of which a given amount of photographic effect can be produced at the least cost, is that of ordinary coal-gas. Although gaslight is thus, considered absolutely, the cheapest artificial source of actinism yet known, it is not, however, one which is practically available to the photographer. Gas will give a great deal of light for a very little money, but the proportion of actinic rays contained in its light is so small that, in order to the obtainment by means of gaslight of the results required in photography, a most inconveniently large quantity of gas must be burnt. For example, to produce, by means of gaslight, a negative of the usual carte-de-visite size, requires the combustion of not less than nine cubic feet of gas. Nine cubic feet of gas cost only a half-penny, but that quantity of gas cannot be burnt, in a single burner of ordinary dimensions, in less than fifty minutes, and although it might be burnt in one minute by using fifty burners, yet, as a cotemporary has remarked, if the light of these fifty burners could be "concentrated so as to illumine a sitter, it is probable that he would be roasted as well as photographed, from the intense heat evolved." Sixty grains of magnesium, costing little more than a penny, would produce as much actinic effect as the nine feet of gas, and could be burnt in a few seconds, and without the production of much more than one five-hundredth part as much heat as the combustion of nine cubic feet of gas sets free. For use as a source of actinism, therefore, coal-gas, despite its greater cheapness, is scarcely likely to compete with magnesium.

REDUCTION OF SILICIUM.

Some little time ago, Dr. Phipson announced that he had obtained silicon by reduction from silica by means of magnesium, and that by reducing, by means of the same agent titanite, tungstic, and molybdic acids, he had obtained some new gaseous compounds of the same class as siliciuretted hydrogen. Detailed accounts of these new compounds he promised to publish so soon as his experiments should be completed.

ANOTHER NEW FIBER FOR PAPER.

Certain plants which grow abundantly on the bank of the Danube, the Dneiper, the Dniester and the Bug, and which are not at present turned to any account, except to a small extent as fuel, are stated by M. Schinz, of Odessa, to be admirably suited for the manufacture of paper. The plants in question are the typha angustifolia, arundo dunax, and phragmites communis. M. Schinz states that these plants are very rich in fiber, and contain very little silica, and that paper equal to the very best made from linen rags can be made from them without the least admixture of any other material! He also states that the cost of making pulp from them is very much less than that of making pulp from rags. If all this be so—and a French journal states that Mr. Cowan, the well-known paper-maker of Edinburgh, has tested the matter by careful experiments, and has proved that Mr. Schinz does not take at all too favorable a view of the advantages of the material he has discovered—very good paper ought to be very cheap by-and-by. Full particulars of M. Schinz's experiments may be found in the last number of the "Bulletin de la Société d'Encouragement pour l'Industrie Nationale, or in the last number but one of "Dingler's Polytechnisches Journal."—*Mechanics' Magazine*.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, May 30th, the President, N. C. Ely, Esq., in the chair.

SPAN WORMS.

Dr. Trimble presented some specimens of the span worm, which is so destructive to the shade trees of this city, and stated that he had been trying his plan of shaking them off in one of the parks, and had succeeded in completely ridding the trees of this pest. Some of the worms exhibited were dark brown, and others of a high green color; and the speaker explained that the change of color resulted from the shedding of his coat by the worm.

Dr. Trimble also presented specimens of the canker worm, which devours the leaves in the fruit trees of New England, and observed that this pest is extending its ravages westward to New Jersey and other States. This worm is, like our span worm, one of the family of *geometra*, or earth measures, and is very similar to the span worm in appearance. The different manner in which the two worms attack the leaves was illustrated by green branches which had been subjected to their depredations. The span worm eats holes in the leaves, while the canker worm strips the ribs of the leaf clean, and then curls them into a tangled mass.

Dr. Trimble said that wherever trees are so situated that the cedar birds can come to them without fear, they are effectually protected from the depredations of the canker worm. This bird is the natural enemy of the canker worm; and the New England people, instead of shooting these beautiful pets for our market, would do well to pass stringent laws for their protection.

MANURE FOR STRAWBERRIES.

Mr. Bergen said that he had been led by the earnest recommendations of Mr. Pardee, whom he respected as high authority, to attempt to raise strawberries on land moderately rich, Mr. Pardee saying that good corn land was better for strawberries than land highly manured, but after years of trial he was fully convinced that the land should be made very rich indeed for strawberries.

Mr. Carpenter remarked that he had had precisely the same experience. The finest strawberries that he ever raised were grown on ground which had been manured two spades deep with all the manure that could be got into it.

THE WAY TO MAKE STRAWBERRY SHORTCAKE.

Mr. Thomas Cavanagh, in the course of a discussion on cooking strawberries, gave directions for making strawberry shortcake as it ought to be done. The shortcake, some three inches thick, is first baked, and then cut into slices three-fourths of an inch in thickness. Upon one of these slices a layer of strawberries is spread, and covered with genuine cream, when a second slice is placed over it, thus sandwiching the strawberries between the two. The cake thus prepared is placed for a moment in the oven to warm the strawberries through, when it is eaten hot.

TO KEEP HENS FROM SITTING.

Solon Robinson read a communication making enquiry for the best method of preventing hens from sitting.

Mr. Ely: I have a gate made of laths, which proved too light for service as a gate, and I have laid it down upon some blocks which support it about two feet from the ground, and have placed a coop on it. Whenever I have a hen that wants to sit at an unreasonable period, I put her under that coop; the wind drawing up between the slats makes it too uncomfortable for the fowl to sit down long, and she soon gets out of the inclination.

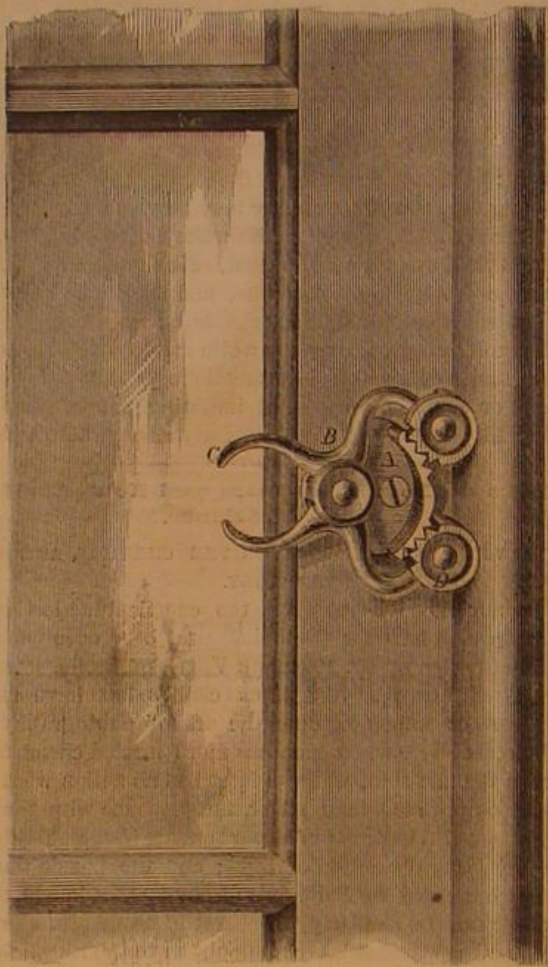
Mr. Carpenter: Tie a bright red rag to her tail. When a hen nestles herself into her seat she always takes a very composed look at her surroundings, and as she catches a glimpse of the fiery object behind her, it is very amusing to see how quickly she will start and run from her nest.

The American Peat Co., of Boston, by an advertisement in another column, invite an examination of their works. We understand from reliable private sources that this company is making a very superior article of condensed peat, and that its manufacture is attracting much attention.

CLARK'S WINDOW-SASH LOCK.

A good window fastener, or a device for holding a sash at any desired height, is a useful thing, and always in demand. If there were forty good ones in the market all would find ready sale, for each variety would have its friends.

The invention herewith illustrated shows a very neat and substantial appliance for the purpose. It is made of brass, handsomely lacquered, and is easily put on in a short time by any one who can drive a screw. It consists of a metal back, A, and two toothed levers, B. These levers are united at the center by a joint, in which there is a spring, tending to keep them together. When the ends, C, of the lever are forced together the jaws are opened, and allow the sash to be raised; on relaxing the pressure the toothed rollers, D, on the ends of the levers, B, bite against the side of the window frame like a tog-



gle joint, and hold the sash firmly, preventing it from being raised from the outside as well. It will be seen that with this supporter the sash can be held at any point without the use of catches or other auxiliaries let into the side frame. These latter mar the wood work very much. One screw and two spurs on the back hold this catch securely on the sash, and it is both ornamental and efficient. For cars, especially, it would be much better than the inefficient and clumsy concern now in use. They are made of iron, with white or black Japan finish, or of brass, or silver plated, and are manufactured by Clark & Co., Mt. Pleasant, Iowa. Agents are wanted in every State. Patented Dec. 8, 1863.

A Perpetual Motion Clock.

Some attentive well-wisher to the SCIENTIFIC AMERICAN takes the trouble to send us the following paragraph from "Nelson, New Zealand," thus showing that our friends at the antipodes do not forget us:

A "Perpetual Motion Clock"—such is the title of a clock exhibited in the New Zealand Exhibition, and is described as follows in the *Lyttelton Times*:—"The other wonder is a perpetual motion clock, in which there is no deception. The workmanship and the secret of the invention both belong to a Mr. Beverly, a watchmaker, long resident in Dunedin, who has before invented some excellent apparatus of a similar character. The clock has nothing recondite about its appearance; extreme simplicity indeed is its characteristic. An oblong case, the upper half of which is glazed and the lower boxed in, stands on end, and supports the works within it; and there is no apparent opening. A dial of the ordinary kind, a singularly looking but not novel 'torsion' pendulum, three little weights, balancing one another on what seems an endless chain passing over two wheels, and a single upright attached by way of support, and passing down into the boxed part of the case below, these are all the parts visible. The inventor does not make a mystery of the principle; he

has had a clock openly going in his house for the last fifteen months without being touched, and there seems no reason why it should not continue to go as long as the material will wear. The principle is so simple as to carry conviction of its truth at once. The alterations in temperature of the atmosphere are applied to create motion, and the motion so created is applied to work always in the same direction, winding up the weight, whose gravitation keeps the clock going. The principle is simple, but the application of it is the difficulty. Mr. Beverly has a right to claim the whole merit of applying a novel force, even though it should turn out, which does not appear likely, that the idea of utilizing the natural alternations of temperature, in expanding and contracting fluids, had occurred to some one before. I have not yet met any person with pretensions to scientific acquirements who questions the propriety of calling Mr. Beverly's invention one of perpetual motion. This alone is worth a long journey to see."

The Virtue of Application.

Working as an ordinary hand in a Philadelphia ship-yard, until very recently, says the *Philadelphia News*, was a man named John L. Knowlton. His peculiarity was that, while others of his class were at ale-houses, or indulging in jollification, he was incessantly engaged in studying upon mechanical combinations. One of his companions secured a poodle dog and spent six months in teaching the quadruped to execute a jig upon his hind legs. Knowlton spent the same period in discovering some method by which he could saw out timber in a beveled form. The first man taught his dog to dance—Knowlton, in the same time, discovered a mechanical combination that enabled him to do in two hours the work that would occupy a dozen men, by slow and laborious process, an entire day. The saw is now in use in all the ship-yards of the country. It cuts a beam to a curved shape as quickly as an ordinary saw-mill rips up a straight plank.

Knowlton continued his experiments. He took no part in parades or target shootings, and in a short time afterwards he secured a patent for a machine that turns any material whatever into a perfectly spherical form. He sold a portion of his patent for a sum that is equivalent to a fortune. The machine is now in operation in this city cleaning off cannon balls for the government. When the ball comes from the mold its surface is incrustated, and the ordinary process of smoothing it was slow and wearisome. This machine, almost in an instant, and with mathematical accuracy, peels it to the surface of the metal, at the same time smoothing out any deviations from the perfect spheroidal form.

Within a few days the same plain, unassuming man has invented a boring machine that was tested in the presence of a number of scientific gentlemen a few days ago. It bored at the rate of twenty-two inches an hour through a block of granite, with a pressure of but three hundred pounds upon the drill. A gentleman present offered him ten thousand dollars upon the spot for a part interest in the invention in Europe, and the offer was accepted on the spot. The moral of all this is that people who keep on studying are sure to achieve something. Mr. Knowlton does not consider himself by any means brilliant, but, if once inspired with an idea, he pursued it until he forced it into tangible shape. If everybody would follow copy the world would be less filled with idlers, and the streets with grumblers and malcontents.

[Mr. Knowlton is one of the most enterprising inventors in the country; he has taken out many patents in this and foreign countries.—EBS.]

How to Clean Quicksilver.

There are few things which cause more trouble in saving gold than the impurities which often exist in the quicksilver used for amalgamating. These impurities often consist of lead, sometimes of some greasy substance, and often of copper and other metals held in metallic or mineral form. To separate these impurities from the quicksilver has, by many, been found a difficult matter. We are assured that the cleaning or separating may be readily accomplished by retorting, but in doing so the mercury in the retort should be covered an inch deep with pulverized charcoal, which at once absorbs all the impurities, and leaves the mercury clean. This method is extensively practiced in some of our mining countries, and is said never to fail in its results. We recommend it to our miners.—*Colorado Miners' Journal*.

WELDING STEEL AND CAST OR MALLEABLE IRON.

Mr. Wm. Carson Corsan, of Sheffield, has provisionally specified the use of a composition, consisting of borax, 50 parts; Calais sand, 30 parts; emery, 10 parts; and manganese, 10 parts, in the welding of steel and cast or malleable iron; but he does not restrict himself to these precise proportions.

The Cactus Plants of California.

The San Francisco *Bulletin* says:—"The cactus—the celebrated family of the floral kingdom, the glory of the hot-houses of Europe and the wonder of travelers, whose flowers and fruits are seen in every league of surface in South California, Arizona and the Peninsula—has never sufficiently attracted the attention of our florists or farmers. Fifty-five species of cactus are known in the botany of these sections, and they include some with magnificent flowers and of extraordinary appearance, forming beautiful ornaments when in the vicinity of other vegetation. If the different species, all covered with thorns, could be got together in a California garden, they would form one of the most singular and unique displays it is possible to conceive in gardening, and it is to be remembered that the fruits are as valuable for human food as the flowers are for feasting the eye."

"The cactacia have an immense range in the altitudes of Central North America, or in what we may term the California *simulacra* of climates and soils, as they are found from the parallel of Cariboo to Cape St. Lucas, and from the eastern slopes of the Rocky Mountains in North Dakota to the Gila river. They are met with in all latitudes between the Gila and Panama, from the line of perpetual snow to that of the sea-shore. Some two hundred different species of this singular family of American plants are enumerated in the botany of Mexico, ranging from the shape of a cabbage to that of a grape-vine, and looming high as a tree and umbrageous as a small oak. Their flowering is of extraordinary splendor and loveliness, and is from the purest white to vermilion, including every mixture of the prismatic colors. But it is the fruit, the standby of the poor and the Indians in the seasons of drouth and famine, that unfolds this providential blessing of the desert in all its value."

"Engleman, of St. Louis, an eminent writer on this family, enumerates as indigenous to Arizona and South California four genera of the cactus; that is, thirty-seven species of the cereus or perpendicular stems, six cumamalaris or mamacs, and six echinocactus or cabbage heads. Almost every one of these is found in the mountain ranges and deserts of Los Angeles, San Bernardino and San Diego counties. In Lower California many specimens are met with which are foreign to our parallels and latitudes, one of which, a climbing variety, is found in the driest months to be full of the purest water. One of the opuntias has a small fruit, specific in scurvy and blood impurities, while others have fruits with the flavor of pine-apples, of strawberries, peaches, plums and cherries, of the luscious cheramoya and mangostein, of the fig and grape, and of the lemon, apple and pear."

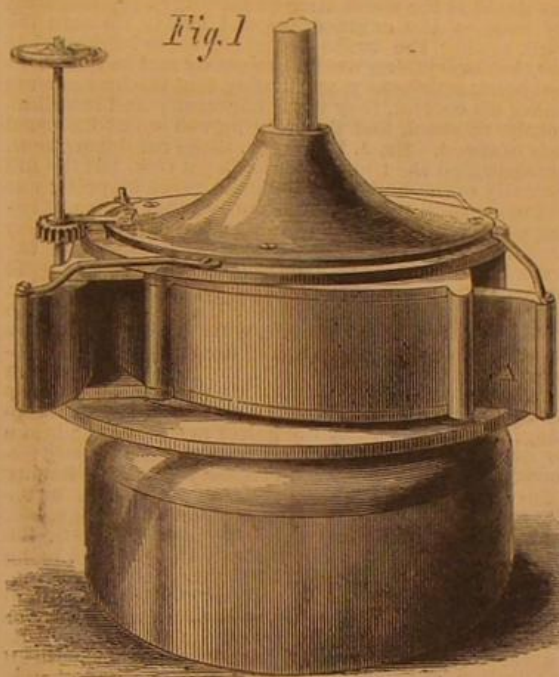
"The *Cactus Opuntia*, or Indian fig of Mexico—white and red—was introduced into the mission gardens of our State from Santa Clara to San Diego in the early settlement of the country, some seventy years ago; but they are also found indigenous to the mountains of the Colorado, in San Bernardino and San Diego counties. Near all the southern missions below Point Conception they grow luxuriantly, particularly at Santa Barbara, San Fernando and San Gabriel. At the two last named places they are extremely abundant and luscious. These varieties of the prickly pear are valuable additions to the food of our State, as the fruit is not only very plentiful in summer and fall but is highly nutritive and agreeable, and can be gathered at will, and the plant requires no care. When stripped of the prickles they can be boiled down to an excellent conserve or sirup, or dried in the sun for preservation, as they contain a large quantity of sugar and gum. The plant is easily propagated by slips or seeds, and has a wonderful endurance, vitality and hardiness. It comes to perfection in three years. Its seeds, which are very abundant in the fruit, are toasted by the Indians as a substitute for corn. The mucilage of the leaves or fronds is thrown into water and used in making cements and white-washes, and gives great strength to those house-building materials in the arid districts of Mexico. It is in common use around Los Angeles."

"Being such plentiful and excellent producers of sugary fruit, so necessary to the laboring man in our dry and attenuated atmosphere, this matter should be attended to by our people, as well as the arts of making molasses from maguey, pumpkins, melons,

watermelons, grapes, pears, beets, cornstalks, and the wild sugar-cane or panoche-carisso of the Tularares. All these fruits are well known to the Indians and Mestizoes of Sonora and New Mexico, and those of Chihuahua and Coahuila, as producing sugar; and particularly the Cactacea and Agave, among the Pimos and Papagos of Arizona, who consider the cactus and the maguey as gifts of the gods, for from them they receive food, clothing, shelter and fencing. The reduction of these articles to conserves and molasses is often facilitated among these simple people by a concentrating process of roasting and baking, and boiling down slowly afterwards, with a little water, to a viscid sirup which never ferments in their keeping, though several of them are also used in the fabrication of mescal or spirits. Of such an exhilarating quality is this fire-water that when 'in the spirit,' they would not give a *clauco* to call themselves king, priest or judge, for they often give for such alcohols weight for weight in silver, and bless the vender for his trade."

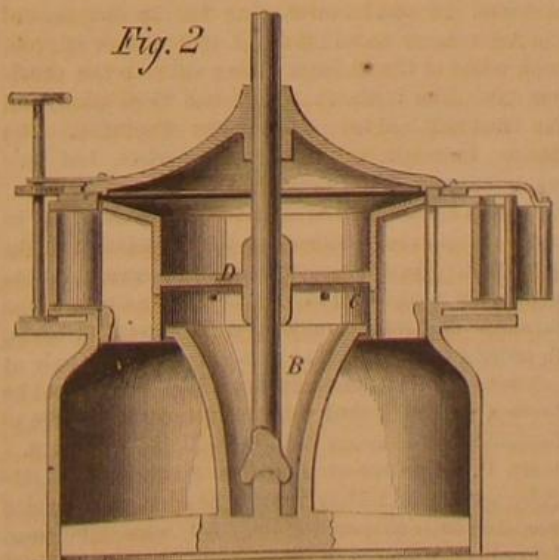
VANDEWATER'S TURBINE WATER WHEEL.

The engravings published herewith represent one of Van Dewater's improved water wheels. These



wheels are quite celebrated and are in use in all parts of the country. We have seen testimonials from different parties now using them, who express the greatest confidence in, and satisfaction with them. Mr. Van Dewater says:—

"My experience for upwards of twenty-three years has enabled me to become thoroughly acquainted with all the difficulties that each and every water wheel of the day is subject to, and I have made effort to avoid them; from my certificates I think that manu-

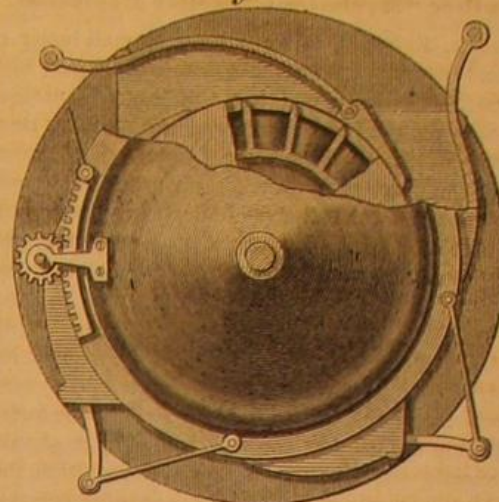


facturers and mill owners will be able to convince themselves of its utility and superiority. My long experience in building turbines has enabled me to construct my buckets so as to gain a maximum speed of the velocity of the water on all their points at the working speed of the wheels."

"I am ready at all times to contract with manu-

facturers and mill owners to construct and set in operation my Improved Jonval Water Wheel, from 3 to 350 horse-power, upon the most reasonable and satisfactory terms. The wheel is highly finished, and

Fig. 3

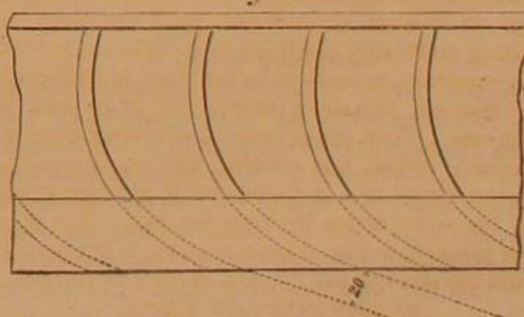


the buckets are polished, and so constructed that they can be built of iron or steel. I am willing to warrant my wheel to work up to my table, which yields the most horse power from the amount of water used. The great outlay of building penstock is avoided, and under a fall from 15 to 25 feet the pressure is so great that the floom must waste more or less water in time if the wheel is not located near the upper level of the fall. It can be located at any point, or between two levels of the fall or set in the bottom of the floom."

An 18-inch wheel, under 6 feet head, 24 inches of water, makes 189 revolutions per minute at work—giving, according to Mr. Van Dewater, 1.81-horse power; and he says he has yet to learn of a single instance where they have failed to give satisfaction."

The several engravings depict the following views:—Fig. 1 a perspective, Fig. 2 a vertical section, Fig. 3 a plan, and Fig. 4 a section showing the shape of the buckets. In Fig. 1 the inlet gates, A, are represented with the mode of operating them; in Fig. 2 the section shows the buckets and the device for balancing the wheel, so as to avoid excessive friction on the step. This is attained by making the step chamber, B, water-tight, and having a series of small holes, C, in the circumference of the wheel disk. Through these wheels the water finds its way when

Fig. 4



the wheel is at work and filling the step chamber, bears up against the diaphragm, D, and finally escapes at the inside edge of the chamber. This does not in any way affect the discharge which takes place at the bottom of the buckets."

This wheel is quite different from that patented by Mr. Van Dewater on June 2, 1863, having many essential alterations which changes its character. The water passes out at the bottom of the wheel, owing to the shape of the buckets, at a tangent of twenty degrees, and the shape of the curve is shown in Fig. 4."

Mr. Van Dewater has obtained several patents on his wheels, and one is now pending on this through the Scientific American Patent Agency; for further information address H. Van Dewater, Buffalo, N. Y."

HOWDAN FOWLS.—In the vicinity of Paris great attention is paid to poultry breeding. The Howdan breed has the advantage of great precocity. Fifteen weeks suffice to enable them to attain their development, and eighteen or twenty days complete the fattening process, on barley meal mixed with milk, without water."



Another "Mysterious" Boiler Explosion.

MESSRS. EDITORS:—I once built a small boiler of tin, and suspended the same over a flame of gas, with the valve tied down, and left the same to natural consequence, the boiler containing rather more than two-thirds its holding capacity of water. Steam soon raised, and shortly after a trifling rupture appeared in some part of the boiler (as indicated by the sound, seemed to be somewhere in the water region); the water escaped through the aperture, striking the support of the boiler, upsetting the same, causing it to drop down from its resting spot, alighting on top of a table about one foot below, whereupon it instantly blew to pieces, tearing the end completely out.

The flame of the fire did not reach above the water line during the heating process; and why it should so violently explode after being removed from the fire, and a small amount of its contents escaped through the started place, is more than I can conceive, as the quantity of water on the table and about the floor plainly showed that there was still plenty left in the boiler after falling for safety, as far as that goes (water, I mean).

Being a reader of your journal I address you for your opinion, if consistent with your views and regulations.

QUERY.

The Curious Clock.

MESSRS. EDITORS:—The clock seen in Montgomery street, San Francisco, is a very common thing in Italy. Two discs of glass are suspended on a double glass column. One of these discs has the figures marked upon it, and is stationary; the other has a pin fastened to it which passes through a hole in the first, and to which the hand is attached; on the outer edge of this disc are teeth, which are moved by an endless screw or cog work attached to the inner glass tube. The tube is put in motion by machinery below and turns the movable plate of glass round in just one hour. A speck or any slight scratch will show the movement after a little patient watching. It is a beautiful toy, and the frame work around the face of the clock is so small that the delusion is almost perfect.

H.

[We have seen clocks of this kind, but the one in San Francisco was described as having the dial upon a square plate of glass. It is possible, however, that the observer may have forgotten in relation to this point.—Eds.]

Inducing Sleep.

MESSRS. EDITORS: I have just read, with some degree of curious satisfaction, a paragraph in the last number purporting to be extracted from "Anatomy of Sleep," and, although but little given to scribbling for newspapers, just wish to say that the remarkable fact there stated, as to the method of procuring sleep, has been known to myself, and, as occasion required, been practised for a number of years. I have never spoken, to my recollection, of its curious effects to a single individual, and was much surprised to find the precise manner of moving the eyes so minutely and accurately prescribed. The rationale of its operation is strictly correct and accords with my own views of psychology. Next to a "conscience void of offense" I know of nothing so remarkably efficacious in bringing to our pillow "balmy sleep, tired nature's sweet restorer," as the method indicated.

B. J. C.

Philadelphia, Pa.

Cleaning Wool with Glycerin.

MESSRS. EDITORS: In your paper of the 20th inst. we find some remarks of Mr. J. H. Smith about the application of glycerin for wool. To prevent the gumming of the wool, we would suggest to wash it after it has been cleaned with soda or soap in diluted glycerin, which will draw out any resinous matter the wool may yet contain. Apply afterwards the concentrated glycerin in the same manner as oil. The diluted glycerin can always be saved from the wash-water of the manufactured wool in which concentrated glycerin has been used. Glycerin is a great solvent; it mixes readily with water, and will neither evaporate nor become dry; hence we think it

will answer in many cases as well as lard oil, being cheaper, and requiring no soap to wash it out of the manufactured goods. HARTMANN & LAIST, Cincinnati, Ohio, May 27, 1865.

Col. Rutherford's Method of Exploding Torpedoes.

MESSRS. EDITORS:—Your remarks, introducing an article in relation to Col. Geo. V. Rutherford's invention of a "submarine battery," were erroneous in attributing to him the writing or sending of that article. It was prepared and sent by one interested in having justice done to him. Please make the correction necessary to relieve Col. Rutherford of the opprobrium of asserting his own merits. R. C. Quincy, Ill., May 26, 1865.

[We cheerfully make it. All articles not written by us are always introduced in the manner described, for the reason that inventors sometimes tell prefer to their own story.—Eds.]

Trial of a New Patent Brake.

The Detroit Free Press gives a lengthy account of the trial of the Patent Railroad Brake, of A. I. Ambler and Isaac Crane, upon the Detroit and Milwaukee railroad:—

The train to which the brake had been attached left the depot at the usual time of starting in the morning. By request the engineer moved slowly through the yard, setting the brake to enable those interested to see that everything worked smoothly and in line. This test being satisfactory, and finding that the brakes were under his control, they were constantly and simultaneously released, and the train moved on at its usual rate of speed. Mr. J. McGregor, of the car department, accompanied the train as far as Royal Oak, but the full capacity of the brake for the most rapid stopping was not made until the train reached Drayton Plains, it being used, however, in a suitable manner for every-day business, until that point was reached, bringing up the train in about half the distance required by the hand brake system. Before reaching Drayton Plains, Mr. Ambler requested the engineer, Mr. Oscar Holmes, to give the brake a trial for still more rapid work, so as to test its capacity for stopping the train in case of imminent danger or disaster, and instructed him to run boldly up to the station at as high a rate of speed as though he intended to pass the station without stopping; to suddenly apply the power and leave the brake to do its work. These instructions were strictly followed, and with a wet and slippery track (it having rained all the way), without braking the tender or using the brakes—without sand or reversing the engine, and with a speed of over thirty miles per hour, the train was brought to a dead stand in 350 feet! being the best braking ever accomplished. And this, too, without sliding the wheels, and without concussion of the cars, producing an effect so perfect and uniform as to astonish those who witnessed its operation. The engineer accomplishes the wonderful result with an application of power which he can move and control with his finger with the most perfect ease. The braking was continued and the power used at every station until the engine was exchanged at Holly; the services of the brakeman for operating the hand brake being in no instance required during the trip. The hand brakes remain, however, by the application of this brake intact, their efficiency and reliability being entirely unimpaired by its action.

Depression in the Iron Manufacture.

The American Iron and Steel Association met on Thursday morning, May 25th, in the County Court Room, Chicago, pursuant to adjournment.

President Ward remarked that, before commencing business, it might be interesting for the members of the Association to be informed that a steel rail had been rolled at the Chicago rolling mills on the previous day. The ordinary rollers had been used, and the steel rail had been rolled most effectually. The flanges, he might say, were very perfect, but they would have an opportunity of judging for themselves, as it was intended to bring the rail into the room in order that all the members of the association might inspect it. On the previous evening several of the gentlemen reported in regard to the condition of the furnaces and rolling mills in their several districts, in order to show the real state of the iron trade at present. It was most important that this should be known, and he hoped that the returns that were to be made that morning would be full and complete.

Mr. C. Grant reported that in Southeastern Ohio there were four rolling mills, the capacity of which was 16,000 tons per annum. All were idle now. Forty blast furnaces, whose capacity was 60,000 tons per annum, are now only producing 30,000 tons.

Seventeen other reports were made in relation to the manufacture in various sections of the country, all showing a general depression of the business. At the close of the proceedings a specimen of steel rail made at the Chicago Union rolling mills, by the pneumatic process, and manufactured from raw pig

iron in twenty minutes, was exhibited to the meeting. It was claimed that the steel rail possessed ten times the durability of the old iron rail. The Chair predicted that within two years nine-tenths of the roads in the country would be laid with the new steel rail.

Respiratory Apparatus.

A series of experiments was made a few days ago, in Paris, with an apparatus, invented by M. Galibert, to enable a man to breathe in the midst of deleterious emanations. A quantity of flour of sulphur was set fire to in a cellar, and a sufficient quantity of sulphurous acid being thus evolved, a fireman, who had never used M. Galibert's apparatus, which is a combination of air tubes communicating with a sort of knapsack, filled with compressed air, entered the cellar, and stayed twelve minutes in it, without experiencing any injurious effects. His nostrils during the time were strongly compressed by a sort of spring, and his eyes protected by a pair of spectacles made for the purpose. The man did not leave the cellar until called by his colonel. The cellar was then filled with a dense and acrid smoke, and another man went in with the same success. At length Colonel Willermé himself put on the apparatus, and stayed a considerable time in that atmosphere of suffocating vapors of every description, and convinced himself by his own experience that a man could breathe as freely with the apparatus as if he were in the open air. Similar experiments have been performed at Versailles, and lately in one of the cellars of the Societe d'Encouragement. When the air in the reservoir has become foul by the action of breathing, fresh air may be introduced; the knapsack, which is of metal, has a tin bottom, but the lid consists of a skin or leather bag. To drive out the foul air this leather bag has only to be pressed down, and to fill the space with fresh air the bag is pulled up again. To fill a larger space, like that of a goatskin, with air, M. Galibert uses a pair of bellows, a slower process, but better adapted to the size of the recipient.—Galignani.

Man Engines.

The man engine is a machine in use in a few of the deep mines in Cornwall, Saxony, the Harz, and Hungary, as well as in some of the deep collieries in Belgium and the North of France; but, although it was originally introduced in the Harz in 1833, the whole number of mines in which it has been adopted in Europe up to the present time probably does not exceed 30. In its original form, it consists of two vertical rods placed parallel to each other, and extending through the whole depth of the shaft: the heads of the rods are connected with the crank shaft of a rotary engine, by a long connecting-rod and two reversed angle levers, by which a reciprocating motion is imparted to them, one rod rising while the other is falling, and vice versa. A series of small platforms project from the face of the rods, the distance between them being equal to the length of the stroke. The miner wishing to ascend steps on to the lowest platform of one or other of the rods at the moment that it commences its upstroke, and is carried up during the time that the other rod is descending; at the moment when the rod stops at the change of the stroke he has arrived opposite to the next higher platform on the opposite rod, and stepping across to it he is lifted through the same amount before stepping back to the rod on which he started, and so on until he arrives at the top; the amount of lift during each revolution of the driving shaft being equal to twice the single length of the stroke in the shaft. In the newer forms adopted in Cornwall a single vibrating rod only is used, and the miner who is traveling up at the end of the stroke steps off the rod on to a fixed platform, and waits until after the next change the rod again moves in an upward direction. In either case the method adopted in descending is the reverse of that adopted in coming up.

Carver's Pump.

Aaron Carver, of Little Falls, N. Y., patented a pump in June, 1864, and it is said he sold the patent for \$100,000. This pump is applicable to domestic use, and also for gardens, but is chiefly intended for oil or other deep wells. Mr. Carver has recently invented another pump, which, like the former, is meant for use in the oil regions, where it is said to be in triumphant operation. We cannot explain the points of the last invention, because the case is now pending in the Patent Office, but Mr. Carver informs us that he has already sold one half of the invention for \$25,000.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening May 17, 1865, the President, S. D. Tillman, Esq., in the chair.

After some miscellaneous business the President opened the discussion of the selected subject, "The best method of drawing street rail cars," by describing

THE NEW AMMONIA ENGINE.

M. Tellier, of France, has recently invented a means of storing and using mechanical power, by condensing ordinary ammoniacal gas to the liquid state, and applying it for propelling omnibusses, and other vehicles, in places where steam power would not be admitted. The conversion of gaseous ammonia into a liquid by pressure, and its application for locomotion is not new, but the mechanical arrangements by M. Tellier embrace several novelties. The small vessel, containing liquid ammonia and gaseous ammonia above it, may be compared to an ordinary steam boiler; when the valve is opened a portion of the gas, having a tension, at 60° F., of about 100 lbs. per square inch, presses against a piston within a cylinder filled with common air. This movement of the piston transmits power through a crank, and at the same time condenses the air before it in the cylinder. At the completion of this stroke a little water is injected into the cylinder, behind the piston, when the ammonia is instantly absorbed by the water and a vacuum is produced. The pressure behind the piston being thus removed, the compressed air on the other side of it is brought into play; thus the piston comes to its original position and the crank has completed one revolution. After the ammoniacal water has been drawn off the piston is ready to receive another charge of ammonia. It will be perceived that this apparatus would work more steadily if two cylinders were used; M. Tellier proposes to use three. This arrangement, or any other in which a gas passes from the liquid state at a nearly uniform pressure, has many advantages over that employing atmospheric air as a secondary motor. The President then directed attention to

THE NEW CARBONIC ACID ENGINE.

A contrivance for drawing cars on street railways, by means of liquified carbonic acid, is soon to be tried in this city by Dr. Barbour, of Auburn, N. Y. The gas is liquified by a stationary engine, and in that state is kept on the car, in a strong receptacle. The whole apparatus is modeled after the steam engine, but is of much smaller dimensions. After its use the gas escapes from the exhaust into a large gas-proof bag upon the top of the car; when the car returns to the stationary engine the gas is withdrawn from the bag, and again condensed into a liquid, and is thus used over and over. In many particulars carbonic acid is preferable to ammonia. 1. It has at the melting point of ice a tension of 575 lbs. to the square inch, and would occupy only $\frac{1}{10}$ the room required for the ammonia arrangement. 2. It is brought from the gaseous to the liquid state at one operation, by means of the force air pump driven by steam; while the use of ammonia on Tellier's plan requires a large quantity of water for its absorption, the weight of which increases the amount of power required to draw the car. At the end of the route the ammoniacal water must be subjected to heat, and the gas, thus disengaged, is reduced to a liquid by means of a force pump driven by steam. 3. The statement of Tellier that a vacuum is produced is not strictly true, for ordinary ammoniacal water when relieved from atmospheric pressure loses a portion of its ammonia. The tension of the gas in Tellier's cylinder is, however, so greatly reduced as to allow the reaction of the compressed air to carry the piston to its first position. 4. The unavoidable leakage of minute quantities of ammonia would make a car more offensive to the olfactory nerves than the stable. 5. The cost and trouble of preparing carbonic acid is much less than that required to produce ammonia.

AVAILABILITY OF OTHER GASES.

The query naturally arises, cannot other gases be used as reservoirs of power? All known gases have been liquified, excepting oxygen, hydrogen, nitrogen, carbonic oxide, coal gas, nitric oxide and common air. An application of several thousand pounds per square inch, at the greatest degree of cold known

—220° F., has failed to reduce them to a liquid state; yet they are regarded by the highest chemical authorities as vapors of highly volatile liquids.

At the melting point of ice, the tension of anhydrous sulphuric acid is about 21 lbs. per square inch; of cyanogen 35½ lbs.; hydriodic acid 45 lbs.; sulphuretted hydrogen 150 lbs.; nitrous oxide 480 lbs.; arseniuretted hydrogen 135 lbs.; and hydrochloric acid 393 lbs.; that of oilfiant gas at 0° F. is 145 lbs. This list might be greatly extended, and include those gases which are liquified under atmospheric pressure by cold alone. If the chair was requested to select from the gases the most feasible agent of force, he would name nitrous oxide (protoxide of nitrogen), commonly known as laughing gas, for the following reasons:

1. It has a tension, when liquified, but little less than that of carbonic acid; these two gases have about the same specific gravity.
2. It is solid at —150° F., while carbonic acid is solid at —73° F.; it cannot, therefore, be so readily frozen by its own rapid expansion, and thus thrown into the state in which it exerts no pressure.
3. Its boiling point is —126° F.; that of carbonic acid being —109° F.
4. To increase its pressure in the proportion of from 2 atmospheres to 3, requires 30° additional of heat; the same increase in the pressure of carbonic acid requires 32½°; of ammonia 60°.
5. It has neither acid nor alkaline qualities.
6. It holds within itself the means of regulating its own temperature; when mixed with bisulphate of carbon, and evaporated *in vacuo*, it produces the greatest degree of cold known—220° F.
7. No dangerous or unpleasant effects would follow from its escape into the atmosphere. However, until some cheaper mode of preparing nitrous oxide can be devised, carbonic acid will be found most available.

The use of any liquified gas to propel cars must be regarded as a temporary expedient for the displacement of horses. The time will surely come when steam, the cheapest of all motors, will be applied directly to draw, not only city cars, but all vehicles containing heavy loads. With properly constructed pavements more than three-quarters of the power now expended in locomotion would be saved. The first step in the great reform must be the introduction of self-moving cars on the street railways, and we will now have the pleasure of hearing Dr. Barbour explain in detail his plan for accomplishing that object.

CARBONIC ACID GAS ENGINE.

Mr. Barbour proceeded to give an exceedingly lucid description of his carbonic acid gas engine. This is not designed as a prime motor, but simply as a compact and portable reservoir of power which is first generated by a steam engine, and is designed especially for driving cars on street railroads. A very strong wrought iron cylinder, about three feet in length and one in diameter, with a capacity of about two cubic feet, is nearly filled with liquid carbonic acid, which is allowed gradually to expand into the gaseous form, and is worked in that form through a small engine precisely similar to a steam engine. The gas is liberated from marble dust by sulphuric acid, or obtained in any other economical manner, and is condensed by means of a steam engine. After being used it is exhausted from the engine into an india-rubber bag placed on the top of the car, and on the return of the car to the station, it is drawn by a fan from the bag into a reservoir ready to be condensed for use again.

The speaker explained that the condensable gases only are adapted for use as portable reservoirs of power. If atmospheric air be compressed to a pressure of forty atmospheres, and then more air be forced into the vessel, the pressure will rise in proportion to the additional quantity; but if carbonic acid be compressed to forty atmospheres it begins to condense to the liquid state, and then as further quantities are forced into the vessel they are immediately condensed, and occupy so little space that they do not add perceptibly to the pressure.

Mr. Reid:—How is your reservoir made?

Mr. Barbour:—The one that I have now was made of five-sixteenths iron, welded along the seam, with heads of one inch wrought iron also welded in, and hooped with five-sixteenths iron sweated on, as it is called, that is driven on red hot. But I shall make the next of five-eighths iron without hoops.

Professor Everett:—Have you provided any means to prevent the solidification of the carbonic acid in your reservoir by the rapid absorption of heat in the evaporation of the liquid?

Mr. Barbour:—Yes, I have two plans. By one, a small vessel communicates with the reservoir by pipes at the top and bottom, the lower pipe having a valve loaded to 700 lbs. to the inch, or whatever pressure I desire, so arranged that when the pressure rises above this, the valve will open and allow a flow from the large to the small vessel. Then I warm the contents of the small vessel, and any excess of gas generated flows over into the large reservoir. About one pint of petroleum will generate enough heat to evaporate the whole of the liquid. But I think that heat for this purpose will be absorbed with sufficient rapidity from the atmosphere. When I first started my engine, the pressure, according to my gage, was about 900 lbs.; it soon fell to about 650 lbs., and after that it remained nearly constant while the engine was running. The next morning the pressure was about 1100 lbs. The gage was not correct, giving in all the cases too high indications, but the proportions were probably about right. I suppose heat was absorbed from the atmosphere about as fast as it was made latent by the evaporation. The reason that the pressure was greater the next morning than at the commencement of the work was that I had the reservoir surrounded by ice during the condensation, and in the morning it was at the temperature of the atmosphere.

Mr. Reid:—Have you tried this engine practically?

Mr. Barbour:—Yes, I have placed one on a car, and run it with a little gas which I condensed by hand. To accommodate the apparatus it was necessary to alter the wheels in a way that multiplied their friction, but the engine not only propelled the car, but when this car came in contact with another, it drove both along. I allowed the gas to follow full pressure, three-fourths of an inch, and worked the rest of the stroke by expansion. I regulate the power and speed by varying the cut-off. The cylinder is 2½ inch bore, by 12 inch stroke.

Professor Everett:—Will there not be danger of your reservoir exploding from variations in the temperature of the atmosphere?

Mr. Barbour:—The range of temperature in our climate will cause a variation in the pressure from about 450 lbs. to about 900 lbs. to the square inch; and I have tested my reservoir up to 5,000 lbs. to the inch. I think the safety is far greater than with a steam boiler, as there is no burning out of the reservoir or other deterioration to diminish its strength. It is true that the liquid carbonic acid has a corrosive action upon iron, but to prevent this I line my reservoir with a coating of wax, which has proved so completely effectual in protecting soda-water fountains. The carbonic acid gas does not corrode iron in the least; wherever this only comes in contact with the iron of my engine, the metal is as bright as when it first left the lathe.

Mr. Bartlett:—What is the weight and power of your engine?

Mr. Barbour:—The whole apparatus weighs about 450 lbs., and I compute the power at one and a half horse.

Mr. Tillman:—Have you ever tried nitrous oxide—laughing gas?

Mr. Barbour:—I have not. I claim the application of my combinations to any condensable gas. I have tried ammonia, but under high pressure it is impossible to confine it. The advantage of carbonic acid is that it is of a coarser nature than either ammonia, or atmospheric air, or steam. It does not leak through my ball valves even under 1,000 lbs. pressure to the inch. I have had my valves covered with water, and not a single bubble of gas came through.

[Carbonic acid has a strong affinity for water, and might there not have been an escape of gas which was absorbed by the water surrounding the valves?—*Eds. Sci. Am.*]

While strawberries are in bloom is the time to examine the beds and eject such as are valueless. Those which are termed male plants, i. e. staminate, do not usually produce any or but very little fruit, and their number should not be over one in ten to fifteen of female plants.

Improved Reversible Car Seat.

When a car reaches the end of its route all the seats have to be reversed before it returns, and as there are many seats and many cars, it is a work of some time and labor to turn each one individually. The inventor of the plan illustrated herewith proposes to turn every seat at once, by mechanical means. All that is necessary, then, is to operate a certain part, when every seat is turned over with one movement.

By inspecting the engraving, a wheel, A, may be seen at one end of the car; this wheel has a pinion on the shaft, which meshes into the rack on the bar, B; this bar runs the whole length of the car and has a rack at each seat. There are pinions also on the ends of the arms, C, which reverse the seats. It is easy to see, therefore, that by turning the hand wheel, A, the bar, B, communicates motion to all the pinions at once and reverses all the backs thus preparing the car for the return trip at one movement. These fixtures also prevent persons from turning two seats into one, and monopolizing them when other parties are standing.

This device was invented by E. F. Shoenberger, of Germantown, Pa., and was patented January 3, 1865. For further information address him as above.

Improved Shifting Carriage Top.

This invention is an improvement on carriage tops and is designed to render them stronger at the point of attachment to the back of the seat, as also to make them removable at pleasure, and convertible into a "no top" wagon when desired. The top is fastened to the seat by a clasp fitting firmly under a stout iron brace, as at A; and the whole frame of the back, and that which supports the top, is made in one piece, so that when the forward clasp is disconnected from the brace the entire top may be lifted off. The straps, B, at the back, enable persons using this top to strain it back, when necessary, so that the clasp will be prevented either from getting loose and being detached spontaneously or rattling.

At the back of the vehicle there are also two fastenings or clips, C, which retain the top at that point, and prevent it from shifting laterally, and the irons, D, which carry the back, E, are made in the shape of an S or of an annular form, as shown, the object being to render them capable of a slight spring or compression, so that they can be connected to the clips before spoken of. The upright braces, F, also afford support to the back, E, and remove the strain, says the inventor, from the seat itself.

This top is claimed to be a great improvement on the old plans.

A patent is ordered to issue. For further information address Enders & Severson, carriage manufacturers, 213 Jefferson street, Louisville, Ky. Patent solicited through the Scientific American Patent Agency.

Combined Cylinder Engines, Surface Condensers, Etc.

At a recent meeting of the Royal School of Naval Architecture, London, Mr. Robert Murray gave his experience on marine engineering, as follows:—

Surface Condensers.—It was found that the water while free from salt was apt to become very foul, the result being that the tubes of the condenser got blocked up, while the boiler was exposed to even more rapid deterioration than under the influence of hot brine. There was a set off, but not an adequate one, in a diminished consumption of coal. Mr. Murray

thought that, on the whole, there was little or no saving in their use at present.

Combined Cylinder.—By a comparison of the performance of the *Poonah, Delhi*, and other vessels of the Peninsular and Oriental Company, with the *Saxon* and *Roman*, of the Cape Mail Company, Mr. Murray was led to the conclusion that there was no such advantage over the single cylinder as would compensate for the increased weight and complexity of the combination.

Superheating.—Mr. Murray stated that it might

and pulverize as fine as possible. Soak that powder with good sharp vinegar, and dry it before the fire or in the sun. Re-soak it as before with vinegar, and dry as above, repeating this operation a dozen of times. By these means you will have a very good and sharp powder, which turns water instantly to vinegar. It is very convenient to carry in the pocket, especially when traveling.

Heavy Rolling Mills—Testing Castings.

"Recently," says the *London Engineer*, "we went

to the works of Messrs. T. Perry & Son, of Highfields, near Bilston, and inspected a fine lot of work intended for the manufacture of ship and armor plates and bars, for the use of the arsenals of our own and one or more Continental governments. The rolls will be used in the working of steel as well as iron; and the steel will be produced by the Bessemer process. The machinery in course of completion and now ordered consists of one 24-inch train for armor plates; one 24-inch train

for the largest sections of angle and T-iron for shipbuilding; one 26-inch train for steel plates; one 24-inch train for steels; one 22-inch trains for steel rails and large sections of angle steel. Each of the above trains is provided with massive reversing gearing, the iron and steel being rolled backwards and forwards so as to avoid the labor and loss of time incurred in lifting the bars and plates over the rolls, as is the practice in ordinary rolling mills. Some idea may be formed of the strength and massiveness of the above from the fact that the housings or frames of the largest rolls weigh thirty tons per pair. In addition to the above there are one 22in. train for puddled bars; one 16-inch merchant train for steel; one 14-inch train for iron; and 10-inch ditto for steel. The engines for a part of the machinery described are also being made by Messrs. Perry. They include three high-pressure engines of very large size, capable of working up to 1,305 indicated horse power. The driving machinery is of the strongest and heaviest description, including (among others of proportionate strength) three enormous driving wheels, 20 feet diameter and 8-inch pitch, weighing about 32 tons each; eight large fly wheels from 25 to 35 tons each, and most of the driving shafts are 24-inch diameter. Messrs. Perry tells us that they have for several years adopted the plan of ascertaining the actual strength of every casting of importance which they make, and the results are duly registered in a book kept for that purpose. A trial bar is cast from each ladle of the melted iron, and these bars are afterwards broken in

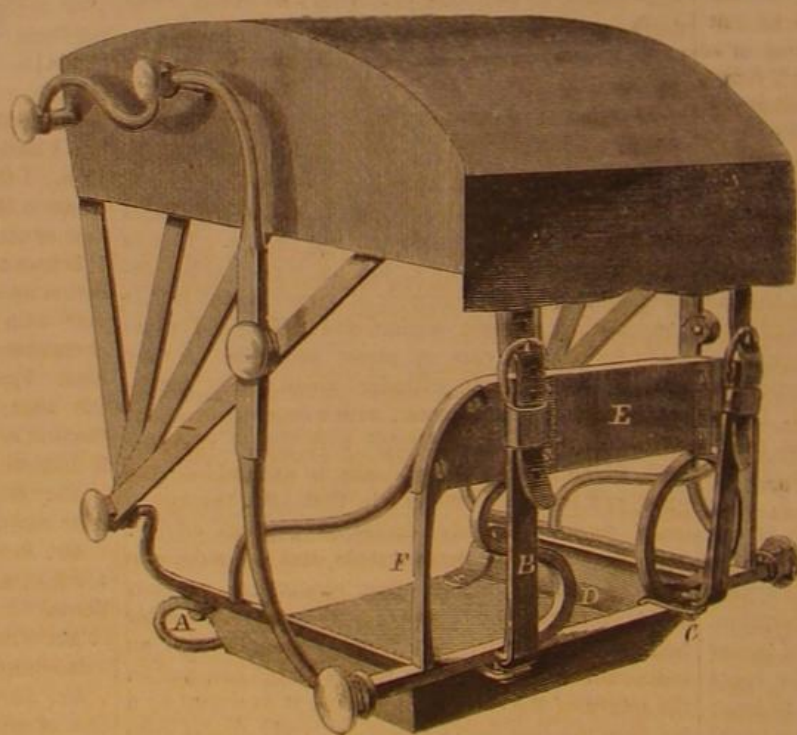
a testing machine made for the purpose. Should any deficiency of strength appear the casting is broken up the same as if it had been a 'waster' from any other causes."

THE "LINNEUS" RHUBARB.—This plant, so highly esteemed for ples, is being cultivated and improved very much. From being coarse, stringy, sour and astringent, it has been rendered exceedingly fine and delicate in flavor. The Linneus is the finest sort, and is justly celebrated. We learn from Mr. R. W. Holton, of No. 32 John street, New York, and from other reliable sources, that it is perfectly hardy, exceedingly fine-grained, and well flavored, and, what is quite important, that it requires but little sugar to render it palatable. Considering its good qualities, it should be widely cultivated.

**SHOENBERGER'S REVERSIBLE CAR SEAT.**

now be considered as certain that this process is desirable for all vessels which make long voyages, and which use expansion in the cylinders to any considerable extent. In the smaller class of coasting and river steamers, where the trip was short, and the engines not worked so expansively, superheating did not answer so well. In any case the temperature of the steam at the superheating should be limited to 320 deg. or 360 deg. at the utmost.

Screw v. Paddle for Ocean Steaming.—Mr. Murray considered that this question was by no means in a

**ENDERS'S SHIFTING CARRIAGE TOP.**

settled state, and discussed in detail the circumstances under which either method had advantages over the other. He remarked that screw vessels were often placed under circumstances disadvantageous for comparison by being under-powered.

Shafts.—Mr. Murray stated it as an established rule, that shafts, whether paddle or screw, will not last beyond a limited time, failing sometimes after five years' work, in other cases lasting ten or twelve years, but always being deteriorated by use. After discussing the cause and manner of this deterioration, he stated circumstances which led him to form a favorable opinion of the recent introduction of steel instead of iron for the shafts both of paddle and screw engines.

A DRY PORTABLE VINEGAR.—Wash well half a pound of white tartar with warm water, then dry it

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NEW YORK, SATURDAY, JUNE 10, 1865.

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THE EFFECTS OF THE WAR UPON THE INDUSTRIAL ARTS.

Grote, Gibbon, Sismondi, Macaulay, Irving, Prescott, Motley, and nearly all the great historians, have been in favor of free institutions; a large study of human affairs bringing conviction that these institutions are most efficient in promoting the happiness and well-being of communities. Buckle, in his learned "History of Civilization," says, that all the great reforms have been the removal of some obstruction to human freedom. Such a reform, more radical and thorough in the scope of its operation, and wider in extent than any which preceded it, has swept over our Southern States, converting 4,000,000 of the inhabitants from simple chattels into freemen.

The most important effect of this stupendous reform will be experienced by the mass of white inhabitants at the South, in bestowing upon them and their children the priceless boon of education. Among all the inhabitants of the country those who will be most benefited by the suppression of the rebellion are the rank and file of the Southern armies, who have been fighting with such blind desperation to prevent this result, for, they will now enter upon that path of forethought, economy, advancement and prosperity which is the invariable accompaniment of popular education.

One of the necessary consequences of the extension of education will be a far greater variety of industrial pursuits. Ignorance was essential to the existence of slavery, and this ignorance was incompatible with the skill and intelligence requisite in the construction and management of machinery, and in all the mechanical operations. Hence the devotion of Southern labor to the raising of rice, tobacco, cotton, hemp, and other agricultural products. To these pursuits the whites, as well as the blacks, were mainly devoted. No pretension could be more ridiculous than that the white men of the South have scorned to labor; there, as elsewhere, the great mass of the people are poor, and must work or starve. We know from personal observation that throughout the South there has been no difficulty in hiring thousands of white men to work at the market wages. Abbott Lawrence once wrote a letter of advice to the people of Virginia, urging them to embark in mining iron ore and smelting it, on the express ground that their ignorant and unskilled labor would be adapted to this industry. But Abbott Lawrence underestimated the obstructions which slavery and its concomitants offered to even the rudest mechanical pursuits, and it was found impossible to follow his advice.

Now all these obstructions are removed, and no

man can estimate the results; he whose imagination is capable of the boldest flight will come nearest to the truth. A vast horde of skilled laborers from the Northern States and Europe will pour into the South, and mining, manufacturing and mechanical industry will spring at once into life and vigor; the ribs of the mountains will be blasted asunder; the streams will be turned into mill courses; cities, canals and railroads will be constructed, and wealth will be accumulated with a rapidity unparalleled in the history of mankind.

To aid all this varied industry there will be a demand for new machinery, new implements and new devices in endless variety. This immense enlargement of the area of freedom is a corresponding expansion of the call and the reward to inventive genius.

CREDITING EXTRACTS.

It requires but little experience in journalism to convince any one of the wisdom of citing the authority on which any assertion is made. Any statement in relation to the expansion of steam on the authority of Rankine; in relation to the strength of iron on that of Fairbairn; in relation to ichthyology on that of Agassiz; in relation to chemistry on that of Prof. Seely, is of a hundred fold more value than the same statement would be if made anonymously. A journal which omits to name its authorities, simply throws away a large portion of the value of its reading matter. Besides this, it makes itself responsible for all the errors and blunders of the investigators whose results it publishes.

We have been forcibly reminded of this truth by a little incident which has just occurred. Finding in the *Shoe and Leather Reporter* a translation from the *Gerber Courier*, describing the mode of manufacturing a certain kind of French leather, we cut it out and gave it to the printer, the credit being accidentally omitted. When the forms were ready for press the omission was noticed and regretted, but it was not deemed of sufficient importance to have the forms unlocked, and it was allowed to pass. The next number of our cotemporary contained this complaint:—

"We notice that a translation of ours, which was duly credited by us as translated from the *Gerber Courier*, on the manufacture of French leather, was very coolly abstracted from our columns and inserted as original by a cotemporary a few days ago. Any of our articles are at the service of our cotemporaries if they will only be kind enough to credit us. In the present instance an injustice was done not only to ourselves but to the *Gerber Courier*."

At the same time we received a letter in French, from a French tanner, saying that the extracted article was ridiculously erroneous. We translate this letter as follows:—

"MESSIEURS THE EDITORS:—I have read in the last number of your journal, page 309, a piece entitled 'The Manufacture of French Leather.' As I am a tanner myself, and as I have worked at this trade in France for ten years, I take the liberty of informing you that the person who wrote that is entirely ignorant of the manner of making the leather, which we call *cachet lisse*, and not 'cachen,' as he says. That is a word which I have never heard pronounced in France."

"First, The leather is not treated with hot ashes, but with lime."

"Second, The leather is not greased."

"Third, The tables used are not of marble, but of oak or walnut, 11 feet long and 5 feet wide."

"If you desire to know the manner of making this leather, and will inform me through the medium of your journal, I will communicate it to you."

"I have read the extract referred to, to several French tanners, who have laughed at it (*qui en ont assez ri*), because it was in no sense correct."

"Your servant, M. A. DURET."

Wellsboro, Pa., May 15, 1865."

We should be pleased to receive from our obliging correspondent a correct description of the method of making this kind of leather in France. In the mean time we inform our New York cotemporary that if we had credited the article referred to it would have been to the *Gerber Courier*, and not to the *Shoe and Leather Reporter*. We translate a great many articles from foreign journals, but should never expect to receive credit for them ourselves. When the *Reporter* becomes as accustomed to having its own original articles plagiarized as we are, it will receive the matter with more philosophy. We have now before us a copy of the *New York World*, containing an article with a large heading on refining petroleum, credited to the *Pittsburgh Commercial*, and on examining it we find that it is copied verbatim from page 112 of our current volume—the original article having

cost us two days' labor to prepare. We have also seen our editorials copied extensively into our own and the Canadian papers, and credited to the *London Chemical News* and the *Technologist*. These plagiarisms, so far from giving us offence, have gratified our pride. They showed that the English editors who published our articles as their own, not only endorsed the soundness of our views, but tacitly acknowledged that the style in which they were expressed was better than that of which these editors were capable.

THE SUEZ CANAL.

The great canal for connecting the Red Sea with the Mediterranean is so far advanced as to be navigable for small barges through its whole length, with the exception of one point where a large lock is in process of construction; a transshipment is required at this place. The advance of the work to this stage was celebrated on the 7th of April by what was called "an opening of the canal," this being the second "opening," which has been publicly celebrated.

The canal when completed will be about 100 miles long, and 330 feet wide at the water line, with its bottom 20 feet below the level of the Mediterranean. The projector of the enterprise is M. F. de Lesseps, a Frenchman, who obtained a grant in 1854 from the Egyptian Government of the right of way for 99 years, on condition of paying 15 per cent of the net profits to that Government. He then formed a joint stock company, with a capital of \$40,000,000, on condition that 75 per cent of the profit should be divided among the stock holders, 15 per cent should be paid to the Egyptian Government, and 10 per cent should go to the originators of the enterprise. On these terms the stock was taken up, \$18,000,000 by the Egyptian Government, and the remainder by capitalists in Paris and London. It is stated that contracts have been made for the completion of the several parts of the work by the 1st of July, 1868. The distance from New York to Bombay, in India, is now by the Cape of Good Hope, 18,600 miles; by the way of the Suez canal it will be 11,283 miles, the new route thus shortening the voyage more than 7,000 miles.

DRILL CHUCKS.

Of late a demand has sprung up among machinists for a small universal drill chuck, or a tool to hold drills of all sizes, with straight shanks, from a sixteenth to three-eighths of an inch. The necessity for employing such a tool was rendered greater by the introduction of the Manhattan twist drills, which are now extensively used by all good workmen. These chucks should not be cumbersome or costly, and should be capable of speedy adjustment, and hold the drill firmly, for it sometimes happens in drilling deep holes that the drill binds, bends and breaks in the chuck if it slip. They are also exceedingly useful for holding wire to make small screws or taps, or to take small rods that have to be cut to a certain length. Some makers apply the chuck to the body of the lathe center, so that it fits on it; others screw the chuck on the mandrel when the lathe is small, and still others make a common taper spindle like a lathe center. All varieties have their good points. Some very good tools of this class are now in market.

Coal-mining Machines Wanted.

At a recent meeting of the American Iron and Steel Association, Mr. A. C. May, of Milwaukee, offered the following, which was referred to the Executive Committee:

Resolved, That the Executive Committee of this Association are hereby authorized to investigate and report at the next quarterly meeting the expediency of offering such inducements or suggestions to inventors and machinists as shall furnish a practical machine for mining coal and iron ore.

The Association meets at Cleveland on the 23d of August next.

From a report submitted to the Italian Government on the education of the people, it appears that out of 21,777,534 people, 16,999,701 are unable to either read or write! An Italian who cannot read is not so ignorant as an Englishman in that position, but there is, nevertheless, ample work for the schoolmaster. In Piedmont, only, is half the population able to read.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Machine for Cutting Sheet Metal.—This invention consists in the use of two pairs of shears adjustable for any desired bevel and length, and applied in combination with a treadle or other suitable mechanism, in such a manner that the bevel end from curved pieces of sheet metal can be cut with little loss of time and with perfect accuracy; it consists, further, in the application of adjustable gages in combination with the adjustable shears, in such a manner that the apparatus can be readily set for pieces of sheet metal of any desired width; it consists, finally, in providing the shears with crooks in the cutting edges, fitting one another in such position that by their action the pieces of sheet metal are notched at the same time the bevel ends are cut off, and each piece, when taken from the shears, is ready for soldering without requiring any further proposition. Hosea Low, of Waukon, Iowa, is the inventor.

Combined Hydraulic and Pneumatic Pump.—This invention relates to a pump for raising water from deep wells or reservoirs, and is more especially designed for oil wells, mining purposes, etc. The invention consists in the use of an air pump in connection with a water receiver arranged in connection with valves and pipes in such a manner that water and other fluids may be raised from great depths by means more simple and less expensive than the force pumps now used for such purposes. G. M. Woodward, of New York city, is the inventor.

Steam Boiler.—This invention consists of certain improvements in the construction of vertical steam boilers, wherein a combustion chamber is employed, and the flues, both downward and upward, are made to pass through the water space, and wherein the upper parts of the apparatus are so arranged that the products of combustion and heated gases are made to superheat the steam in the steam space of the boiler. Thomas Main, of Green Point, N. Y., is the inventor.

Operating Slide Valves.—This invention consists in a novel mode of operating slide valves of steam engines, so that they may be made to cut off steam at any desired part of the stroke, and be also moved with a quick stroke, one of the features of the invention being the communication of the motion of the valve stem to the valve through a vibrating lever whose upper end, which is free, is made the fulcrum of the said lever. John B. Cochrane, of Brooklyn, N. Y., is the inventor.

MARKET FOR THE MONTH.

During the month of May the price of gold fell from 150 to 130, and recovered to 137, most other values, of course, going down and up with it. The following are the comparative rates at the beginning and close of the month:—

	Price April 26.	Price May 31.
Coal (Anth.) 2,000 lb.	\$11 00	\$9 00
Coffee (Java) 33 lb.	33 @ 35	33 @ 36
Copper (Am. Ingot) 34 lb.	34 @ 36	34 @ 36
Cotton (middling) 50 lb.	50 @ 51	50 @ 51
Flour (State) 70 lb.	70 @ 70	70 @ 69
Wheat (Am.) 2 20 @ 2 50	2 20 @ 2 50	1 90 @ 2 20
Hay 100 lb.	1 32	1 00
Hemp (Am. drs'd) 275 00 @ 350 00	275 00 @ 350 00	260 00 @ 270 00
Hides (city slaughter) 8 @ 9	8 @ 9	8 @ 9
India-rubber 51 @ 90	51 @ 90	46 @ 75
Lead (Am.) 9 75 @ 9 87	9 75 @ 9 87	8 25 @ 8 50
Nails 100 lb.	7 00	5 50 @ 5 75
Petroleum (crude) 37 @ 37	37 @ 37	35 @ 36
Beef (mess) 12 00 @ 20 00	12 00 @ 20 00	10 00 @ 18 00
Salt-peter 28	28	25
Steel (Am. cast) 14 @ 22	14 @ 22	21 @ 22
Sugar (brown) 10 @ 15	10 @ 15	9 @ 15
Wool (American Saxony fleece)		
75 @ 85	75 @ 85	75 @ 77
Zinc 13 @ 14	13 @ 14	12 @ 12
Gold	1 51	1 37
Interest		6 @ 7

MISCELLANEOUS SUMMARY.

COUNTRY readers, fond of toilette fineries, can perfume the water in which they wash by throwing violets into the pitcher, and letting them remain for some hours.

THERE is a paper collar manufactory in Springfield, Massachusetts, that turns out ten thousand dollars worth a day.

To SOFTEN IVORY.—In three ounces of spirits of niter and fifteen of spring water, mixed together, put your ivory a soaking. In three or four days it will be soft so as to obey your fingers.

To dye ivory thus softened dissolve in spirits of wine such colors as you want to dye your ivory with. And when the spirit of wine shall be sufficiently tinged with the color you have put in, plunge your ivory in it, and leave it there till it is sufficiently penetrated with it, and dyed inwardly. Then give that ivory what form you please.

To harden it afterwards, wrap it up in a sheet of white paper, and cover it with decrepitated common salt, crumbled by heat, and the driest you can make it to be; in which situation you shall leave it only twenty-four hours.—*Ancient Work.*

QUALITY OF MILK.—It is sometimes forgotten that the last gill of milk drawn from the cow's udder is the best part of every milking. Careful experiments made in England, (according to a report lately published), prove that the quality of cream obtained from the last cup taken from most cows exceed that of the first in proportion of twelve to one. The difference in the quantity also is considerable. Hence, a person who carelessly leaves one pint unmilked loses in reality as much cream as would be afforded by six or eight pints at the beginning, and loses, too, that part of the cream which gives the richness and flavor to the butter.

A NEW company for the manufacture of pocket cutlery has been formed at Rochester, Pa., under the title of the "Pittsburgh Cutlery Company." The men comprising it are all practical English workmen. They will employ from forty to fifty hands, beside using all the most improved machinery.

If you have a lathe job to do, clean your lathe first, keep it clean while you are at work, and clean it when you get done. The lathe will last longer, the work will be better, and you will get a reputation for neatness.

THE owner of the McRae farm, 160 acres, lying east of the Coquette well has been offered and refused \$900,000 for it.



ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING MAY 30, 1865.
Reported Officially for the Scientific American.

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.

47,911.—Waxed-thread Sewing Machine.—Hosea P. Aldrich, Spencer, Mass., assignor to himself and George Jenks:

I claim, First, Heating the pressure pad and cloth plate of a sewing machine, or either of them separately, by steam or otherwise, for the purpose of preventing waxed thread from sticking thereto while passing through the machine, substantially as and for the purpose specified.

Second, Including the tension wheel, or other tension device of a sewing machine, over which the waxed thread passes in a heated chamber or casing, for the purpose of preventing waxed thread which passes around it from sticking thereto, substantially as herein described.

Third, Combining with the steam chest of the wax receptacle, D, the casing which contains the tension wheels, substantially in the manner and for the purposes specified.

Fourth, The combination with the wax receptacle, D, and its steam chest, A, the pipes, G O K, hollow pressure pad, B, and hollow cloth plate, C, substantially as and for the purposes specified.

47,912.—Thread-waxing device for Sewing Machine.—Hosea P. Aldrich, Spencer, Mass., assignor to himself and George Jenks:

I claim, First, The combination of the wax-receptacle, A, with the water tank, D, water jacket, E, and chimney, G, substantially as and for the purposes described.

Second, Attaching the wax receptacle to the sewing machine by passing a rod through the hollow tube, I, which tube performs the function of a thread guide for immersing the thread under the surface of the wax, substantially as herein described.

Third, The combination of the tube, L, india-rubber plug, O, and screw, M, substantially as and for the purposes described.

Fourth, Making the india-rubber plug, O, convex at both its ends, in combination with socket of tube, L, and that on screw, M, substantially as and for the purposes set forth.

Fifth, The application to thread-waxing devices of the tube, L, when constructed as and for the purposes described.

47,913.—Shade Holder for Lamps.—Lewis J. Atwood, Waterbury, Conn.:

I claim, First, The combination of mortises and rivets or eyelets, with the springs for securing the latter to the ring, as set forth.

Second, In combination with the springs for holding the lamp shade upon the chimney, I claim the ring formed of thin sheet metal, stiffened by corrugations running around it, for the purposes and as specified.

Third, I claim securing the exterior ring by projections from the springs, in the manner set forth.

47,914.—Compound for Removing Scale from Boilers.—Albert B. Auer, Babcock's Grove, Ill. Antedated April 27, 1865:

First, I claim the compound herein described, composed of gum catechu, salt and saltpeter, substantially as and for the purposes specified.

Second, I claim, in combination with a compound for removing boiler incrustations, the employment of flaxseed, as and for the purposes herein described.

47,915.—Desk.—Frederick Baltz, New York City:

I claim the arrangement and combination of the levers, B C and D, with the desk and cover of the desk or table, and with the furniture, in such a manner that the opening or shutting of the cover or door will pull the desk outwards or inwards, substantially in the manner and for the purpose described.

47,916.—Potato Digger and Separator.—John M. Bartlett, Harmer, Ohio:

I claim, First, The combination of the iron frame, A2, scraper, E, endless apron or chain, F, main shaft, G, spur wheel, H, with gearing, as stated, or their equivalent, by means of which the machine is made to dig and automatically separate potatoes, as set forth.

Second, The platform, K, in combination with the chute, Y, and sacking device, X', in the manner and for the purpose set forth.

47,917.—Apparatus for Applying Paint to Stencil Plates.—Caleb Bates, Kingston, Mass.:

First, I claim the apparatus herein set forth for applying paint or ink to stencils, constructed and operated substantially as above described.

Second, I claim the plate, I, for compressing the brush at the time it receives paint or ink from the hopper, substantially as above described.

[This invention consists in an apparatus for applying paint or ink to stencil plates by means of a revolving brush, to whose surface the paint is applied from a hopper, the brush and hopper being carried upon a truck, which is made to travel over the stencil plates, and the brush being revolved by means of gearing which is connected to one of the shafts of the truck.]

47,918.—Coupling Conducting Wires.—G. W. Beardslee, College Point, Long Island, N. Y.:

I claim for effecting the insulating coupling or union of electric conductors, the combination of the metallic disks, or the equivalents thereof, on the conductors, the coupling tube and nut, or its equivalent, and the elastic plug interposed between the metallic disks and the coupling tube and nut, substantially as and for the purpose specified.

47,919.—Hay Spreader.—Horace Beers, Brookfield, Conn., assignor to Smith & Burham:

I claim the employment of the revolving head piece, D, provided with spirally-arranged teeth, in combination with the supporting pieces, E E', and with the movable journal box, J, all arranged in the manner and for the purposes substantially as herein described and set forth.

I also claim the arrangement and combination of the coil springs, L, platform, M, and lever, K, in the manner and for the purposes substantially as herein described and set forth.

47,920.—Bridge.—John Boles, Jr., Boston, Mass.:

I claim the combination as well as the arrangement of the lacing, b, with the truss composed of the posts, top and bottom chords, braces and vertical tie rods, as specified.

I claim the construction of the truss with the arrangement of the several curved braces, and the several curved counter braces divergent with respect to each other, as described, whereby the crossings thereof are increased from the top to the bottom chord, as specified, and in combination therewith I claim the two tension wires or cables, c c, arranged as specified.

47,921.—Sorghum Evaporator.—Jesse Brockway, Oswego, Ill.:

I claim, First, In combination with an evaporator, the heater, B, constructed and operated as and for the purposes specified, substantially as described.

Second, In combination with an evaporator, the damper, E, constructed and operated as and for the purpose specified, substantially as set forth.

Third, In combination with an evaporator having various compartments, the conductor, C, when used as and for the purpose specified, substantially as set forth.

Fourth, In combination with an evaporator having various compartments, the gates, D, constructed and operated as and for the purpose specified.

Fifth, An evaporator, having slides that overlap the furnace upon which it rests, and extending down the outside thereof, for the purposes specified, substantially as set forth.

47,922.—Piano-forte Action.—Stephen P. Brooks, Somerville, Mass. Antedated May 21, 1865:

I claim the combination of the hammer arm, D, with the standard, C, and fly lifter, F, in connection with the escapement on the rail, G, substantially as and for the purpose specified.

I also claim extending the hammer arm through and in the rear of the standard, in connection with the back catch, H, for the purpose of holding the hammer after the blow is struck, as set forth.

I also claim placing the back catch, H, in the rear of the hammer arm, substantially in the manner and for the purpose specified.

I also claim the combination of the standard, C, upon the key lever, B, the hammer arm, D, the fly lifter, F, with the button and spring, the escapement, g, and the back catch, H, substantially as shown and described.

47,923.—Damper for Stovepipes.—H. C. Brown, Buffalo, N. Y.:

I claim the combination and arrangement of the annular disk, C, and hollow perforated cones, D D', with the pipe, A, substantially as and for the purposes herein specified.

47,924.—Washing Machine.—Hiram Brown, Burton, Ohio:

First, I claim the beaters, H, when constructed and arranged as herein specified, in combination with the ribs, F, for the purpose set forth.

Second, I claim the slotted arm, H', in combination with the arm, p, plate, n, lip, p', and key, i, when constructed and arranged in the manner, substantially as and for the purpose set forth.

47,925.—Blasting Rock.—George C. Bunsen, Belleville, Ill.:

I claim the application for blasting purposes of a disk, a, when used either with a cylinder, d, or support, c, or in combination with both cylinder and support, substantially in the manner and for the purposes specified.

47,926.—Harvester.—Wm. H. Burkhart, Bucyrus, Ohio:

First, I claim arranging the spring, i, so that it is pendant from near the reel shaft, upon the reel post, and so that it supports the pulleys, s s, near the lower end of the reel post, in the manner and for the purpose described.

Second, The arrangement of the pendant spring, i, swivelling pulleys, s s, reel shaft, s, pulley, t, and driving chain or cord of the reel, in the manner and for the purpose described.

47,927.—Whitewash Brush and Handle Attachment.—W. B. Burdett, New York City, and J. P. McIntosh, Brooklyn, N. Y.:

First, We claim securing a handle to a brush by means of a screw fastening, which is applied to the rounded portion, D, constructed substantially as described.

Second, The adjustable section, C, having a screw formed on it, in combination with a hemispherical slotted speed, D, and ferrule, B, substantially as described.

47,928.—Die for Spike Machine.—Samuel Cameron, Pittsburgh, Pa. Antedated May 17, 1865:

I claim the use of dies for spike machines made to overlap each other, each having two convex operative faces at right angles to each other, one such face being horizontal and the other perpendicular, for the purpose of making spikes with fluted shanks, substantially as described.

I also claim the use of a removable clip for forming the point of the spike, so constructed as hereinbefore described, as that its operative

47,976.—Means for Feeding Wool and other Fibrous Material to Picking, Carding, and other similar Machines.—S. R. Parkhurst (assignor to Emily R. Parkhurst), Bloomfield, N. J.

I claim, First, The combination of a vibrating comb with a toothed cylinder for removing wool or other fiber and foreign substances from the teeth of said cylinder, and also cleaning the teeth of said comb, substantially as specified.

Second, I claim the feed rollers, b and c, in combination with the vibrating comb, substantially as specified.

Third, I claim the combination of a feeding cylinder, b, vibrating comb, c, and burring cylinder, d, for the purposes and substantially as specified.

Fourth, I claim the combination of a shell with the vibrating comb and toothed cylinder, d, for the purposes and substantially as specified.

Fifth, I claim the heads, f, connecting bars, g, and eccentrics, in combination with the vibrating comb and cylinders, b and d, as set forth.

Sixth, I claim the combination of the burring cylinders, b, m, and strippers, l and n, with the feed cylinder, b, and vibrating comb, c, substantially as specified.

Seventh, I claim the combination of the burring cylinder, m, the stripper, p, the worker, q, and the carding cylinder, o, substantially as specified, whereby the stripper, p, transfers the fiber from the carding cylinder to the carding cylinder, as set forth.

47,977.—Road Scraper.—Wm. Patterson, Salem, N. J.

I claim, First, a road scraper, having its scraper proper, A, made in the curved form and arranged obliquely to the line of draft as described and set forth, the said scraper, A, being supported in its place by means of arms, c1, c2, bent downward behind, and hinged or looped to the back of the said scraper, A, as described, so as to allow the latter to tilt forward from its upright position before the arms when required, as and for the purposes described.

Second, The arrangement of the adjustable notched lever, f, in combination with the curved bar, C, and scraper, A, as and for the purposes specified.

Third, The curved connecting bar, C, when arranged in combination with the tongue, D, and scraper, A, so as to be adjustable at its connection with the said tongue, substantially as described for the purposes specified.

Fourth, The arrangement of the carrying wheels, E, E, or their equivalents, in combination with the scraper proper, A, substantially in the manner described for the purpose specified.

47,978.—Glass Presser Feet of Sewing Machines.—Robt. E. Paterson, Jr., Philadelphia, Pa.

I claim the glass presser foot, with its longitudinal recess, adapted to receive the edge of the guide plate, substantially as described.

47,979.—Rolling Pin.—C. E. Phillips, Abington, Mass.

I claim, First, Forming a rolling pin, at one end or through its whole extent hollow, or with a suitable aperture or receptacle for receiving such implements as are generally used in the manipulation and ornamentation of pastry, etc.

Second, Combining with the rolling pin a removable handle which will also serve as a cutter as described.

Third, The combination and arrangement of the removable handle and cutter, f, with the pastry smoother, h.

Fourth, The combination of the rolling pin, a, a, nutmeg grater, c, c, and biscuit cutter, f, as described.

47,980.—Horse Rakes.—Daniel Prest, Marlborough, N. J.

I claim the combination of the levers, E, E, with the bar, D, clearers, D', and teeth, A', the whole being arranged to operate substantially as herein described.

47,981.—Lathe Chuck.—William A. Reilly, Cincinnati, Ohio.

I claim the above described lathe chuck, provided with the slide, H, arm, I, and slide, K, with the adjusting screws, M and L, substantially in the manner and for the purposes set forth.

47,982.—Horse Hay Forks.—R. Reynolds and Charles Young, Stockport, N. Y.

We claim, First, The toggle joint and lever D D, in combination with the hinged jaws, B B', of the fork, A, constructed and operating in the manner and for the purpose substantially as herein shown and described.

Second, The ring, C, when the same is arranged on one side of the center of the fork and operates in combination with the toggle arms, D D, and jaws, B B', substantially as and for the purposes set forth.

[This invention consists in combining with two hinged tined jaws two levers or toggle arms in such a manner that when said toggle arms are straightened out, the jaws are firmly closed, and a load or hay taken up by them can be hoisted up to any desired height, and by a slight pull on one of the toggle arms they are thrown out of line, and the jaws open to dump their load; and, furthermore, by the action of the toggle lever the operation of entering the fork in the hay is facilitated. It consists, further, in placing the ring which takes the hoisting rope out of the center of the fork and in such position in relation to the toggle arms and to the pivot connecting the two jaws, that by the strain on the hoisting rope the opening and the closing of the fork is facilitated.]

47,983.—Tube Sheet Cutter.—D. E. Rice and William Everett, Detroit, Mich.

We claim the sleeve, B, arranged to carry the cutters or tools in combination with the spindle, A, and feed wheel, C, or its equivalent, constructed and operating substantially as and for the purpose set forth.

Also the combination of the revolving rest, E, with the spindle, A, sleeve, B, and handwheel, C, constructed and operating substantially as and for the purpose described.

[This invention consists in the employment or use of a center point inserted in the end of a bore spindle in combination with a longitudinally sliding sleeve and cutter head, and with a handwheel or other equivalent device, in such a manner that by means of the handwheel the cutters in the cutter head can be set up, while the center point turns in the center of the hole to be cut, and the necessity of first drilling a hole, so as to allow the center point to follow the longitudinal motion of the cutters, is avoided.]

47,984.—Sugar Press.—D. C. and L. S. Riggs, Omaha City, Neb.

We claim the combination of the pressing box, F, base block, D, and bottom wedge, I, constructed and arranged to operate substantially as described.

[This invention relates to a press intended for the purpose of separating molasses from crude sugar. Said press is cheap, durable, and easily operated, and it does its work perfect.]

47,985.—Car Coupling.—Henry M. Rulon, Monmouth, Ill.

First, I claim the coupling pin, C, when constructed and operating substantially as and for the purpose set forth.

Second, The combination and arrangement of the coupling pin, C, the weight, D, and the draw head, A, when all constructed and operating as herein delineated and set forth.

Third, I claim the combination of the draw head, B, with the coupling pin, C, constructed, arranged and operating substantially as and for the purpose herein specified and shown.

47,986.—Apparatus for the Manufacture of Gas.—Silas C. Salisbury, New York City.

First, I claim the combination of the washing and purifying chambers and automatic regulator, so that the gas passes through them in succession, substantially as described.

Second, The arrangement of the washing and purifying chambers and automatic regulator described, so that they constitute one apparatus, substantially as and for the purpose set forth.

Third, The combination of the washing and purifying chambers and automatic regulator with the cooling chamber, substantially as and for the purpose set forth.

Fourth, The combination of the cooling chamber, constructed substantially as described, with a retort for the production of fixed gas.

Fifth, The purifying chamber, C, constructed substantially as described, and for the purposes set forth.

Sixth, The combination of the movable vessel or gas receiver, d, with the supply pipe, 2a, connecting the vaporizer, 2,

and retort, 3, so as to constitute an automatic regulator of the supply of the vaporized products of the vaporizer to the retort, substantially as and for the purposes set forth.

Seventh, I also claim the combination of the movable vessel, d, with the stop cock of the air-supply pipe, so as to constitute an automatic regulator of the supply of air to the gas, substantially as described and for the purposes set forth.

Eighth, I also claim a washing chamber, constructed substantially as described; that is to say, of a vessel in the lower part of which is a conduit for gas, perforated with numerous small holes, so that the supply of gas is finely divided and compelled to enter the water in numerous small jets, substantially as and for the purposes set forth.

Ninth, I also claim the combination of a washing chamber, so constructed with an apparatus for producing a current of air to cause the gas to more certainly be passed through the water, substantially as described and for the purposes mentioned.

Tenth, I also claim the combination of the cooling chamber, constructed as described, with the washing and purifying chambers, and also with the naphtha fountain, substantially as set forth, so that it can be used as a cooling chamber and also as a naphtha reservoir or chamber in the production of fixed or vapor gas, substantially as set forth.

47,987.—Corn Planter.—Matilda Saviers, Wyandott, Ohio, administratrix of the estate of M. Saviers, deceased, and W. N. Ayres, Bristolville, Ohio.

We claim the reciprocating slide, K, provided with the projections, d d', arranged to work in relation with the perforated bottoms of the seed boxes, J, in connection with the cam, M, bar, L, and spring, N, all arranged substantially as and for the purpose specified.

[This invention relates to a new and improved marking device, whereby the corn may be planted in check rows without previously marking the ground. The invention also relates to an improved seed-dropping device and to an improved seed-covering arrangement, whereby the seed may be dropped or planted with certainty by an automatic mechanism, and covered with earth in a proper manner.]

47,988.—Corn Sheller.—Frederick H. Schroeder, Bushnell, Ill.

I claim the employment of the stop valve, S, provided with flexible flanges, when constructed and operating substantially as herein described.

47,989.—Gang Plow.—Jacob Seibel, Manlius, Ill.

I claim the combination of the seat, I, fulcrumed at J; perforated standard, M, the spring, K, provided with the pin, a, the lever, L, or its equivalent, for operating said spring and pin, the rod, N, and plow beams, P, arranged and operating substantially as and for the purposes herein specified and shown.

47,990.—Corn Planter.—Jacob Seibel, Manlius, Ill.

First, I claim the combination of the cutters, x x, and runners, P, arranged and operating substantially as and for the purposes herein shown and described.

Second, I claim the combination and arrangement of the cutters, x x, the runners, P, jointed at the front end, the cross bar, N, standard, R, levers, H, cross bar, I, and standard, J, operating as and for the purpose delineated and set forth.

47,991.—Air-cooling Apparatus.—N. S. Shaler, Newport, Ky.

I claim the apparatus, substantially as explained; that is, consisting of the series of cells, the tortuous passage, and the propeller, or the equivalent thereof, arranged in manner and so as to operate as and for the purpose specified.

47,992.—Ambulance.—William Slatter, Allegheny City, Pa.

I claim attaching the thills to the underside of the axle, and bracing the thills and axle together by braces running from the center of the springs to the thills, constructed, arranged and operating substantially as herein described and for the purpose set forth.

47,993.—Boring Jar.—Joseph Slusser, Cincinnati, Ohio.

I claim the mode of constructing a well-boring jar, of two pans of quarter round bars or sectors, confined to each other by sleeves, and closing each other's interstices in the act of sliding together, substantially as set forth.

47,994.—Farm Gate.—Wm. F. Smelley, Vevay, Ind.

I claim the combination of the rack, H, with the pivoted truss, G, and gate, A B C F, substantially as and for the purposes set forth.

47,995.—Corn Harvester.—John W. Smith, Iowa Point, Kansas.

I claim, First, In combination with the sled runners, the movable platform, B, operated substantially in the manner described.

Second, Making said platform in two parts, with front end hinged to the main body of the platform, and arranged to move up or down the inclined plane, H, in the manner shown and described.

Third, I claim the rule, G, constructed substantially as described, and revolved by the pressure of the stalks upon its arms, when used in connection with the guides, for the purpose specified.

47,996.—Rotary Digger.—Henry Stanley, Troy, N. Y.

I claim, First, The combination of the H-formed, g, with the tooth links, f, provided with lugs, h, all being constructed as specified.

Second, I claim having the ends of the teeth made of conical form when fitting into corresponding-shaped sockets in the links, substantially as described.

Third, I claim the lips, k, to prevent the turning of the teeth, substantially as described.

Fourth, I claim the employment of one or more intermediate shaft supporters, H, in combination with the chain rollers, substantially as herein described.

Fifth, I claim the employment of the toothed segment, O, in combination with the wheels, L, substantially as described.

Sixth, I claim the combination of the lever by which the digging teeth are raised and lowered with the driver's seat, substantially as described.

Seventh, I claim the pawls, S T, in combination with the lever, R, and ratchet, Q, substantially as described.

Eighth, I claim the employment of a locking device, V, or its equivalent, in combination with the raising mechanism, substantially as and for the purpose described.

Ninth, I claim the employment of an adjustable driver's seat, in combination with one or more endless chains of digging teeth, substantially as described.

Tenth, I claim the combination of the cranks, N N, with the rear roller, substantially as described.

Eleventh, I claim the employment of the raising lever in combination with the segment or its equivalent, substantially in the manner herein shown and described.

Twelfth, I also claim the adjustable handle of the raising lever in combination with the raising lever and the adjustable driver's seat.

47,997.—Lathes.—John Stark, Waltham, Mass.

I claim the combination as well as the arrangement of the sliding contractor, D', and its operative mechanism, E and I, with the tubular arbor, A, and the clamp, C, having the cone, e, and being fixed to the arbor so as to operate therewith, substantially as described.

I also claim the combination of the chamber, h, and the socket, e, with the tubular arbor, A, tubular clamp, and its contractor, D, provided with screws, E and I, constructed, combined and arranged substantially as set forth.

47,998.—Time Keeper.—James Stephenson, Canandaigua, N. Y.

I claim, First, A detent consisting of a cylindrical block, D', formed with a rim, d, and adapted to operate in connection with a balance wheel, F, to regulate the escape wheel, substantially as and for the purpose set forth.

Second, I claim communicating motion from the detent to the balance wheel, and vice versa, through the medium of a segmental rack, E', and pinion, P', substantially as and for the object specified.

47,999.—Exercising Machine.—T. P. Thorpe, New York City.

I claim the springs, P P, or their equivalent, combined with the walking beam, marked, C, and the shaft, N, together with the post, B, for the purpose herein described.

I also claim the device as a new article of manufacture, as above described, for the purpose herein intended and described.

48,000.—Grate.—Wm. I. Towne, Newton, Mass.

I claim suspending the journals, b, of the grate on rollers, d, substantially as set forth for the purpose specified.

48,001.—Sawing Machine.—A. E. and I. V. Warner, Norwalk, Ohio.

We claim the above described arrangement of the cross-cut and

circular saws when operated substantially in the manner and for the purposes set forth.

48,002.—Artificial Arm.—Thomas Uren, New York City.

I claim the arrangement of the straps for securing the artificial arm to the body and on the stump of the upper amputated arm, without any strap passing across the chest, in combination with the wing of the upper artificial arm extending in front of the shoulder, substantially as and for the purpose specified.

I also claim the means herein described for holding out the covering of the open part of the artificial arm at the junction of the upper and lower arm, and in combination therewith, substantially as and for the purpose specified.

I also claim connecting the turning wrist piece with the fore-arm by a turning flange joint, in combination with the two cords attached to the cross-bar in the wrist piece, and hitched to the fore-arm and on opposite sides thereof, substantially as and for the purpose described.

I also claim the cord which is attached to the upper arm, and passes through the fore-arm and hand, and is attached to the thumb and fore-finger, to open the thumb and finger by simply depressing the hand so as to bring the fore-arm in line or nearly in line with the upper arm, in combination with the cord to elevate the fore-arm and close the thumb and finger by a forward movement of the stump of the natural arm, substantially as and for the purpose described.

I also claim, in combination with the hinged fingers, the employment of a cord or cords attached to the fingers, and which can be hitched to a pin or its equivalent outside to hold the fingers in a partially closed position, substantially as described.

48,003.—Locking and Stopping Window-blinds.—John Weitzel, Mott Haven, N. Y.

I claim, First, The spring catch, E, and notched rod, D, applied, in combination with each other, with the stile, A, and with arms, G, or their equivalents, at one end of the slats, and operating substantially as herein specified.

Second, The pivot arms, C, each cast of one piece, with its respective pivot, c, and with a dovetail groove in one side, substantially as herein described, to enable it to be secured to the slat without nails, screws, or other fastenings.

48,004.—Boring Machine for Artesian Wells.—George Washington Wicks, New York City.

I claim, First, The apparatus described, when constructed substantially as shown, for imparting to the drill the alternate vertical and rotary motions, as described.

Second, Spur gear, c, with its rods or frame work and the slide piece, x, in combination with the tripper, D, and drill Z, operating together substantially in the manner and for the purpose described.

48,005.—Explosive Shell.—Lewis E. Williams, Pecks kill, N. Y.

I claim a series of radial chambers, extending from a common central chamber to the inner perimeter of the shell, for the purpose of dividing the interior of the shot into a series of separate and distinct chambers to contain explosive material, substantially as described.

48,006.—Drill for Boring Oil Wells, Etc.—D. H. Wiswell and George W. Shaw, Buffalo, N. Y.

First, We claim the rotating frame, H, in connection with the cross-head, F, uprights, e, guides, r and m, pawl and ratchet, j j, substantially as herein described.

Second, Frame, H, in combination with pawl, N, and ratchet, M, all constructed and operating in the manner specified.

Third, An automatic rotating drill, constructed and arranged substantially as herein set forth.

48,007.—Sewing Machine.—August Wittneben, New York City.

First, I claim the employment and use of a revolving wheel, F, with internal cams acting through movable pins the lever, E, in the manner and for the purpose substantially as described.

Second, I claim the arrangement of the lever, E, moving on a universal joint and combination with the feeding pad, I, and operated by the wheel, F, and the spring rod, W, or its equivalent, in the manner as specified.

Third, I claim operating the needle bar, P, from the end of the lever, E, by means of the lever, M, and rod, N, in the manner substantially as set forth.

Fourth, I claim the arrangements of the plate, V, on the end of the lever, E, for the purpose of regulating the amount of feed, operating substantially in the manner specified.

Fifth, I claim the application of the feeding pad above the material operated upon, when arranged and operated in the manner substantially as described.

Sixth, I claim the combination of the revolving ring, F, with internal cams, the pins, a' b' c', lever E, feeding pad, L, spring rod, W, lever, M, rod, N, and needle bar, P, when arranged and operating in the manner and for the purpose substantially as set forth and specified.

47,008.—Street Steam Railway Car.—Joseph P. Woodbury, Boston, Mass.

I claim, First, The combination of the gear wheels, C C' (or cranks and rods, as shown in Figure 7), on the axles, E E, with the crank shaft, Y, and pinion, B', and vertical boiler, S, and engines, U U', when constructed and operating in the manner and for the purposes described.

Second, The combination of the friction clutches, M' M' N' N' with one or more pinions, B and L, and gear wheels C' C' and K' K', in the manner and for the purpose set forth.

Third, The rack, W, and pinion, V, when combined with the circular platform, I, in the manner and for the purpose herein described.

Fourth, The stop-pins, a, a, and bolt, b, in combination with the platform, I, in the manner and for the purpose herein set forth.

Fifth, Connecting the driving shaft, Y, rigidly with the circular platform, I, by means of the hangers, H' H', when constructed and arranged in the manner and for the purpose herein set forth.

48,009.—Air Pump.—G. M. Woodward, New York City.

I claim the air pump, D, provided with adjustable or reversible valves, b b, in combination with a receiver, A, the latter communicating with the air pump, and provided with an eduction tube, B, and all arranged substantially as described.

48,010.—Compressing Cartridges around Bullets.—John S. Adams, Taunton, Mass., (Assignor to himself and William C. Dodge, Washington, D. C.)

I claim the jaws or levers, C, and D, constructed and operating substantially, as and for the purpose herein set forth.

Second, Connecting the jaws, C, and D, by the arm, a, a, and strip, E, or their equivalents for the purpose of securing a positive uniformity of motion in the two, by means of one handle.

Third, The shield or plate, F, or its equivalent for the purpose of preventing any lateral movement of the jaw, C, and prevent it from being bent laterally by operating the handle.

Fourth, The cartridge case rest, n, to ensure the union of the ball and case on the same axial line.

Fifth, The adjustable plug, H, arranged as described for the purpose of adapting the machine to bullets of different lengths.

Sixth, The stop pin, e, in combination with the recess or slot for limiting the movements of the jaws, C, and D.

Seventh, The washers, i, in combination with the jaws and face plate, B, as and for the purpose set forth.

48,011.—Air Injector.—J. A. Bassett, and O. C. Smith, Salem, Mass., (Assignors to Oliver Bennett, Boston, Mass.)

We claim the injection of air through adjustable openings constructed as described, into and through burning fuel, by means of the force of a jet of steam used direct from the boiler, or superheated as may be required.

[The object of this invention is to inject air into and through the ignited fuel of a furnace, by means of the force of jets of ordinary or superheated steam through adjustable openings.]

48,012.—Boring Wells.—William H. Bechtel (Assignor to himself and B. H. Bartol), Philadelphia, Pa.

I claim the use, substantially as and for the purpose described, of elliptical or oval cog-wheels, in combination with a well boring bar or rope, and with the mechanism described or the equivalent to the same, for seizing and releasing the said bar or rope.

48,013.—Bridge.—John Boles, Jr., (Assignor to G. W. and F. Smith), Boston, Mass.

I claim the combination of the series of arch connections, a, a, a, the straight braces and counter braces, and their chord or chords, the whole being arranged substantially as set forth.

I also claim the combination of the series of diagonal upright struts, E, E, with the system of braces and counter braces and their chords, the whole being arranged substantially as specified.

48,014.—Cutter for Bread, Meat, Etc.—Daniel Campbell, of Elizabeth, N. J., (Assignor to Henry Seymour, New York City.)

I claim, First, The application of the knife, D, to parallel oblique slot

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A. W. L. McB., of Mo.—Write to Henry Carey Baird for a treatise on making sugar from sorgho.

K. L. M., of N. Y.—Bottle glass is said to be the hardest variety. Glass of any kind may be scratched with a file.

S. H. W., of Ill.—If you mean by a "storm glass" a barometer; that is made by filling a glass tube, three feet long—that has one end closed, and the other open—with mercury, and then turning the open end down and inserting it into a cup of mercury. The mercury in the tube is prevented from running out by the weight of the atmosphere resting on the surface of the mercury in the cup. As the weight of the atmosphere varies, the height of the mercurial column in the tube, of course, varies to correspond—one balancing the other.

F. H., of Ohio.—We know of no late works on making sugar from cane. The juice is extracted by rollers, and in no other way.

L. J. L., of Ill.—Messrs. Todd & Rafferty, Patterson, N. J., have flax machines.

L. K., of Mass.—You will find the address very plainly given in the article on smelting iron by steam and air combined. As it is an English invention we know nothing beyond the article in question.

G. W., of N. J.—Stuffing birds is an art which requires practice and experience to succeed in. If you inquire at the book stores for a work on taxidermy you will learn something about the art.

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ANT Les inventeurs non familiers avec la langue Anglaise, et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous adresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confiance. MUNN & CO., Scientific American office No. 37 Park Row, New York.

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Die Unterschieden haben eine Unterzettel, die Erfinder das Ver-

halten angibt, um sich ihre Patente zu sichern, herauszugeben, und

verabfolgen solche gratis an dieselben.

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können ihre Mitteilungen in der deutschen Sprache machen. Stützen

von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen

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Improved Fly-Trap.

Flies are a serious nuisance in summer, for they not only annoy one by continually buzzing about and lighting on the face but they deface the wood work and walls very much.

Many ingenious devices for catching flies have been invented; they generally operate by clock-work, and are self-acting when wound up.

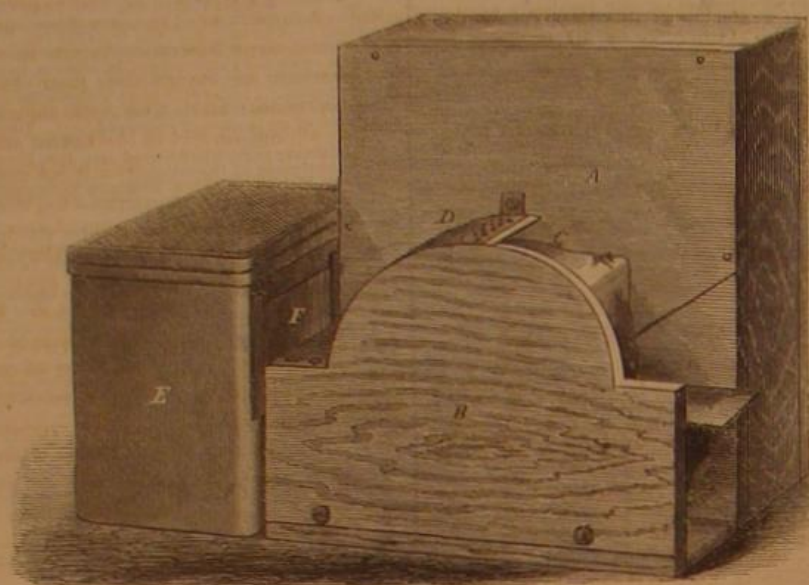
This engraving represents a new arrangement for the same object. It consists of a series of boxes, A and B. In the first, A, there is a train of clock-work which, when wound up, gives a slow rotary motion to the cylinder, C. This cylinder has a series of projections on it, which are to be covered with any sweet substance or material likely to attract flies, and it is

moving the valve over the face to let the steam in and out.

In the engravings published herewith, we have a representation of a new method of balancing a slide valve. No springs, gears, or steam-tight joints or levers are interposed between the valve and cover, but it is of the ordinary form in its general features.

Two valves are joined together at the back, as in the isolated view, and the ports are made double, so that there are two valves and two valve faces in the chest, instead of one, as heretofore. These ports are constructed as shown in the section.

The valve faces being inclined, shed any dirt or sediment that may chance to drop upon them or be carried over from the boiler by priming, and from

**LAKE'S FLY-TRAP.**

further covered with a wire gauze shield, D. As the cylinder rotates slowly the flies alight on it, and, being absorbed by collecting the sweet, move slowly under the guard, and are thus carried into the chamber, E, at the end, where they are knocked off. There is a door, F, which slides down when the box is full, so that the flies cannot escape while they are being destroyed.

By this method an apartment can be kept free from flies or other annoying insects common in summer time. It was patented June 21, 1864, and Jan. 10, 1865, by D. Lake. For further information address him at Smith's Landing, N. J.

Improved Balanced Slide Valve.

The enormous absorption of power by the slide valve is the greatest objection to its use. Engineers of experience know well how to construct a valve

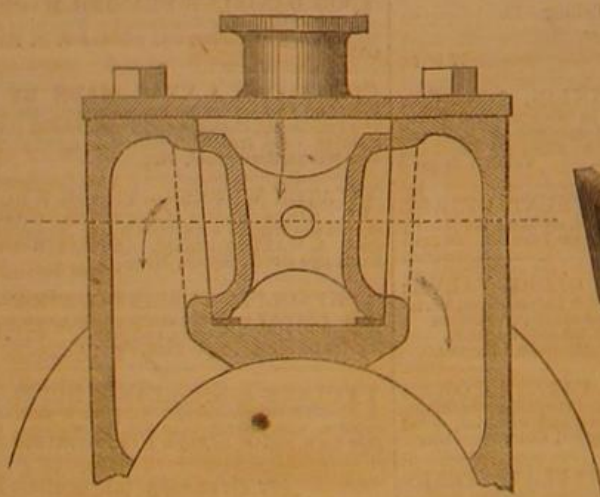
being inclined they wear steam tight, top and bottom, the degree or angle being suited to equalize the wear. The steam passes between the two valves, as shown by the arrow in the section, and, pressing equally against both sides, causes the valves to work freely, and yet steam tight, against the face.

Messrs. Fisher & Co., of Portsmouth, N. H., have been using one of these valves, and express their entire satisfaction with it. A locomotive is also being fitted with them in the Globe Works, Boston, and we are certain that in regard to equalizing the pressure good results will be obtained. Patented June 2, 1865.

For further information, address the inventor, J. S. Howell, at Portsmouth, N. H.

New Caloric Engine.

A caloric engine, which possesses some peculiari-

Fig. 1**HOWELL'S BALANCED SLIDE VALVE.**

ties, has been recently invented in Germany. Its principle consists in pumping atmospheric air into an air-tight furnace, for the support of the fuel which is introduced previously, and must be from time to time renewed. The combustion is effected within a fireplace of refractory clay, surrounded at some little distance by the closed cylinder which constitutes the furnace. The atmospheric air keeps the fuel in a state of such intense ignition that at a pressure of four atmospheres, it will fuse wrought-iron, and will

change cast into malleable iron; it is at the same time greatly expanded by the high temperature. The gaseous products of combustion, mingled with a small quantity of steam—introduced chiefly with the object of lubricating the pistons—move two pistons of peculiar construction. After doing its work, the heated air passes into the atmosphere perfectly free from smell. There is a great tendency in this engine to acquire a very high velocity, since the combustion augments in intensity in proportion to its speed.—*Stockton and Hartlepool Mercury.*

[This is essentially the same as Shaws Engine.—*Eds. Sci. Am.*]

BOOK-MAKING.—In "Burgh's Practical Rules for Modern Engines and Boilers" we find the following statement in regard to gear for working slide valves:—"The slide valve being only used in beam engines of small power, a brief notice will only be given." It seems difficult to reconcile this with some drawings we have seen of English screw engines, where the slide valves would weigh half a ton.

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OF THE
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a full account of all improvements in machinery will be given. Also, practical articles upon the various Tools used in Workshops and Manufactories.

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will continue to receive careful attention, and all experiments and practical results will be fully recorded.

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Vol. XII.—No. 25.
(NEW SERIES.)

NEW YORK, JUNE 17, 1865.

\$3 PER ANNUM
(IN ADVANCE)

Improved Boring and Mortising Machine.

These engravings represent two views of a single machine intended for sawing and mortising fence rails, but which can be readily used for any work requiring similar manipulation, such as the framing of a house or other timbers. By the use of the machine the holes are mortised of a fixed length in the right places, sawed to a given length, and the rails pointed; picket tops can also be worked on slats or boards by this machine when so desired. This latter operation is performed by a separate detail attached to the back of the machine. This appliance is merely a bracket to support the rail and a guide set diagonally to carry the stuff to the saw at the proper angle. The saw bench is also provided with a gage (not shown) by which timber can be split to any given width. The peculiar feature of this machine is the means by which the length of the slot or mortise in the fence post is governed. By means of a lever, A, and the pins, B, the bench is moved forward a certain distance, when the lever, A, is acted on.

The boring mechanism seen protruding through one of the mortises then cuts away the timber fast. The pins govern the length and distance apart of the mortises, and the lever is brought close to the stationary pin, C, each time, so that it forms a stopping and starting point. The auger is worked up and down to enter or leave the timber, D, by the hand lever, E. Figure 2 shows the saw and the ingenious device by which, when the boring apparatus is at work, it is dropped out of the way. This device consists in placing the saw mandrel in bearings on an arm, F. This arm is fast at G, and swings on a pivot there, so that by taking hold of the bearing box the saw mandrel runs in, and, depressing it, the saw is carried down through the table out of the way. When wanted for use it is easily set up tight by the screw in the supporting arm, H, which bears against the slotted arm. The gage for governing the width of the stuff split is here shown at I.

These are the principal features of this machine, and combined with others spoken of previously, it is a very useful one. It was patented through the Sci-

entific American Patent Agency, on Jan. 31, 1865, by Benjamin Klahr, of Bernville, Pa., whom address for further information.

Plaster of Paris.

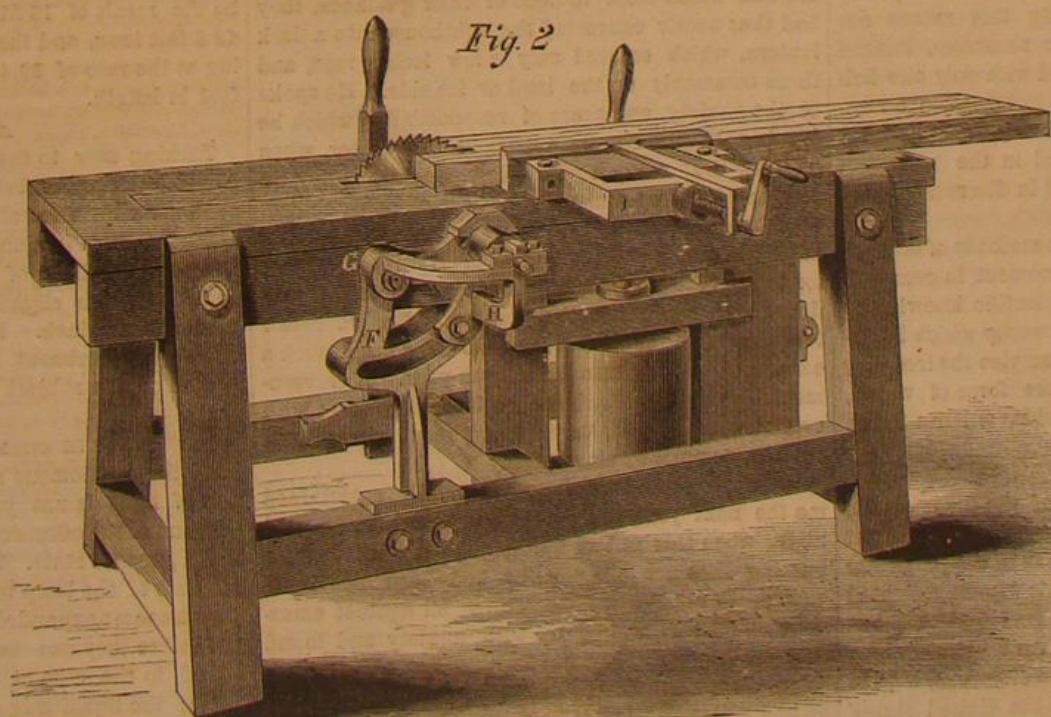
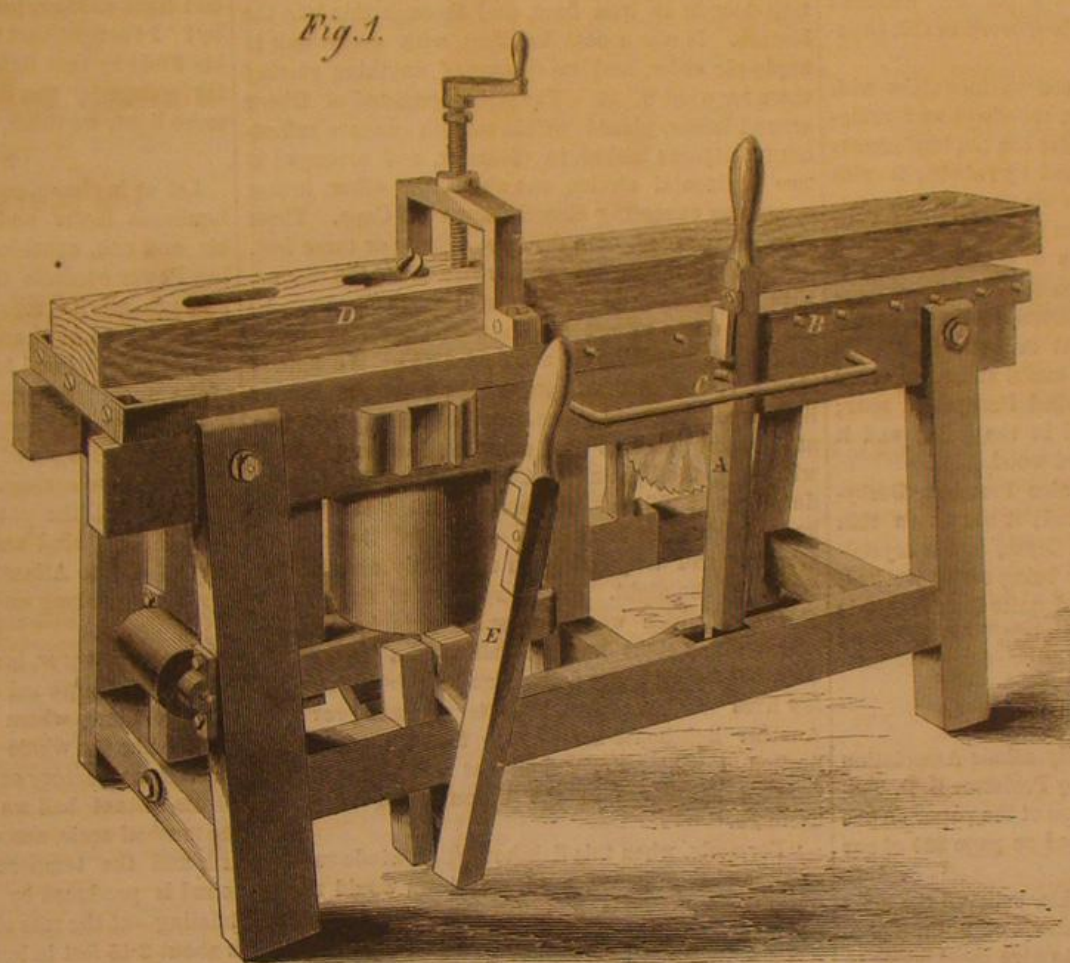
Dr. Ure, in the supplement to his dictionary gives

new red or keuper marl; in Glamorganshire, on the Bristol channel; in Leicestershire, at Syston; at Tutbury and near Burton-on-Trent, in Staffordshire; at Chellaston, in Derbyshire; near Droitwich it is associated in the marl with rock salt, in strata respectively 40 and 75 feet in thickness; and at North-

wich and elsewhere the red marl is intersected with frequent veins of gypsum. At Tutbury it is quarried in the open air, and at Chellaston in caverns, where it is blasted by gunpowder; at both places it is burned in kilns and otherwise prepared for the market. It lies in irregular beds in the marl, that at Chellaston being about 30 feet thick. There is, however, reason to suppose that it was not originally deposited along with the marl as sulphate of lime, but rather that calcareous strata, by the access of sulphuric acid and water, have been converted into sulphate of lime—a circumstance quite consistent with the bulging of the beds of marl with which the gypsum is associated; the lime, as a sulphate, occupying more space than it did in its original state as a carbonate. At Tutbury and elsewhere, though it lies on a given general horizon, yet it can scarcely be said to be truly bedded, but ramifies among the beds and joints of the marl in numerous films, veins and layers of fibrous gypsum. A snow-white alabaster occurs at Volterra, in Tuscany, much used in works of art in Florence and Leghorn. In the Paris basin it occurs as a granular crystalline rock, in the lower tertiary rocks, known to geologists as the upper part of the middle eocene fresh-water strata. It is associated with beds of white and green marls; but in the Thuringewald there is a great mass of sulphate of lime in the Permian strata. It has been sunk through to a depth of 70 feet, and is believed to be metamorphosed magnesian limestone or Zechstein. In the United States this calca-

reous salt occurs in numerous lenticular masses in marly and sand strata, of that part of the upper silurian strata known as the Onondaga salt group. It is excavated for agricultural purposes.

"The gypsum of our own country is found, in apparently inexhaustible quantities, in the red marl form-



KLahr's BORING AND MORTISING MACHINE.

these facts in relation to gypsum, or plaster of Paris:—

"Gypsum is a sulphate of lime. When massive it is called indifferently alabaster or gypsum; and when in distinct and separate crystals, it is termed selenite. Massive alabaster occurs in Britain in the

ation in the neighborhood of Derby, and has been worked for many centuries. The great bulk of it is used for making plaster of Paris, and as a manure; and it is the basis of many kinds of cements, patented—as Keene's, Martin's, and others.

"To get it for these purposes, it is worked by mining underground, and the stone is blasted by gunpowder; but this shakes it so much as to be unfit for working into ornaments, etc.; to procure blocks for which it is necessary to have an open quarry. By removing the superincumbent marl, and laying bare a large surface of the rock—the alabaster being very irregular in form—and jutting out in several parts, allows of its being sawed out in blocks of considerable size, and comparatively sound (as is illustrated by the large tazza in the Museum of Practical Geology). This stone, when protected from the action of water, is extremely durable, as may be seen in churches all over the country, where monumental effigies, many centuries old, are now as perfect as the day they were made, excepting, of course, willful injuries; but exposure to rain soon decomposes the stone, and it must be borne in mind that it is perfectly unsuited for garden vases or other out-door work in this country.

"In working, it can be sawed up into slabs with toothed saws, and for working moldings and sculptures, fine chisels, rasps and files are the implements used; the polishing is performed by rubbing it with pieces of sandstone, of various degrees of fineness, and water, until it is quite free from scratches, and then giving a gloss by means of polishing powder (oxide of tin) applied on a piece of cloth, and rubbed with a considerable degree of friction on the stone. This material gives employment in Derby to a good many hands in forming it into useful and ornamental articles, and is commonly called Derbyshire spar; most of the articles are turned in the lathe, and it works something like very hard wood.

"Another kind of gypsum also found in Derbyshire is the fibrous or silky kind; it occurs in thin beds, from one to six inches in depth, and is crystallized in long needle-like fibers; being easily worked, susceptible of a high polish, and quite lustrous, it is used for making necklaces, bracelets, brooches, and such like small articles."

CLYDONICS.

At the last meeting of the Polytechnic Association the following paper was read by Professor S. D. Tillman, the President, in conclusion of the paper on the same subject which was published on page 225 of our current volume:—

The celebrated historian, Buckle, believed the most effective way of turning observations of natural phenomena to account, would be to give more scope to the imagination and incorporate the spirit of poetry with the spirit of science. By this means our philosophers would double their resources, instead of working, as now, maimed and with only one half of their nature. They fear the imagination on account of the tendency to form hasty theories. But surely all our faculties are needed in the pursuit of truth, and we cannot be justified in discrediting any part of the human mind.

These views, if not applicable to methods of original research, are certainly of great moment in considering the best means of diffusing scientific knowledge; and if there is any branch of philosophy which is pre-eminently entitled to bring to its service the free play of fancy, it is that treating of the force of waves, whether propagated through liquids, æriform fluids, or more attenuated media.

THE PHAROS.

A discourse on the structure of the flame of the ordinary lamp might not gain general attention, yet how intense the interest as we speak of the particular light which a captain seeks when his vessels, freighted with human beings, midst storm and darkness, has nearly reached its haven. There are scattered along our vast boundary five hundred such beacons, kept in operation at an annual expense to the United States' Government of more than a million of dollars.

A description of one of these is given in the posthumous papers of the gifted Thoreau, just published under the title of "Cape Cod;" and although since the time of his visit a more imposing structure has arisen in the place of the old lighthouse, the account is so graphic, one feels, after its perusal, the satisfac-

tion which he would probably have experienced by a personal inspection of the premises.

THE CAPE COD LIGHT.

"The Highland Lighthouse, where we were staying, is a substantial-looking building of brick, painted white and surmounted by an iron cap. Attached to it is the dwelling of the keeper, one story high, also of brick, and built by Government. As we were going to spend the night in a lighthouse we wished to make the most of so novel an experience, and therefore told our host that we would like to accompany him when he went to light up. At rather early candle-light he lighted a small Japan lamp, allowing it to smoke rather more than we like on ordinary occasions, and told us to follow him. He led the way first through his bedroom, which was placed nearest to the lighthouse, and then through a long, narrow, covered passage way, between whitewashed walls like a prison entry, into the lower part of the lighthouse, where many great butts of oil were arranged around; a winding and open iron stairway, with a steadily increasing scent of oil and lamp smoke, to a trap-door in an iron floor, and through this into the lantern. It was a neat building, with everything in apple-pie order, and no danger of anything rusting there for want of oil. The light consisted of fifteen argand lamps, placed within smooth concave reflectors twenty-one inches in diameter, and arranged in two horizontal circles, one above the other, facing every way excepting directly down the Cape. These were surrounded, at a distance of two or three feet, by large plate-glass windows, which defied the storms, with iron sashes, on which rested the iron cap. All the iron work, except the floor, was painted white. And thus the lighthouse was completed. We walked slowly round in that narrow space as the keeper lighted each lamp in succession, conversing with him at the same moment that many a sailor on the deep witnessed the lighting of the Highland light. His duty was to fill and trim and light his lamps, and keep bright the reflectors. He filled them every morning, and trimmed them commonly once in the course of the night. He complained of the quality of the oil which was furnished. This house consumes about eight hundred gallons in a year, which cost not far from one dollar a gallon; but perhaps a few lives would be saved if better oil were provided. Another lighthouse-keeper said that the same proportion of winter-strained oil was sent to the southernmost lighthouse in the Union as to the most northern.

"Formerly, when this lighthouse had windows with small and thin panes, a severe storm would sometimes break the glass, and then they were obliged to put up a wooden shutter in haste to save their lights and reflectors; and sometimes in tempests, when the mariner stood most in need of their guidance, they had thus nearly converted the lighthouse into a dark lantern, which emitted only a few feeble rays, and those commonly on the land or lee side. He spoke of the anxiety and sense of responsibility which he felt in cold and stormy nights in the winter, when he knew that many a poor fellow was depending on him, and his lamps burned dimly, the oil being chilled. Sometimes he was obliged to warm the oil in a kettle in his house at midnight, and fill his lamps over again; for he could not have a fire in the lighthouse, it produced such a sweat on the windows. His successor told me that he could not keep too hot a fire in such a case. All this because the oil was poor. A Government lighting the mariners on its wintry coast with summer-strained oil, to save expense! That were surely a summer-strained mercy.

"This keeper's successor, who kindly entertained me the next year, stated that, one extremely cold night, when this and all the neighboring lights were burning Summer oil, but he had been provident enough to reserve a little winter oil against emergencies, he was waked up with anxiety and found that his oil was congealed and his lights almost extinguished; and when, after many hours' exertion, he had succeeded in replenishing his reservoirs with winter oil at the wick end, and with difficulty had made them burn, he looked out and found that the other lights in the neighborhood which were usually visible to him, had gone out, and he heard afterward that the Pamet River and Billingsgate Lights also had been extinguished.

"Our host said that the frost, too, on the windows

caused him much trouble, and in sultry summer nights the moths covered them and dimmed his lights; sometimes even small birds flew against the thick plate glass, and were found on the ground in the morning with their necks broken. In the spring of 1855 he found nineteen small yellow birds, perhaps goldfinches or myrtle birds, thus lying dead around the lighthouse; and sometimes in the fall he had seen where a golden plover had struck the glass in the night, and left the down and the fatty part of its breast on it.

"Thus he struggled by every method to keep his light shining before men. Surely the lighthouse keeper has a responsible, if an easy, office. When his lamp goes out, he goes out; or, at most, only one such accident is pardoned.

"I thought it a pity that some poor student did not live there, to profit by all that light, since he would not rob the mariner. 'Well,' he said, 'I do sometimes come up here and read the newspaper when they are noisy down below.' Think of fifteen Argand lamps to read the newspaper by! Government oil! light enough, perchance, to read the Constitution by! I thought that he should read nothing less than his Bible by that light. I had a classmate who fitted for college by the lamps of a lighthouse, which was more light, we think, than the University afforded."

WAVE-MOTIONS.

Let us in imagination stand with Thoreau on the luminous tower and amid the agitations of ocean, air and æth, consider the laws by which The Presiding Power controls these elements. The restless sea through all its movements, from ripple to billow, obeys the same mandate; the time of each oscillation is proportional to the square root of the length of the wave. At great depths the motion of the fluid is wholly insignificant, because at a distance below, equal to the length of a wave, the motion is only $\frac{1}{25}$ of that at the surface.

The size of the wave depends, therefore, upon the force of the wind and the depth of the sea. The largest on the Atlantic observed by Capt. Scoresby were 550 feet long and 30 feet high.

AIR WAVES.

The air, however, is not confined like the sea, which has only an upward and downward motion, except near the shore, where the force it contains would escape. But the whole mass of air, moving as wind, has also a vibratory or wave-motion producing sound. If the distant bell we hear is tuned to middle C of the musical scale, according to the new French standard, and the temperature is at 16° centigrade, its sound is produced by air-waves vibrating—not undulating—at the rate of 522 per second, each of which is about 2.15 feet in length. The lowest octave of this note which could be heard would, according to Savart, be the result of 16.31 waves per second, each about 68.8 feet long, and the highest octave by waves moving at the rate of 33,408 per second, each .0492 of a foot in length.

ÆTH-WAVES.

Turning now to the light produced by the fifteen Argand lamps, we behold still more wonderful wave phenomena. The all-pervading æth is, for miles around, thrown into undulations moving at an average rate of 582 million of million per second, having an average length slightly exceeding twenty-one millionths of an inch. These numbers, determined by repeated experiment, appall us, and we turn to that branch of the subject where results are more palpable.

THE CHEMISTRY OF FLAME.

All the phenomena attending the artificial production of light is not yet fully understood. Light is only one of the effects of the burning of hydro-carbons in the gaseous state. The solid candle and the liquid contents of the lamp must be volatilized, and brought into the same expanded state as ordinary illuminating gas before they can be burned. This condition is attained, in the case of the candle, by the heat of the flame; the liquid wax or tallow, by capillary attraction, is carried along the wick to the point where it is turned to gas. Yet light does not emanate from gases. Draper found that while gases heated to over 1100° centigrade do not give light, all the solids subjected began to be luminous at about 510° C, and they display the several colors of the prism, and finally emit white light.

In the process of burning illuminating gas, the

hydrogen is first combined with the oxygen of the air, and the solid particles of carbon, thus deserted by the hydrogen and exposed to the heat generated by the burning gasses, become incandescent, and afterwards unite with oxygen forming carbonic acid gas.

It is, however, true that when the carbon is consumed at the same time with the hydrogen, no light is evolved; such condition exists when the oxygen is mechanically, but thoroughly mixed with the hydrocarbon gas before it arrives at the place of burning. This is effected by the Bunsen burner, in which the air is admitted at the bottom and mixed with the gas on its upward passage within the burner.

The result of this simultaneous burning of both carbon and hydrogen is an increased amount of heat and an almost entire absence of light. It seems, therefore, to be essential to the production of light, that the combustion of the carbon should take place after that of the hydrogen.

INCANDESCENCE.

Steel filings dropped into a current of heated gases give forth brilliant scintillations. Hare, soon after his invention of the hydro-oxygen blow-pipe, found that a pencil of lime held before it, in the burning gases, emitted a light of intense brilliancy. Such a light, when its rays were thrown into parallel lines by means a parabolic mirror, has been seen in diffused daylight at a distance of more than one hundred miles. But to assert that light is generated because carbon or any other solid is incandescent, is not to explain the phenomenon.

Light is proved, beyond a doubt, to be the result of waves moving transversely to the line of propagation; the solid from which it proceeds must, therefore, have the power of producing such waves in the æth. The interesting question to be settled is whether the solid itself, or the æth within it, can be set into high vibratory action by means of waves of heat having a lower rate of velocity. Reasoning from analogy, we must decide in the affirmative.

WAVE INDUCTION.

Air waves have the power of exciting vibrations in solids which are more rapid than the waves producing them. This fact was brought forcibly to my notice many years ago, when I found the low tone in which I was conversing in a certain room was constantly followed, not by an echo, but by a musical note of very high pitch; after a search, the sound was found to proceed from a sheet of steel, 6 or 8 feet long by as many inches wide, standing on its end and resting against the wall.

This sympathetic action can be accounted for by the laws of harmonics. The proper tone of a bell is always accompanied by harmonic sounds readily perceptible to a fine ear. It is asserted by some musicians that every sound made by a musical instrument is thus accompanied.

The vibratory action arising from periodic pulses sometimes appears to be greater than the cause; this arises from the fact that a new impulse is given just before the force of the previous impulse is expended. The same remark may be applied to oscillations. In the gymnasium, the self-swingers exert themselves only at the extremities of the arc. The danger of regular pulses where weight is sustained is well known. Soldiers in crossing a wooden bridge are required to break ranks and step out of time. I have often seen the long span of a timber bridge, which was firm under the tread of a herd of cattle, thrown into quick vibration by the rapid passage of a dog across it.

The condition required in this case is, that the tread of the dog shall harmonize in time with the vibratory action due to the elasticity of the timber. Many points connected with the subject of secondary vibrations are yet to be further elucidated by experiment.

LIGHT FROM RAPID DILATIONS.

Only one other cause for æth-undulations by means of carbon can now be suggested; it arises from the characteristics and conditions of the three important simple bodies which play the principal parts during ordinary combustion. Oxygen, the element of which more than one-half of our globe is composed, when isolated, is a permanent gas. No power yet applied has reduced it to the liquid state. Hydrogen, a gas sixteen times lighter than oxygen, has also no cohesive power. Natterer, of Vienna, subjected these

gases separately to a pressure of 3,000 pounds to the square inch, when at a temperature of 106° centigrade below the freezing point of water, without producing cohesion. Yet these two gases, when mixed in the proportion of two volumes of hydrogen to one of oxygen, are, by the electric spark, instantly condensed to steam, and, on cooling, to water. Carbon, on the other hand, when isolated, is always a solid. No amount of heat yet applied has brought it to a gaseous, or even a liquid state. In its most condensed condition—as the diamond—it had 3.55 times the specific weight of water; it is 41,890 times heavier than an equal bulk of hydrogen, 2,618 times heavier than oxygen, and 2,992 times heavier than olifant gas (C_4H_4).

In the process of illumination by the combustion of hydrocarbon gases, as described, the isolation of the carbon seems to be essential. It must, therefore, instantly change its volume and become a solid, and then as quickly assume the gaseous state, in the formation of carbonic acid gas. These rapid contractions and expansions of carbon may act as pulsations on the pervading æth, and thus generate the whole series of waves, which, commingling, form white light.

It is passing strange that carbonic acid gas, a resultant in generating light and heat—including the vital heat of myriads of animals—should, after its passage from the lamp or the lung to the leaf, be again separated from oxygen by a force similar to that its constituents can generate under certain conditions.

MOLECULAR FORCES.

Turning again to the Highland Lighthouse, let us estimate the power expended on its lamps. The average weight of oil consumed nightly was about 16 pounds at the time of Thoreau's visit. Taking the mean of the results of experiments by Favre, Silbermann, Dulong, and Andrews with olifant gas (oil-gas not being given), we find that 11,943 pounds of water are raised 1°C by the combustion of one pound of oil. This sum multiplied by 16, the number of pounds used per night, and that product by 1,390, the number of foot-pounds which measures the force expended in raising one pound of water 1°C—that being the mechanical equivalent of heat as correctly determined by Mayer in 1842—we have 265,612,320 foot-pounds as the amount of energy expended in generating the light required for a single night.

In order to fully appreciate the power of these molecular forces, it is only necessary to refer to Dr. Tindall's admirable work on "Heat as a Mode of Motion." After calculating the mechanical value of the energy developed when the atoms of one pound of hydrogen and eight pounds of oxygen attract each other, fall and clash together, when the molecules of steam thus generated condense to water, and this water is converted to ice, the author says:—

"Thus our nine pounds of water, in its origin and progress, falls down three precipices; the first fall is equivalent to the descent of a ton weight, urged by gravity down a precipice 22,320 feet high; the second fall is equal to that of a ton down a precipice 2,900 feet high; and the third is equal to a descent of a ton down a precipice 433 feet high."

"I have seen the wild avalanches of the Alps which smoke and thunder down the declivities with a vehemence almost sufficient to stun the observer. I have also seen snow-flakes descending so softly as not to hurt the fragile spangles of which they were composed; yet to produce from aqueous vapor a quantity of that tender material which a child could carry, demands an exertion of energy competent to gather up the shattered blocks of the largest avalanche I have ever seen, and pitch them to twice the height from which they fell."

Such is the impressive estimate of the force expended in the formation of a pound of ice from its component elements in the gaseous state, yet it will be observed, by the figures already presented, that the energy developed in one nocturnal display of the Highland beacon was sufficient to have thrown the fragments of five such avalanches to the same height.

Thoreau, the student and lover of Nature in her wild moods and original garb, doubtless, with mingled feelings of awe and delight, beheld from that beacon-tower the surging of the sea, and heard, in sullen sounds, the threatnings of a tremendous force; but as he turned toward the light, which fixed

the gaze of many an anxious mariner, he did not realize the truth that Art had there trained Nature to perform the common service which must ever be regarded as one of her greatest miracles; and that, to guide the sailor along the dangerous coast, she sent forth her messengers of light amid the ambient æth, whose undulations, in each and every minute of time, outnumber all the ocean waves that have culminated since man first ventured on the deep.

The National Debt.

The entire debt of the United States is officially reported, under date of May 31st, at a little over twenty-six hundred and thirty-five millions of dollars, which is near five hundred millions more than was estimated in the last report of the Treasury Department. The exact figures are as follows:—

Interest payable in gold.....	\$1,103,113,842
Interest payable in currency.....	1,053,476,371
Treasury Notes not bearing int....	472,829,270
Past due, and interest ceased.....	786,270

Total.....\$2,635,205,753

The estimated receipts for the year ending June 30, 1866, are three hundred and ninety-six millions, as follows:—

From Customs.....	\$70,000,000
From Internal Duties.....	300,000,000
From Lands.....	1,000,000
From Miscellaneous Sources.....	25,000,000

Total.....\$396,000,000

The annual interest in coin and currency together is over one hundred and twenty-four millions, which is an inconsiderable fraction less than six per cent on the interest-paying portion. We are now able for the first time to assign a proximate limit to the debt, and to estimate very closely its yearly burden on the country. When all the expenses of the war are settled the mass will doubtless be near three thousand millions of dollars. The policy of the Government will be to convert the Treasury Notes into bonds with as little delay as possible. At six per cent, which is the present average rate, our annual interest will be one hundred and eighty millions of dollars.—*Evening Post*.

MISCELLANEOUS SUMMARY.

At the Academy of Sciences, M. Collignon read a paper on a method of representing the surface of the earth on a plane, by making the poles the common centre of a series of circles representing the geographical parallels. By this system of projection, the deformation of the angles and changes of length may be easily ascertained, and thus, by easy rules and tables, constructed by the author, the real dimensions may be easily determined at each point of the map. Mr. Reboul sent in a paper on a new carburet of hydrogen, which he calls *valylene*, and which is composed of ten equivalents of carbon and six of hydrogen. It is obtained by distillation from the bromide of valerylene, treated with an alcoholic solution of potash. The new substance only distills from the latter at a temperature of from 40° to 50° centigrade.—*Galignani*.

TEST FOR RUM.—Mix a little of the rum to be tested with about a third of its bulk of sulphuric acid, and allow the mixture to stand. If the rum is genuine, its peculiar odor remains after the liquid has cooled, and even after twenty-four hours' contact, may still be distinguished. If, on the contrary, the rum is not genuine, contact with sulphuric acid promptly and entirely deprives it of all its aroma. The author affirms that he had never found this very simple process fail, and that all spurious rums may thus easily be distinguished from the genuine.—*Pharmacie & Chem. News*.

ADULTERATED LARD.—Dr. Grace Calvert, of Manchester, England, says that the snowy appearance of American lard is obtained by thoroughly mixing, by means of machinery, starch in a state of jelly and a little alum and lime, with the lard, by which means two ends are attained, viz., the introduction of twenty-five per cent of useless matter, and a perfect whiteness from the high state of division of the same.

A HUGE raft of logs, estimated to contain 700,000 feet of lumber and measuring half a mile in circumference, was towed up Lake Memphremagog the other day. It belonged to a company in Newport whose steam mill sawed 13,000 feet of lumber in nine hours and forty minutes.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, June 6th, the President, N. C. Ely, Esq., in the chair.

PROFITS OF STRAWBERRY CULTURE.

Mr. Bergen stated that the statistics of the strawberry culture in Burlington County, N. J., and two or three of the adjoining counties, had been collected, and it was found that the average yield per acre was 58 bushels, and the average price was \$6 per bushel. The average yield of blackberries is 48 bushels to the acre, and the average price \$4 per bushel. The yield of strawberries seemed to the speaker very small, as we have had accounts of 300 or 400, and even of 700 bushels to the acre. But he supposed the statistics embraced all the fields, good and poor.

He remarked further that experience had taught him that it is unwise to attempt to gather more than one crop of strawberries from the same plants. Set the plants in the spring and take good care of them through the season; then gather the crop the next year, and turn the vines under.

Mr. Carpenter confirmed this opinion, except where strawberries are cultivated in hills; then they should be richly manured every fall, the manure spaded in the spring, and the ground should be mulched. In regard to the profits of strawberry culture, a friend of Mr. Carpenter's, in Burlington county, was having 1,500 quarts per day picked for the Philadelphia market, and they sell for 40 cents per quart. A neighbor of his is gathering 2,500 quarts per day, thus receiving more than \$1,000 daily for strawberries. In both these cases the variety cultivated is the French seedling, a large, early and productive kind.

SEEDLING ROSES.

Mr. William A. Burgess, of Glen Cove, presented a bushel-basket full of different varieties of seedling roses, which were produced by himself from the seed. He remarked that the idea had prevailed that seedling roses could be produced only in France, but the truth was, that they could be propagated from the seed here better than in France. He advised everybody to plant their rose seed. He had obtained blossoms in nine weeks from the time the seed sprouted.

THE WAY TO GET RID OF ROSEBUGS.

Mr. Solon Robinson observed that he was very much troubled with rosebugs this year, his grapes being threatened with total destruction by them. He had, however, a plant of spirea—the Spirea Lindliana—which is so attractive to the rosebugs that they all collect upon it, and it is then very easy to pull them off and roast them—the only mode of destroying them that he had found effectual.

Gum Copal.

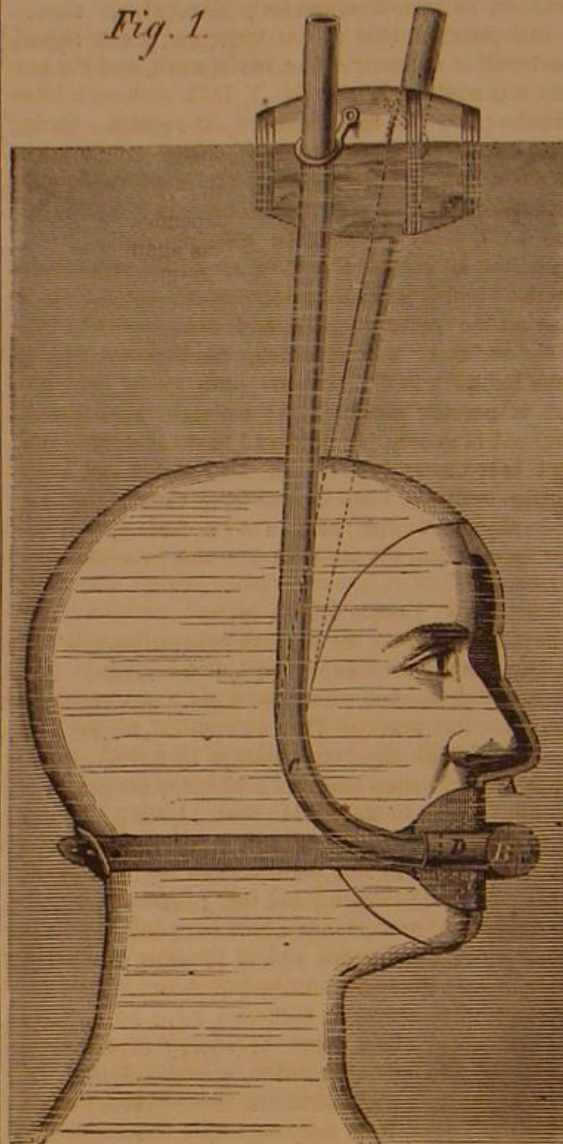
The purest and best gum copal in the world is found on the mainland of Africa, near Zanzibar. It is, without doubt, a fossil gum. It is dug from the earth by negroes, and by them carried to the Banian traders, in small quantities, for sale. When it reaches Zanzibar, it is in a very dirty state, and requires much sifting and garbling before it is merchantable; it is then cleansed with solution of soda-ash and lime, put up carefully in boxes, when it is ready for the home market. That it is a gum may be proved from the fact of its rough or "goose-skin" surface, which no doubt is an impression of the sand or earth when it ran down from the tree in a soft state. Pieces, too, are found with sticks, leaves, and insects preserved in them in the most perfect state. Large and uncouth-looking pieces will often have many impurities, such as dirt, sand, and hundreds of little black ants in them, giving the copal a dirty, dingy appearance. At the diggings no copal trees are found, or even any signs of them; and to this time it is mere conjecture in what ages these deposits of copal were made, probably many thousands of years ago. I have tried to get specimens of anything the negroes might dig up with the copal; but they, in every case, say that they get nothing whatever. There are copal trees on the coast and on the island; but the gum from them is not a merchantable article at all, and when mixed with the fossil gum, is always rejected. Without doubt the quality of that dug is made as pure as it is, by the chemical action of the peculiar kind of earth in which it is buried. Some copal is found on this island, but it is so poor that it is not much sought.—*Pacific Monthly*.

HAWKINS'S DIVING MASK.

This invention is intended to assert the respiration of divers, or persons exposed to noxious gases, foul vapors, smoke, etc.

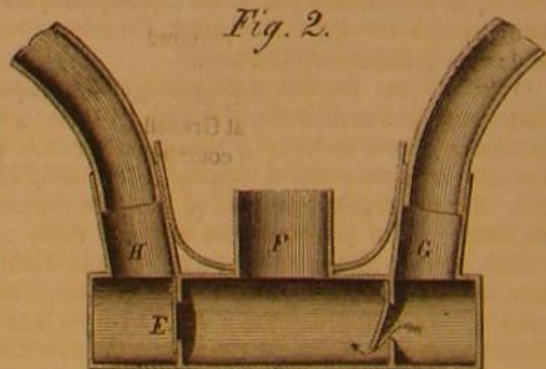
By the use of it fresh air can always be led to any point where the atmosphere is vitiated. Thus, in diving—going to a depth below the surface of the sea—great difficulty is experienced in breathing, as is commonly known, and fresh air has to be pumped or forced down to persons who follow such calling.

Fig. 1.



The engravings published herewith represent a contrivance for regulating the admission of pure and the exit of foul air to and from the lungs. To this end the mask is fitted with a T-shaped tube, B, which has pipes, C, issuing from its branches, D. In the T there is a compartment, as in Fig. 2, in which the valves, E, fit. The mouth-piece is at F, and it will be seen that as the cold air is forced down or falls by its gravity in the pipe, C, the heated air expelled from the lungs rises naturally through the

Fig. 2.



valve, H, thus rendering exhalation and inhalation comparatively free, and separating pure from foul air. This device would be useful in foul wells where carbonic acid gas collects in cess pools, or in similar places.

Patented through the Scientific American Patent Agency March 21, 1865, by James Hawkins, of Brad-dock's Field, Pa.; for further information address him at that place.

CORNISH PUMPING ENGINES.—The number of pumping engines reported for March is 36. They have consumed 3,048 tons of coal, and lifted 23.2 million tons

of water 10 fms. high. The average duty of the whole is, therefore, 51,400,000 lbs. lifted 1 ft. high by the consumption of 112 lbs. of coal.

RECENT ENGLISH PATENTS.

GELLERAT'S STEAM ROLLING AND PORTABLE ENGINES.

This invention, patented as a communication to Mr. Henry, the patent agent, Fleet street, consists of an apparatus, mounted on axles which carry rollers, acting both as propelling and bearing wheels or rollers, and which can be caused to converge or move out of the parallel, in order to turn the engine to either side. Motion is communicated to them by a train of toothed wheels driving a chain-wheel, mounted on the axle-box, and transmitting rotary motion to the bearing-wheels or rollers by a crank arm or short connecting rod jointed to a radial arm of such wheel or roller. The axles are not fixtures, but are suspended in brackets, fitted with friction-rollers, and they are moved by a double-threaded worm, or right and left handed screw, which takes into nuts, and is worked by handle and bevel gear.

CLAVEL'S LAMP-GLASS HOLDERS.

The specification of this patent, recently filed by Mr. Henry, patent agent, Fleet street, consists in constructing the sockets, holders, or supports for gas and lamp glasses, or chimneys, adjustable as to size, or extensible and contractible, so that one holder will serve for various sizes of glass or chimney. This is effected by forming the socket or holder with slots, and tightening or loosening it, so as to vary its diameter, either by a conical outer ring, or by an incomplete ring or cylinder, with a break or opening in it, fitted with a screw; or the holder itself may be of the form of an incomplete ring or interrupted cylinder, opened and closed, or tightened or loosened, by a screw. The improvement may be applied to the rings or lower parts of frames or supports fitted round chimneys or glasses of lamps or burners to receive shades or reflectors.

RAILWAY TRANSIT.

Mr. John Routledge, carriage-department manager of the West Hartlepool Railway, has recently effected an improvement in railway passenger traffic, in rounding extreme curves in the line, that cannot fail to prove highly useful and beneficial to the traveling public. Some of the immediate results of the improvement will be to insure perfect safety, with long carriages, at a high rate of speed, and prevent what is known as the crease of the tire and side of the rail. There are three pairs of wheels, the center ones performing the radiating process, and the end ones connected with the center by rods, are made to the requirements of the case, no matter how great the curve may be. The invention was tested a short time since by Mr. W. S. Leng, the West Hartlepool Harbor and Railway manager, on the curve near Hartlepool station, and found to be a complete success.—*Stockton and Hartlepool Mercury*.

[This is the same thing as the Bissel truck which has been in use for years in this country.—Eds.]

How to Combine Fat and Oil with Aniline Red.

Dr. E. Jacobsen gives the following process:—He first separates rosaniline from commercial fuchsine by heating with soda or digestion with ammonia, washes and dries it. He then adds the rosaniline to oleic acid or melted stearic acid as long as it will dissolve, or puts them together in equivalent proportions. An excess of oleic acid must be avoided when the compound is required for a varnish, as it delays the drying. Oleate or stearate of rosaniline easily dissolves in fats or oils, and colors these an intense red. If it is wanted for a linseed oil varnish, the linseed oil must be free from lead. The compound must be kept from the fire, or it soon burns blue, probably by the reducing action of the fatty acids. The best red color is obtained in linseed oil varnish. Stearin with oleate or stearate of rosaniline appears a bluish red. Paraffine appears to act as a reducing agent with the compounds of fatty acids and aniline, and changes to a dirty violet color; the mixture then is inapplicable to the coloring of paraffine or stearin candles. The oleate or stearate of rosaniline is a good coloring agent for hair oil or pomatum, but from the instability of the color seems inapplicable for oil painting or varnishes.—*Dingler's Polytech. Journal*.

GREAT CRUCIBLE-CLAY DEPOSIT IN MISSOURI.

Glass has been defined as the silicate of potash, but this definition is not sufficiently comprehensive. Glass is generally a double silicate, a combination of silica with two or more of the metallic oxides, potash, soda, lime and red lead. The silica is usually obtained in the form of sand, which has been produced by the slow grinding of quartz rock, by the action of waves, or other natural agencies. This is thoroughly mixed with the metallic oxides and the mixture is placed in a clay crucible, where it is subjected to a heat so intense as to be fused, when the several substances enter into chemical combination, and become glass. The pots are set in circular furnaces, and are so formed as to exclude the flames from contact with their interiors, openings being provided through the walls of the furnace for introducing the materials and removing the glass when it is melted. The crucibles are in the form of a coconut dipper, elongated and inverted, closed at the bottom, but having an opening near the top provided with a neck to enter the hole in the furnace wall. They vary in size, but are usually about four feet in diameter and four and a half feet high. They stand in a circle around the interior of the furnace, and are entirely surrounded except the bottom and narrow opening, with flames of the most intense heat, the heat to melt the glass passing through the thick walls of the crucible; though for some kinds of glass the crucibles are made open.

When a pot cracks it is very apt to cause the cracking of others, and the placing of a new pot in lieu of a broken one, is one of the most difficult and trying operations known in any of the arts. The wall of the intensely-hot furnace is broken open to admit the removal of the old pot, the new crucible is taken at a red or white heat from the annealing furnace, and trundled on an iron carriage to its place, where it is nicely adjusted in position, and the wall is then rebuilt around it with brick and mortar, which are manipulated by means of long-handled shovels and trowels.

The evils resulting from the cracking of a pot being so great, every precaution is adopted to make the disaster as rare as possible. The clay is kneaded and re-kneaded, the labor of a whole week being expended upon the formation of a single pot; after the crucible is formed it is set in a warm room to dry for several months, some manufacturers continuing the drying for more than two years; before being set in the furnace it is placed in an annealing chamber, where, by a gradual increase of temperature continuing for several days, it is slowly raised to a white heat, and it must be set in the furnace while in this condition.

With this great importance of the quality of a crucible, of course the utmost attention is given to the material of which it is formed. The properties required in the material are perfect infusibility and the greatest possible exemption from liability to crack. The desired infusibility is found in pure clay—the silicate of alumina—but this is decomposed at a high temperature by lime, the silica leaving the alumina and entering into combination with the lime to form a silicate of lime, which is easily melted. Clays, therefore, which contain lime, are worthless for making glass pots. But the most troublesome substance is sulphide of iron; where this is present, sulphuric acid is formed, and this dissolves the alumina. So serious is the difficulty from this source, that some English establishments have the clay rolled out in thin sheets upon tables, and men are employed to pick out, by the aid of magnifying glasses, every minute speck of iron pyrites.

Heretofore the clay for crucibles has been imported by all our glass works either from Germany or from Stourbridge, in England; it is worth \$25 per ton in gold in this market, and a single manufactory will consume 300 tons a year. But a large deposit has been found near St. Louis, in Missouri, which from analysis and practical trial is pronounced fully equal to the best English or German clay. This is another important step in the development of the mineral resources of the country.

The owners of this clay bed are J. L. Smith & Co., of St. Louis, and the agent for the Eastern States is H. T. Malcolms, of No. 40 Murray street, New York.

The Artesian Well in St. Louis.

Most of the residents of St. Louis know where the artesian well is situated—on O'Fallon, above Lewis street—and have drunk of its waters. This well was commenced in the spring of 1849, by Messrs. Belcher & Brothers, for the purpose of procuring water for the use of the refinery. At first, the bore was but nine inches in diameter, and the process of boring was carried on by hand for eighteen months; but as the rock became hard to penetrate, at the end of that time only two hundred and nineteen feet of rock had been bored through, and the total depth of the well was but two hundred and forty-nine feet.

In September, 1850, steam power was first employed, and used to the termination of the work, and the boring was continued until Feb. 7, 1851, with such intermission only as was requisite for repairs. During this time (five months) forty-two days were lost, and 208 feet of rock were pierced, and the total depth of the well was then 457 feet. From Feb. 7, 1851, till Sept. 29, 1851, the work was suspended.

At the latter date the work was again commenced with a 3½-inch bore, and continued till March 22, 1852, the boring during the time being carried on night and day from Nov. 18, 1851. March 22, 1852, the well had reached a depth of 1,351 feet, and, during the period of nearly six months, 894 feet had been penetrated. From March 25, 1852, to April 30, of the same year, was taken up in widening the bore of the first 80 feet of the well from 9 to 16 inches in diameter, which, accomplished, a large pump was inserted, with a view of determining the quantity of water then furnished; but the results of the experiment proved unsatisfactory. From Sept. 1, 1852, several weeks were employed in widening the 3½-inch bore of the well to 5½ inches, from the depth of 457 feet to that of 1,050 feet, which had proved a source of great trouble, and in a measure prevented the prosecution of the work.

Jan. 6, 1853, the prosecution of the work was recommenced with a bore of 3½ inches in diameter, and continued up to March 11, 1855. During this time (fourteen months), though 120 days were lost in making necessary repairs, it had sunk 848 feet deeper, making its total depth 2,197 feet. Since Aug., 1856, the first 456 feet of the well have been tubed with a 3-inch wrought-iron pipe, and, at the time of inserting this, it was found that water would rise to a height of about 75 feet above the surface.

The boring was effected by a simple wedge-shaped drill, the size of which varied according to the diameter of the bore. This drill was screwed to a wrought-iron bar, 30 feet long, and about 2½ inches in diameter, the total weight of which was about 600 pounds. To the bar was screwed a pair of slips, by which arrangement the drilling was effected by the weight of the bar alone. To this was fastened the poles, each 30 feet long (with male and female screws), made of two pieces of split hickory, joined and riveted in the center. To the last pole was fastened one end of a chain, the other end of which was attached to a spring beam worked by a steam-engine running with a speed of about eighty revolutions in a minute, and a stroke of fourteen inches. The boring apparatus was constantly turned by hand-power, and, for performing all the work connected with the boring, the labor of four men was, in general, daily required.

This well was finished at the expiration of thirty-three months' steady work, and cost \$10,000. The depth of the Artesian well at Grenelle, France, is 1,797 feet. It was eight years in completion and cost \$30,000. The Louisville Artesian well is deeper than the St. Louis. What it cost, we are unable to state.

The water comes up through a twenty-inch cast-iron pipe, bolted thirty feet below the surface to the solid rock, and by means of a connecting pipe, is conducted outside of Belcher's sugar refinery, where the largest quantity of it passes into the sewer. A small pipe discharges into a box, and any one can drink of it, or carry any quantity away in bottles or jugs. Neither its quantity or quality has changed since it commenced to flow, and it discharges, according to measurement, 300 quarts per minute. It has a salty taste, and a strong odor of sulphur. In fact, so strong is the sulphur, that the white paint on the building near it has been turned blue. It is highly praised for its remedial virtues, and is visited daily by hundreds to drink of its water. The workmen in the refinery say that it is much pleasanter than ice water, and they feel better after drinking it.—*Dispatch*.

Clark on Steam Boilers.

Mr. D. K. Clark, author of the ablest and most practical work on the locomotive engine ever written, gives his views on the subject of the wear and tear of steam boilers in a letter to the *Engineer*. What Mr. Clark says about electricity and galvanism in connection with this subject, will be appreciated by every sensible person. We have generally found that when any one desires to make a display of knowledge about a matter he is ignorant of, he explains the mystery by something else he is equally uninformed upon. Mr. Clark's opinions are not liable to this imputation, for he knows whereof he affirms, and accounts for the frequency of disasters to boilers on mechanical grounds.

"Probably the most important practical inference to be drawn from the tests of the strength of riveted joints, is the explanation they supply of the failure, hitherto unexplained, of boiler plates, not at the joints, but in their neighborhood. We are aware that electrical and galvanic action are freely adduced in explanation. But these words have two meanings; they mean electricity and galvanism, and they mean ignorance and mystery. It is known that boilers fail by corrosive and other agencies eating into the plates on the inside, pitting and furrowing the surface. The pitting of the metal is readily explained by the presence of chemical agents in solution in the water, and the known inequality of substance of iron plates and bars, in consequence of which the metal is gradually but unequally separated and dissolved, and probably a weak galvanic circuit may be established between the iron shell and the brass tubes, accelerating the process of dissolution. But this explanation does not meet the frequent case of a straight, continuous furrow, cut like a groove upon the surface. Furrows are observed to be found parallel to, and close to, the riveted joints. Not in any case, that we are aware of, have they been found at any notable distance from a riveted joint, nor otherwise than parallel to one. The inference is inevitable that there is a relationship between them, and our conviction is, that the alternate tension and relaxation of the plates at the joints, as the steam is got up and let down, are attended by an alternate distortion—incipient, it may be—and resumption of the normal form, a bending and unbending of the plates on each side of the joint, in consequence of which the texture of the metal is gradually loosened in lines near to and parallel to joints, and it is thus laid open to corrosive action. On this interpretation the commencement of a groove or furrow, establishing a weak place and concentrating the action there, would suffice to extend and deepen it to the dangerous limits occasionally announced by explosions.

"The weakness attendant on lap-joints is strikingly exemplified in the lap-welded joint, when subjected to extreme tension; the tensile strength, though the metal at the weld is perfectly solid and fully as strong in itself as the body of the plate, is much below that due to the regular section of the plate. Here there is no elementary weakness in the reduction of metal by rivet-holes; the inferiority of strength arises solely from the bending of the plates on both sides of the lap, and the overstraining of the fire-box, in the endeavor to attain to the position of stability.

"The furrowing of lap-jointed plates reads an important lesson on the real and ultimately practical value of direct connection, and direct action in exerting, transmitting, or resisting forces.

"That the furrowing of the plates at the riveted joints results from the indirectness of the strain of the steam pressure, is rendered still more probable by the analogous furrowing which results from reciprocating strains of another kind. In the more ancient classes of engines, in which the cylinders are fixed to and work from the smoke-box plates, the alternate forward and backward strains by the steam pressure on the piston have been observed to weaken and to subject to corrosion and leakage the substance of the plate along the edge of the angle iron at the junction with the barrel. In further corroboration of this doctrine, Mr. Colburn states that he is not aware that any accidents from furrowing boiler plates have taken place in the United States; and we believe that their immunity from accidents arising from this source is to be ascribed to the use of very thin boiler plates—one-fourth of an inch to five-sixteenths of an inch in thickness."



Ingenious Device to Prevent Boiler Incrustations—Letter from an English Engineer.

Messrs. Editors:—Although not an actual subscriber, I have been a constant reader of your valuable paper for years, having more than twelve volumes of it, and heartily wish we had as good and as cheap a paper in England. Now, having received many, very many, useful hints in reading it, I think it my duty to give a little of my experience in water heating, in connection with boiler incrustations—if you deem it worthy a space in your very valuable publication, and trust it may be of benefit to some of your many readers. First, I look on the many advertisements of patents for preventing boiler incrustations as almost useless, although I won't condemn any, not having ever tried one, for I hold if the water introduced into the boiler contains impurities, nothing can prevent its settling somewhere, unless it is frequently blown out. Now, I put up a 10-horse power two years ago, and my greatest fear was from incrustation of boiler, and knowing that by heating the feed water I should lessen it, if not prevent, I concluded the hotter the water the less siliceous in the boiler. I introduced the feed water from cold-water pump into the exhaust pipe, at about seven feet from heater, as it may be called, for which I made use of a strong cask, holding about 120 gallons; the exhaust steam drove the water in a fine spray into the heater, and deposited its siliceous all round the inside of the cask, more especially opposite the jet. I took a pipe of the same diameter as the exhaust (3 inches) vertically from the top into the open air, and one, same diameter, one inch lower than the exhaust, to carry off any surplus that might arise at any time from shutting off the feed from hot-water pump; this pipe I put in at right angles to the exhaust, so as not to take any of the jet of spray. This pipe went into a 6-inch drain, 200 feet long, to the reservoir, and condenses four quarts of water in five minutes, or 240 gallons in ten hours; now, after ninety-seven days run I cleaned out the boiler, and found no scale, except a very thin film over the bridge; the greater part of the fire-box had no scale whatever, and, I suppose I had no more than six gallons of mud altogether, but inside the cask I had a coal of hard siliceous three-fourths of an inch thick, which I removed by means of a hammer and chisel; the cask I furnished with a man-hole complete. I should have said the feed is heated to boiling point by being blown through the exhaust and finely subdivided. I can draw from the hot water feed pipe at 207°, which necessitates my having a slight head above the hot water pump. I find the exhaust being partly condensed in blowing the water through is a relief to the engine's working, although siliceous forms within it as fast as in the heater, and which has of course to be cleaned out when the heater is cleaned. This spring I replaced the cask for an iron cylinder, seven feet long by fourteen inches in diameter, lying horizontally in a line with the exhaust, and can plainly hear the jet striking hard against the extreme end, being about sixteen feet from where the cold water enters the exhaust pipe. All the other arrangements are the same. I find it necessary to have plenty of room in the heater, otherwise the spray, instead of quietly settling, will be blown up the vertical exhaust pipe into the open air. I am situated over a sand-stone rock, but have no doubt I should find my plan answer as well on a chalk formation as on a sand-stone range.

I hope this article may be of benefit to some of your readers. I receive your paper from Mr. A. J. Chapman, gunsmith, Schenectady.

EBENEZER RUSSELL.

Union Mills, Cranbrook, Kent, Eng., May 11, 1865.

[We are pleased to publish Mr. Russell's communication, and thank him for his good opinion of our paper. We recommend a trial of his device to our engineers. His ideas accord with our own upon this subject. We deem it much better to remove the incrustations from the boiler by preventing them from entering than by employing nostrums for the

purpose, which, in the hands of inexperienced persons, are always fraught with danger. The compound Mr. Krause mentions is made in one form as follows:—Powdered charcoal, common soda, and alum, which may be mixed in about equal parts; add to these matters wood dust, and mix the whole together. This will remove incrustation from old boilers, and prevent it in new ones.—Eds.]

Incrustation Powder Swindles.

Messrs. Editors:—Your valuable paper serves to spread so much useful knowledge among the mechanics and all producing classes of the country that I think it is but the duty of every reader of the SCIENTIFIC AMERICAN to assist you in your work to free the mechanic and manufacturer from all individual taxes that are everywhere imposed upon the ignorant. Being opposed to all secrecy and secret compounds for any use whatever, and the vendors thereof, because nine times out of ten, if the facts are known, they are either worthless or have been known in the scientific world for years; as, for instance, the case you reported, "How to make Aqua Regia," as one of the secrets sold to an ignorant party. I wish to report you a case of great usefulness to all who use steam boilers, to prevent boiler incrustations. Boiler incrustations are caused (except on salt water) by the crystallization of lime, etc., held in solution by the water with which the boiler is fed, and water will only dissolve a small portion of lime and other earthy substances if saturated with carbonic acid, which is the case with most all well and river water; and, as the water is evaporated, the lime, etc., crystallizes on the iron. To prevent this, all that is necessary is to drive the carbonic acid out of the water as fast as it enters the boiler, and the lime will then not crystallize, but form a mixture with the water like an insoluble fine powder, which can be swept out of the boiler; or, if the water is let out at the beginning of boiling produced by a quick fire, after the water has been cold, this powder will leave the boiler with the water in almost every instance.

The substance which will produce this action of depriving the water of its carbonic acid is common wash soda—carbonate of soda; one or two pounds in a boiler, from ten to twenty horse-power, will do this most effectually until the water is let out. The action is simply that of depriving the water of the carbonic acid, the soda forming a bicarbonate of soda wherever the water of a lower temperature enters the boiler; and as soon as the bicarbonate of soda is heated to the temperature of the steam, it again parts with one half of its carbonic acid, which is immediately carried off with the steam, and thus the soda will renew its work as long as there is any in the boiler.

I have used soda for more than ten years with success, and it is my impression that all incrustation preventive mixtures are nothing but soda mixed with something else to hide its real character. An incrustation powder sold extensively in the West, chemically analyzed, proves to be nothing but soda mixed with sawdust, and then baked to give the sawdust a brown mysterious color, and to make the world believe (as the agent informed me when I told him that it was sawdust and soda) "that every pound of it was imported across the Atlantic," and sold here at thirty cents per pound—about eight pounds of sawdust with one pound of soda; a very profitable secret to deal in, indeed. This powder has the certificate of a number of our best mechanics in the West as a very efficient preventive of boiler incrustations, and to stop leakages, etc. Soda will prevent incrustations, and sawdust will, of course, fill up cracks, but this might be procured at one-thirtieth of the cost, soda at eight cents and sawdust for nothing.

F. W. KRAUSE.

Chicago, Ill., May 22, 1865.

Light and Heat from Water Power.

Messrs. Editors:—There is a stream of water running near my house in which I propose to set a water wheel which shall turn a magneto-electric machine to produce a current of electricity. This current of electricity shall decompose water, and produce oxygen and hydrogen gases; I will bring these together in a Dr. Harris's compound blowpipe, and burn in a manner to produce the calcium light which will light my house. Without producing the calcium

light I think I can expand the heat produced at the blowpipe, and so do my cooking, and warm my house, with water, as well as to burn a cold water candle. Why not? B. P. R.

Hartland, Vt., May 31, 1865.

[If you have power enough you may produce the electric light, but it will require a very large magneto-electric machine, and the light is not sufficiently diffused for ordinary illumination. The amount of heat that you will obtain will be very small indeed in proportion to the power expended, though the fire will be the cleanest and most perfect of all fires.—Eds.]

The Center of the Earth Composed of Gold.

Messrs. Editors:—The question as to the kind of matter composing the interior of the earth has long been one of considerable interest among that class of men who "dare to think;" and though our present knowledge of facts does not allow us to answer it in a positive manner, yet, I think it does enable us to draw conclusions which, at least, are highly probable.

When we consider the constant and never-varying changes to which the universe of matter is subject, we must conclude that there was a time—though that time be almost infinitely remote—that our world, as such, did not exist. Though as to the mode of its origin, and the time at which it first took its place among the spheres as an independent body, we can hazard nothing more than vague conjectures. It may have been hurled forth as a fragment from some mighty sphere, and thus attained an independent existence; or, it may have been by the collection into one body of a number of fragments or smaller worlds. But what would seem to be most probable, is, that it attained its present independent position by the condensation of a vast collection of gases, vapors and fluids, which had gathered around some aerolite or fragment, which served as sort of nucleus.

This latter idea concerning the mode of the earth's origin, seems to be the one most generally entertained by those who have given attention to the subject. But be this matter as it may, there is one thing which the teachings of geology so clearly established that it does not admit of a doubt, that at some remote period there must have been a vastly greater proportion of the earth in a gaseous and fluid state than at the present time.

Accompanying this idea a very singular and absurd notion has gained the popular ascendancy, that is, that the gradual cooling of the earth took place first at the surface, and that during the gradual change of the gaseous to the fluid, and the fluid to the solid state, a sort of crust was formed upon the surface, while the center still remained a fluid mass. No idea on the subject could be much more contrary to the known laws of matter. This notion, doubtless, arose from the idea that heat was a material substance, and would have to pass off from the earth before it could cool; whereas, the more modern researches into science show that heat is no more a material substance than motion, gravitation or magnetism, but that it is merely a condition of matter, and that, in the case in question, instead of passing off from the earth it would only become, by a gradual chemical action, fixed or latent. But even supposing that the cooling would, or did, take place first at the surface, it is a well known fact that all substances (water in a state of ice excepted) increase in density and weight as their heat is diminished, so that the cooler portions would be the first to sink from the surface toward the center. There are many other very absurd notions prevalent among the masses upon this subject. Some suppose that the interior of the earth consists mainly of water; this could not be, since water has a specific gravity inferior to nearly all the mineral substances; though it doubtless penetrates to a great depth through the crevices. Others suppose that its interior is one melted and burning mass, and that the volcanic mountains serve as chimneys to this great internal fire. Prof. Sims maintained, with considerable force of logical reasoning, that there is a vast hole running through the center of the earth from pole to pole. I once heard a distinguished clergyman maintain that the infernal regions were located in the center of the earth, according to which idea it is to be the future and eternal abode of nearly the entire human race,

and should command our utmost attention. For my own part I have quite a "golden" idea upon the subject—that the interior of the earth is abundantly supplied with, if not mainly composed of, gold, platinum and other precious metals. If we suppose but for an instant that the earth was once in a gaseous or fluid state, is it not quite evident that those substances most difficult of fusion, and possessing the greatest specific gravity, would be the first to find their way to the center? Now gold, platinum and a few other of the precious metals, possess these properties in a high degree above all other known substances, and though we know them to be scarce on the surface of the earth, we have no assurance but that they are abundant in nature. In view of these facts, is it not reasonable to suppose that these substances rapidly increase in quantity as we approach the center of the earth?

But it may be said that this probable or possible increase depends upon the idea that the earth was once mainly in a gaseous and fluid state. But even supposing that such never was the case, and throwing aside all possible and probable changes which the earth may have undergone, and taking only such changes as the learned geologist, who has carefully studied the chemical composition, structure and general position of the various strata of rocks, must know have actually taken place, we would ask, would it not be the constant tendency of these substances, being so much heavier and more difficult of fusion than other substances, to work away from the surface toward the center? And is it not probable, in view of the properties of these metals, and the known changes which the earth has undergone during the myriads and myriads of ages it must have existed, that they do actually increase in abundance as we approach the center portions of the earth. Indeed it is a matter of wonder that they are to be found at all on the surface, and such a fact can only be accounted for by the supposition that they exist in great abundance in nature.

It may be further urged in favor of this theory that these metals occur in nature invariably in a metallic state, and but little alloyed with other metals.

JOHN CALVIN MOSS.

[The specific gravity of the earth is only about one-third that of gold, the earth being $5\frac{1}{2}$ times heavier than a mass of water of the same size would be, and gold more than 19 times heavier than its own bulk of water. Consequently the earth cannot be nearly all gold, though the idea that there is a great deposit of gold and platinum at the center may not be improbable. The specific gravity of the earth has been measured by three different methods.

A commission, of which Dr. Franklin was a member, measured the contents of the mountain Schiehallion, in Scotland, and from the specific gravity of the rocks of which it was composed, computed its weight. Then a ball was suspended by the side of the mountain, and, by observations on the stars, the extent to which the ball was drawn from a vertical position, by the attraction of the mountain, was ascertained. From this the relative power of the mountain and the earth in attracting the ball, and hence the relative weight of the two, was computed.

A second plan, tried by Cavendish, was to measure the attractive force of a large leaden ball by means of a torsion balance.

A third plan, which was tried by the Italian astronomers, Plana and Carlini, and which has been recently repeated by Professor Airy, is to observe the effect upon the oscillations of a pendulum produced by varying its distance from the center of the earth.

The first method gave the specific gravity of the earth.....	4.95
The second.....	5.48
The same repeated by Baily.....	5.44
Plana and Carlini's result was.....	4.95
Professor Airy's was.....	5.56

The mean of these is.....5.44
Ebs.

THERE are some lines of railroad in this country running side by side. The Morris and Essex and the New Jersey Transportation Company, are examples. Trains on these roads start at the same hour and for three or four miles run side by side so close that passengers reach out of the windows and shake hands with each other when running 25 miles an hour.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Hats and Caps.—The object of this invention is to thoroughly ventilate a gentleman's hat or cap, and it is effected by securing the sweat lining upon the interior of the hat body in such a manner that a space will be left all around between it and the body proper, through which space air is freely admitted to the hat, and after circulating through it escapes at the ordinary ventilating apertures made in the top or sides of the hat. A good and thorough ventilation is secured by this arrangement; the hat easily adjusts itself to the head, and has, in every respect, the appearance of a hat having its sweat lining attached in the usual manner. This invention is applicable to any style of hat or cap now in the market, and any one wearing a hat having this ventilating arrangement will experience much comfort and relief during the hot and sultry weather of the summer months—the head being always kept cool. The inventor of the above is Chas. L. Rahmer, Brooklyn, L. I., and the hats are now being manufactured by Messrs. Spruham & Rahmer, No. 21 Park Place, New York City.

Apparatus for Making Extracts.—This invention relates to an apparatus which is particularly intended for extracting oil from paraffine, but which can also be used for making extracts of any other material. The invention consists in subjecting the material to be extracted to the pressure of the atmosphere by placing it in a tank with a perforated false bottom, and forming underneath said bottom a more or less perfect vacuum. The means employed for producing the vacuum are of different kinds, and can be varied as may be convenient. Patented in the United States and in Europe through the Scientific American Patent Agency. Lyman Smith, Erie, Pa., is the inventor.

Watchman's Time Detector.—This invention relates to an improvement in that class of time detectors on which a patent was granted to John Buerk, Jan. 1, 1861. In that case a strip of paper is used stretched on the circumference of a drum, to which a rotary motion is imparted by a clock or watch movement, and a series of spring points serve to perforate this strip according to the same, when these points are operated by a series of keys of peculiar shape. On the strips are marked the hours corresponding to hours on the dial of the clock or watch, and the time when one or more of the spring points have been actuated can be ascertained after the strip has been taken off. This construction necessitates a drum in addition to the ordinary clock or watch movement, whereby the expense of the mechanism is increased; and, furthermore, the operation of applying and removing the strips of paper is tiresome, and requires much care. These difficulties are avoided by using a clock or watch with a stationary index and revolving dial. On this revolving dial are fastened removable dials of paper, or other suitable material, with a series of circles corresponding to the positions of the spring points, and these spring points are concealed under the stationary index. By inserting one of the keys, and turning the same round, the paper dial is pierced by one or more of the spring points, and the time when this takes place can be ascertained by examining said dial when the watch or clock is opened. The perforations in the paper dial are made from below, under the stationary hand, leaving a slight beard on the upper surface, and a similar perforation cannot be produced, even if the watch or clock be opened, except if the paper dial is taken off. Jacob E. Buerk, Boston, Mass., is the inventor.

Corset.—This invention consists in a new mode of making corsets and applying the springs used in them, whereby one is enabled to remove them for the purpose of washing the body of the corset, or for any other purpose. Corsets are now commonly made with flat metallic springs inclosed within the stuff of which the corset is made, along the front edges thereof, or else fastened along said edges on the outside of the stuff. In order to unite the edges of the corset on the person of the wearer, the springs are furnished with hooks and eyes or equivalent fastening devices, which are riveted to the faces of the springs or otherwise secured thereto. These springs are

fastened to the body of the corset in a permanent manner, with no provision for removing or detaching them for any such purpose as cleaning or repairing the corset, or of renewing or repairing the springs. In consequence of this construction the corset cannot be washed when it has become soiled without wetting, and thereby rusting the springs, and the common course now is to wear a corset without washing it, until it is worn out, and its place is then supplied by a new one. This invention has for its object to construct the corset and apply the springs in such a manner that the latter can be removed at pleasure. James Bowers, No. 540 Pearl street, New York City, is the inventor.

Handle for Sheet-metal Tea and Coffee Pots.—The object of this invention is to obtain a sheet-metal handle for sheet-metal tea and coffee pots, and other similar sheet-metal vessels, which may be cheaply constructed, and have a neat and ornamental appearance—far more so than the common sheet-metal and cast-iron handles at present used. The superior class of sheet metal tea and coffee pots are now provided with japanned cast-iron handles, and also with white-metal handles. These, however, retain the heat from the warm contents of the vessel, and are heavy and expensive—so much so as to augment very materially the cost of such articles. This invention consists in having the handles constructed of two longitudinal parts swaged or stuck up in proper form, of sheet metal, and connected together by solder, so as to form a thin hollow or tubular handle. They can be made according to any ornamental pattern desired. The above is the invention of G. B. Halsted, No. 25 Cliff street, New York.

Device for Washing the Blankets of Printing Machines.—This invention relates to a new and useful improvement in means employed for washing the blankets of machines for printing fabrics, such as calicoes, delaines, etc. Hitherto the blankets have been washed by means of rollers placed in a box or tank containing water, and the blanket arranged so as to work in contact with and pass over said rollers, the blanket then passing between pressure or squeeze rollers, in order to have the moisture taken from it before it passes around the cylinder of the printing machine. This plan is defective. In the first place, the pressure or squeeze rollers wear the blanket; and in the second place, the washing rollers, in consequence of being well charged with moisture, bring an excess of the latter in contact with the blanket, and in case the latter is perforated, or has a hole made in it by wear or accident, causes the cloth to which the rubber portion of the blanket is attached or cemented to be separated from the cloth, thereby spoiling the blanket. This improvement consists in dispensing with the pressure or squeeze rollers entirely, and using, in connection with the washing rollers, a "doctor" or scraper or a pressure roller, so as to take the superfluous moisture from the washing rollers, leaving the latter only possessed of sufficient moisture to wash the color from the blanket. Thos. W. Clarke, Manchester, N. H., is the inventor.

SPECIAL NOTICES.

CYRUS W. BALDWIN, Boston, Mass., has petitioned for the extension of a patent granted to him on the 2d day of December, 1851, and antedated August 30, 1851, for an improvement in looms for weaving bags.

Parties wishing to oppose the above extension must appear and show cause on the 14th day of August next, at 12 o'clock, M., when the petition will be heard.

ROBERT CRICHTON and James Rees, executors of Henry Carter, deceased, and James Rees, Pittsburgh, Pa., have petitioned for the extension of a patent granted to them on the 26th day of August, 1851, and reissued on the 19th of June, 1855, for an improvement in nut and washer machine.

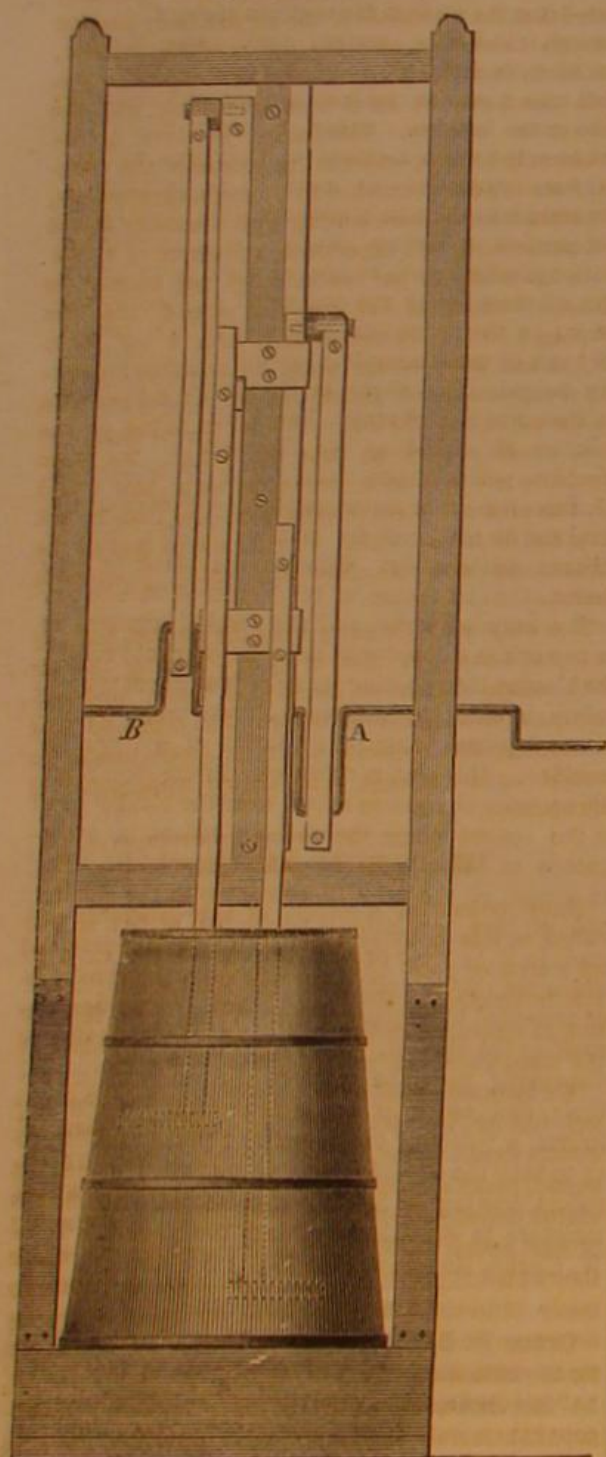
Parties wishing to oppose the above extension must appear and show cause on the 7th day of August next, at 12 o'clock, M., when the petition will be heard.

Mr. E. S. ALLIN, master armorer at Springfield, has invented a new breech-loading musket, which is highly commended. General Dyer, chief of the ordnance department at Washington has ordered 5,000 muskets of the old model to be changed to breech-loading after Mr. Allin's plan.

SAYRE'S CHURN.

A great deal of ingenuity has been shown in constructing churns to expedite the process of butter-making. The old-fashioned machines require a long time to bring the butter, and many tedious hours have been spent at it by impatient lads and lasses who longed for more congenial employment.

The object to be attained is to free the butter in the cream from the sack or vesicle in which it is contained, and as this is done by friction, or pounding, it follows that a rapid and thorough agitation of the contents of the churn will produce butter quickly. The inventor of this churn provides two dashers, operated by a series of cranks, A, and shafts, B, so arranged that the dashers ascend and descend alternately, creating counter currents and causing the globules containing butter to act on one another, and aid in obtaining the end desired.



This churn is well spoken of, and was patented by George W. Sayre, of Pisgah, Ohio, August 9th, 1864; for rights in New York, Pennsylvania or Delaware, address Daniel J. Moffat, Washington, D. C.

WILDE'S BUTTON FASTENING.

This engraving represents an improved method for fastening buttons to garments without sewing. The advantages derived are increased strength and durability, saving in time in attaching the button, and, as the result of these, greater economy. Where a number of buttons have to be applied to garments they can be put on much more rapidly than by sewing. They can be inserted by children or other cheap labor, and do not require experience and care to avoid spoiling the work; they are also free from liability to tear out, for by having a wide bearing surface on the under side of the garment the surrounding cloth is sustained and preserved from injury when under strain.

This fastening is also convenient for linen or other coats that require frequent washing, and for buttons that would be injured by water, as it can be easily detached in a moment.



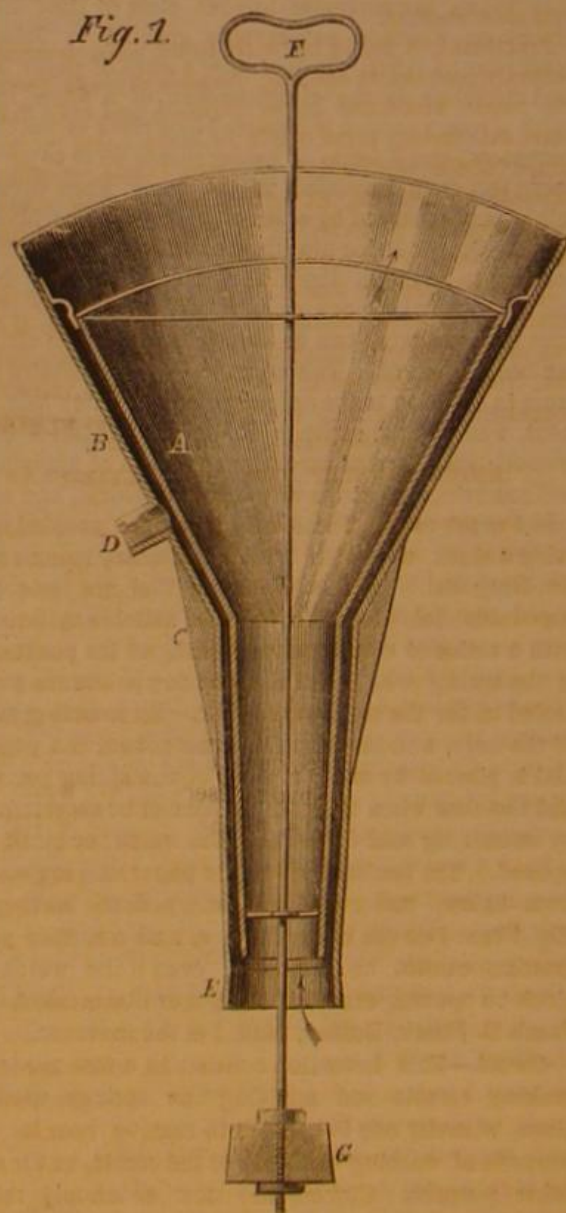
The details of this improvement are as follows:—The cloth is represented by A, and the button has a shank, B, which passes through two washers, C and D—one on top and the other on the bottom. The bottom washer is shown isolated at E, and it will be seen that a flange, F, is raised around half its circumference. The clasp, G, fits over the small stud, H, on the button shank, and also in the bottom washer. The button having been inserted the clasp is put on and turned half round so that the slot in it comes opposite the rim on the bottom washer, thus preventing the button from getting off and holding the same firmly. Where it is not desired to take the buttons out, the clasps may be sprung over the shank and the bottom washer made so as to hold them firmly like a countersink.

This button was patented through the Scientific American Patent Agency on March 14, 1865, by J. F. Wilde. Address patentee for further information at No. 1 Amity street, New York.

LOCHMAN'S LIQUOR-SAVING FUNNEL.

The ordinary funnel is a very imperfect utensil, and in the hands of many persons causes great waste. At

Fig. 1.

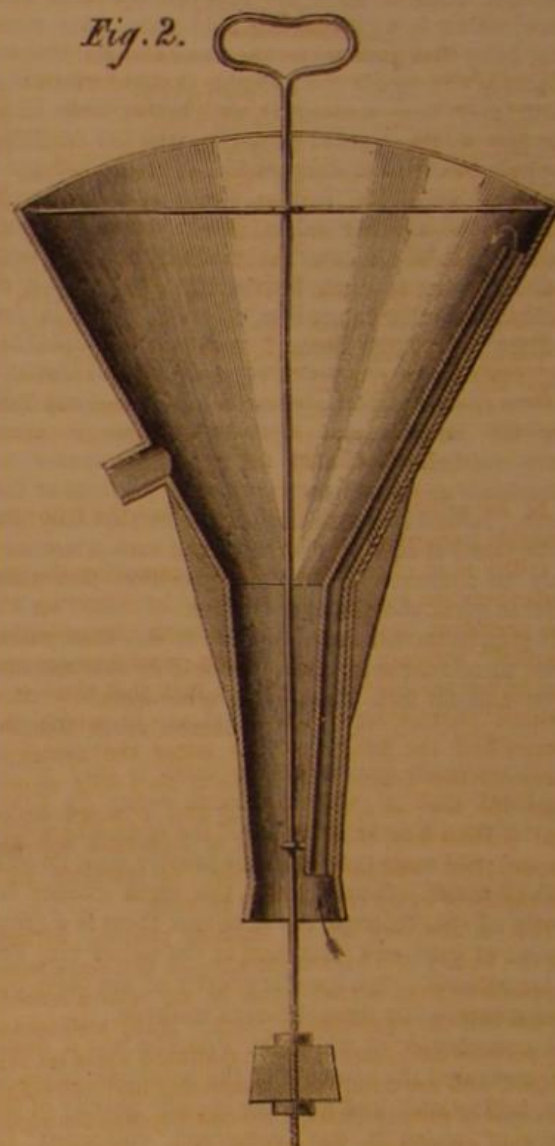


the present prices of alcoholic liquors, it is especially necessary to use economy.

We publish herewith an engraving of a funnel free from the objections attaching to others, and one that can be easily and expeditiously used, without the loss of any liquid, even in the hands of slovenly people. The construction and use of the funnel is apparent

by examining the engraving. In Fig. 1 the funnel is constructed double, or of an inner and an outer part; A being the inner part, and B the outer one, leaving sufficient space for the escape of air between the two. The elastic washer, C, causes the funnel to fit tightly in a vessel when filled. Ordinarily the cock is closed. This funnel is used as follows:—the liquor runs in the top, and when it reaches the nipple, E, rises in it, indicating that the vessel is full, excepting an ullage of the length of the spout (which can be graduated to show the amount), when the funnel is removed, by grasping the handle, F, which, with the connecting rod, moving upward, closes it with the stopper, G. The liquor which may remain in it can then be saved. When a barrel is being filled from a tank and the liquor runs in a continuous stream into the funnel, the cock, D, is opened, and by a tube or gutter connected with another funnel or vessel, into which the liquor escapes when the first one gets full. Fig. 2

Fig. 2.



represents another form of the funnel, on the same principle, having an air-tight tube, H, on the inside for the air to escape, other parts being similar. In some cases a metallic screw cone may be used in place of the elastic washer, C, and the nipple, E, be opened and closed in the manner of a spigot working in a faucet, by a rotary motion of the connecting rod and handle, F, and a movable cullender be placed inside for straining liquids.

This funnel was patented on Feb. 7, 1865, by C. L. Lochman, of Carlisle, Pa.; address him for further information at that place.

ACTION OF PETROLEUM ON THE HUMAN SYSTEM.—

Landerer relates the case of a man who swallowed a quantity of petroleum; the greater part he vomited again. It caused a strong burning sensation in the tongue and throat, which were reddened and became swollen. The stomach and bowels were also affected, and slight gastro-enteritis ensued. For several days the urine and sweat smelt strongly of the oils, and the odor was specially strong under the arm-pits. The patient was very weak for a time, but recovered. —*Chem. Central Blatt.*

In Troy they are inaugurating a new style of pavement with alternate lines of flagstone, two feet wide and six inches thick, divided from each other by three feet of cobble stones. The wheels run on the former he horses travel on the latter.

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THE POLICY OF STRIKES.

In an article in the New York *Sun* the following sensible paragraph appears:—

"The most effectual method for removing the disputes between capital and labor is by removing the too prevalent notion that there is an 'irrepressible conflict' between them. When workmen and employers are convinced of the fact that there is a natural partnership between them, in which the former find the labor and the latter the money to carry on the business, and when they fully appreciate the necessity of harmony and concord under that partnership, then strikes or lock-outs will not disturb the 'channels of trade,' or interfere with the rights of every class of our citizens."

This is the view of all sensible people. Strikes are the legacy of a barbarous age—of the days when apprentices were bound—and in no wise a remedy for the evil they pretend to reach. Many well-meaning persons and journals have confused ideas on this subject, and are continually discussing and defending the right of men to strike. No one disputes the right, but the expediency of such a step. Strikes never bettered any trade; on the contrary, most have been injured by them. Ceaseless agitation of the question of pay has resulted in neglecting the trade itself. Wages forced up for a time by combinations come down again by degrees when the combinations are inactive, so that the last end of the strikers is worse than the first.

Strikes are generally originated by envious dissatisfied men, who, finding themselves falling behind their comrades in pay, create dissatisfaction in order to rise to popularity on the topmost wave thereof. We have always deprecated strikes, and shall raise our voice against them—not because, as has been insinuated by a silly paper, we are interested in reducing the earnings of our fellow-men, but because there is no benefit in the act; on the contrary, the greatest evils ensue. We hear enough in papers interested in fomenting discord between men and their employers about the grand success of such and such a combination, but they never tell us how ephemeral it is, or of the misery and sufferings of the families who want when the father is idle, or of the loose habits and false ideas engendered which fasten on him sometimes for life.

In this country the workman of to-day is often the proprietor to-morrow, and we can look back on many in the course of our experience who once ardently espoused the policy of striking, but now oppose it because of its fallacy. It is a hopeful sign of the times that, with all the demagoguism of the

false friends of the workman, there are so few trades that lend an ear to their twaddle, but pursue the even tenor of their way to prosperity and peace, never dreaming that they are abused and down-trodden.

OPENING HOT SAFES.

We find this item in a Baltimore paper:—"The late conflagration at Richmond developed a curious incident and fact which may be valuable, if remembered. Some week or ten days after the fire, the iron safe of the *Enquirer's* office was opened, when immediately on the admission of the air, the books and papers were ignited and consumed. And such was the case of all other safes which were not in brick vaults. In these the contents were uninjured. The *Enquirer's* safe, at the time it was reopened, was cold externally to the touch."

It is very doubtful if the contents would have been preserved had the safes been allowed to become perfectly cold before they were opened. The fact that the books and papers took fire on the admission of air shows that the temperature was at the burning point, but paper is charred and reduced to tinder below the temperature at which it will burn. Any one who has a kerosene lamp may readily try this experiment, for it so happens that the temperature at the top of a kerosene lamp chimney is generally hot enough to char paper, but not enough to set it on fire. It is probable that the paper in these Richmond safes was decomposed, the hydrogen, nitrogen and oxygen being driven out, and mingled with a quantity of steam from the drying of the plaster in the safe walls—the carbon remaining as tinder. On the opening of the door these hot gases were swept out, and as the oxygen of the atmosphere came in contact with the hot carbon, the two entered into that swift combination which is combustion. The same non-conducting properties of the safe walls which enabled them to resist heat for a moderate period, caused them to retain it for so long a time after their interiors had become heated; hence their very slow cooling.

Practically, it might be better to let safes become perfectly cold before opening, because in many cases the paper would not be decomposed, and even if it were, satisfactory proof might in some cases be obtained of the destruction of notes, bonds, or other valuable documents, as writing or printing sometimes remains perfectly legible on paper after it has been reduced to perfect tinder.

The most valuable lesson, however, enforced by the condition of these Richmond safes, is the same that was so impressively taught by the great Troy fire, that iron safes are not to be intrusted with valuable documents unless they are inclosed in brick vaults.

ANOTHER STEP TOWARDS FLYING.

In the proceedings of the Polytechnic Association, published in our last number, was a description by Mr. Barbour of his carbonic acid engine, and he stated that he obtained one and a half horse power from an engine which weighed with all its auxiliary apparatus 450 lbs. This was the power obtained by following the piston with the full pressure only three-fourths of an inch in a stroke of twelve inches. There was also surplus weight in the engine, no effort having been made to reduce the weight to a minimum; the main reservoir was sufficiently thick to bear 5,000 lbs. to the inch, while the maximum pressure used was only 1,100 lbs.; and the reservoir was large enough to run the engine an hour and twenty minutes.

Now if an engine of the same form were made of aluminum, the weight would be reduced to about one-third, say 150 lbs., and then by following full pressure 3 inches instead of $\frac{3}{4}$ of an inch, the power would be materially increased, though, of course, the same supply of carbonic acid would not last as long. But if an engine could be driven for half an hour, this would be sufficient to travel thirty miles, going at the rate of sixty miles an hour. It would seem, therefore, that it is in the present power of the arts to construct an engine of $2\frac{1}{2}$ or 3-horse power that will not weigh more than 150 pounds. Will these conditions enable us to fly?

A sand hill crane weighs 40 pounds, and it does not seem possible that three sand hill cranes can

have the muscular power of one horse; at the first view, therefore, there would appear to be sufficient encouragement for a further examination of the question.

If we allow 180 lbs. for the weight of a man, the whole weight of a machine and its burden will be 330 lbs. If with this weight we have a machine of two-horse power, and if one-half the power be expended in moving the air and the other half in raising the machine, it will rise vertically 100 feet per minute. When sufficient altitude is attained the machine may be inclined, and a portion of the power previously expended in rising may be employed in horizontal propulsion.

Notwithstanding all that has been said to the contrary by our correspondents, a revolving spiral fan would probably be the proper form for the wings, especially as this would be the easiest way in which to obtain the high velocity requisite. It is generally stated that the resistance of the air to a body passing through it increases with the square of the velocity, but Morin says that for very high velocities the formula must contain an element increasing with the cube of the velocity. Calculating, however, an increase only in proportion to the square of the velocity, from the data furnished by Rouse's experiments, a surface 1 foot square moving with a velocity of 146 feet per second, will experience a pressure of 49 lbs. With 6 revolutions per second—360 per minute—to obtain a velocity of 146 feet per second, the fans must be 8 feet in diameter—each arm 4 feet long. As but half the pressure would be available for raising the machine, we should require a total pressure on the air of, say 700 lbs., and this, at 50 lbs. to the foot, would require an area of 14 feet. As there would be two fans with two arms each, this would give an area of $3\frac{1}{2}$ feet to each arm—less than $2\frac{1}{2}$ feet long and 18 inches wide. It will be seen that all the dimensions and velocities are within practicable limits.

The only plan for navigating the air that has any hopes of success is that of flying—beating the air with wings driven by mechanical force; and certainly no machine heretofore proposed comes so near possessing the requisite power in proportion to its weight as a carbonic acid engine constructed of aluminum.

TRAINING UP MECHANICS.

Many years ago a system of apprenticeship prevailed in this country by which youths were bound for a term of years to a master, who agreed to provide instruction in his trade, board, clothes and tuition in return for their services, and, for a portion of the time, pecuniary reward.

We have never heard of any legislation on the subject, but for reasons which are quite apparent the system exists no longer, and youths, instead of being bound, make a verbal agreement to serve out the stipulated period, whatever that may be. To the credit of our young men, but few instances occur where they forfeit their word. The old plan was open to many objections, so many that the evil wrought its own cure, and our shops are purged of it forever. In many cases hard masters starved their apprentices, half clothed them, gave them no schooling, and educated them only in such branches of the trade as they chose, lest in the future they might become rivals and so spoil the business by too great competition.

It was not in human nature to be so treated and not rebel, and if any reader is curious in these matters let him turn back to files of papers, published twenty years ago, and he will find small cuts of a man with a bundle slung over his shoulder on a stick, and an advertisement reading—"One cent reward! ran away from the subscriber an indentured apprentice." What wonder that they ran away? The world does not stand still; and so flagrant were the wrongs alluded to, that, by common consent, the system has been abolished. The times were out of joint. "The Idle Apprentice" is the subject of a series of the most celebrated cartoons of Hogarth, and the idle apprentice of that time was the indentured apprentice, who received blows instead of food, and curses in lieu of instruction. There were few inventions in those days; not because mankind were more degenerate, but because there was no incentive to exertion, and it was much harder then than it now is to introduce any labor-saving machine.

Since the gradual abolition of the cruel and infamous system of indenturing apprentices to masters a great improvement in the character of our workmen and the machinery they make has been manifested. Our machine shops, a few years ago, were full of English planers, slotting machines, compound planers, screw-cutting machines, etc. Now there are none imported. We can make better machines at much less cost at home. We can make them better and sell them in England at a lower price than they can be manufactured there. This statement is admitted by the *London Engineer*; (see *SCIENTIFIC AMERICAN*, page 297, Vol. IX., article "Energy and Aptitude of American Mechanics"); and this in spite of the fact that wages and iron are both higher with us than in England.

Our plan of educating youths in trades, as it exists at present, is the very best conceivable. The term "master," which is especially offensive to the American mechanic, is unknown, and the relation between the workman and his employer is that of good will and a disposition to work for mutual benefit. Instead of learning one branch the apprentice is put through each in turn, and the consequence is a more thorough knowledge of the trade. There is no eye-service in the present plan, and no compulsion; if a youth does not like his business or his employer, he puts on his coat and goes home, and neither carries off his victuals, his clothing, nor his schooling, for he has had neither. This course is the best for both, for every one knows that enforced labor is good for nothing, and a man who has to be watched to do his work is not worth watching.

The character of American machines and American mechanics, is higher to day than it ever was. There are no shops in Europe which turn out more perfect work than the establishment of Sellers & Company, in Philadelphia; A. M. Freeland, in New York; the Putnam Machine Company, in Fitchburg, Mass.; Browne & Sharpe, in Providence, R. I.; Portland Machine Company, in Maine, and hosts of others too numerous to mention; these are only noticed because we know their work; aside from this fact we have never spoken a word to any of their representatives.

English workmen are far behind our own, both in point of dispatch, accuracy of workmanship, personal cleanliness and moral character. We judge from the samples we see among us. They are arrogant, boastful, uneducated, and continually prating about "the Clyde," and what wonderful achievements are performed on that classic stream, or else eternally sounding the praises of Maudsley and Fields, Napier-ers, etc.—to the disgust of our mechanics, who think, not unreasonably, that what "Napier" may do or not do is of very slight importance. Let any man go into the shop of the Waltham Watch Company, where machinists of a high class are employed, and if he can find a cleaner, more intelligent, better dressed set of mechanics, write us word where they can be found, for we want to see them. Comparisons are invidious, however, and it is not in this shop alone that we are to look for steady, intelligent and active mechanics. New England is full of them; so are the other States; and the workshops of the North are the schools where men are taught patience, endurance, and manual dexterity.

In foreign countries you shall find the workmen congregated in beer shops, engaged in dog-fighting, or some low enjoyment. It is not so with us. There are few who do not spend their time in the development of some scheme to make fortunes, or, at the least, become their own masters. That would be a dark day for the trades when we should return to the bondage of signing indentures and making a trade something like punishment for an offense, instead of enlisting all the energies and sympathies of its members in its elevation. We have no fears for any such result, and so long as our present plan is in force will the character of American mechanics maintain its high standard.

INCORUSTATION POWDERS.

We have been many times solicited to puff this or that remedy for preventing deposits in boilers, but have never sanctioned the use of powders in general, for we have felt that an indiscriminate use of them was more likely to result injuriously than beneficially; moreover, cases are frequent where one particular

remedy is of no avail. The better plan is to remove the impurity before it enters the boiler, and that this can be done effectually will be seen by referring to the letters which we publish in another part of this paper. We have also given from time to time, in the columns of the *SCIENTIFIC AMERICAN*, a list of different articles to prevent scale from adhering, and we direct attention to page 107, Vol. IX., for information on this point. Most of the scale powders and nostrums of this sort are composed of the materials there spoken of, and can be bought in any drug store for one-fourth what is charged by agents for the same stuff.

DEFECT IN STEAM ENGINES.

Zealous professors of science occasionally call attention to the fact that steam, as a motor, costs much more than it should, and that little over one-tenth of the actual heating value of the fuel is realized in practice. Experiments and experience prove the statements to be virtually correct, and it is a reproach to the mechanical skill of the period that it should be.

The loss is not in the theory of the engine, for that is perfect, but in the practice of that theory; or, in plain terms, in the construction of steam engines. It is an undeniable fact, however, that but few of the steam engines now constructed work with the economy that they should, or even approximate in performance to the theoretical value of the fuel.

Portable engines are turned out by scores which, although well enough externally, are far from being in a healthy condition in those parts which affect economy. The slide valves are only such in name; they exercise few of the proper functions of this most important detail, and the boilers are heavy, enormously large in fire and heating surface, and every way disproportioned to the size of the cylinders. The feed pumps are poorly got up; the valves lift too much; the water passages are cramped and crooked, and the absence of any proper method for heating the feed water without creating more loss from back pressure on the piston than is gained by injecting hot water to the boiler is often noticeable. We make these statements for the interest of any it may concern—not to find fault. Many stationary engines are in precisely the same condition.

It is not the only thing required in a slide valve that it shall open and close the ports at a certain time, but that it shall be properly set for the work it has to do, that it shall exhaust the contents of the cylinder at the proper time, that it shall close properly, and that the lead shall be proportioned to the duty. That this is important every one is aware who has ever inspected, or is familiar with, indicator diagrams.

It is a common thing, on railways, to hear a locomotive exhausting "one-sided," as it is termed, or giving palpable public evidence that it is out of order and that the master-mechanic on the line is either indifferent or careless of his duties. We know of one road where our ears are daily saluted by the sound of a locomotive drawing a long train of coaches and regularly exhausting 1-2-3-4, 1-2-3-4, or with a very positive interval between the successive exhausts. It would be quite as sensible to draw two or three empty coaches, day after day, as it is to permit an engine to run in this way; for at every uneven or irregular interval, the steam is compressed or choked in the cylinder, and delayed in getting out until it acquires a high tension, so that the actual pressure is much greater on the exhaust side than on the steam side. This subtracts from the efficiency of the machine, adds to the cost of repair, of fuel and every thing used in running the engine. A locomotive engine, exhausting unequally, carries dead weight which costs a great deal to keep.

We know that engines are often regarded as in chronic or incurable difficulties, because some mysterious cause conflicts with setting the valves properly, but we have frequently found that individuals were more fond of declaring that the defect was very mysterious, than they were zealous to remedy it.

It is very plain, from the simple facts here cited—many of which are so well known among professional engineers as to be truisms—that one of the greatest obstacles in the way of economy in the steam engine is a want of mechanical accuracy in construction, erection and oversight; and that the cost of a

horse-power could be very much reduced by attention to obvious and well-known defects existing in steam engines.

The Pneumatic Dispatch Works.

The Pneumatic Dispatch Works, so far as regards the extension of the line from the Euston-square terminus of the London and North-western Railway to the Bull and Gate Station, Holborn, a distance of over a mile and a half, are nearly completed, and the tube will shortly be opened for the transmission of goods and parcels. The new tube is much larger than the first experimental one, and is about four feet high and four feet six inches in breadth. A commodious station has been erected near the arrival platform at Euston, and at the end of this there is an opening in the floor leading to the entrance of the large tube, which is laid beneath some of the busiest streets of the metropolis as far as Holborn Hill, near Hatton Garden, whence it will ultimately be extended to the General Post Office. The engine station, whence the system will be worked, is in the Bull and Gate Yard, Holborn, and the soil in this place had to be deeply excavated to find room for the tubes, which extend from beneath the street into the station, and lie at some depth below its upper works. At the extremity of the yard is the immense circular fan, composed of wrought-iron plates. This fan is a sort of disk containing numerous cellular compartments, with the divisions radiating from the axis of the wheel, the diameter of which is about twenty-two feet. The fan lies in a large chamber, and will be driven by two very fine engines, each of twenty-five horse-power, made by J. Watt & Co., of Birmingham. The machinery is already fixed, and the transit of goods, it is stated, will commence soon. Thus a goods traffic propelled by atmospheric power will be the next novelty for the metropolitan public.—*English Paper.*



ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING JUNE 6, 1865.
Reported Officially for the Scientific American.

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.

48,036.—Paper Bag.—James Arkell and Benj. Smith, Canajoharie, N. Y.:

We claim softening the upper parts of paper bags and making them pliable, substantially as and for the purpose above described.

48,037.—Stove.—Wm. Bamford and J. F. Tate, Jr., Milwaukee, Wis.:

We claim First, The air chamber, E, provided with one or more draft flues, L L, discharging into the main pipe or flue, D.

Second, The flues, L L, and pipe, I, in combination with an air chamber placed inside of a stove.

Third, The opening or pipe, H, when used for passing the outer air through a heated space and into an inner chamber, provided with flues, as specified.

Fourth, The air chamber, E, flues, L L, pipe, I, pipe or orifice, H, and register, G or F, in combination with the outer case or stove, A, each of said parts and combinations being substantially as set forth and specified.

48,038.—Pipe Coupling.—A. E. Barnard, Cleveland, Ohio:

I claim the cam, P, and boss, D, in combination with the lugs, d c, and opening, e, substantially as and for the purpose set forth.

Second, I claim the recessed chamber, f, packing, J, in combination with the coupling, substantially as and for the purpose set forth.

48,039.—Buckle Attachment.—Wm. E. Barton, East Hampton, Conn.:

I claim the metallic buckle fastening for fastening buckles to straps, constructed as described.

Also the said metallic buckle fastening, in combination with buckle and strap, substantially as described.

48,040.—Sleigh-bell Attachment.—Wm. E. Barton, East Hampton, Conn.:

I claim the within-described metallic bell-holder, cast of brass or suitable malleable metal, having a hole through it to secure the strap, impinging points on the strap side, and on the bell side prongs adapted to enter the bell through suitable holes therein, and hold the same by bending or clenching, substantially as set forth.

Second, The said bell-holder strap and bell, in combination when put together so as to hold the bell loosely and away from the strap, substantially as described.

48,041.—Composition for Lining Oil Barrels.—Julius Baur, Brooklyn, N. Y.:

I claim the employment or use in a compound for lining petroleum packages of chloride of zinc and glue, made substantially as herein set forth.

Also the use in a compound for lining petroleum packages of chloride of zinc mixed with glycerin, as described.

Also a compound made of chloride of zinc, glue and glycerin mixed together, substantially in the manner and about in the proportion therein specified.

48,042.—Power-gaining Machine.—Henry Bickel, Elizabeth City, N. J.:

I claim the combination of the toggle levers, G H I J K L M, working beam, C, and fly wheels, E R, all arranged and operating as specified.

[An engraving and description of this invention will be published soon in the SCIENTIFIC AMERICAN.]

48,043.—Air Engine.—Dana Bickford, Boston, Mass.:

I claim the combination of the hollow vibrating conduit, H, and the gate, K.

I also claim the combination of the lifting spring, a, with the piston and cylinder provided with the vibratory conduit, H, and gate, K, as described.

I also claim the combination of the hollow vibratory conduit, H, and the gate, K, with the air-compressing reservoir, A, and the open cylinder, M, and the piston, N, thereof.

I also claim the combination of the vibratory conduit, H, and gate, K, with the flexible conduit, G, and the opening, a, thereof, the whole being substantially as and so as to operate as set forth.

I also claim the employment of the mass of liquid in the reservoir, B, with the air pump combined therewith, as set forth, and a piston and cylinder connected therewith, and having a conduit, H, and gate, K, or their mechanical equivalents, as specified.

48,044.—Hoisting Machine.—James Bird, New York City:

I claim the hoisting apparatus constructed substantially as above described, the driving pulley and gear, B C, being placed on the same shaft with the hoisting pulleys and their gear wheel, as above set forth.

[This invention consists in a novel arrangement of power and gear wheels in an apparatus for hoisting heavy weights, whereby the machine is made very efficient and the expense of making it is much reduced.]

48,045.—Corset.—James Bowers, New York City:

I claim a garment connected by means of lacing or their equivalents passing through the eyeletted stays within a duplicate fabric also eyeletted, all substantially as shown and described.

48,046.—Stovepipe Damper.—John Bradshaw and Samuel C. Wilson, Albion, N. Y.:

We claim the employment of the within damper, cast in the form described, and arranged to operate as and for the purpose specified.

48,047.—Thrashing Machine.—C. B. and Wm. T. Brown, Alton, Ill.:

We claim a thrashing machine mounted upon two wheels and constructed and arranged as herein described, so that the operators can stand on the ground, dispensing with the use of a platform.

[This invention relates to a new and useful improvement in the construction of thrashing machines, whereby the same are greatly simplified and rendered capable of being constructed at a much less cost than hitherto, and the machine nearly balanced on its wheels in order to facilitate the operation and the transportation of the same.]

48,048.—Watchman's Time Detector.—Jacob E. Buerk, Boston, Mass.:

I claim, First, The use of a false revolving dial, E, in combination with the stationary index, D, and spring points, d, constructed and operating substantially as and for the purpose set forth.

Second, Producing the perforations on the paper dial or its equivalent from the inside out, instead of from the outside in, as before.

[An engraving and description of this invention will be published in one of the next numbers of the SCIENTIFIC AMERICAN.]

48,049.—Gang Plow.—John C. Brown and G. H. Slimpert, Pinckneyville, Ill.:

First, We claim the arrangements of the hinged adjustable beam, L, with a castor wheel, C, in the manner and for the purpose herein described.

Second, The use of self-locking levers, J J, for raising or depressing the plows, applied to the adjustable guides, d d', substantially as described.

Third, Connecting the hooked rocking levers, J J, to the plow beams by means of bent spring rods, substantially as described.

Fourth, The laterally adjustable slotted plates, d d', applied to the slotted frame, G, and adapted to serve as guides for the plow beams, F F', and also as bearings for levers which are used to raise and depress said beams, substantially as described.

Fifth, Pivoting the forward ends of the plow beams to rocking bars, a a', which are arranged one in advance of the other, and applying the plows to said beams at about equal distances from their respective pivotal connections, substantially as described.

48,050.—Weight-lifting Apparatus.—D. P. Butler, Boston, Mass.:

I claim a weight-lifting apparatus having a construction and capability of adjustment, substantially as described.

48,051.—Weight-pulling Apparatus.—D. P. Butler, Boston, Mass.:

I claim a weight-pulling apparatus having a construction and provision for adjustment, substantially as set forth.

48,052.—Shank Laster.—John Cain and A. B. Cain, Dubuque, Iowa:

First, We claim the compound jaws, b b g g, when the inner jaws are made of leather or other flexible substances, substantially as described.

Second, Extending the edges of the jaws, d d, beyond the toothed or spurred ends of the jaws, b b, substantially as described.

48,053.—Washing the Blankets of Printing Machines.—Thomas W. Clark, Manchester, N. H.:

I claim the employment or use in the blanket-washing devices of machines for printing fabrics, such as calicoes, dolaines, etc., of a scraper or pressure roller to the washing rollers, to operate in the manner substantially as and for the purpose set forth.

48,054.—Tool for Cutting Off Boiler Tubes.—Dennis A. Dacey, New York City:

I claim the implement herein described, constructed and operated substantially in the manner set forth, for cutting off boiler tubes and for other work.

[This invention has for its object the construction of a tool for cutting off boiler tubes, and which can also be used for chiseling and for tapping holes of any size, and also for drilling and reaming holes in metal, and in general for any use wherein a tool can be operated by a pawl wrench.]

48,055.—Sheep Label.—Chas. H. Dana, West Lebanon, N. H.:

I claim the within described link-shaped label for marking sheep, both ends being fastened closely to the ear, in the manner substantially as set forth.

48,056.—Machine for Attaching Balls to Cartridges.—Darwin Ellis and George R. Stetson, New Haven, Conn.:

We claim the combination of the two shafts, g and k, with the revolving crimper, F, when the whole is constructed, arranged and fitted to produce the result substantially as herein described.

Second, We claim the combination of the two shafts, g and k, with the receptacle, j, and the anti-friction rollers, r r, when they are constructed, located and fitted for use, substantially as herein described.

Third, We claim the combination of the revolving crimper, F, with the receptacles, j, and the anti-friction roller, r r, when the whole is constructed and fitted for use, substantially as herein described.

48,057.—Heddle Frame for Loom.—Milton Finkle, New York City:

First, I claim the adjustable heads, C, constructed in the manner substantially as above described, for receiving the ends of the shafts, A, and rods, a.

Second, I claim the combination of the heads, C, and caps, D, made and applied substantially as above described.

Third, I also claim the stays, D', with hooks or eyes attached, with or without the connecting rods, B', substantially as above described.

48,058.—Stovepipe Damper.—A. V. and A. F. Fletcher, Athol, Mass.:

First, We claim the disk, F, constructed and arranged substantially in the manner shown and described.

Second, The spiral cord, E, attached to a stovepipe damper, substantially as and for the purposes herein specified.

[This invention consists in the application to a circular frame of a disk on the one side, so arranged that when the damper is turned in one position said disk will be pressed tightly against the frame, and thus prevent the heat from escaping up the chimney; but when turned in an opposite direction, will fall away from the frame, and permit the products of combustion to pass freely to the flue or chimney; it also consists in attaching to the opposite side of the frame a spiral cord, made of strips of metal, and so arranged that the smoke, heated air, etc., will acquire a circular motion while passing through the coil, which serves to detain the smoke, heated air, etc., and thus give a better radiation of the heat therein contained.]

48,059.—Carding Machine.—P. S. Haines, Newburgh, N. Y.:

I claim the combination of the shaft, H, and comb, C, with the hanging bearings, N, and clamping nuts, O, substantially as and for the purposes above described.

[This invention consists, among other things, in a new mode of operating the doffer comb of a carding machine, by which it is re-clipocated in a nearly vertical direction, and caused to strip the doffer cylinder in a more perfect manner than has hitherto been effected.]

48,060.—Mode of Applying Covering to Roofs, the Decks of Vessels, Etc.—James Hall, Dorchester, Mass.:

I claim as my invention the application of heated metals to the surfaces of the cloth in the process of imbedding the cloth in the paint, uniting the cloth to the surface more firmly and smoothly than can be done without the application of heated metals.

48,061.—Handle for Tea and Coffee Pots.—G. B. Halsted, New York City:

I claim as a new article of manufacture a handle for sheet metal tea and coffee pots, and other similar sheet-metal vessels, constructed of two longitudinal parts swaged or struck up in any proper or desired form, of sheet metal, and connected together by solder or otherwise, substantially as herein set forth.

48,062.—Stone-grinding and Polishing Machine.—Jas. Harsha, Circleville, Ohio:

I claim, First, The combination of the carriage, B, gate, D, and inner frame, J, operated substantially as described, so as to secure the vertical rotary, and two horizontal motions, for the purpose described.

Second, The grinder, K, with its orifices, constructed in the manner described, for the transmission of the grinding material to the impinging surfaces.

Third, The scraper, S, in the described relational position to the orifices, R, in the grinder, K.

48,063.—Combined Seeding Machine, Roller and Drag.—Wm. H. Hartman, Fostoria, Ohio:

I claim, First, The oscillating drag, M, provided with a seed-box, V, as and for the purpose specified.

Second, I claim the distributing board, K, in combination with the seed-box, G, and roller, B, when arranged and operating as and for the purpose set forth.

Third, I claim the adjustment of the roller, B, in its relation to the drag, M, as and for the purpose described.

48,064.—Machine for Gathering and Loading Flax, Etc.—G. W. Hatch, Parkman, Ohio:

First, I claim the springs, e, and rake, C, attached to the pieces, B' d, of the frame, and in combination with the adjustable side pieces, E, the carrier, M, elevators, H, and rollers, F F', when arranged and operating substantially as and for the purpose set forth.

Second, I claim the roller or sleeve, F, and shaft, D, in combination with the pulleys, m m', and I J, when arranged and operating substantially as and for the purpose set forth.

48,065.—Ventilation of Mines.—Herman Haupt, Cambridge, Mass.:

I claim the use in mining, tunneling, and other subterranean operations of steam generators, in combination with a vacuum pipe.

48,066.—Cultivator.—Samuel G. Horning, Mount Carroll, Ill.:

I claim the combination of axle, B, the bar, E, the beams, s s, chains, t, the beams, C C, and braces, O and I, the whole constructed and arranged as and for the purpose substantially as herein set forth.

48,067.—Boiler for Steam Heating.—Henry Howard, Westfield, Mass.:

I claim the boiler, A, for heating water and generating steam when formed, constructed and arranged substantially in the manner herein set forth.

48,068.—Cultivator.—Henry Howe, Darlington, Wis.:

I claim, First, The oblique bars, E E, connected to the draught pole, D, and to the short parts, a a, of the axle, A, in connection with the bars, I I, and driver's seat, L, substantially as and for the purpose set forth.

Second, The plow frames, F F, connected to the bars, E E I I, and shaft, K, substantially as shown, and to admit of being operated as described.

[This invention relates to a new and improved cultivator, designed for plowing corn and other crops which are grown in hills or drills, and it consists in a novel arrangement of parts, as hereinafter fully shown and described, whereby the plows are placed under the complete control of the operator, and rendered capable of being moved laterally, to conform to the sinuosities of the rows of plants, and also of being readily raised and lowered.]

48,069.—Grain Drill.—Joseph Ingals, Milton, Ind.:

First, I claim the spring brace bar, G, attached to the drag bar, and impinging at the curve, b, upon the end of the flange, F, in the working position of the hoe, and having an incline, upon which the point of the flange rises when the hoe is deflected backward, as described and represented.

Second, The indentation, n, on the flange, F, in which the end of the spring rests, detaining the hoe from further backward deflection.

48,070.—Slide Valve.—John G. Ives, Springfield, Ill.:

I claim the combination of the sections or rings, E E, composing the valve, the chamber or space, b, and the apertures, c, for admitting steam to the said space, b, from the space, d, the whole being constructed and arranged to operate in the manner and for the object specified.

[This invention relates to a peculiar construction of slide valves for steam engines, whereby they are made to always form a steam-tight joint with the cage or chamber in which they move. Also in a novel formation of the valve cage, so as to obviate and prevent the valve from abutting or being caught against the edges of the post, as it moves back and forth.]

48,071.—Washing Machine.—Josee Johnson, New York City:

I claim as an improved construction of washing machine the sides, 3 and 4, of the tub, A, arranged as represented, in combination with the lever, C, and pounder, E, operating relatively to each other and to the sides, 3 and 4, substantially in the manner and for the purpose herein set forth.

48,072.—Meat Crusher.—Robert V. Jones, Canton, Ohio:

I claim the combination of the roller, C, rotating in fixed bearings, and provided with a crank, D, the roller, C, mounted in sliding boxes, E E, the guide rods, F F, and springs, H H, one of the said rollers, being provided with teeth and the other with longitudinal grooves, and all arranged to operate as specified.

[This invention relates to a new and improved machine for crushing meat—breaking the fibers thereof—so as to render it tender and more desirable for the table than it otherwise would be.]

48,073.—Breech-loading Fire-arm.—Benj. F. Joslyn, Stonington, Conn.:

I claim, First, The breech block, D, with its pin, d, and concave shoulder, n, in combination with a convex shoulder, m, on the stock or frame adapted to the said shoulder, n, all substantially as set forth.

Second, The block, G, with its projection, k, spring catch, W, and spring rod, H, in combination with the breech piece, D, pin, d, and notched disk, E, the whole being arranged for joint action substantially as and for the purpose herein set forth.

48,074.—Submarine Port-hole Closer.—John H. Kavanaugh, Joliet, Ill.:

I claim, First, The combination of the outer and inner valves G and G', with the outer and inner plates, A and B, surrounding the port-hole, constructed and operated substantially as described.

Second, The combination of the valves, G and G', with their axes, I and P, and scroll springs, L and L'.

Third, The rocking lever cranks, S T U, and S' T' U', and their combinations with the valve levers, N and N', and the wheels of the gun carriage, substantially as described.

48,075.—Shutter Hinge.—Christian F. Kriauer, Pittsburgh, Pa.:

First, I claim a hinge for window shutters, blinds, etc., composed of tangs and shanks, at right angles to each other, and provided respectively with pintles and eyes, substantially as herein shown and described.

Second, In combination with a hinge, so made, I claim the corrugated or roughening of the tangs, substantially as and for the purpose specified.

Third, The double pintle, a, and two projections, e e, on the part, A, of the hinge, in connection with the V-shaped projection, l, of part, C, all arranged substantially as shown, to admit of the hinges being applied indiscriminately to either right or left-hand shutters or blinds.

48,076.—Car Coupling.—G. C. Lawton, Syracuse, N. Y.:

First, I claim the peculiar shaped head, B, of the draw rod, A, with its shoulders, e c, and its extension above and the sloping position at which it is attached to the draw rod, constructed, arranged and operating as substantially described.

Second, The backwardly sloping shoulders, F, in the rear of the gain or slot attached to and projecting from the inner surface of the sides of the buffer head.

Third, The combination of the peculiarly shaped and positioned head, B, with its shoulders, e c, with the double and upwardly and backwardly inclining plane, E E, and the central gain or slot, open at the top, and the backwardly inclining shoulders, F, behind the gain or slot in the buffer head, all constructed, combined, arranged and operating together as substantially shown and described.

48,077.—Corn Husker, Sheller and Cleaner.—C. J. Legg, Penn Yan, N. Y.:

I claim, in combination with the shelling cylinders, B D, constructed as described, and provided with the screen, G, and fan, K, the arrangement of the bagging elevator, M, with the valve, S, the whole operating substantially as and for the purposes herein specified.

48,078.—Machine for Tallying Lumber, Etc.—G. R. Lewis, Ashtabula, Ohio:

First, I claim the disks, C and D, in combination with the index, B, and indicator, F, as and for the purpose set forth.

Second, I claim the catch, d, arm, g, and spring, b, in combination with the indicator and disk, D, as and for the purpose set forth.

Third, I claim the cam, I, with the catch, J, and pinion, G, in combination with the disk, C, and cam, h, as and for the purpose set forth.

Fourth, I claim the slide, p, and cam, K, in combination with the indicator, F, and disks, as and for the purpose set forth.

48,079.—Button.—C. M. Loomis, Hartford, Conn. Antedated May 23, 1865:

I claim the employment of the staple, C, in combination with the disk, A, having the curved or concave surfaces inside the button, substantially as and for the purpose herein described.

48,080.—Mining Pick.—Harvey L. Lowman, Virginia City, Nevada:

I claim as a new article of manufacture, the pick, constructed as herein described; that is to say, with an elliptical socket, the opposite sides of which are parallel to each other, and elongated in the line of its axis, in combination with bits merging by curved lines into the central socketed head, as described and represented.

48,081.—Propulsion of Street Car.—Chester M. Mann, Detroit, Mich.:

I claim the arrangement of the lever, G, links, H H, and cranks, I I, in combination with the ratchets, L and M, provided with palls to reverse the motion, and connected by gearing to the driving wheels, for the purpose specified.

48,082.—Mold for Button Making.—George Mathewman and Anthony Leininger, Brooklyn, N. Y.:

First, We claim constructing the lower die in separate parts, B and C, adapted to close tightly around the neck of the eye, E, substantially in the manner and for the purposes herein set forth.

Second, We claim in connection with the above the shelf, e, or its equivalent arranged as represented, and adapted to support the eyes, E, and aid in placing them in the die, substantially as herein before set forth.

Third, We claim supporting the parts, B C, on the bed, A, so that the pressure of the upper die, G, upon the face of the buttons shall cause the parts, B and C, to be sprung or compressed more tightly together substantially in the manner and for the purpose herein set forth.

Fourth, We claim the arrangement of the handles, b c, on the parts, B and C, and standing parallel or nearly parallel to the axis, D, substantially as and for the purposes described.

48,083.—Bag Holder.—L. W. Morlan, New Lisbon, Ohio:

I claim, First, A bag holder constructed and operated substantially as above described.

Second, I also claim the self adjusting rocking plates, E, for holding the mouth of the bags, when they are to be filled, constructed and applied, substantially as described.

[This invention consists in an apparatus made so as to be portable for holding the mouths of sacks while they are being filled with grain, flour or other articles.]

48,084.—Car Spring.—John Murray, New York City:

I claim the peculiar construction of the division plate, C, combined with the boxes, springs and spindles or studs, by which it is made to answer the two fold purpose of a cap and a base for the two boxes and sets of springs respectively; and at the same time acts as a guide and support to the spindles and allows them the required action, as described.

48,085.—Railroad Signal.—Gabriel Natcher, Sidney, Ohio:

I claim the bar, L, laid transversely to the track and provided with an arm, N, and counterbalance weight, M, for the purpose, and arranged substantially as described.

48,086.—Fence.—William Nevins, Lyons, N. Y.:

I claim the combination and arrangement of the stiffeners, b b, slats, a, and wires, c c, substantially in the manner, and for the purpose herein set forth.

I also claim forming the posts, B, with the spurs or forks, K k, and notches, m m, said parts being made either entirely of metal, or partially of metal and partially of wood, substantially as herein specified.

48,087.—Steering Apparatus.—Albert H. North, Nauvau, Conn.:

I claim the employment of the cam or eccentric wheels, C E, operated by proper mechanism, substantially as and for the purpose described.

48,088.—Butter-molding Machine.—Amos Nudd, Wampun, Wis.:

I claim, in a butter-molding machine, constructed as described, the catch, or hold fast, consisting of the pawl, f, and notch, g, arranged so as to operate substantially as and for the purpose set forth, in combination with the matrix or molding chamber, C, the two levers, B E, and the expelling plunger, H.

48,089.—Deep Well Pump.—James Old, Pittsburgh, Pa.:

I claim the use of a spring, so placed in combination with the upper valve of pumps for deep wells as to counterbalance wholly or in part, the hydrostatic pressure of the superincumbent column of liquid, and insure the opening of the valve, on the descent of the piston, substantially as herein before described.

48,090.—Rein Holder.—S. J. Olmsted, Binghamton, N. Y.:

I claim as an article of manufacture the rein holder, constructed substantially as herein recited.

48,091.—Mode of Raising Sunken Vessels.—Austin B. Page, Weaversville, Cal.:

I claim the combination and arrangement of the lever, E, and the crutch, G, or their equivalent, together with the cross timber, I C H C H F O F and D B D, substantially as and for the purposes herein specified and set forth.

48,092.—Hat.—Charles L. Rahmer, Brooklyn, N. Y.:

I claim a flexible band made of metal or other suitable material provided with a series of sharp pointed pins or other proper fastening devices, rubber or other suitable elastic cushions arranged together substantially as described and for the object specified.

48,093.—Sheep Rack.—John P. Ray (assignor to himself and Wesley W. Ray), Honeoye, N. Y.:

I claim the grain trough or receptacle, C, constructed in sections, 11, so arranged as to open and rest against the sides of the box, or to close centrally to feed the sheep, the same being used in combination with the box, A, substantially as described, in combination with the grain trough, constructed as described.

I also claim the double folding and compressing racks, B B, arranged and operating substantially as specified.

48,094.—Mode of Operating Churns.—Jacob Redding, New Castle, Ind.:

I claim the general arrangement of the vertical dashers, C D, pitman, F, crank shaft, G H, gearing, I J K L M, drum, S, cord, R, pulley, Q, and spring box, C, all as herein described and for the purpose set forth.

48,095.—Button.—W. H. Reed, Philadelphia, Pa.:

I claim the button, A, with its opening, e, countersunk on the under side of the button, substantially as and for the purpose described.

48,096.—Churn.—Albert Rhoades, Pontiac, Mich.:

I claim the combination with the balance wheel, c, of the lever, G, pivoted to the crank pin of said wheel and to an elastic arm, b, in the manner and for the purposes herein described.

48,097.—Horse Leg Fender.—Stephen Romssan, Hudson, N. Y.:

I claim the former interlining or stiffener, Fig. 5, and the brace, a, when both are inclosed, combined and arranged substantially in the manner and for the purpose herein described and set forth.

48,098.—Piston for Pumps.—Phillip C. Rowe, Boston, Mass.:

I claim the elastic cylinder, C, in combination with one or more elastic leather cups, F, with disks and nuts all placed on the piston rod and arranged substantially as and for the purpose set forth.

[This invention consists in the employment or use of a piece of leather, one or more, of cup form, and an elastic cylinder placed on the piston rod and arranged with metal disks and nuts, in such a manner that the leather cups may be expanded so as to operate tightly within the pump cylinder by compressing the elastic cylinder.]

48,099.—Manufacture of Glucose and White Lead.—Robert Rowland, New York City:

I claim the combined manufacture of glucose or grape sugar and white lead in such a manner that both articles are manufactured independently of each other but that the waste gases and vapor arising from the manufacture of the former are used for the corrosion of lead into white lead, substantially in the manner herein described.

48,100.—Snap Hook.—Cyrus W. Saladee, Newark, Ohio:

I claim, First, The buckle-shaped guard, B, with or without the spur, c, in combination with a hook, b, substantially as described and for the purposes specified.

Second, The buckle-shaped guard, D, in combination with a hook, b, substantially as described, and for the purposes specified.

Third, The hook, o, on the end of the spring, C, for the purpose described.

Fourth, The combination of a snap hook, A B, with a buckle, H, when the buckle is provided with an extra bar, I, for the attachment of a strap.

48,101.—Wheelbarrow.—N. C. Sanford, Meriden, Conn.:

I claim the combination of the trussed frame and tilting bottom, substantially as and for the purpose specified.

48,102.—Cultivator.—William G. Savage, Clinton, Ill.:

I claim the arrangement of the plow standards, G G, shafts, F F, and levers, H H, placed within the frame, C, which is pivoted within the mounted frame, A, substantially as and for the purpose herein set forth.

I also claim the connecting of the frame, C, to treadles, I I, in the manner substantially as and for the purpose described.

I further claim the combination of the two frames, A C, with the plow standards, treadles and levers, all arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved cultivator or corn plow, and it consists in a novel arrangement of the plows, whereby the driver will have full or complete control over the same, and at the same time a very simple and efficient implement for the purposes specified.]

48,103.—Sail Clutch.—E. T. Sawyer, Portland, Me.:

First, I claim providing on each end of a sail hank or hoop a ferule, which is constructed substantially as described.

Second, Locking the hoop or hank, and clamping the rope and the sail by means of a clutch or clasp, constructed substantially as described.

Third, The two part clasp, constructed substantially in the manner and for the purpose described.

48,104.—Seed Planter.—Geo. M. and Samuel H. Seward, Guilford, Conn.:

First, We claim constructing the hopper, G, so as to revolve with the disk, E, when the same is combined with the plate, D, and the brush, K, or its equivalent, substantially in the manner and for the purpose described.

Second, Adjusting the hopper, G, constructing and operating in the manner described by means of the screw, F, substantially as and for the purpose specified.

48,105.—Deep Well Pump.—John Sheffield, Putneyville, N. Y.:

I claim the employment in a lift pump, with two tubular pistons, D D', of the rods, E F, their lower extremities, b b, constituting valves, and bars, d d, substantially as and for the purpose described.

[This invention has for its object the removal of gases from oil and other wells, and it consists in applying a gas or air pipe alongside the well tube through the packing so as to conduct the gases out of the well. It also consists in providing a chamber or trap at the lower end of the well tube, which will prevent the entrance of gases into said tube, but will not obstruct the entrance of oil or other liquids.]

48,106.—Oil Ejector.—John Y. Smith, Alexandria, Va.:

First, I claim the combination of a pipe or tube in sections of enlarged valve chambers, when arranged immediately between the tube or pipe sections, and concentrically therewith, substantially as set forth.

Second, In combination with a revolving central steam pipe and stationary outer tube, I claim the conical valves upon the former and their valve seats upon the latter, substantially as and for the purpose set forth.

Third, The means herein described of producing condensation of steam in the chambers, for the purpose of raising the liquid or oil, by injecting or dropping a portion of the liquid raised into the said chamber, substantially in the manner herein set forth.

Fourth, I claim the attachment to the revolving central steam pipe of a cam plate, or the equivalent thereof, in combination with gears or projections on the valve, so that by revolving the pipe the valve shall be lifted off its seat for dropping the requisite amount of liquid for condensation of steam, substantially as set forth.

Fifth, In combination with valve chambers constructed and oper-

ated as described, I claim the weighted valve covers, so as to close the valve opening if the external pressure of the liquid exceed that from within, substantially as set forth.

48,107.—Apparatus for Making Extracts.—Lyman Smith, Erie, Pa.:

I claim the combination with the tank, A, of a vacuum pan, F, or other equivalent device for producing a vacuum, substantially as and for the purpose set forth.

48,108.—Thrashing Machine.—Samuel Spencer, Groton, N. Y.:

I claim the concave, D, when attached to the regulating and tightening blocks, B B, to render it adjustable with the elevator, C, when constructed and operated as above described.

48,109.—Horse Rake.—Ariel B. Sprout, Hughesville, Pa.:

First, I claim the foot lever, E, so provided to the rake head as by being depressed to throw the rake from its elevated to its working position, and by being held down with the foot to retain the rake in its working position.

Second, I claim attaching the fulcrum bar, F, to the cleaners or other rigid parts of the rake by means of straps, g, connecting the two parts of a hinge joint, so as to allow a limited amount of vertical play to the bar, F, for the purpose described.

Third, I claim in combination with the straps, g, the movable rings, or their equivalent, for the purpose of preventing the vertical play of the bar, F, relatively to the cleaners, under the circumstances described.

Fourth, I claim the extension in front of the axle of the cleaners, G, which support the rake head, so as by their vertical adjustment to regulate the height of the rake head from the ground at a given elevation of the shafts.

Fifth, I claim the rotating notched pinbolt, H H', with grooves therein corresponding to similar grooves on the lug, H', for colling the rake teeth, until the requisite force is attained, and for holding the teeth when colling in position under the action of the nut on the bolt.

48,110.—Upsetting Tire.—Albert Stedman, Homer, N. Y.:

I claim the machine or apparatus as a whole, when used in connection or combination with any vise, as and for the purposes above set forth.

48,111.—Carriage Axle.—George Hayward Thomas, New York City:

I claim the mode herein described of securing a wheel upon its axle, the same consisting in the use at the outer end of the axle of a detachable or movable collar or ring, in connection with a nut, the two being arranged together and operating substantially in the manner herein above set forth.

48,112.—Drag Bar for Grain Drills.—J. H. Thomas and P. P. Mast, Springfield, Ohio:

We claim so constructing the arm, F, and lugs, I, that when the pin, g, is in place the said arm will be maintained in position in contact with the face, e, substantially as set forth.

48,113.—Manufacture of Machine-sewed Shoes.—Edwin Thompson, Abington, Mass., and L. N. Mears, Brooklyn, N. Y.:

We claim the process or method of temporarily uniting the vamp and sole of a shoe for their subsequent union by stitches, substantially as set forth.

48,114.—Axle for Wheel Vehicles.—Jonathan G. Tibbets and W. M. Merriell, Jeffersonville, Ind.:

We claim a divided axle, or one composed of two parts, A A', connected by a bridge or skeleton hub, composed of the heads, B C D, and brace rods, E, arranged and applied to the axle in the manner substantially as and for the purpose herein set forth, and the ends of the parts, A A', fitted together by a cone joint.

We further claim providing the heads, B D, with radial openings or air passages, and having said heads bushed with Babbitt metal, substantially as herein described.

[This invention relates to a new and improved axle for wheel vehicles, such as are generally termed compound axles, on account of being composed of two or more parts so arranged that one part may rotate independently of the other. The invention consists in a peculiar construction of the axle, whereby the same is rendered strong and durable, and at the same time light, and capable of being kept perfectly lubricated, so as to run with but little friction.]

48,115.—Coal Stove.—W. B. Treadwell, Albany, N. Y.:

First, I claim a parlor-heating stove, with an oven for cooking purposes, so constructed that hot air circulates in a chamber formed in the bottom of the oven, and also through the chamber of the body of the oven, substantially as and for the purposes described.

Second, The construction of the oven, which is a component part of a stove, with a double bottom, a double walled hole cover and circulating passages for hot air, substantially as and for the purposes described.

Third, The fire-pot or chamber, C c l f, constructed as represented in Figs. 1 and 2, and substantially as herein described, for the purpose set forth.

Fourth, The combination of the plate, H, with removable section, u, and a fire-pot having a removable sectional lining, f, substantially in the manner and for the purpose described.

Fifth, The combination of fire chamber, C, cavity, g g, cold-air passage, o o, and receiver, E, substantially in the manner and for the purpose described.

Sixth, The cold-air passage, formed by means of plates, b b and e, connected with cavity, g g, in combination with the ring or receiver, E, tubes, s s, and oven, D, all constructed and arranged substantially as described.

48,116.—Window Blind.—Albert Van Wagenen, Boston, Mass.:

I claim, First, The method herein described of constructing window blinds so as to admit of the ready removal of the slats, in the manner and for the purpose set forth.

Second, The method described of maintaining the slats of window blinds at any given inclination with respect to the frame by the means and in the manner herein set forth.

48,117.—Seed Drill.—A. H. Wagner, Chicago, Ill.:

I claim the vibrating feeding tubes, H, provided with a partition across the lower end to stir the grain and feed the drilling tubes.

In combination with the vibrating feeding tubes, H, I claim the receiving cups, R, with curved inner bottoms to hold the seed until it is pushed off by the vibrating tubes, substantially as described.

I claim the hook on the lever which raises the link from the wrist pin simultaneously with the raising of the drilling teeth.

48,118.—Vegetable Slicer.—Sylvanus Walker, New York City:

I claim the guides, b b', forming the sides of the knife stock, A, with the adjustable mouth-piece, B, and spring, C, when formed of one continuous piece of metal, substantially as described.

48,119.—Cigar.—Chauncey Walton, Washington, D. C.:

I claim the new article of manufacture herein described, made in the manner and for the purposes substantially as set forth.

I also claim a longitudinally-perforated cigar, combined with a sponged mouth-piece, as and for the purposes set forth.

48,120.—Throttle-valve Gear.—H. W. Warner, Greenfield, Mass.:

I claim the combination and arrangement of the male and female screw, F, male screw, B, and nut, E, for the purpose of operating and controlling the throttle valve of a steam engine, substantially as herein set forth.

48,121.—Lever Buckle.—H. W. Warner, Greenfield, Mass.:

I claim the projections or handles, b, one or more, in combination with the tongue of a lever buckle, substantially as and for the purpose herein set forth.

48,122.—Boot-Jack.—Jonathan Wheeler, Athol, Mass.:

I claim the boot-jack herein described, consisting of the fixed platform, A, vibrating platform, B, supported upon pivot pins, C C, and provided with a projection, e, curved jaws, D D, approaching each other, longitudinally arms, a a, standards, b b, and slots, d d, the whole constructed and arranged as set forth.

[This invention consists in a peculiar mode of constructing boot-jacks, by which they are simplified in construction and operation.]

48,123.—Knob Latch.—Albert Williams, Norwich, Conn.:

I claim the arrangement of the slotted arbor with the dead and

slide latches and knob, substantially as shown, so that the dead latch may be operated or thrown back by the insertion of the key through the knob and arbor while the latter is used for operating the slide latch, as described.

[This invention consists in combining in a novel way a dead latch and an ordinary slide latch in such a manner that the slide latch may be operated by the turning of the knob-arbor as usual, and the dead latch operated by a key, the hole for which passes through one of the knobs and the knob-arbor, whereby a very simple, economical and efficient lock is obtained, and one that cannot be readily picked or opened illegitimately.]

48,124.—Device for Steering Boats from another Boat.—J. D. Willoughby, Washington, D. C. Antedated Nov. 24, 1864:

I claim attaching the steering cords, f f, to the cross tiller, c, or rudder, B, and passing them around some point on the boat, so as to cause the tension of either cord to pull the rudder into a position that will incline or steer the boat in the same direction that it is inclined by the tension of the cord, substantially as described and represented.

48,125.—Boller Furnace.—Thos. B. Wilson and Wm. R. Shaw, Meadville, Pa.:

First, We claim the deflector, C, arranged as shown within the furnace, and operated by the action of the hand lever, A, without, substantially as above described.

Second, We also claim the combination of the deflector, C, with the door space of the furnace, and the air box, E, opening into said space, substantially as above described.

[This invention] consists in the arrangement of an air-deflector within a furnace and over its mouth, for the purpose not only of regulating the amount of draught to the fire, but also of directing the draught so that the air will become thoroughly mixed with the gases arising from the fuel, and a more perfect combustion be thereby obtained.]

48,126.—Sash for Roofs of Hot-houses.—J. N. Woodward and W. Holden, Aurora, Ill.:

We claim the sheet-metal strips, constructed with gutters, c c, and employed in combination with the sash, A, glass, B, and putty or luting, b, in the manner and for the purposes described.

[This invention consists in covering the upper or outer portion of the sash with sheet metal, and using in connection therewith putty or other suitable cement or material, whereby the sash is rendered perfectly tight and water-proof, and far more durable than the sashes as now glazed.]

48,127.—Bread Cutter.—Joseph Buckett (assignor to himself and L. W. Warner), New York City:

We claim the combination with the eccentric circular cutter, D, projecting plates, E E, shaft, B, opening, F, of the holder, G, composed of a series of plates, a, connected by joints, b, substantially as and for the purposes described.

[This invention consists in the employment or use of a cutter of circular form, attached eccentrically to a shaft, placed on a suitable framing, the cutter working between plates which have an opening made in them, into which the article or substance to be cut is fed to the cotton; the frame or table on which the article being cut is placed having a holder applied to it, composed of a series of jointed plates, whereby the desired work may be accomplished with the greatest facility.]

48,128.—Lamp.—Mills L. Callender (assignor to the Callender Lamp Manufacturing Company), New York City:

First, I claim sustaining the cone or deflector by supporters that are bent or folded, to increase their length, for the purpose and substantially as specified.

Second, I claim the plate, h, extending across the deflector, g, and having an opening with lips, l l, composing an inner deflector, and formed with the flame-spreading projections, 2 2, as and for the purposes specified.

Third, I claim the elastic ring, a, with an opening through which to fill the lamp, in combination with the slide rods, c c, carrying the burner, as set forth.

48,129.—Sad Iron.—Robert Drake, Newark, N. J., assignor to himself, Jas. F. Bless and Danl. F. Bless.:

I claim constructing the bottom of the heating chamber of a sad iron with an inclined or curved guiding or deflecting surface, r r s, adapted to operate as herein described.

[This invention relates to sad irons heated by a gas flame, and consists in a peculiar construction or formation of the interior of the iron, whereby the combustion of the gas is greatly increased, and also fully consumed before issuing at the chimney of the iron, the importance of which is manifest.]

48,130.—Corn Planter.—John Gross, Decatur, Ill., assignor to himself and Thos. K. Alexander:

First, I claim the employment or use of the circular intermittingly rotating plates, N, provided with openings or holes, j j, in combination with the vibrating seed plates, M, substantially as and for the purpose described.

Second, The vibrating bars, O, placed below or underneath the plates, N, connected with the plates, M, and receiving their motion therefrom, and provided with pawls, m, for the purpose of operating the plates, N, as set forth.

Third, The circular gauge, P, placed underneath the plates, N, and arranged substantially as shown, for graduating the capacity of the holes, h, in the plates, M, as set forth.

Fourth, The arranging of the cut-offs or strikes, d, with springs or elastic rods, N', in the manner substantially as and for the purpose specified.

Fifth, The scrapers, A A, at the outer ends of arms, R R, which are connected by rods, t, to treadles, u, substantially as and for the purpose specified.

[This invention relates to a new and improved seed-distributing apparatus, and in an improved scraper, whereby it is believed that an improved machine for planting corn and other seeds is attained]

48,131.—Petroleum Stove.—Ira Holmes, Moscow, N. Y., assignor to himself and Scott Lord, Genesee, N. Y.:

First, I claim concentrically arranged lamps or burners with the rotary platform, A C, combined and arranged substantially in the manner and for the purpose set forth.

Second, The pipes, b, leading from each reservoir into the main pipe, B, carrying off any vapor or gases into the same for safety.

Third, The jacket heaters or cylinders with side flues, f, discharging into a central pipe, B, constructed as and for the purpose set forth.

Fourth, The wire gauze, c, located in the central pipe, B, above the entrance of pipes, b, for the purpose set forth.

Fifth, The combination and arrangement of the several parts described, operating in and for the purpose, substantially as set forth.

48,132.—Safety Match Holder.—Helen M. Jewett, (assignor to Universal Safety Match Company), Roxbury, Mass.:

I claim a safety match box or holder composed of the match pack and waste receptacles, A B C, and one or more igniting card holders, D, the whole being for use as specified.

I also claim the match safe made of the three receptacles, A B C, and one or more card holders, D, and having the cover, e, of the rearmost receptacle, so constructed as when closed down upon the cover, b, of the pack receptacle it shall entirely overlap it, as set forth.

I also claim the match safe as not only made with a match pack, waste and igniting card receptacles, but with separate covers to the waste and pack receptacles, the same being in order that the pack receptacle may be protected from fire or sparks dropped from a match while in the act of being moved over the pack receptacle for the purpose of being inserted in the waste receptacle.

48,133.—Breech-loading Fire-arm.—William Morgenstern (assignor to himself and Wm. B. Wiltach), Philadelphia, Pa.:

I claim, First, Raising the rear of the movable breech from its engagement, and retracting it by means of the tumbler lever, H, operated by the hammer in the act of cocking.

Second, The lifting and retracting lever, H, and the tumbler, in one piece.

Third, The swinging cam or lever, J, constructed and arranged substantially as and for the purpose set forth.

Fourth, The combination of the breech piece, C, cam, J, and tumbler lever, H, operating in the manner substantially as described.

48,134.—Roll for Machines for Preparing Fibrous Material for Spinning, Etc.—Daniel Read (assignor to Amos A. Taylor), New York City:

I claim covering rolls for preparing materials for spinning yarn and manufacturing cloth with an inner covering of vulcanized rubber, gutta percha, or other suitable gums, and with an outer covering of leather parchment, paper, or the equivalent of either of these two coverings, being united together in the manner as and for the purpose described.

48,135.—Buckle.—John E. Smith (assignor to himself and Henry C. Griggs), Waterbury, Conn.:

I claim the combination of the frame, a, with the tongue, g, and the hook, h, when the tongue and hook vibrate separately and on independent hinges or joints, though on the same bar, as herein described.

48,136.—Cranberry Gatherer.—Charles Thacher (assignor to himself and George Shove), Yarmouth, Mass., (and assigned by said Thacher to Luther W. Clark, Boston, Mass.):

I claim as my invention the combination of the holding comb, C, with the receiver, A, provided with teeth, substantially as described.

I also claim the combination of the grate or sieve, B, the holding comb, C, and the receiver, A, provided with the teeth, substantially as described.

48,137.—Cherry-stoning Machine.—Theophilus Van Kannel, Cincinnati, Ohio, assignor to himself and Joseph Beaire, Chester, Ill.:

I claim, First, So applying the needle carrier, g, to a reciprocating slide that the needles, h, will discharge the pits from the pulp and then assist in discharging the pulp from the machine, substantially as described.

Second, In a machine for stoning cherries, which has a rotary driving shaft, I claim giving a lateral motion to the needle carrier in the act of removing the pulp from the basin, substantially as described.

Third, Constructing the needle carrier with a nose, g', for the purpose substantially as described.

Fourth, The feeder, b, arranged to work between the hopper, A', and the basin, a, substantially as described.

Fifth, The employment of an elastic perforated bottom for the basin, a, substantially as described.

Sixth, The arrangement of the hopper, A', feeder, b, basin, a, and discharging spout, A2, so that cherries will be moved from one to the other of these contrivances, deprived of their pits, and discharged from the machine, substantially as described.

48,138.—Artificial Leg.—James W. Weston and Thomas B. Stanley (assignors to James W. Weston), New York City:

We claim, First, A bolt formed with two joints at right angles to each other, and secured to the leg and foot respectively, as set forth, so that the foot cannot turn out of its place, but motion is allowed at the ankle, as specified.

Second, We claim the india-rubber block perforated with holes or formed with cavities at those points where the spring is required to be most yielding, the same being introduced at the ankle joint, as specified.

Third, We claim the side knee-pieces extending from the artificial limb, as and for the purposes set forth.

Fourth, We claim the band for attaching the artificial limb, consisting of the strap, l and m, and intermediate laced strap or webbing, n, for the purposes and as specified.

48,139.—Steam Engine.—Robert Wyatt (assignor to himself and W. Larder), Brooklyn, N. Y.:

I claim, First, Connecting the two pistons, B C, with a crank outside of the cylinder, by means of a piston rod, D, which is attached to the inner piston, C, and passes through the outer piston, B, and which has a longitudinal movement with the inner piston, C, and a lateral movement with the two pistons, B C, substantially as and for the purpose herein specified.

Second, The stuffing box, E, through which the piston rod, D, works, attached to the outer piston, B, and working in a slot, f, in the cylinder, substantially as and for the purpose herein set forth.

Third, The sliding plate, F, and its socket, F', fitting the stuffing box, E, and working within a groove or guide, g, on the exterior of the cylinder, substantially as and for the purpose herein set forth.

Fourth, The combination of the slide valve, M, and the two connected slide valves, N N3, the three worked by two eccentrics, Q S, and operating as described in relation to a system of ports o o' o2 o3 p s' s3, arranged substantially as herein specified.

48,140.—Oil Press.—John Marshall, Pentonville Road, Eng. Patented in England Oct. 27, 1863:

I claim the expression of oil from oil-yielding substances, and the production of oil-cake and other residuary matter, by means of a chamber, in combination with a ram and plug and a strainer or filter, these parts being constructed and acting substantially as described.

48,141.—Machine for Making Cigarettes.—Manuel J. Lopez y Manoz, Havana, Cuba:

I claim, First, The arrangement of the feeding rollers, G G', connected together and pressed together in the manner specified, and worked by means of gearing, in the manner and for the purpose substantially as described and set forth.

Second, I claim the arrangement and combination of the cutting bar, K, and knife, L, worked by means of a segment, L', in the manner and for the purpose substantially as set forth.

Third, I claim the manner of working the forming rollers, v w, by the pinions, 12 13, in combination with the pinion, 14, when said pinions, 12 13, form part of the surface of said rollers.

Fourth, I claim the arrangement of the frames, X X', swinging upon central slides, y, attached to the frames of the machine, and secured in its place during the operation of the machine by spring levers, r', and a lever, E, acted upon by a cam, F', in the manner specified.

Fifth, I claim the arm, q, and the pin, q', or their equivalent, acting upon the spring levers, r', for the purpose of disengaging the same, in combination with the pin or projection, p', acting upon an arm, p, fast to the said frames, X or X', for the purpose of swinging said frames around central studs, y, the whole operating together in the manner and for the purpose described.

Sixth, I claim the wheel, W', acting upon the pinion, W'', and the pinion, 5, operating through the pinions, 4 and 6, the forming rollers, in the manner substantially as described.

Seventh, I claim the forming levers, N, attached to a crank shaft, O, and operated by teeth 24 25 26, and pins or projections, 27 28 29 30 and 31, in the manner and for the purpose substantially as specified.

Eighth, I claim the arm, b, in combination with the spring lever, x, and the cam, n, in combination with the lever, n', acting on the crank shaft, O, and the forming lever, N, in the manner described and set forth.

Ninth, I claim the lever, T, acting upon the forming lever, N, and operated by arms or cams, U and U', substantially as specified.

Tenth, I claim holding the rolled cigarette firmly in its place while the ends of the paper are closed by means of the lever, F, operating in the manner specified.

Eleventh, I claim the levers, Q, operated in the manner specified, or its equivalent, for the purpose of turning down the upper parts of the paper at the ends of the cigarettes.

Twelfth, I claim the levers, R' R', operating and arranged in the manner and for the purpose substantially as set forth.

Thirteenth, I claim rolling the cigarette by the combined action of the rollers, v w v' w', and a lever, N, as described.

Fourteenth, I claim holding firmly the paper while being cut, by the action of the knife, L, by means of the feeding rollers, G G', and by the forming lever, N, while the latter is acting upon the tobacco and distributing the same evenly on the paper.

Fifteenth, I claim the combination of the feeding rollers, G G' as bar, K, and knife, L, the forming rollers, v w v' w', the forming bar, N, the lever, T, the levers, Q Q', and the levers, R' R', when arranged, combined and working together in the manner and for the purpose substantially as set forth and described.

Sixteenth, I claim the construction of the wheels, H W' E and W,

attached to the driving shaft, and operating the different parts of the machine, in the manner and purpose as set forth.

48,142.—Lamp Burner.—James Wood, Nottingham, Eng.:

I claim the combination of the door, B e e, thumb piece, e, stops, g h (all made out of one piece of metal), with the guides, f, the latter being formed of strips or pieces of the shell, a, of the burner, in the manner and for the purpose herein described.

[This invention relates to a new and useful improvement in that class of lamp burners which are provided with chimneys for burning coal oils and other similar hydro-carbons, and it consists in a novel manner of applying a door in the side of the burner, whereby a ready means is obtained for lighting the lamp without removing the chimney from the burner, and without adding in an appreciable degree to the cost of the construction of the burner.]

48,143.—Coal Stove.—Philo P. Stewart, Troy, N. Y.:

I claim, First, The employment of the perforated cone or cap, F, constructed, arranged and combined with the said plates, C and D, and with the fire pot and combustion chamber of a stove, in the manner and for the purposes substantially as herein described and set forth.

Second, I claim the employment of the wire gauze door, P, or its equivalent, in combination with the said perforated cone or cap, F, or any equivalent thereof, and with the said radiating chamber, B', in the manner and for the purposes substantially as herein described and set forth.

Third, I claim the perforated cone or cap, E, constructed and arranged in sections, a b c, with small apertures between each section or division, in the manner and for the purposes substantially as herein described and set forth.

Fourth, I also claim the arrangement and employment of the inner vertical tube or conical cylinder, L, and the outer vertical tube or cylinder, E, in combination with the radiating chamber, B', and with the horizontal flue, g c, in the manner and for the purpose substantially as herein described and set forth.

Fifth, I also claim the arrangement and combination of the vertical radiating tubes or columns, G G G G, with the return flues, e and f, in the manner and for the purpose substantially as herein described and set forth.

Sixth, I also claim the said flanges, l, constructed and arranged upon the outside of the said perforated cone or cap, E, in the manner and for the purpose substantially as herein described and set forth.

Seventh, I also claim the combination of the said perforated cap or cone, E, or its equivalent, with the air chamber surrounding the chamber of combustion, and communicating with numerous apertures, and the said wire gauze door, P, in the manner and for the purposes substantially as herein described and set forth.

REISSUES.

1,979.—Cock.—Nathaniel Jenkins, Boston, Mass. Patented April 18, 1865:

I claim, First, The swivel, H, in combination with the follower, E, and seat, L, substantially as and for the purpose described.

Second, The combination and arrangement of the thimble, I, swivel, H, and packing, K, substantially as and for the purpose described.

Third, A hemispherical, or hemispherical valve or packing, constructed with a flange, m, substantially as and for the purpose described.

Fourth, The elastic packing, or valve attached to the follower by means of a flange, m, and a corresponding socket, substantially as set forth and specified.

1,980.—Ladies' Collar and Cuffs.—Wm. E. Lockwood, Philadelphia, Pa. Patented April 26, 1859:

I claim an embossed collar or cuff, made of a fabric composed of paper and muslin or an equivalent fabric.

1,981.—Ladies' Collar and Cuffs.—Wm. E. Lockwood, Philadelphia, Pa. Patented April 26, 1859:

I claim an ornamental collar or cuff, made of a fabric composed of paper and muslin or of an equivalent fabric ornamented by printing or otherwise marking on the surface plain or colored devices.

1,982.—Ladies' Collar and Cuffs.—Wm. E. Lockwood, Philadelphia, Pa. Patented April 26, 1859:

I claim an ornamental collar or cuff made of a fabric composed of paper and muslin or an equivalent fabric, ornamented by perforations as set forth.

1,983.—Ladies' Collar and Cuffs.—Wm. E. Lockwood, Philadelphia, Pa. Patented April 26, 1859:

I claim an ornamental collar or cuff made of a fabric composed of paper and muslin, or of an equivalent fabric, ornamented by the interlacing of colored tapes or ribbons as set forth.

1,984.—Street Washer.—Joshua Regester, Baltimore, Md. Patented July 23, 1861:

I claim, First, A metallic sectional stop-cock case, which is so constructed that in the act of securing the sections together the stop-cock and its appendages are confined within said case, in a permanent position, substantially as described.

Second, Centering the stop-cock at its lower end by means of a collar bearing, F, or its equivalent, in combination with a metallic case, substantially as described.

Third, The combination of a twining discharge pipe, B, with a stop-cock and a metallic case, which is constructed with an upper and a lower bearing, F, substantially as described.

1,985.—Hydrant.—Charles L. Stacy, Cincinnati, Ohio. Patented Oct. 4, 1859:

I claim, First, The provision in hydrant piston of a flexible cup, G, or its described equivalent, so arranged as to cover the waste aperture in the act of drawing, and to be pressed against said aperture by the head of water in the discharge pipe, substantially as set forth.

Second, The relative arrangement of the cup-formed disks, F G and G', and the apertures, K and L, adapted in the manner set forth to form a chamber, I, closed on all sides, with the exception of the ingress aperture, K, while the hydrant is open, substantially as set forth.

1,986.—Spring-back Chair.—Robert H. Staples, Lowell, Mass. Patented Nov. 8, 1864:

I claim a back swinging independently of a seat, and pivoted above it to stationary supports (r the arms of the chair, in combination with a spring or springs, or equivalent device, to return it to its normal condition.

1,987.—Improvement in Stoves by the Use of Superheated Steam upon the Fuel.—The Hagan Manufacturing Company, New York City, assignees to William E. Hagan, Troy, N. Y. Patented March 8, 1864:

I claim as my discovery or invention in the management of combustion in fire chambers the application, substantially as herein described, of superheated steam in jets, so as to impinge without admixture with atmospheric air directly against the incandescent coals, in addition to or in combination with the supply separately of atmospheric air, either by draft or blast, in the usual manner, as set forth and for the purposes specified.

I also claim in the construction of fire chambers for the combustion of fuel, and provided with apertures at or near the bottom for the admission of atmospheric air, combining therewith a steam chamber or chambers for superheated steam, having numerous small apertures next to the chamber or chambers having the superheated steam to impinge, without admixture of atmospheric air against the incandescent coals, substantially as and for the purposes specified.

And I also claim in the construction of fire chambers, combined substantially as herein described with a chamber or chambers for superheated steam, and with numerous apertures for the escape of superheated steam in jets to impinge against the incandescent coals, the making the perforated wall of the fire chamber grooved, or the equivalent thereof, to reduce the thickness thereof at the perforations, substantially as and for the purposes specified.

1,988.—Furnace for Treating Ores by Superheated Steam.—The Hagan Manufacturing Company, New York City, and Wm. E. Hagan, Troy, N. Y., assignees by mesne assignments of Wm. E. Hagan. Patented March 8, 1864:

I claim, First, The employment or application of superheated steam, in the manner as or substantially as herein described and set forth, for the purpose of refining or reducing metals, and for the

removal of sulphur, arsenic, phosphorus, or other impurities from ores or minerals.

Second, The employment or application of superheated steam, as or substantially as herein described, for the purpose of calcining and disintegrating quartz rock, containing silver, gold or other metals.

Third, The employment or application of superheated steam for the refining of iron, and for the converting of iron into steel or pure steel, in the manner substantially as herein described and set forth.

DESIGNS.

2,079.—Coffin Handle.—Stephen D. Arnold, New Britain, Conn., assignor to P. and F. Corbin.

2,080.—Cook Stove.—James G. Clarke (assignor to S. H. Burton & Co.), Cincinnati, Ohio.

2,081.—Animal Trap.—Hubert C. Hart, Unionville, Conn.

2,082.—Bust of Abraham Lincoln.—Fisk Mills, Washington, D. C.



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In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for new inventions in the United States and in all foreign countries during the past seventeen years. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after seventeen years' experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAR. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter.

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant, WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of \$3, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can

be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 24th of March, 1881 are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention; the Government fee for a caveat is \$10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention is susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is out little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is \$15. Other changes in the fees are also made as follows:—

On filing each Caveat.....	\$10
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Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

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The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

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Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO.'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort of extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting, or writing to, MUNN & CO., No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Earlier, therefore, who wish to preserve their models should order them returned

within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model, is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO., No. 37 Park Row, New York.

Hints & Queries

G. P. S., of N. Y.—The mere use of a machine in a foreign country prior to the issue of a patent here to another party for the same invention, does not invalidate the patent. If the invention was patented in France, or described in any publication, it would invalidate a patent obtained here, unless the American inventor could prove prior invention.

D. H., of Mass.—The Patent-office Reports of 1862 and 1863 have not yet been issued.

C. C., of Mass.—We advise you to send us a drawing and description of your invention for our examination. A mere statement of what it is capable of doing does not convey a proper idea of its mechanical construction.

J. T. D., of Ill.—Your communication in relation to the weight of a barrel of flour is received, but your views do not seem to us sound. We have no doubt that the price adjusts itself precisely in accordance with the weight.

C. G., of Mass.—The practice of destroying caterpillars by saturating a rag with kerosene oil and burning their nests is quite common in many parts of the country. We have tried it successfully for two seasons.

J. B. L., of D. C.—Your countryman, Morin, has demonstrated that the idea of navigating the air by the plan of propelling balloons by muscular power, is preposterous. If the whole muscular force of a man could be exerted upon a balloon of sufficient size to sustain him in the air, it would direct it from the course of the wind only about four miles in an hour.

T. C. R. H., of R. I.—Fluids do not rise to the same level in tubes of unequal diameter connected with each other. In tubes under half an inch diameter a sensible difference is perceived in the height of the fluid in the larger and the smaller—the latter being the higher. This is owing to capillary attraction.

A. M., of Wis.—Keep the coffee-pot bright; coffee cools quicker in a dull pot than in a bright one, for the reason that heat radiates more rapidly from a lusterless surface than from a brilliant one.

C. B. H., of Conn.—A piece of wrought iron one-fourth of an inch thick, twelve inches long and three inches wide, weighs two and a half pounds.

T. R., of Mass.—Bismuth melts at 476; tin, at 421; tin and bismuth, equal parts, melt at 283; tin 3, bismuth 5 and lead 2 melt at the boiling point. Advantage is taken of this to surprise children, by making tea-spoons of it, which melt when plunged into boiling liquid.

W. W., of N. H.—Pattern-makers' varnish—a pound of shellac to a gallon of varnish; ivory black enough to color.

A. A. S., of Pa.—The substance that you send us is principally clay. Emery is so hard that it can be quarried only by drilling the rocks on the sides of the emery teams.

D. H., of Mass.—Sulphate of copper is soluble in three parts of cold water, and is decomposed by iron filings, or by the galvanic battery.

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TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that eight words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

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tern is the thing long desired. If Diogenes, seeking for his honest man had had one of these lanterns to light him he would have found what he sought. This lantern is one of the most ingenious combinations of its class we have ever seen. When extended, or opened for use, it assumes the shape shown in Fig. 1, which is, as any one can see, a perfect lantern in every respect. When not required it is collapsed by folding first the roof, A, which has a hinge in the middle, and secondly, applying pressure across the corners of the case, B, which causes it to shut up flat; a second folding then brings it to the shape shown in Fig. 2, which is just half the size of the actual lantern. The candle will burn fully an hour, and

Fig. 1

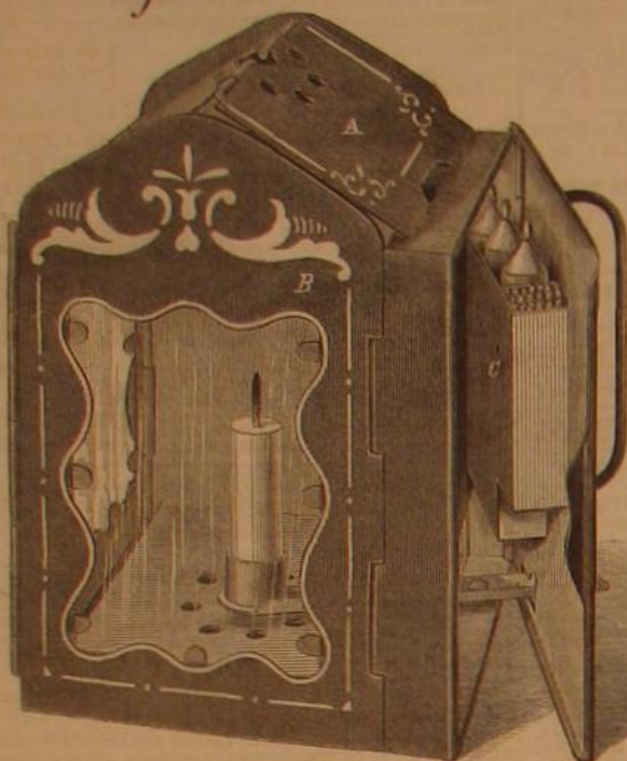


Fig. 2

**MINOR'S POCKET LANTERN.**

tern is the thing long desired.

If Diogenes, seeking for his honest man had had one of these lanterns to light him he would have found what he sought.

This lantern is one of the most ingenious combinations of its class we have ever seen. When extended, or opened for use, it assumes the shape shown in Fig. 1, which is, as any one can see, a perfect lantern in every respect. When not required it is collapsed by folding first the roof, A, which has a hinge in the middle, and secondly, applying pressure across the corners of the case, B, which causes it to shut up flat; a second folding then brings it to the shape shown in Fig. 2, which is just half the size of the actual lantern. The candle will burn fully an hour, and

thinks, make discoveries profitable to hygiene and agriculture.

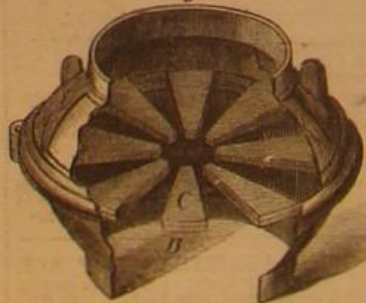
Improved Damper and Ventilator.

These engravings represent a new damper and ventilator for stoves. By the use of it the shaft can be perfectly controlled or the apartment ventilated, as occasion requires. The invention consists in forming a casting, A, with a diaphragm, B, in which are a series of openings. These openings are covered by plates, C, when the same are placed in the proper position. The exterior of the casting is ornamental in design, and is also furnished with holes, D, and there is a sleeve inside which covers them up when the projection, E, is moved. Both the plates, C, and

Fig. 1



Fig. 2

**BOYNTON'S DAMPER AND VENTILATOR.**

a supply of them is provided in the magazine, C, which is on the door. Just inside the door there is a reflector, which cannot be shown. The candle holder, D, can be turned outside on a pivot so as to use this reflector when in a room; the light is much increased thereby. This is a capital lantern and it will be appreciated by every one.

It was patented through the Scientific American Patent Agency, by John A. Minor, on Jan. 24, 1865. Patents have also been secured abroad. For further information address the general Agent, New York Lamp Co., No. 259, Pearl street, New York.

M. HOUZEAU has presented to the Academy of Sciences a memoir, "On the Influence of the Seasons on the Properties of Atmospheric Air." The author

the sleeve are connected together, but the apertures are so arranged with relation to each other that when one set is open the other set is shut, so that when the fire requires all the air which can pass through it, the openings, D, are closed, as in Fig. 2; otherwise, when the atmosphere is vitiated, by turning the damper so as to open the hole, D, it will be ventilated.

This damper and ventilator was patented through the Scientific American Patent Agency on May 5, 1863; for further information address Richardson, Boynton & Co., No. 234 Water street, New York.

It is said that a foreign photographic house now makes pocket handkerchiefs with the photograph of the owner in the corner. In some cases this addition would not be an ornament.

Petroleum as a Steam Fuel.

In some experiments made by Mr. C. J. Richardson, an Woolwich Dockyard, with his improved petroleum boiler, he has succeeded in evaporating 150 gallons of water with 14 gallons of petroleum. It appears that with the improvements he evaporizes, on the average, at the rate of 12½ lbs. of water per one gallon of petroleum, and Mr. Richardson anticipates reaching 14 lbs. or 15 lbs. with the gallon of petroleum. For such early trials, he considers the results hitherto obtained are extremely satisfactory. The oil is under perfect control, there is no danger whatever, and the boiler is very easily worked.

TO KEEP BUTTER IN THE SUMMER.—A simple mode of keeping butter in warm weather, where ice is not handy, is to invert a common flower-pot over the butter, with some water in the dish in which the butter is laid. The orifice at the bottom may be corked or not. The porousness of the earthenware will keep the butter cool.

[It will be still cooler if the crock be wrapped with a wet cloth. Not the porosity of the earthenware, but the rapid abstraction of heat by external evaporation causes the butter to become hard.—Eds.]

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Vol. XII.—No. 26.
(NEW SERIES.)

NEW YORK, JUNE 24, 1865.

\$3 PER ANNUM
IN ADVANCE.

Improved Attachment to Steam Boilers.

This machine combines in itself the steam gage, water indicator, safety valve regulator, alarm and blow-off, and is designed to fill the place of these appendages. The accompanying article was furnished for publication.

The ordinary spring balances or weighted levers, as regulators for the safety valve, are liable to several objections, which arise from the nature of the spring and the lever as applied to them. The spring balance is too slow to act in case of any sudden or undue generation of steam in the boiler, and consequently always requires the watchful eye of the engineer, in such cases requiring both tripping by the hand and often a lessening of its tension. Should the engineer be called away it will allow an escape of steam long after the pressure has come down to its nominal standard. This is both dangerous and annoying.

The machinery here illustrated not only entirely overcomes these difficulties as a safety-valve regulator but is also a superior pressure gage that will indicate the varying pressure of steam from one pound up to what the regulator is set at, beyond which the pressure cannot get. It is also an accurate and delicate water indicator, showing the varying heights at which the water stands in the boiler. Should the water, through neglect, get very low, it will sound an alarm whistle that cannot fail to attract the engineer's attention. Should the alarm be neglected and the water fall to a dangerously low level it will then allow the steam to escape through the safety valve at a very rapid rate so as to reduce its elastic force immediately, and thus insure the safety of the boiler. The following description, in connection with the illustration will render this device intelligible. It consists of a cylinder, A, fitted with the piston heads, B B', working steam-tight in the cylinder and made fast with the rod, C, which works through the stuffing box on the top of the cylinder. Steam is admitted through the apertures, D D, from the boiler and the area of the head, B, is greater than that of B', by as much as the area of the safety valve lessened by the amount the long arm of the safety-valve lever is greater than the short, and the rod, C, is made fast at the top to this lever. This is after making due allowance for the weight operating on the end of the lever of such parts of the regulator as have a gravitating effect on it. The rod, C, is hollow throughout, and is perforated by the apertures, c c c', and is fitted with the collar, C', which can be operated as a hand screw. The valve, E, is made fast on to the small rod, e, and works steam-tight in the hollow rod, C. One end of the spiral spring, F, is made fast to the collar, C', and the other to the rod, e. The upper end of this rod constitutes a rack which operates suitable gear wheels, G, that

turn the hand, H, upon the face of the dial, I. When steam is generated in the boiler, and enters by the apertures, D D, it presses downward on the head, B, and contrariwise on the head, B'. Now, if the total lifting power of the safety valve, at the end of its lever be, say 30 lbs., when the pressure in the boiler

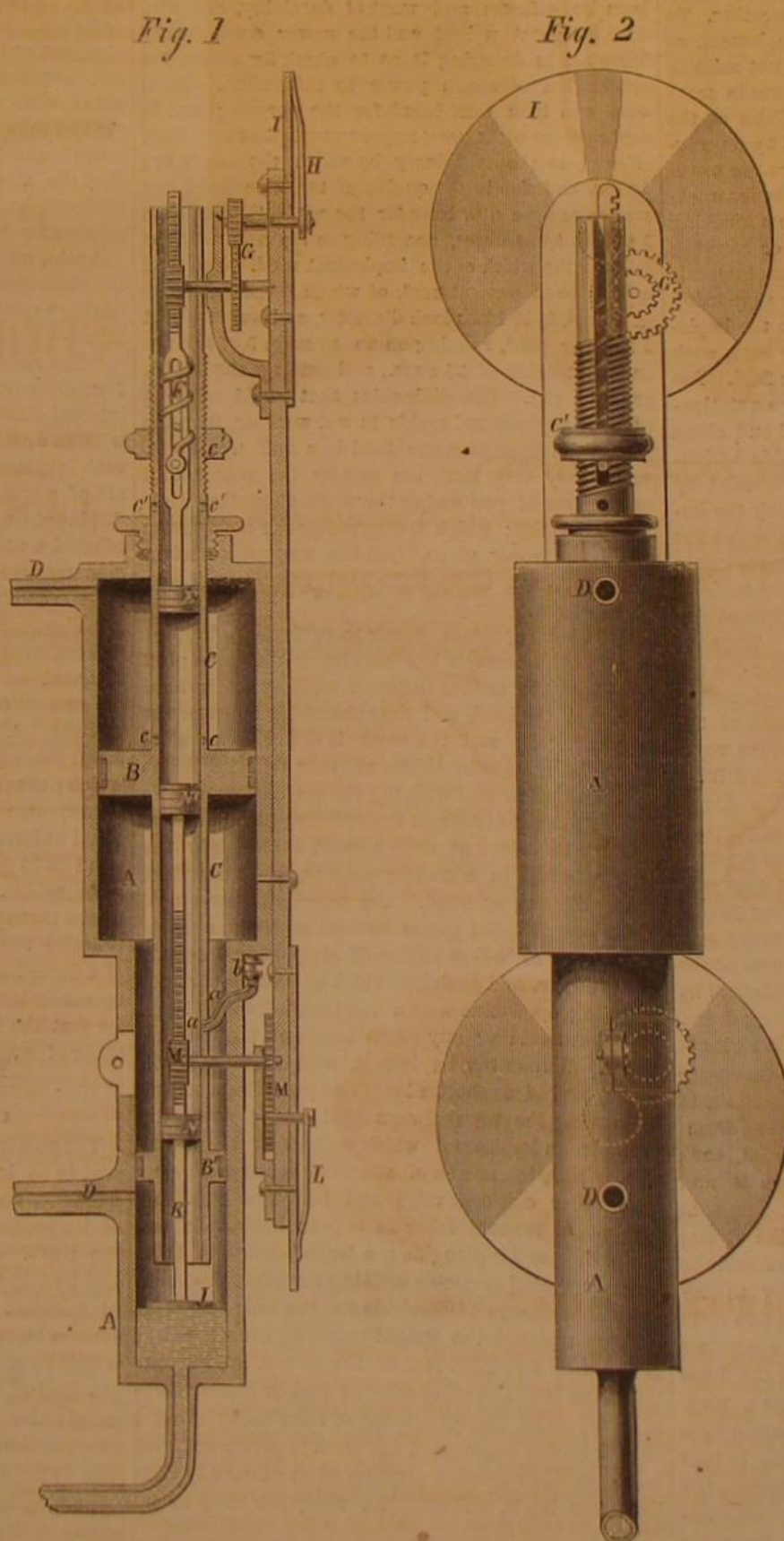
75 lbs., so as to exactly counterbalance the lifting power at the end of the safety-valve lever. The collar, C', is screwed down on the rod, C, which has a graduated face for its regulation, so far as to prevent the valve, E (on the under side of which the steam is acting, having free access through the apertures, c c), from overcoming the power of the spring, F, and clearing the apertures, c' c', until the steam has got up to 51 lbs., when the valve will rise above the apertures, c' c', and steam from above the head, B, will escape into the air. This will prevent the total pressure on the head, B, from exceeding one hundred lbs., while that on the head, B', becomes 76½ lbs., which has an effect on the safety valve the same as if the ordinary spring balance were suddenly reduced in tension by two pounds—and so on for every one pound increase of pressure on the boiler, this regulator allowing an accelerating escape of steam through the safety valve. This action is exactly reversed as the steam comes down to its normal pressure. It is easy to see that as the pressure in the boiler varies, the valve, E, acting under the control of the spring, F, will be moving up or down, thus acting through the gear wheels, G G, on the index hand, H.

The cylinder, A, is fixed on the boiler so that when the water stands at the proper height in the boiler it will stand at a certain height in the lower part of the cylinder, A. In this is fitted the float, J, made fast on the rod, K, and having a rack on it acting on the index, L, through the gearing, M M; and the rod K, is provided with stuffings or packing, N N'. Now, when the water stands at the proper height in the boiler, the stuffings, N N', will prevent any escape of steam, but when the water gets low the float, bringing down the rod and stuffings, on the upper one, N', coming below the aperture, a, steam will escape through the flexible pipe, a', and sound the alarm whistle, b. Should this not be noticed, on its coming further down, there being slots in the hollow shaft, steam will escape into the air. This steam, coming from above the piston head, B, will have the same effect on the safety valve as if the collar, C', were set to control a smaller pressure and that the escape were through the apertures, c' c'. This arrangement may appear a little difficult to comprehend at first sight, as the principle of the regulator is entirely novel, but everything is simple in construction, and the whole arrangement will

RIORDAN'S ATTACHMENT TO BOILERS.

is 50 lbs. on the square inch, and if the weight of any parts of the regulator acting by gravity on the lever be 5 lbs., and if the total effective area of the head, B, be two square inches, that of the head, B', must be one and three-quarter inches. The total pressure on the upper head will be 100 lbs., and on the lever

not be liable to get out of order and cannot but prove extremely useful. It is designed on scientific principles and will be found to perform all that is claimed for it in the most reliable manner. It will relieve the engineer from incessant watching of innumerable gages, cocks, tubes and balances—which is done



much to the detriment of other parts of the machinery under his care, which often suffers for the want of supervision. The inventor is desirous of introducing it among engineers, and for all further information address him, care of Munn & Co., Washington, D. C. This machine was patented on January 31, 1865, by Peter Riordan.

Steam Plowing in England.

At a meeting of the Institution of Mechanical Engineers in Birmingham, England, on the 4th of May, a paper on steam plowing was read by Mr. David Greig, of Leeds, giving the results of Mr. Fowler's experience in steam cultivation during the last eight years, in continuation of a previous paper read by him upon the same subject. The difficulties that have been met with in applying steam power to cultivation have arisen from the irregularities in the level of the ground, the changes necessary in the position of the machinery on the ground, the necessity for moving heavy engines where there are no roads, the want of a rope sufficient strength and elasticity, and the different states of the soil from changes of weather. To attach the moving power direct to the implement, as is done in the case of horses, was found not suitable with a steam engine, from the loss of power in moving such a heavy weight over inequalities of the ground, and from the compression caused by its traveling over the soil to be cultivated. Hence the use of a rope driven by the engine became requisite for working the implement. The rope is held up from touching the ground by a number of rope porters or carrying pulleys, mounted on wheels and placed at intervals along the entire course of the rope; those supporting the portion of the rope that is attached to the implement are withdrawn and placed again by boys, each time that the implement passes across the field. The earlier arrangements of leading the rope from a stationary engine, round the corners of the field and along the headlands, or diagonally across the field in a triangular plan, have now been generally superseded by the improved system of direct pull, in which the implement is pulled backwards and forwards across the field by a rope passing across direct from the opposite headland, both the engine and anchor being made to travel slowly along the headlands each time of the course of the implement being reversed. The rope was at first driven by two drums fixed under the engine, being wound up on one drum and unwound off the other alternately. Afterwards the length of the rope was diminished by the use of an endless rope, driven by friction by passing round a grooved driving pulley, instead of being wound on and off a drum; but the different plans first adopted for the purpose of obtaining the necessary adhesion for driving were attended with serious difficulties, from the wear and tear of the rope and the grooves of the driving pulley.

These difficulties have now been effectually surmounted by the valuable contrivance known as the "clip drum," in which a sufficient bite is obtained by only half a turn of the rope round the driving drum. This very ingenious apparatus consists of a series of pairs of jaws or clips, hinged round the circumference of the driving drum close together in a continuous line, forming a complete groove all round the drum. As the rope comes in contact with the drum, each pair of clips in succession closes upon it and seizes hold of it, and continues to grip it throughout the half revolution until the rope leaves the drum; the force of grip being in all cases proportionate to the pull of the rope, and such as effectually to prevent slipping. The width of opening of the two rows of clips is adjusted for working with different sizes of ropes, by having one row centered upon the drum itself, while the other row is centered upon a ring, which is screwed upon the body of the drum by a thread chased round its entire circumference; so that by turning round this ring in either direction, the distance between the two rows of clips is simultaneously increased or diminished to exactly the same extent in every pair of clips. A working model of the clip drum was exhibited, and a full size specimen of one of the pairs of clips.

In order to allow for working fields of irregular boundary, the implement is provided with an arrangement of slack gear for taking up the slack of the rope, as the working length of the rope becomes reduced by the narrowing of the boundaries. This consists of a pair of barrels geared together with a relative

speed of five to one; so that the pulling rope, in drawing off one foot length of rope from the one barrel, winds up five feet length on the other; and thus all the slack is taken up and the rope drawn tight, before the implement can start to work. For getting heavy engines moved about over ground where no roads exist, the whole of the machinery is made so strong that it cannot be broken by the full steam power, the steam itself being thus the weakest part of the whole machine; and the width of the carrying wheels is increased to such an extent as to ensure carrying the engine over the wettest and softest ground, the width of carrying wheel having been made as much as 2½ ft. in special cases. A pair of engines of smaller size and weight are also used in some instances, placed on the opposite headlands of a field, and both constantly in action, drawing the implement backwards and forwards between them, instead of a single heavy engine at one side of the field with an anchor at the opposite side, as previously described. The first rope used for steam cultivation was made of iron wire; but this was so unsatisfactory, from its softness and want of durability, and also from its great weight and the power consequently absorbed in dragging it, as to check for a time the application of steam power to cultivation. Steel wire was then introduced for the purpose; and in consequence of its great improvements that have been effected in the machinery by which the ropes are driven, and also in the quality of the wire itself, one steel wire rope now lasts for the cultivation of from 2,000 to 4,000 acres, according to the nature of the soil and the width of the implement used. The steel wire rope at present used, of which a specimen was exhibited, is 11-16ths inch diameter, and weight about 2 lbs. per yard, running on an average 3,000 miles under a tension of 25 cwt., and costing about 2½d. per mile run. The difficulties that would arise in working engines and tackle in wet weather, from the sticky condition of some land in a half wet state, particularly clay land, are met by the power that steam gives of performing the work altogether while the land is dry; which is impossible on a clay farm with horse power alone, from the want of sufficient power to break through the hard ground until softened by rain.

For applying steam power to cultivation, the use of rotary implements has been much advocated; but these have the serious defect of striking on the hard surface of the land, and thus absorbing much power in entering it; and the work is found to be more economically done by shares or tynes entering in the softer soil below and wedging the earth off to a loose side. By the aid of steam the ordinary plough shares can now be driven at such a speed as to throw the earth sideways in a manner quite equal to the effect of any digging by hand. The principal mechanical conditions essential to the success of steam cultivation appear to be—an engine of simple construction, ample power, and sufficient width of bearing surface; a hauling apparatus with a horizontal drum of large diameter, avoiding any sharp bends of the rope; a direct pull upon the implement, with a rope of good quality and of as short a length as possible; a means of keeping the rope always tight and clear of the ground; an implement which wedges off the soil to a loose side, by means of shares or tynes following each other consecutively; and lastly, as small an amount of manual labor as is practicable. In the use of horses for ploughing, a large portion of their power is wasted in merely undoing the effect produced by their weight in treading down the soil; but with the steam plough the weight traveling over the field is less than one-third that of the horses, and is carried upon broad bearing wheels; and in consequence of a very much greater amount of force being brought to bear on the implement, the work is performed with much greater expedition and far more effectually than by horse labor, ensuring an adequate crop in all years.

As the result of some observations on the planet Jupiter, Mr. H. Huggins, F.R.A.S., observes that several lines in the spectrum of that planet indicate a powerful absorption by its atmosphere. These were compared with the lines of our atmosphere. The atmosphere of this planet contains some of the gases or vapours present in our atmosphere, but it is not identical with it in construction.

The Shape of Chimney Tops.

Dr. Gironard recently wrote as follows to the *Mondes* (an excellent weekly scientific paper, published in France, under the direction of the learned Abbe Moigno):—

"Positive experiments have demonstrated in the most complete manner the following principle:—The air in passing with force over any vessel provided with, at its surface, an orifice of small diameter, produces a vacuum in that vessel. If we place a glass receiver, provided with a small opening at its summit, or a stop-cock, upright upon a liquid, and if, by aid of a blowpipe or a tube, we blow strongly over it, the liquid will rise into the receiver and fill it. To obtain a vacuum by means of current of air, it is necessary that this should be brisk, and powerful enough to displace and carry with it the column of air standing over the orifice, and the surrounding air, and that the openings should be disposed in such a manner that the air passes over and does not enter the vessels. The vacuum obtained by currents of a produces the same effect as that obtained by an air pump. In making experiments on liquids strong insufflations made with the mouth, by aid of a blowpipe, over glass receivers of several litres capacity, and over six wide tubes, several metres high, provided with stop-cocks with narrow openings, have sufficed to make the liquids on which they were placed ascend and fill them, when after each insufflation I shut the stop-cock." [This latter precaution would evidently be unnecessary if the current of air was continuous, as in the case of the wind.]

Again, on the 19th, M. Gilbert-Charrier writes to the same periodical from Chartres, describing some further experiments made with mercury by Dr. Gironard:—

"The results has been so complete that in a tube 7 centimetres (2½ in.) high, 2 centimetres (4-5 in.) internal diameter, terminating in the form of a dome with an opening of 7 millimeters (5-18 in.) diameter, each insufflation made obliquely with the mouth by aid of a glass tube at the base of the cone, raised, displaced, and carried with it a column of air, and effected a vacuum so complete that at each blast the mercury rose in the tube to the height of 15 millimeters a column of mercury weighing 60 gram. (926 troy grs.)"

Here, says a correspondent of the *London Mining Journal*, we have the germ of an idea as to the form the summit of a chimney should take—that of a dome or cone. A bell-shaped termination to any chimney is not the right form, especially for a locomotive, in which draught is the principal element of its motive-power, encountering at high speeds a current of air equal in force to a strong gale. The tendency of the wind is to go down, and not up, a chimney with a wide orifice. In the above experiments the tube blown through was slightly inclined upwards, and in practice the wind striking against the upper part of a domed surface would pass over the orifice in an upwardly-inclined direction. It seems to me singular that the Doctors Gironard and Charrier did not think of applying the principle they demonstrated to the improvement of factory chimneys.

Commerce on the Lakes.

The commerce of the great lakes amounts at present to at least twelve hundred millions of dollars annually, and increases so rapidly that all estimates of its prospective value have hitherto fallen short of the truth. It employs about two thousand vessels and twenty thousand sailors, besides four great lines of railroad. It sends to the seaboard one hundred million bushels of grain, two million hogs, and a half a million of cattle; composing the principal part of the food of the Atlantic States and affording a large surplus for exportation. It being well known that the wheat crops of New York would hardly feed her people for one-third of the year, and that that of the New England is sufficient for only about three weeks' consumption. The cereal wealth yearly floated on these waters now exceeds one hundred million bushels. It is difficult to present a distinct idea of a quantity so enormous. Suffice is to say that the portion of it (about two-thirds) moving to market on the Erie and Oswego canals requires a line of boats more than forty miles long to carry it.

On the lakes it requires a fleet of five thousand vessels, carrying twenty thousand bushels each. If loaded in railroad cars of the usual capacity, it would

take two hundred and fifty thousand miles in length. The four great lines from the lake to the seaboard would each have to run four hundred cars a day for half the year to carry this grain to market. This grain trade is a new fact in his history of man. In quantity it already much exceeds the whole export of cereals from Russia, the great compeer of the United States, whose total export of cereals was, in 1857 but forty-nine million bushels, being less than half the amount carried in 1864 upon the American lakes. It was the constant aim of ancient Rome, even in the zenith of its power, to provision the capitol and its adjacent provinces from the outlying portions of the empire. The yearly crop, contributed by Egypt, was fifteen million bushels. Under the prudent administration of the Emperor Severus, a large store of corn was accumulated and kept on hand, sufficient to guard the empire from famine for seven years. The product of 1860 in the five Lake States of Ohio, Michigan, Indiana, Illinois, and Wisconsin, was three hundred and fifty-four million bushels.

Testing the Telegraph Cable.

The *London Telegraph* in an article on the new cable for the Atlantic telegraph gives this account of the manner in which it is tested:—"It seems impossible that there can be any fault in the Atlantic cable when the Great Eastern goes to sea. To say nothing of the tests applied to it at the manufactory, it is tested not alone after it has been taken on board, but during its delivery into the ship. As soon as a length is brought alongside, one end is connected with the coils already on board, and the other end with the instruments in the testing room. The circuit is thus made through the whole extent of the coil—the portion on board and the portion alongside. The process of hauling in then commences, and the insulation is continuously observed. The instruments in the testing-room record the smallest deviation from absolutely perfect insulation. It will be understood that an insulation which shall be quite perfect, as an electrician understands the word, is not attainable. A piece of metal separated by means of the purest glass, and enclosed in the driest atmosphere that can be obtained, will, if charged with electricity, lose that electricity after a time. In speaking of insulation we must therefore be understood to mean an approximate condition; but the approximation in the case of the new Atlantic cable comes so near to perfection that this rough tarry rope is a scientific wonder.

"The last dying pulsation of the old Atlantic cable was forced through by means of a galvanic battery consisting of two hundred and forty cells. The submarine telegraph from London to Amsterdam is habitually worked with a battery of fifty cells, and such a battery is commonly used for the other submarine lines to Europe. Signals have been repeatedly sent through more than thirteen hundred miles of the cable now on board the Great Eastern by means of one cell. Galvanic currents so feeble that they could not have been felt by the hand, and might have been passed harmlessly through a circuit completed by the operator's tongue can be used to convey messages along a length of cable that should very nearly stretch from London to St. Petersburg. Over needle instruments such as those in ordinary use for land telegraph a current from one cell would be powerless.

"To record such faint pulsations of electricity it is necessary to use Professor Thompson's mirror galvanometer. This beautiful instrument consists of a mirror about the size of a fourpenny piece, made of microscope glass, and so thin that it weighs only a grain. On the back of this mirror a minute magnet is fixed, and thus supplemented it is suspended by a silken fiber in the heart of a coil of wire, so that any current passing through the coil deflects the magnet and the mirror along with it. A ray of light reflected by the mirror falls on a scale, distant about eighteen or twenty inches, and reveals its faintest movements. Different combinations of these movements represent the different letters of the alphabet, and thus the apparently erratic wanderings of a ray of light are made to convey intelligence. An instrument of this kind is constantly used to test the cable, as it is hauled on board; and if any fault had existed it could not have passed without detection. Up to this time, when there are on board the ship and

alongside, one thousand nine hundred and seventy miles of cable, no fault has been discovered."

The Telegraph Cable Completed.

The Atlantic telegraph cable was completed on the 29th. The completion was witnessed by a numerous and distinguished party, and as the end was deposited in the tank hearty cheers were given. The company then adjourned to the Ship Tavern, where a sumptuous banquet was given in honor of the event by the Telegraph Construction and Maintenance Company (late Glass, Elliott & Co.), the makers of the cable.

The cable has been made on an average at the rate of seventeen miles per day complete, and in some days its outside covering of hemp and iron has been overlaid at the rate of one hundred and seventy-three miles a day, through not a fathom or a foot has been manufactured without every part being kept under constant test for "conductivity" and insulation, and to this hour it is as regularly tested as it was a year ago when the first mile was twisted. It is believed that the *Great Eastern* will start in the very early part of July, and certainly, if possible, not later than the 10th. With her will also sail her Majesty's ship *Terrible* and another paddle wheel steam frigate of great power not yet chosen, but which, like the *Terrible*, will give towing aid to the *Great Eastern* in case of mishaps to her machinery, either screw or paddle. Every care has been taken to get these engines into the highest state of good working order; but it cannot be denied that the very possibility of their breaking down is looked upon with something like anxiety. They will certainly not be overtaken, as it is intended, if possible, not to let the vessel go beyond a speed of six knots, a minimum of velocity which it will be difficult to keep to if steerage way is wanted quickly, and which will, be found absolutely impossible to retain in a seaway. On this occasion, however, the middle of July is chosen as being thought even more favorable in point of weather than the middle of June, when the last *Agamemnon* cruise was commenced. Captain Anderson, is in favor of starting towards the early part of July, and his long experience in command of the *China* has very properly induced the directors to give every weight to his opinion. In addition to Captain Anderson, all the officers connected with the ship, with the exception of the chief engineer, have been chosen from the Cunard service. With ordinarily fair weather, and steaming at the rate of six knots, it is expected that the voyage from Valentia to the Bay of Hearts' Content, in Newfoundland, will occupy from twelve to fourteen days, during every hour of which regular communication will be kept up with England.

Tropical Vegetation.

A correspondent of the *Boston Commonwealth* says:—

"I have been a little astonished at tropical vegetation; taken as a whole, in differs externally very little from temperate in appearance. The palms, canes and vines alone would distinguish it as a superficial observer. The palms are almost all along the water-side, the cocoa-palms only grow by the sea. The prettiest plants are the banana-plants, which have broad, light-green leaves, which are so very tender that the wind often breaks the leaf on each side of the midrib into fringes. The male flower is shaped like a top, and hangs down some distance below the bunch in the early stages of the fruit. The palms are shorter in the trunk than those you generally see in pictures. The leaves of the palm are something like a fern, but are hard and woolly. The leaf-sheath is fibrous, and in texture like woven-cloth. The best dishes they have here are frijoles, a kind of red bean, and fried plantains, which I liked very much. They taste between a sweet-potato and a peach."

REDUCTION IN TERMS.

With a view to encourage the formation of "Clubs" for the ensuing volume of the *SCIENTIFIC AMERICAN*, we offer to take subscriptions in Clubs of ten or more at \$2 50 per annum. We trust that our friends will set themselves to work to get up Clubs at the rate here proposed.

A RAILWAY train recently ran into a water spout in Scotland, causing great consternation among the passengers.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Circular Oven.—This invention consists in an endless arch or channel divided into a series of distinct sections, each of which is provided with openings for introducing the fuel and the materials to be burned, and communicates through a radiating flue with an annular smoke chamber, in combination with suitable slides or movable partition and with a central smoke stack communicating with said annular smoke chamber by four (more or less) passages, in such a manner that brick or other material introduced into the several sections of the kiln can be gradually heated and cooled, and the operation of the kiln can be continued for any length of time with great economy in fuel. T. E. Hoffmann, of Berlin, Prussia is the inventor.

Grain Separator.—This invention relates to a grain separator for separating impurities from thrashed grain, and also for separating oats from wheat. It consists in a novel and improved means for operating or communicating a shake-motion to a shoe containing a series of screens, and also in a novel arrangement of said screens within the shoe as well as in the manner of hanging the shoe and a screen below it, whereby the device is prevented from becoming choked or clogged and made to operate far more efficiently than the ordinary separators in use. S. K. Ayres, of Delton, Wis.

Roller for Trunks.—This invention consists in mounting the roller on a flexible plate with lugs which can be spread or sprung open to admit the roller, if it is desirable, in such a manner that the roller can be either used as a plain bottom roller or that it can be applied to the corner by securing one end of the plate to the bottom, and turning its other end up over the edge and securing it to the side of the trunk, as may be desirable. John Schmadel and John A. Lieb, of Newark, N. J., are the inventors.

Boy's Sled.—This invention relates to a an improved sled for children, and it consists in constructing the sled in such a manner that it may be extended or enlarged, as may be desired, in order to hold a greater or less number of boys; and it also consists in an improved brake for checking the speed or stopping the sled when necessary; and further, in an improved guiding or steering apparatus. D. G. Hussey, of Nantucket, Mass., is the inventor.

USEFUL RECEIPTS.

TO POWDER CAMPHOR.—Camphor may be beaten in a mortar for some time, without being reduced to powder, but if it be first broken with the pestle, and then sprinkled with a few drops of spirit of wine, it may be readily pulverized. Powdered camphor is much used in tooth powders, fireworks, etc.

PORTABLE LEMONADE.—Tartaric or citric acid 1 oz.; finely-powdered loaf sugar $\frac{1}{2}$ lbs.; essence of lemon 20 drops; mix; 2 or 3 teaspoonfuls make a very pleasant glass of extemporaneous lemonade; also powdered sugar 4 lbs.; citric or tartaric acid 1 oz.; essence of lemon 2 dr.; mix well. As last. Very sweet and agreeable.

FURNITURE, PASTE.—Turpentine 1 pint; alkanet root $\frac{1}{2}$ oz.; digest until sufficiently colored, then add beeswax, scraped small, 4 oz.; put the vessel into hot water, and stir until dissolved. If wanted pale, the alkanet should be omitted.

FUMIGATING PASTILLES.—Powdered gum benzoin 16 parts; balsam of tolu and powdered sandal wood, of each 4 parts; a light charcoal (Linden) 48 parts; powdered tragacanth and true labdanum, of each 1 part; powdered nitre and gum arabic, of each 2 parts; cinnamon water 12 parts; heat to a smooth ductile mass, form into small cones with a flat tripod base, and dry in the air.

PINK SAUCERS.—Well washed safflower 8 oz.; carbonate of soda 2 oz.; water 2 gallons; infuse, strain, add French chalk, scraped fine with Dutch rushes, 4 lbs.; mix well, and precipitate the color on it by adding a solution of tartaric acid; collect the red powder, drain, add a very small quantity of gum, and apply the paste to the saucers. Less chalk may be used for a very fine article.

Improved Hydraulic Motor.

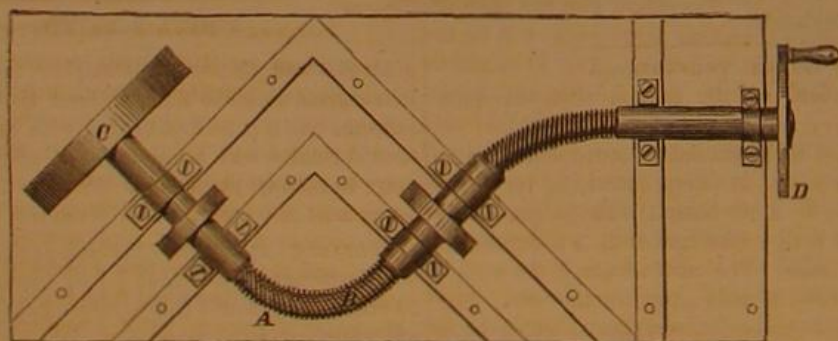
In this machine Mr. Welham claims to have utilized the whole power of the water. In an interview with him he stated that, being convinced that the full force of any stream could be employed, he designed this arrangement to effect the object. The machine, in detail, consists of right and left-handed screws, A, in the case, B, to which water is admitted through the opening—as shown by the arrows. After propelling the first screws, the water passes through the opening, C, into another case containing more screws, when whatever force remains in the water is taken up by it. A third case and a third set of screws is provided, but in this instance the water enters at the center and discharges at each end. Any number of cases and screws may thus be employed and act with useful effect; the end of each cylinder or screw is prolonged into a shaft on which there is a pulley to transmit power.

We have given the inventor's views of this machine, and not our own. One of them may be seen running at the aqueduct bridge, Georgetown, D. C., where a series of experiments are being made with it.

It was patented on May 31, 1864, by Thomas Welham; for further information address him at 100 Broadway, New York.

Method of Transmitting Power.

It is well known to mechanists that in order to transmit power at right angles it is necessary to use bevel gearing, universal joints or similar devices. These consume power, and in the case of gearing make a great deal of noise and jar, which render delicate operations impossible in their vicinity.

**WELHAM'S METHOD OF TRANSMITTING POWER.**

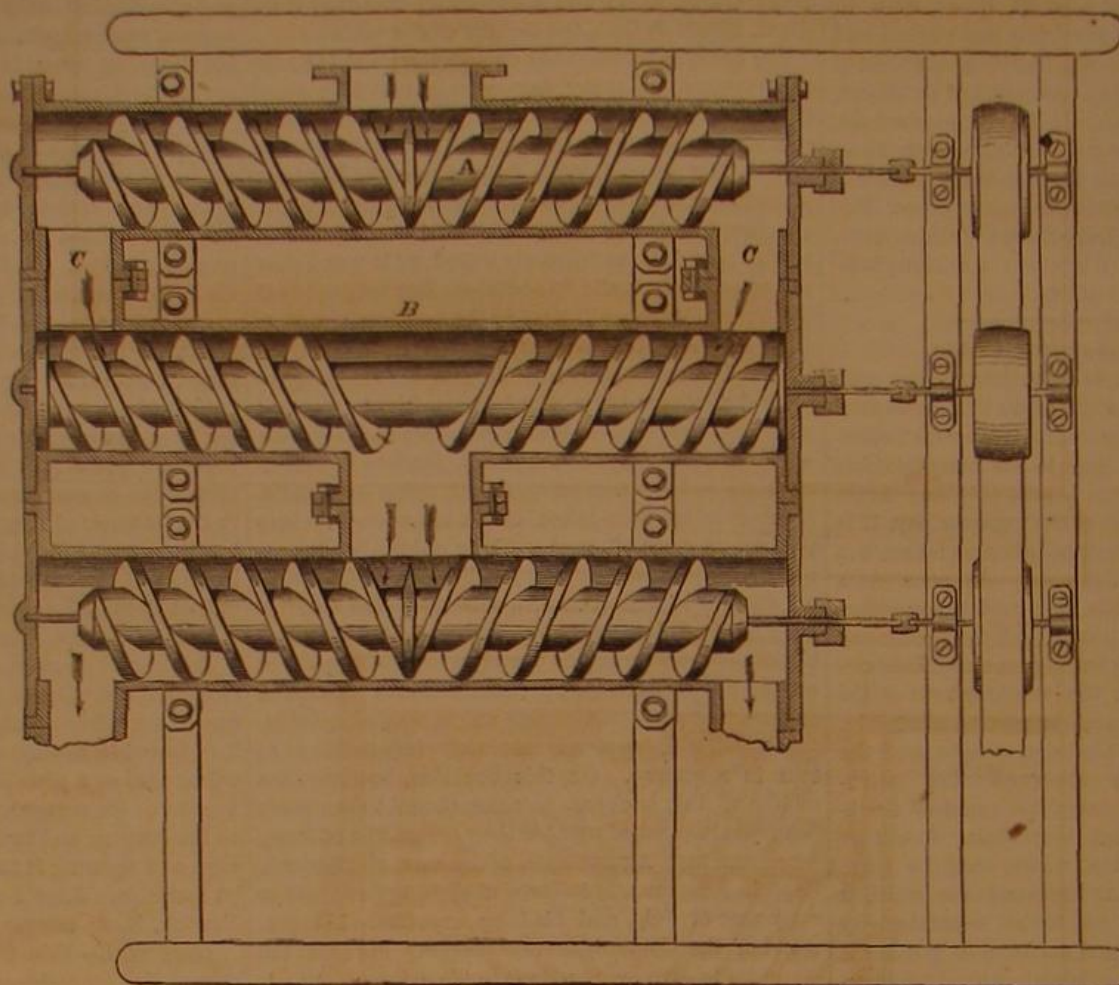
The inventor of this arrangement claims that it is an efficient and useful substitute for gearing; that it is wholly noiseless, may be used at any angle, requires no adjustment or lining up, and in all other respects desirable. In construction it is simply an elastic shaft, A, composed of rubber strengthened with canvas, or of gutta percha, and surrounded externally with a wire, B, to preserve its rigidity when under strain; C is a pulley standing obliquely with the prime motor, D, from whence the power is derived. It is claimed that by this device a simple and efficient transmitter of power is obtained.

This invention was patented by Thomas Welham, on Jan. 31, 1865; for further information address him at 100 Broadway, New York.

Improved Rotary Countersink.

Those persons who have undergone the delightful

experience of tooth-filling and plugging in all its varied details, will appreciate anything that tends to alleviate their sufferings. Dentists will know how to value the instrument here illustrated, for by the use of it the work is much expedited and more perfectly executed. It also saves the patient from fatigue, lessens the flow of saliva from this cause, and is, in other obvious points, a desirable improvement on the common instrument. By the simple adoption

**WELHAM'S HYDRAULIC MOTOR.**

of two small bevel wheels, the rose head or countersink, is caused to revolve, thus cutting away the decayed parts very rapidly and producing a much better artificial cavity in a shorter time, for the introduction of the filling, than is possible with the old-fashioned

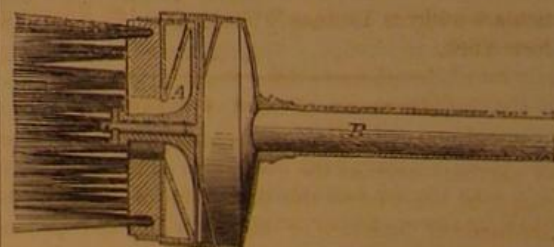
Engineer says:—"The growing application of the Bessemer system to the production of steel, with the much larger attention that is being paid now than has been paid for some time past to the application of steel to uses before assigned to iron, is occasioning a growing demand in South Staffordshire. Mr. Clayton, at Westbromwich, is now erecting eighteen furnaces, at the works of the Dowlais Company, twenty-four at the Barrow Steel Works, is making castings for six at Ebbw Vale, is on with the third lot for Messrs. John Brown & Co., Sheffield, and after putting up twenty-two for Messrs. Cammell & Co., at the Cyclops Works, in the same town, is now putting up six for the Yorkshire Steel and Iron works of the same firm at Penitine. The same maker is also putting up furnaces at the Lancaster Steel Works, Gorton-lane, and at the Gibraltar Works, Newton Heath. These furnaces are all for smelting iron to make steel or for the heating of ingots of steel."

HYDRAULIC BRUSH.

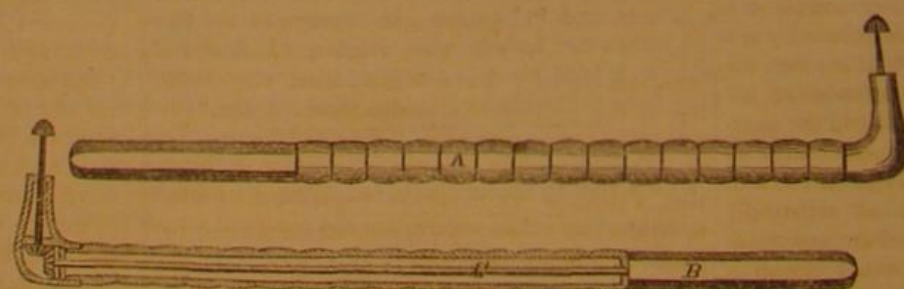
This is one of the most decided novelties in the way of brushes that we have seen in a long time. It is not only novel but useful, and can be employed with great advantage in many places. It is simply a brush constructed with a small turbine wheel, A, at the back and set in a proper frame, so that when the stream of water, which is forced

through the hose, B, comes in contact with the wheel the brush will revolve with great velocity and considerable power. For cleaning carriages, windows, wood-work of any kind, or machinery, this brush will be found valuable, for the rotary action of the brush, in connection with the water, causes it to perform with unsurpassed rapidity and effect.

Since the brush revolves the bristles are always



worn evenly to the butt, and it lasts much longer than a common "Turk's head" brush, which is generally used for washing windows. We think this a valuable and useful novelty. It was patented on Jan. 31, 1865, by Thomas Welham, of Baltimore, Md. For further information address him at 100 Broadway, New York.

**WELHAM'S ROTARY COUNTERSINK.**

tion; for further information address Thomas Welham, No. 100 Broadway, New York.

Extension of the Bessemer Manufacture.
The Birmingham correspondent of the London

A PUMP WHICH CATTLE CAN WORK THEMSELVES.—Mr. Cousins, of London, has invented a pump by which cattle can water themselves without human aid. The water is forced up by the weight of the animal operating on a platform which sinks down a certain distance by its weight, causing the water to rise in the pump and to flow out to the extent of three pailsful. As soon as one has slaked its thirst, another

takes its place on the platform which brings up another supply, and so on till all the flock are watered. This is a labor saving affair, certainly.—*Canada Farmer*
[There are several patents on such pumps in this country.—Eds.]

Improved Steam or Gas Engine.

These engravings represent Welham's steam or gas engine, which consists of two right and left hand screws, A, set in a case or cylinder, B. These cylinders are placed in the boiler, C, and receive steam therefrom.

One of the cylinders has a central flange, D, upon it, against which the other cylinder works; the alternate action of both, in contrary directions, tending to balance the pressure on the cylinder, so that it is not all thrown on one end of it.

The steam enters the case, B, at E; and after passing its length, issues into the other cylinder, F, and finally through an opening into the atmosphere when used as a high pressure engine, or into a condenser when used at low pressure.

The screws are both connected by gearing, H, so that their rotation is balanced or equilibrated. By inclosing the cylinders in the boiler, the latter serves as a steam jacket to prevent radiation and condensation, and renders the usual fittings of pipes, etc., unnecessary. A pulley, I, is fixed on one end to transmit power from the revolving screw, to any machine it is desired to drive.

Fig. 3 shows an end section of the boiler and cylinder, wherein the positions of the several parts are given; the screws are double or triple threaded, as required; a double thread is preferable on account of the greater area and steam space left available. Any desired number of screws may be used, and the proportions and pitch vary with the work to be done.

This engine was patented on Jan. 31, 1865, by Thomas Welham, of Baltimore, Md. For further particulars address Thomas Welham, No. 100 Broadway, New York.

German Wood Carving.

Some of the more delicate and elaborate specimens of carving—such as the groups for chimney-piece ornaments, honored by the protection of glass shades, are made of lime-tree or linden wood, by the peasants of Oberammergau, in the mountain parts of Bavaria. There were specimens of these kinds of work at our exhibitions which could not have been produced in England at thrice the price; our good carvers are few, and their services are in request at good wages for mediæval church-work. We should be curious to know what an English carver would require to be paid for a half guinea Bavarian group, now before us—a Tyrolean mountaineer seated on a rock, his rifle resting on his arm, the studded nails in his climbing shoes, a dead chamois at his feet, his wife leaning her hand lightly on his shoulder, his thumb pointing over his shoulder to denote the quarter where he shot the chamois, his wooden bowl of porridge held on his left knee, the easy fit and flow of garments of both man and woman—all artistically grouped and nicely cut, and looking clean and white in linden-wood. No English carver would dream of such a thing at such a price.—*All the Year Round*.

[Patents have recently been issued to parties for a material composed of wood, dust and other ingredients, which can be molded into any shape or form, however intricate, and retain the same when removed from the mold. In this way beautiful carving, which would cost immense sums if executed in

the ordinary way, can be afforded for a small sum.—Eds.

The Shunt Gun Tried and Condemned.

Our predictions with regard to the ultimate destiny of the shunt system have been singularly and com-

pletely verified. After a protracted trial, it has at length had that verdict pronounced upon it which we from the first specified. The shunt gun has been definitely abandoned, and no large guns will for the future be rifled on that principle. The 64-pounders which have so very recently been finished and issued to the royal navy, have utterly failed on trial on board ship. The shot with the hollow head did not travel in a straight course, and were found to break up on impact, or even by a fall upon the ship's deck. The intention now is to make new shot, which are to be hollow in the rear. The shells from this naval 64-pounder have been found to burst prematurely in the gun, and in one gun, on board the "Excellent," the rifling was entirely destroyed from this cause. A second gun was also seriously damaged by a similar premature explosion of the shell. The rifling of the French gun, which has a gaining twist, has been strongly recommended by the Ordnance Select Committee, for naval guns. The committee, however, states that it will be necessary to introduce sundry modifications, which it is now engaged in carrying out, previously to applying the system to the naval guns, of 7, 8, and 9 in. bore, weighing 6½, 8, and 12½ tons, respectively. The new gun, constructed according to the committee's modifications of the French rifling, is to be called the "Woolwich" gun. This, then, is the present position of matters in this respect, a position which speaks so plainly for itself as to render more than superfluous any comment on our part.—*Mechanics' Magazine*.

Annealing in Closed Vessels.

At a recent meeting of the French Society of Civil Engineers, Mr. Julien, in the course of a discussion remarked:—"The most interesting result of M. Fremy's researches is that all commercial irons and steels contain nitrogen, absorbed in the successive

heatings they have undergone; annealing in a closed vessel makes sheet irons infinitely more supple than reheating in open air. Steel manufacturers should profit by this investigation to reheat in a closed vessel the sheet metals and all fine steels."

An English Breech-loader.

A new gun of this description has been recently patented by the Messrs. Powell & Son, of Birmingham. The principle upon which it is constructed and acts is as simple, and, at the same time, as complete as can be conceived. Between the hammers there is placed a lever with a thumb-bit on the end; on raising the bit the barrels are released and rise by their own weight; one of Eley's cartridge cases is inserted, and on shutting down the barrels they lock themselves. The mechanism in the body of the gun is one piece with the lever; there are no small bolts or other delicate contrivances, doubtful in their operation; the whole is as solid and substantial as the hammer. The patent may be said to consist of a lever and a double spring in the action, applied through the top of the stock. The simplicity of construction of this implement will much diminish the chances of its getting out of order, and the invention has already attracted much attention.—*London Times*.

[This seems to be a sporting gun, as the *Times* speaks of barrels.—Eds.]

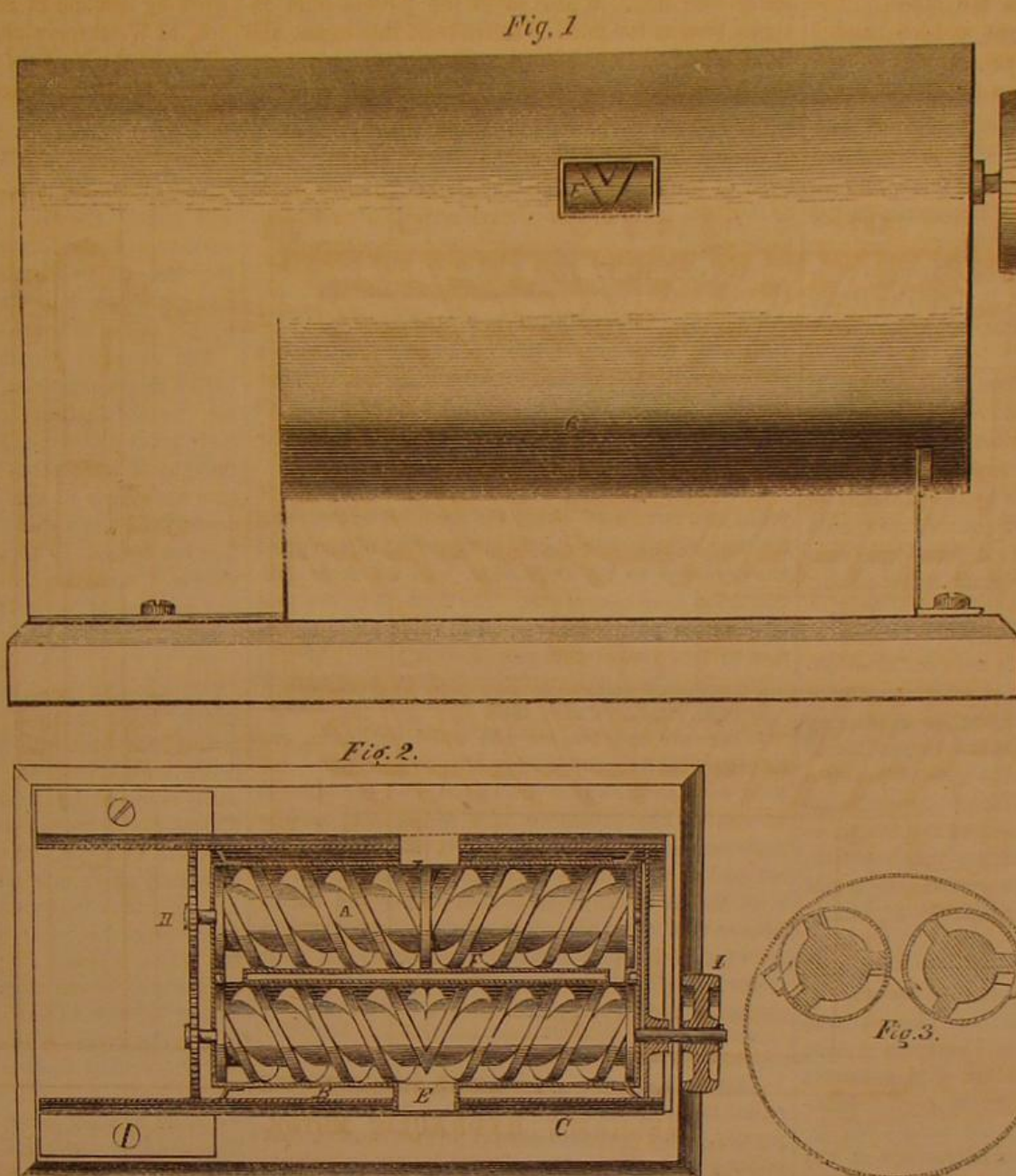
Cabbage Plants in Three Days.

Mrs. Paull, of Mich., thus relates, in the *Rural New Yorker*, how she raised cabbage plants in three days:—

"I took a box six inches deep and of sufficient size to hold all the plants I wanted. Then I selected stones of the size of a hen's egg, enough to cover the bottom of the box, and poured hot water on them, and at the same time I had earth (good, rich, garden mould,) in an old dripping pan, heating on the top of the stove, which I heat hot enough to kill all seeds of weeds and insects.

"When all was hot enough, I placed the stones on the bottom of the box, and put the hot earth on top of the stones, and then filled the box with cold earth. Then I made a print with the tip of my finger where I wanted each plant to stand, put two seeds in a place for fear all might not come up, pressed them into the earth and cover them sufficiently deep. Then I took the green leaves of the plant and laid all over them, and set the box in a chair in my cook room. I had some fire in the stove for about half a day, and the rest of the time there was none; and when they had been planted nineteen hours and a half, I raised the leaves and most all of them had come up, but the leaves were not yet expanded. I did not put them in the sun immediately, but kept them in the shade until the third day. I now have as nice, healthy looking plants as any one could ask for.

A MONSTER pig trough has been manufactured at Dorchester, for a swinery in England. The trough is 500 feet long, and shaped like a horse-shoe. Two thousand pigs will be able to feed out of it at one time.



WELHAM'S STEAM OR GAS ENGINE.

Correspondence

Transporting Power by Electricity.

MESSRS. EDITORS:—Water power, it is well known, is often inconveniently situated for manufacturing purposes. Now, why could not such power be employed to drive one or more electro-magnetic machines placed in the immediate neighborhood, and the electricity thus induced carried over insulated conductors to almost any distance, and finally, where the power is required, into a proper apparatus for the decomposition of water or other liquid.

The gases generated might then be consumed in a gas engine—one perhaps, similar to Lewis's—either mixed or unmixed with other gases, as experiments would determine.

This is offered rather as a question than otherwise, but if, electro-magnetic machines are not too expensive, and have reached such perfection in construction, as to give nearly the power expended in driving them, in an electric current, then by the principle of the correlation of forces now recognized, we should have ultimately—allowing the usual loss—from one-half to three-fourths of the original water-power.

E. L.

Hackettstown, N. J., June 7, 1865.

[Very sensible, and all sound, if the conditions obtained, but they do not. Electro-magnetic machines do not give nearly the power expended in driving them, and probably never will, as it is impossible to convey, or even produce electricity without losing a large part of it. The nearer and more direct the application of power after it is generated the better, as every change in form or distinction involves loss; even the turning of a corner with a bevel gear is said to consume some four or five per cent in friction.—Eds.]

A Microscope in a Spectacle Bow.

MESSRS. EDITORS:—Spectacles for persons who have lost the sight of one eye, and who are obliged to use glasses, may have in one bow a glass to suit the sight, and in the other a microscopic or magnifying glass. Such a glass would not make a bad appearance, and could be used as a microscope at any time by taking the glasses from the face and holding the lens in a proper position for the eye that has the sight. The use of a microscope is certainly a great pleasure; to look into a flower with one and see its beautiful colors and constructions would certainly repay all one costs. I think microscopes should be used by every one; the cost is so little for a pocket one, and it can be carried so handily. Their use would lead to the examination of every minute object that attracts attention, and also to close observation, by which alone good practical knowledge is obtained. It is by such means our greatest discoveries are first made. How often we pass over beds of mineral wealth without knowing anything of their value; but if in the habit of using a microscope their usefulness might be discovered. I would recommend all persons to use one; it will be found a great source of pleasure and would give an insight to the minute objects in nature which cannot be obtained in any other way. Its refining influence upon the mind cannot be too highly valued.

This is but a small matter, so I shall not claim a patent for it; but if it is original—which it is with me—and useful, I would like to have the credit.

I have written the above in consequence of your asking for contributions. I think, with you, there are few that cannot suggest something of use to the world, and I further think that no one has a right to live a life time without doing so.

A. PURVES.

Philadelphia, Pa., June 9, 1865.

Trial of Copper Cartridges.

MESSRS. EDITORS:—The question of the failure of the copper cartridges, which is being discussed in the SCIENTIFIC AMERICAN, is one of very great importance. I take the liberty to suggest the following mode of ascertaining the facts, without waiting for the winter months in which to test the question. My suggestion is, that a sufficient number of the

best cartridges be placed on ice, in an ice-chest and in a cold cellar. India-rubber cloth could be placed between the ice and the cartridges, if desired. It is well known that wetting these cartridges will not prevent their explosion in summer. The theory of Mr. Cleaveland is that the cold weather of winter so condenses the air contained in the powder that the fulminating material is made damp and will not explode.

It seems to me that the above process would demonstrate the facts in the case. By keeping the cartridges on the ice for some time and then trying them in the cold temperature of the cellar, before the contents of the cartridge had any chance to grow warm or dry, the truth of Mr. Cleaveland's theory could be ascertained.

A READER.

Peterboro', N. Y., June 6, 1865.

Petroleum for Gas.

MESSRS. EDITORS:—Some weeks ago you made a statement in the SCIENTIFIC AMERICAN that "if petroleum could be used on gas works so as not to fill up the pipes," it would obviate the difficulty heretofore existing in using it for that purpose.

I have been putting up gas works for the past five years and have used either the crude oil or that with the naphtha removed, and no stopping up of the pipes has occurred to my knowledge, and no more condensation than in coal gas. The light from one foot of gas from petroleum is equal in value for illumination to four feet of coal gas.

J. C. APPLETON.

Boston, Mass., June 5, 1865.

[There are only two ways in which petroleum can be prevented from condensing after evaporation—one is by burning the vapor while hot, and the other is to convert the substance into permanent gases by destructive distillation. The first method is easily effected in a kerosene lamp; the success of the second plan is so improbable that people will hardly believe that it has been done except upon the authority of a series of experiments conducted by some disinterested person who is sufficiently well known to command confidence.—Eds.]

Latent Heat from Condensation.

MESSRS. EDITORS:—My attention has been lately called to a scientific question, which has puzzled me greatly, and I therefore send it to you, hoping that either you or some one of your numerous readers will answer it through your columns. It is a well-known fact that the condensation of steam in pipes sets free an immense amount of latent heat, while in the atmosphere, on a much larger scale, condensation goes on, but reversely, produces cold.

The question is, as the condensation of vapor in pipes produces so much heat, why, on the same principle, does not condensation in the atmosphere produce a correspondingly greater amount of heat?

T. E. K.

Richmond, Ind., June 4, 1865.

[What grounds has our correspondent for supposing that condensation in the atmosphere produces cold? That is the only thing that puzzle us in the matter.—Eds.]

The San Francisco Clock.

MESSRS. EDITORS:—Having read a couple of articles in your paper about the Montgomery-street clock, in San Francisco, I am induced to send you the following. The clock was called "the mysterious clock," and it kept the correct time of San Francisco. I saw it in 1857. There were three visible pieces—a piece of glass about twenty inches square and one-fourth of an inch thick, and two hands. The minute hand was formed at the butt like the stock of a rifle. At the butt or short end it was about five-eighths of an inch wide, five-eighths of an inch thick, and an inch and a quarter long, and hollow. This box contained the works that drove the hands round a pin in the center of the glass. The works were not visible. There were two holes in the top of the glass, near the edge, through which two common hooks were passed, and these hooks hung on a round brass rod that ran across the window. Any one could see through the glass, and see there was no secret connection, only what might be in the butt end of the minute hand. The figures were in gilt, and on the glass.

T. D.

Albany, June 10, 1865.

Improvement in Microscopes Wanted.

MESSRS. EDITORS:—Is it not a surprising circumstance that the inventive genius of our time has never been turned to the improvement and increase of the mechanical contrivances for the grinding and polishing of lenses for the microscope? Even so early as the day of Descartes, mathematicians demonstrated how the main imperfections incident to the use of all lenses whose curves were sections of the sphere could be evaded by other curves, and yet no invention has ever been made by means of which such other curves could be obtained.

Such curves are the ellipsoidal and hyperbolic, either of which, it is demonstrated to a certainty, will totally overcome all spherical aberration and curvature of the image, while by accomplishing this they free us from other difficulties and defects of compound lenses incident to our present grossly imperfect modes of overcoming the former.

The so-called "opticians" of our day, with perhaps a single exception, are, my experience convinces me, totally destitute of the inventive qualities of their great prototype, Fraunhofer, and I have long thought it were worth while for some mechanic to turn his efforts in this direction. Success would no doubt yield him a standing in the scientific estimation not second to that of the great and original worker I have named—would yield him a position any man might be justified in coveting.

RUFUS KING BROWNE.

No. 12 East Sixteenth street.

[We know of no department in any of the arts to which more thought, intelligence and inventive genius has been directed than that of grinding lenses for microscopes. While spherical curves are easily obtained by the simple rotation of circles, the difficulty of forming other curves with the perfection requisite in a lens, our correspondent would perhaps more fully appreciate after he had made the attempt. An important improvement in grinding lenses for microscopes has recently been made in this city by Mr. Wales, a young Englishman. His objectives are pronounced by our most eminent microscopists decidedly superior to any made abroad. Indeed, some careful observers say that the definition obtained by Mr. Wales's combination of $\frac{1}{10}$ ths focus superior to that of Smith & Beck's $\frac{1}{10}$ th. Our correspondent can see some of these lenses by calling at the store of S. Hammond, importer and repairer of fine watches, No. 41 William street.—Eds.]

The Perpetual Motion Clock.

MESSRS. EDITORS:—Your New Zealand correspondent is mistaken in assuming the so-called "perpetual motion clock" described by him, to be "new to all the world." About fifteen years ago, my father, John M. Patton, of Milton, Northumberland County, Pa., invented and had constructed a clock, operating upon exactly the same principle, viz., the expansion and contraction of the atmosphere from natural changes in its temperature. It consisted in the main of a cylindrical reservoir, in which was inverted another open-mouthed cylinder of smaller diameter. Olive oil was poured in the outer cylinder to form a packing between the two. Suitable guides were attached to keep the interior reservoir concentric to the outer one. Upon the head of the center cylinder a double rack was erected, which drove clock gear of the lepene style. This wound a spring, in which was stored power to continuously drive the time-computing gear. This clock ran about two years; it then stopped, from mechanical imperfections. Portions of it are now in my possession.

WILLIAM P. PATTON.

Harrisburg, Pa., June 12, 1865.

A SERIOUS explosion of petroleum took place recently at the works of Messrs. Charles Price and Co., at Frith, Eng. A workman held a naked lamp over some petroleum oil, in order that he might note the index which marked the rise of the liquid, before putting the cover over the retort. An explosion was the consequence, and three men were seriously injured about the head and face thereby.

A CAR has been contrived for the transportation of butter. It has an inside lining of inch board, with a space of three inches left, which is filled with sawdust.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening June 8, 1865, the President, S. D. Tillman, Esq., in the chair.

IMPROVED GUN LOCK.

Mr. W. H. Baker, of Marathon, N. Y., exhibited a gun lock in which the main spring was placed directly under the cock upon the outside of the lock.

Mr. Blanchard remarked that the improvement made an extremely simple lock, and obviated the necessity of cutting away the stock to as great an extent as in other locks.

IMPROVED SADDLE TREE.

Mr. W. H. Disbrow, of this city, presented an improved saddle tree made of leather and strengthened by straps of steel. The advantage is in the elasticity by which the saddle adapts itself to the form of the horse's back; it is also several pounds lighter than the wooden tree. Mr. Disbrow said that he had used it extensively in his riding school, and that it never chafes a horse's back.

SLAUGHTER HOUSES NOT INJURIOUS TO HEALTH.

Col. Devoe read a long paper on slaughter houses, giving a history of their establishment in Europe and in this country, citing the ordinances in relation to them in this city from the first one in 1636. A large portion of the paper was devoted to an examination of the question whether slaughter houses are injurious to health, and the argument in the negative was sustained by a very formidable array of facts. It was shown that some wards in this city have as low a rate of mortality as the country districts, only 17 in the 1,000 annually, while in other wards the annual mortality is over 60 in the 1,000, and that the healthiest wards are those in which there are the largest number of slaughter houses. Statistics were also produced of the deaths resulting from yellow fever and cholera during the several ravages of those epidemics, showing a remarkable exemption from the disease among butchers and those living in the vicinity of slaughter houses. The famous report of the French commission, was, of course, cited, containing the statement that not only butchers, but the workers in animal offal in the city of Paris have quite as low a rate of mortality as any other portion of the community.

One of the most interesting facts brought out was the extreme unhealthfulness of our tenement houses. In one of these containing 329 persons the average sickness all the time was 1 in 3, and the average annual mortality 105 in the 1000. All the sickly wards are those in which the inhabitants are crowded, while the healthy ones are invariably those inhabited by the more wealthy portions of the people, among whom there is no crowding.

BALANCED SLIDE VALVE.

Mr. Charles E. Emery, an engineer in the U. S. Navy, exhibited a balanced slide valve, which seems to be one of the most promising that has yet been invented. A hole is cut in the back of the steam chest directly over the valve, and is covered by a plate which is connected with the valve by a rigid stem. It will be seen that the valve and plate both wear in the same direction, so there is no tendency to produce a leak.

FAIR OF THE AMERICAN INSTITUTE.

The President remarked that as this was the last meeting before the summer recess, he would announce that the managers of the American Institute had decided to hold a fair in the fall; the grounds of Palace Garden, corner of 14th street and 6th Avenue, have been secured; and the fair will be opened on the 14th of September. Preparations will be made for running machinery, and an unusual display of novel machines is anticipated.

ADJOURNMENT FOR THE SUMMER.

The Association then adjourned to the 21st of September, when the novelties of the fair will be the regular subject for discussion.

ESPARTO, or Spanish grass, is now extensively used in papermaking. Great quantities of this grass are brought into the Tyne by ships from Spain, and stored in the Tyne Dock of the North Eastern Railway Company, whence it is despatched by rail to all the papermaking districts in the kingdom.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, June 13th, the President, N. C. Ely, Esq., in the chair.

BIRDS AND INSECTS.

Dr. Trimble said that he had recently visited the grounds of the Pennsylvania Hospital for the Insane, at Philadelphia, where the good effects of protecting birds are very strikingly exhibited. About fifty acres are inclosed by a high stone wall, and for twenty-five years no one has been allowed to discharge a gun on the grounds excepting Dr. Trimble, who, for scientific examination, has been allowed to shoot two or three birds not to be found elsewhere. In consequence of this protection, all the birds that will live there are found in the inclosure in great numbers. There are cherry trees in the grounds, and when the cherries first began to turn red the trees were swarming with birds, especially the grackle, or crow blackbird. But they soon became cloyed with the fruit, and by the time the cherries were ripe had almost entirely ceased to eat them. Dr. Trimble visited the grounds in company with a number of naturalists, and they made a search for worms, but none were to be found; the birds had exterminated them. Two crow blackbirds were shot and their crops examined; not a fragment of cherry was found in either, but the crops were filled with water beetles from the neighboring marshes, showing that the birds had learned to come to this inclosure for protection, even when they were obliged to seek their food elsewhere.

PRESERVING THE VIRTUE OF HOPS.

Solon Robinson called on Prof. Percy to explain his mode of preserving the aroma of hops.

Dr. Percy:—It is well known that hops retain their virtue only about six months after they are gathered, when they begin rapidly to deteriorate, and at the end of two years they are nearly worthless. This is a very serious evil, as the crop fails in some seasons, and great efforts have been made to devise some plan to obviate it. Some twenty years ago my attention was called to the subject, and I set about its investigation. The first step was to ascertain the cause of the deterioration, and this I found to be oxidation, the general process of the decay of organic substances. The lupulin of the hop consists of an essential oil and a resinoid substance, which, by oxidation, becomes insoluble in water. It was known that this could be extracted by alcohol or ether, but these were too expensive, and they spoiled the ale. In 1838 I made the discovery that the extract might be made by alkalies. I accordingly dissolve the lupulin in soda, and then condense the solution in a vacuum pan without access of atmospheric air. I then add muriatic acid, which converts the soda into muriate of soda, or table salt. The extract thus made I preserve by means of glucose, or grape sugar. Grape sugar is one of the most general preservatives against oxidation that we have. Mr. Miles, proprietor of the Croton Brewery, in this city, has made several barrels of ale from hops preserved by my process, and it is a delicious beverage, though not as bitter as beer made from fresh hops. Mr. Miles is a man who puts nothing in his ale but hops, malt and salt. These are the only things required besides water for making good ale or beer, and no honest brewer will add any others. I am sorry to say that nearly all English ales—and being an Englishman, I may be permitted to make the remark—contain in addition a quantity of Indian berry, or *cocculus indicus*, one of the most deleterious and poisonous drugs known to the materia medica. The sleep produced by it is more lethargic and prostrating than that resulting from opium. I know of nothing more stupid, degrading and loathsome than a man who has made himself drunk on beer rendered bitter by the infusion of *cocculus indicus*. I have tasted lager beer in this city which was manifestly adulterated with this stupefying poison, and it would be an invaluable service to the community if the honest brewers who never employ it could be universally made known.

[Would it not be better to make notorious those who do use it?—Eds.]

ONE CHERRY TREE YIELDING \$100 A YEAR.

Dr. Trimble exhibited some cherries of the Bigreau Doula variety, a large and very early kind, and stated that one of his neighbors at Newark, N. J., had sold \$100 worth from a single tree this season.

THE BEST STRAWBERRY.

Mr. Carpenter presented a plate of strawberries of the Horticulturist variety, which he pronounced the best variety of strawberry yet produced. He said that he has now in cultivation about seventy varieties, and has probably tried as many more which he has abandoned. He would recommend for cultivation not more than six varieties. The Wilson we still hold on upon, as well as the Triomphe de Gand, though they will probably both be abandoned. The Buffalo, Russell's Prolific, Downer's Prolific, and French Seedling are our best varieties next to the Horticulturist. Downer's prolific is excellent for home use though too soft for market, and the French Seedling is the best early variety.

MISCELLANEOUS SUMMARY.

At the first *conversazione* of the Bradford Philosophical Society, which took place recently, there was a good display of microscopes, stereoscopes, mechanical models, and other objects of interest; but attention was chiefly directed to a steam carriage, constructed by Mr. C. H. Holt, engineer, of Huddersfield. This vehicle will hold eight persons, exclusive of stoker and driver, and, being provided with apparatus for consuming the smoke and condensing the steam, has no unsightly funnel. It is estimated that it will travel over an ordinary highway at a speed of from ten to twelve miles an hour, and that 1 cwt. of coke, with 50 gallons of water, will supply sufficient motive power for a journey of 20 miles.

A NEW GREEN PAINT.—A mode of obtaining a green pigment from manganate of baryta has been patented by Mr. Ludwig Schad, of Cassell, Germany. He proposes to call the pigment Cassell green. He heats a mixture of oxides or salts of manganese and nitrate of barium, sulphate of barium or China-clay being added to prevent fusion. He uses (say) oxide of manganese, 14 parts; nitrate of barium, 80 parts; sulphate of barium, 6 parts; or nitrate of manganese, 24 parts; nitrate of barium, 46 parts; sulphate of barium, 30 parts. The mixtures are heated until they assume a uniform green color. The product is ground with water to the required fineness. The pigment may be used for staining papers, as an oil color, for calico printing, etc.

THE Academy of Sciences has received from M. Seguer an account of a cartridge he has invented, which he considers to have many recommendations. He puts into a metallic case a certain amount of gun-cotton, and on this he places a perforated wad. Upon this wad he puts the coarse-grained powder, and now the projectile, which rests upon the powder. By a peculiar contrivance, something like that of the Prussian needle gun, the powder is first ignited, and then the gun-cotton.

KEROSENE FOR SQUASH BUGS.—A writer in an exchange says:—"I took some of the oil and with a feather passed it lightly over and under the plants, sufficiently to diffuse the odor among them; then took up a position, at a suitable distance, to observe the result, and I soon discovered that the operation was a complete success; the bugs would light down on the plants and immediately fly off. I passed through all my vines twice in two days with the feather, giving the hills a general odor, and the bugs troubled me no more."

WONDERS OF NATURE REVEALED.—Mr. W. J. Tait, corner of Greenwich and Cortland streets, has shown us a series of photographs of natural objects which are very interesting and instructive. They are photographs of a fly's foot, bee's sting, trunk of a butterfly, fly's eye, of a louse, a spider's foot, and similar things, as they appear when greatly magnified by an achromatic microscope. Much information can be obtained by examining these cards; they are also a suitable ornament for the center table.

PAPER PIPE.—The Portage (Lake Superior) Mining Gazette, says that paper pipes, six inches in diameter, are used in the Pewabic copper mine to convey air from one portion of the mine to the other. The pipe is six inches inside diameter, the paper pipes are quite strong and can be joined perfectly airtight by a strip of canvass and a coating of tar.

On the site of Sodom and Gomorrah, English enterprise has established a factory for the extracting of bromides from the waters.

Improved Hay Rake.

Farmers appreciate the value of the horse rake, and there are but few places in the country where they are not in use. Many claimants for public favor are in the market, and we herewith illustrate another variety which has some excellent points.

It is necessary that a rake should be light as well as strong, and this object is attained in this rake. By the method of constructing the teeth they are much more durable than the solid ones, being stronger for a given amount of wood, and also lighter.

Fig. 1.

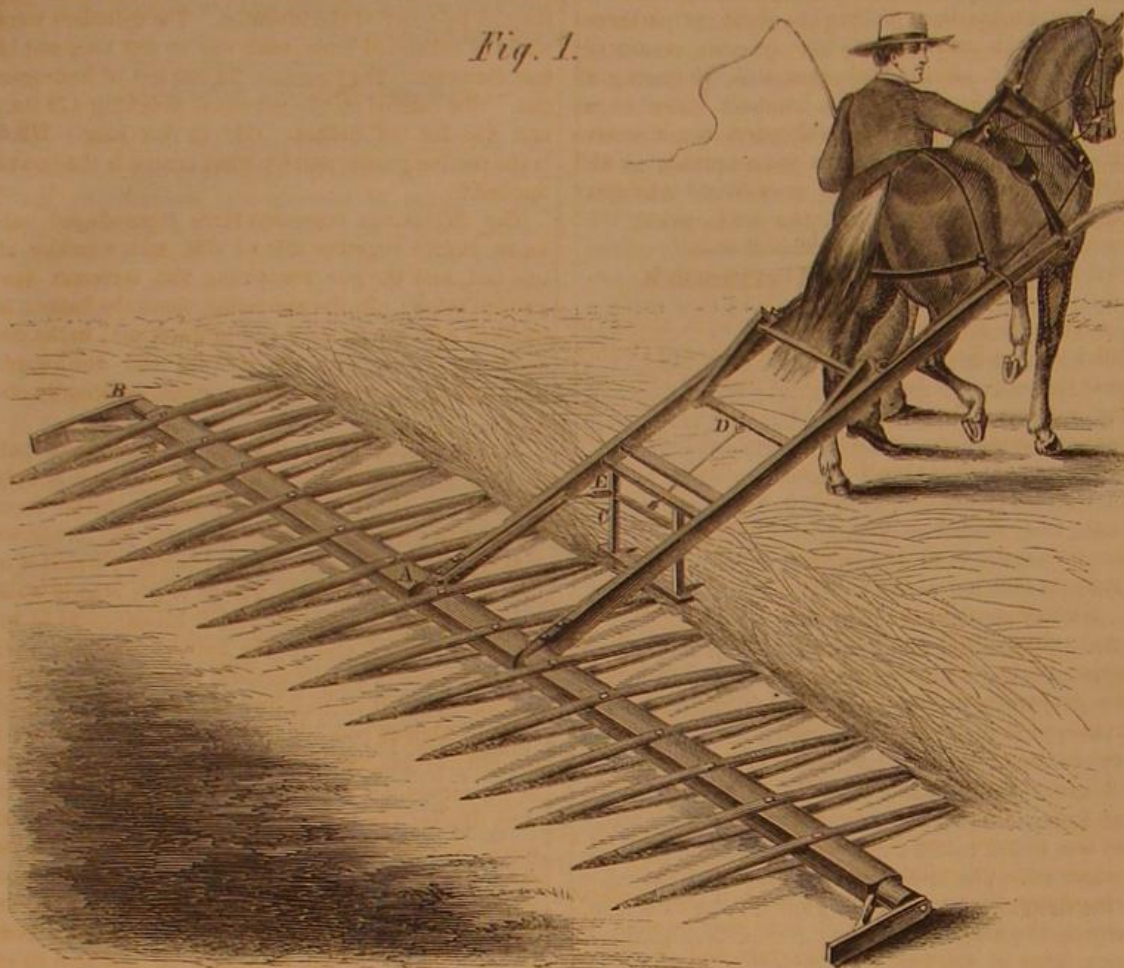


Fig. 2.

**CRELLIN'S HAY RAKE.**

The machine is constructed as follows:

The rake head, A, is carried in bearings as usual, in which it turns easily, and has at each extremity a projecting support, B, which keeps the weight off the teeth, and guards them from injury against strain sidewise. The device for discharging the load is also novel. It consists of a frame, C, attached to the thills, bearing on the two middle teeth; this frame works on a hinge and is connected to a secondary frame, D, by a cord; when this secondary frame is moved toward the rake the teeth are liberated in a manner easily understood by referring to the engraving. The frame is brought back to its position by a spring, E.

By the method of drawing this rake a large quantity of hay can be taken upon it, and in the construction of the teeth strength and lightness are secured. These are favorable features which will no doubt give this rake popularity. A section of the tooth is shown in fig. 2; the ends are armed with iron.

This rake was patented through the Scientific American Patent Agency, May 16, 1865, by J. Crellin; for rights in Massachusetts, Connecticut, New York, Indiana, Michigan, Minnesota, Iowa, and Kansas, address the inventor at Marshalltown, Iowa. For Maine, New Hampshire, Vermont, Pennsylvania, Ohio, Wisconsin, Illinois, Missouri, address Z. Dixon, Bristol, Illinois.

THE English system of announcing storms by telegraph has been adopted in Prussia. Professor Dove, the famous meteorologist, will send the result of his observations daily to all the principal ports.

New Gas for Motive Engines.

The Motor Lenoir has achieved considerable success, but its application is limited to the supply and cost of the gas required to work it; and it is said that an engineer of Lyons, M. Million, has hit upon an expedient which is likely to have a great effect in extending the use of that or other motors in which power is obtained by the explosion of mixed gases.

The problem is to find a gaseous mixture which takes fire easily and rapidly, and which can be produced in almost any place at a low cost. This de-

As steam will be required to produce the gaseous mixture the new motor will come into direct competition with the steam engine, which the motor Lenoir does not.—*Journal of the Society of Arts.*

LINDSAY'S CHURN DASHER.

"All is not gold that glitters," says the proverb; neither does all cream that goes into the churn come out good butter—indeed making a prime article of this kind is such an achievement that the fame of the maker spreads far and wide. In order to make good butter it is necessary to take great pains to preserve the cream from getting sour and prevent it from being tainted by bad smells. It is also necessary to churn it quickly. The old fashioned dasher churn is still preferred by a great many persons, notwithstanding the variety of new ones in the market, and the illustration here published shows an improvement on it.



The old features are all preserved, and a new motion is given the dasher, which adds very much to its efficiency. This motion is simply a rotary one, so that as the dasher ascends and descends it also revolves right and left, causing a thorough agitation of the contents, and causing the butter to come in a short time. This change is merely in having an iron rod instead of a wooden one, and twisting the rod so that as it is moved up and down the dasher revolves—the orifice the rod moves through is a mortice, not a round hole. The rod does not turn in the hands of the operator, but in the handle; this is fitted with a nut and washer so as to allow it to work easily.

This dasher can be applied to any churn of that class now in use; it is not necessary therefore to put aside the old one, as the dasher rod is the invention, and not the churn itself.

This churn dasher was patented through the Scientific American Patent Company by John B. Lindsay, April 25, 1865; for further information address him at Davenport, Iowa.

PRESENCE OF MIND.—Two young men on board the steamer St. John, from New York for Albany, set a good example by their presence of mind and cool determination the other night. A kerosene lamp broke in a closet, and the burning fluid covered the floor. Intense alarm, of course, ensued, but the young fellows stood at the door, and refused to allow even the officers of the boat to enter until the kerosene was burned out. The theory was that if the door was opened and water poured in the flames would not be extinguished, but would be floated to other combustible material at the risk of the destruction of all.

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A WORD ABOUT OURSELVES.

Probably no other journal in the United States has received more "honorable mention" from the press of the country than the SCIENTIFIC AMERICAN—while it is equally true that this is the only truly successful and reliable journal of the industrial arts and sciences ever undertaken here. We do not often transfer to our columns the complimentary notices which are so freely bestowed upon this journal, but we cannot forbear to insert the following which we clip from the *Buffalo Advocate*:—

"Of late we have received papers which appeared to us to have been set afloat to rival the SCIENTIFIC AMERICAN, published in New York, by Messrs. Munn and Company. We have no disposition to discourage any lawful enterprise, especially in the making of papers, but it does appear to us to be as weak, as it is foolish, for any one to attempt or even think of bringing out a paper that will at all compare with the one noticed above. The proprietors of the AMERICAN are working, enterprising men, and are in possession of facilities for making a first class paper which others could not attain in a score of years. Besides, the polish, beauty, and exquisite taste which marks the appearance of each successive issue of the paper, must be attended with a great outlay, which no new enterprise could afford to expend. To our citizens, and to all, we recommend the SCIENTIFIC AMERICAN."

So far as other journals are concerned we can only remark with Uncle Toby, in *Tristram Shandy*, "the world is wide enough for me and thee." Our business is to pursue the even tenor of our way. As in the past, so in the future, we shall devote all our energies to the interests of our thousands of generous readers and patrons of the world over. The SCIENTIFIC AMERICAN circulates in every country on the globe, and is generally acknowledged to be the best popular expositor of the arts and sciences now extant.

The present volume closes with this number. Some of our friends' subscriptions close with it, and as our rule is not to thrust the paper upon those who may not desire to take it, we invariably discontinue sending it whenever the subscription expires. We not only hope that all our subscribers will promptly renew, but we trust also that they will be able to induce some of their neighbors to join with them.

THE PATENT AGENCY DEPARTMENT connected with this journal is unquestionably the most complete and extensive in the world. For nearly twenty years it

has been our privilege to be associated with mechanics, inventors, and manufacturers as counsel for them in the prosecution of claims before the Patent Office.

From a very modest beginning we have gradually enlarged our operations, until they have come to include almost one half the entire business transacted with the Patent Office. Ours is the only patent agency in existence that has a co-operating branch office in Washington through which preliminary examinations are made, and personal supervision given to all such cases as may require it.

In our LEGAL DEPARTMENT attention is given to all matters of litigation affecting the rights of patentees—such as bringing suits for infringement, contesting interferences, prosecuting extensions, preparing all legal documents and papers—indeed there is no branch of the patent business which does not receive our most careful attention. Popular opinion as well as attested facts place the SCIENTIFIC AMERICAN Patent Agency Offices as the first in the world.

WHERE TO LOOK FOR PETROLEUM.

A man is sinking a well for petroleum about two miles west of Mount Vernon, in Westchester County, near this city, and has penetrated some 80 feet below the surface. The rocks in this locality are of the taeonic formation, which is many thousand feet below any of the oil-bearing rocks. There is no spot on the face of the earth where a well could be sunk with less chance of finding petroleum, while there are thousands of square miles of the oil-bearing formations that have not yet been explored.

We have now in the hands of the engraver a diagram illustrating the position of the rocks in the great basin where petroleum is found, and this will be accompanied by Dr. Stevens's description of the rocks, of their position and location, and of the manner in which they were deposited, all so plain that it will be understood by any one who knows nothing of geology. Indeed, the article will give a better idea of the general position and formation of the rocks which constitute the earth's crust than can be found elsewhere in so few words; and it will indicate clearly the localities in which wells may be sunk with any hope of success. The diagram and description will appear in our next issue probably; if not, the week after.

THE WAR ENDED.

Few people realize the inestimable blessings they possess in the close of the war. They miss the accustomed accounts of engagements, and the sight of soldiers in the streets is becoming rare. Flags no longer wave from every house top. The bands that paraded and the regiments that marched away to the front, these are all among the scenes that were. There are no more dreadful battle-fields, no sewing-circles for the soldiers, and few boxes to be forwarded. The foundries have done their work; shot and shell are no longer turned out by the ton, but, figuratively speaking, the iron for them is cast into plowshares, and the sword has been beaten into the pruning-hook. The shipyards are busy on their contracts for merchant's, the armories are disbanding their forces, the makers of ordnance are unemployed, and the whole tenor and tone of our daily lives is as suddenly transformed from one of eager and vigilant activity for our national existence as if we had dropped from one sphere to another.

Perhaps the most striking transformation visible in the external appearance of this city is that of the Park, opposite our office. But a few months ago it was full of troops, armed and equipped as the law directs; and cannon, tents, recruiting booths, and bands were too common to attract more than a passing glance. These have all vanished, and where the armed men congregated grass is growing vigorously. Welcome, peace! And happy America that has lived through the schisms and schemes that sought to destroy her.

THE MOST PLAUSIBLE PLAN FOR NAVIGATING BALLOONS.

We have before us a large lithograph print, neatly framed and glazed, with this note at the bottom:

"THE AERON,
or Air Ship, invented and constructed by Solomon

Andrews, M. D., of Perth Amboy, New Jersey, in which he sailed against the wind at the rate of 25 miles an hour; not daring to risk a greater speed until the strength of the material, to meet resistance, was proved. The engraving shows the Aeron as she appeared on the 4th of September, 1863, in his fifth and last entertainment, when she traveled 30 miles in 14½ minutes or at the rate of 124 miles per hour, in a spiral circle upwards, when she was lost to view in the clouds. Though hundreds of persons were present when she started, and thousands witnessed the flight, yet no one discovered the means by which she was propelled. She was afterwards destroyed by order of the inventor. The cylinders were made of varnished linen, each one 80 feet long and 13 feet diameter. They contain 26,000 feet of hydrogen gas. She carried up the aeronaut weighing 172 lbs., and 256 lbs. of ballast. Car 12 feet long. What is the motive power, and by what means is the power applied?"

The engravings represent three cigar-shaped balloons lashed together side by side, with a rudder at one end, and the car containing the aeronaut suspended below. In the ascending views the balloon is inclined with the forward end upward, and in the descending views with the forward end downward. This makes the solution of the puzzle sufficiently obvious.

It is well known that the vertical position of balloons is under control; to make them rise it is only necessary to throw out ballast, and to make them descend to permit an escape of gas. Mr. Andrews makes a broad, flat balloon, and having pointed it in the direction in which he wishes to go, stands while it is ascending in the rear end of his car so as to incline the forward end of the balloon upward, when the resistance of the air against the upper side of the balloon causes it to glide forward as it rises. Having risen as high as possible, the aeronaut discharges a quantity of gas, causing the balloon to descend, and at the same time steps to the forward end of the car, thus tipping the balloon with the forward end downward, when the pressure of the air against the lower side during its descent causes the balloon to shoot forward in the same direction as during the ascent. The balloon thus being driven by the force of gravity through the air, it will, of course, be obedient to its rudder, and its course may be governed at will.

This is the only even plausible plan that has ever been suggested for navigating balloons, and it is certainly very ingenious. In regard to the statement, however, that the Aeron sailed against the wind at the rate of 25 miles an hour, it would be satisfactory to know by whom and by what methods the velocity was measured, and what was the force of the wind against which it sailed.

LEATHER BELTS.

Since publishing an article on leather bands for driving machines we have been in receipt of many letters; one of them we shall publish next week.

We are obliged for this letter and for others on this subject received but not published. The difficulty alluded to in our article of estimating exactly what power is transmitted by a belt is not solved by our correspondent's communication, although he gives so much that is interesting, and is a thinking man. He assumes that the belt (rule 1st,) gives or transmits 22½ H P, but is this an inference or the result of actual experiment, or practice, which is better? A belt transmitting 22½ H P will have to raise 742,500 lbs. at the rate of one foot high in a minute, and that the force exerted is materially changed by the conditions the belt works under is very certain from the data furnished by Mr. Cooper.

A 12-inch belt running on a 5½-foot pulley at 45 revolutions per minute would be very slack not to transmit more than 12-horse power. We know of an 11-inch belt that daily transmits, from a 4-foot pulley running 60 per minute, the power exerted by an 11-inch cylinder and 30-inch stroke running 45 revolutions per minute with 50 pounds of steam. In this comparison the advantage is with the 5½-foot pulley, for the speed of the belt over it, in lineal feet, is 780, while the smaller pulley runs 753 feet per minute. The power thus carried off by this belt (vertical) without an idler pulley is, by the rule for estimating the powers of steam engines, 29-horse power.

Let it be understood that we do not criticise our

correspondent's letter in a spirit of fault-finding, but with a view to further information in the case.

On page 84, Vol. III., of the SCIENTIFIC AMERICAN, we published some interesting rules and facts relating to the transmission of power by belts, and the opinion is there expressed that but little reliance can be placed on rules in general, for so much depends on the elasticity, length of belt, and velocity of the same, that arbitrary formulae do not always suit the case. We are not of this opinion now, and see no reason why, when the length and width of the belt is given, we should not have an approximately correct result, with the ordinary tension, that is a stretching that that will neither tear out the lacing, or the holes, or heat the shaft, but be sufficient to cause a moderate and proper adhesion. Of course, in this case, common sense must be used to determine what reasonable tension means.

As our correspondent remarks, the experiments with the india-rubber and the leather belts proved nothing. Mere adhesion of two surfaces, or one slipping under a less load than the other, with the same width, is no criterion, for by applying foreign substances, such as rosin or oil and rosin, the adhesion can be greatly increased, and a small belt made for the time to draw as much as one of greater sectional area.

We shall be glad to receive further communications on this subject, and thank Mr. Cooper for his promptness in responding to our request.



ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING JUNE 13, 1865.
Reported Officially for the Scientific American.

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.

48,144.—Air-tight Stove.—Joshua G. Allen, Philadelphia, Pa.:

I claim inclosing the air-tight chamber forming the base of a sheet-iron stove in a case of cast iron, substantially in the manner and for the purpose set forth.

48,145.—Grain Drill.—James B. Amos, Lower Chanceford, Pa.:

I claim, First, Connecting the forward wheels, when mounted upon one and the same axle, to the truck or frame by means of a central vertical pin, in combination with side links attached to either side of the frame or truck and to the axle next to the wheels, so as to diverge, inclining forward and downward, from the truck to the axle, substantially in the manner and for the purpose set forth.

Second, In combination with the cup slide valves, I claim stationary cleaning blades penetrating a longitudinal slot in the valve-bar traversing the cups, substantially as set forth.

Third, In combination with the operating the slide valves, I claim the means herein described of enlarging or diminishing the diameter of the said wheel, in the manner and for the purpose herein set forth.

48,146.—Caster for Furniture.—Marshall L. Babb, Cape Elizabeth, Me.:

I claim as my improvement the slotted and bulbous-headed spindle, c c, in combination with the cylinder, b.

48,147.—Stuffing Box for Valve Spindles.—Thomas and John Barber, Brooklyn, N. Y.:

We claim the combination with the annular valve, E, socket, B, and valve stem, D, of the gland, A, and collar, A', when constructed and arranged to operate in the manner and for the purposes herein set forth.

Second, We also claim the combination of the guides or snugs, a, in the collar, A', with the straight sides of the valve spindle, substantially as above described.

Third, We also claim the lubricating device above shown, and its channel, d, in combination with the socket in which the valve-spindle works, substantially as described.

[This invention consists in an improvement in stuffing boxes for spindles of valves, by which one is enabled to dispense with the system of packing stuffing boxes with hemp or similar stuffing material, and yet make the joint tight.]

48,148.—Paper Collar.—William S. Bell, Boston, Mass.:

I claim, First, Doubling the thickness of the band, and connecting the folds together, substantially in the manner set forth.

Second, Folding the collar upon the line, b, by making the edge, a, the guide in such operation.

48,149.—Machine for Coring, Slicing, and Stringing Apples.—Noah Bennett, Sherman, N. Y.:

I claim the combination and arrangement of the piston or plunger raised by a spring, and composed of a driving head, g, core-depressing projection, h, and centering point, i, with the cutting, coring, and stringing device, all substantially as herein specified.

48,150.—Corn Planter.—William Blessing, Jeffersonville, Ohio:

I claim, First, The tooth, C D, and seed box, F f, secured to each other and to the beam by the operation of a single screw, substantially as set forth.

Second, The obliquely-floored seed box, F, connected to the tooth by the oblique boss, i, and having its slide reciprocated in the plane of the trigger, substantially as set forth.

48,151.—Baling Press.—Charles B. Brooks, Auburn, Me.:

I claim the wheel, G, on the upper end of the screw, E, in combination with the friction wheels, H H, when the latter are placed in an adjustable frame, and rotated in reverse directions from a shaft, K, driven alternately by a straight and cross belt, and all arranged substantially as and for the purpose set forth.

[This invention relates to an improvement in the screw press for baling purposes, and it consists in a novel manner of operating or applying power to the screw through the medium of friction, whereby several advantages are attained over the mode of applying power.]

48,152.—Show Case for Cigars and Tobacco.—Charles E. Brown, Owego, N. Y.:

I claim a show case for cigars and tobacco, constructed substantially as herein shown and described.

[This invention consists in arranging a series of compartments in a circular or polygonal case, having a glass top or cover, in such manner that each compartment may be brought underneath a door in the top or covering thereof, for the purpose of enabling the party purchasing to select the particular priced or kind of cigar he desires, the said price or name being denoted on a plate conveniently arranged in the center of the case, and revolving with the compartments. It also consists in arranging the door in the top in such a manner as to prevent its being opened by any person except the vendor of the articles in the case.]

48,153.—Method of Attaching Loops to Buckles, Etc.—L. C. Chase, Boston, Mass.:

First, I claim confining buckles, loops and rings to straps by means of a clasp or band, substantially as and for the objects specified.

Second, Constructing the clasp or band in one piece with the loop, substantially as and for the purpose described.

Third, The prong, f, in combination with the clasp, substantially as set forth and for the purpose described.

Fourth, Constructing one side of the clasp opposite the prong f, in two parts, substantially as and for the purpose described.

48,154.—Shuttle for Looms.—John H. Coburn, Lowell, Mass.:

I claim securing the tip of the shuttle by means of its screw-threaded shank, b, which screws through the transverse, plug, c, substantially as above described.

[This invention consists in a method of securing the tips of shuttles so that they may sustain the violent blows and shocks given to them in weaving without becoming loose and falling out, and whereby also the shuttle will be strengthened and prevented from being split.]

48,155.—Improvement for Distributing Fertilizers to Growing Plants.—Daniel C. Colby, Claremont, N. H.:

I claim the combination of the inclined button, B, the stay, g, the temporary partition, J, and the standard, E, with the box, A, as and for the purposes set forth.

48,156.—Flour Sifter.—Daniel C. Colby, Claremont, N. H.:

I claim the arrangement of two or more strips, E E, upon the underside of the side of the bar, D, substantially as described, and the combination of the said bar, D, and the cross piece, F, as and for the purposes set forth.

48,157.—Machine for Making Clinch Rings.—J. A. Coleman, Providence, R. I.:

I claim the method of forming "clinches," or other similar articles, by the use of a pin, in combination with a die, both acting in the manner substantially as and for the purpose set forth.

48,158.—Low Water Detector.—John Cosfeldt, Philadelphia, Pa.:

First, I claim the tube, A, or its equivalent, forming a passage between the interior of the boiler and the pipe, B, through which the end of the float lever, H, or equivalent device connected to and operating the valve, E, may project into the boiler, substantially as specified.

Second, The alarm whistle, G, and the valve, E, gage cock, C, blow-off cock, Y, and float lever, H, combined with the four-way pipe, B, substantially as set forth, for the purpose described.

48,159.—Wool Press.—John Crane, Glover, Vt.:

I claim as my invention the machine or combination substantially as described, the same consisting of the hinged boards, D D, and their supporting frame, and the grooved slides, F F, and standards, E E, and their operative mechanism as described.

I also claim the above-described arrangement of the hinged boards, their supporting frame, and the grooved slides, F F, and standards, and their operating mechanism.

I also claim the combination of the sliders, G G, with the grooved standards, E E, and slides, F F, when combined with the hinged boards, D D, and the mechanism for operating the slides, F F, as specified.

48,160.—Mode for Making Corundum Wheels.—Elijah H. Danforth, Jamestown, N. Y.:

I claim the (base, A, on the curb, B, etc.) combination as set forth and described, and represented in Fig. 1, a perspective view.

48,161.—Scroll Sawing Machine.—William H. Doane, Cincinnati, Ohio:

First, I claim connecting the pitman, D, to the upper end of a scroll saw stock by means of the conical bearing, b, on the end of the slide, a, and a bolt, c, passing through the stock, substantially in the manner and for the purpose described.

Second, The combined conical wrist pin and slide, a b, formed on or attached to the saw stock, substantially as described.

Third, The hollow cylindrical stock, E, in combination with a combined wrist, pin and slide, which works in guides at the back of the stock, substantially as and for the purpose described.

Fourth, The arrangement of the back and side guides, n n', on a plate, k, attached to the table, b, substantially as described.

48,162.—Tobacco Pipe.—F. Doellbor, Philadelphia, Pa.:

I claim the elbow, B, provided with a socket, d, and made to fit in the lateral socket, b, of the fluid receptacle of a smoking pipe, substantially as and for the purpose set forth.

[An engraving and description of this invention will be published in the SCIENTIFIC AMERICAN in a few weeks.]

48,163.—Whiffletree.—James Elder, Carthage, Ill.:

I claim the combination of the adjustable lever, G, lever, J, and rod, K, with the treble tree, D, for equalizing the draft upon the horses of the team, substantially as described.

48,164.—Sheet-metal Spoon.—James Fallows, Philadelphia, Pa.:

I claim a sheet-iron or tin-plate spoon or fork, having a hollow handle, constructed and finished substantially in the manner described, as an improved article of manufacture.

48,165.—Pump.—A. D. Foster, Jordan, N. Y.:

I claim the combination and relative arrangement of the valves, v and v', when rigidly attached to the pivoted lever, G, with the hollow piston, P, having a head composed of the plates, B and C, between which is arranged the disk valve, D, which is constructed and operates conjointly with the other parts in the manner shown and for the purpose described.

48,166.—Steam Regulator Valve.—George H. Fox, Boston, Mass.:

I claim the combination of the valve, e, diaphragm, l, and inlet and outlet chambers when arranged to operate together and with reference to each other, substantially as set forth.

48,167.—Concussion Fuse for Explosive Shells.—George P. Gauster, New York City:

I claim the use of two cones, C and D, operating in a double coned chamber, substantially as shown and described.

48,168.—Head for Barrels.—Lewis S. Gilliland, Dayton, Ohio:

I claim, First, The removable barrel head with adjustable segments arranged and operated so as to be lessened or enlarged in circumference, e, for the purpose of being placed into and out of the croze of barrels or casks without moving any of the hoops thereon, constructed as described.

Second, I claim the arrangement and use of either the lever ratchet or the holder and thumb screws or their equivalents for the

purpose of forcing and holding the outer edge of the head into the croze of the cask, substantially as herein set forth.

Third, I claim as a new article of manufacture the metallic segments, G D H, with the lever, H, the said article being adapted for attachment to and operation with a barrel head in the manner and for the purpose herein explained.

48,169.—Wagon Brake.—Willis Glaze, Rochester, Ind.:

I claim, First, The connecting of the whiffle trees, Q, to a bar, o, pivoted to a rod, e, which is connected with the lever, J, for the purpose of relieving the rear wheels of the pressure of the shoes, G, under the pull of the team, as set forth.

Second, The arrangement of the slide, K, fitted in the guide plate, L, lever, J, and rods, e M, and thimble, N, all arranged to operate in connection with the levers, E E, substantially as and for the purpose specified.

Third, The combination of the levers, E E, rod, I, lever, J, rod, e, slide, K, rod, M, and thimble, N, with the bar, O, connected by rods, P P, to the whiffle trees, Q Q, for the purpose set forth.

[This invention relates to a new and improved self-acting brake for wagons, and it consists in a novel arrangement of parts, whereby a very simple brake of the kind specified is obtained and one which may be applied at a moderate expense.]

48,170.—Oil Ejectors.—Wm. R. Greenleaf, Buffalo, N. Y.:

I claim the combination of the ejector or ejectors, C, or equivalent, with one, two, three or more compartments or chambers, A, for the purpose and substantially as described.

48,171.—Flower Basket.—G. Gunther, New York City:

I claim a flower basket, A, with a detachable bottom, made substantially as set forth.

[This invention consists in a flower basket with a detachable cup or bottom in such a manner that water or other impurities accumulating in the lower part of the basket can be readily and easily removed without injuring the root of the plant or plants growing in said basket.]

48,172.—Filter for Oils, Etc.—Phillip Halle, Philadelphia, Pa.:

I claim, First, A filter for purifying oils, consisting of a close chamber having a perforated diaphragm top and a diaphragm bottom composed of a number of conical tubes fitted with raw cotton, substantially in the manner described.

Second, The use of raw cotton in conical tubes, substantially in the manner and for the purpose set forth.

Third, The combination of a series of two or more filters, constructed substantially in the manner described for the purposes set forth.

Fourth, The combination of one or more filters constructed substantially in the manner described with a heating or refrigerating vessel, constructed and arranged substantially in the manner described for the purposes set forth.

48,173.—Ice Scraper.—H. W. Harkness and J. C. Mack, Bristol, Conn.:

We claim as a new article of manufacturing an ice scraper, the bowl or body, a, having an aperture, m, in its bottom, in combination with the knife or scraper, c, pin or screw, l, and handle, n, substantially as and for the purpose described.

48,174.—Machine for Cutting off Cigars.—Conrad and Frederick W. Hoffman, Morrisania, N. Y.:

We claim, First, The hinged trough or channel plate, C, operated by the knife lever, and arranged in the manner and for the purpose described.

Second, We claim the plate, D, operated by a pin, s, fast to the boer, F, in combination with an inclined projection, a, fast to the frame and arranged in the manner and for the purpose set forth.

Third, We claim the movable head piece, E, in combination with the plate, D, as described.

Fourth, We claim, in combination with the plate, D, the index ratchet wheel, H, arranged and operated in the manner and for the purpose substantially as set forth and described.

Fifth, We claim the combination of the marble table, B, trough, C, plate, D, knife lever, F, and index wheel, H, when arranged and operating together in the manner and for the purpose substantially as set forth and described.

48,175.—Machine for Gathering and Loading Stone, Hay, Etc.—George W. Holley, Niagara, N. Y.:

First, I claim operating devices for elevating hay, stone, or substances of any kind, by means of a backward or retrograde move of the horses.

Second, I claim the use of two tongues to one wagon, as described, to permit the same to be drawn forward as usual and adapt the motion of the horses in backing to be transmitted to elevating devices, substantially as set forth.

Third, I claim the slot, h, in the lower tongue, H, in combination with the evener, P, and cord, Q, the whole being employed in the manner and for the purpose stated herein.

Fourth, In a machine herein constructed as herein described, I claim the combination of the movable rack frame, J J J2 the cog wheels, G G, the pinion, O, and the shaft, F, the whole being constructed and arranged to operate in the manner and for the purpose explained.

Fifth, I claim the lever, S, in combination with the clutch, T, when employed to enable the attendant to assist in elevating the hay or stone, as set forth.

Sixth, I claim the neck yoke, R, employed to attach the upper tongue, H', to the horses, so as to cause said tongue to undergo the backward movement of the horses as and for the object specified.

48,176.—Match Splint Cards.—Bennet Hotchkiss, New Haven, Conn.:

I claim, as a new device of manufacture, making the cards of match splints, substantially as herein described and set forth.

48,177.—Chair.—James A. and Henry A. House, Bridgeport, Conn.:

We claim the combination of reel, R, bolt, D, spring, x, and cords, T, operating together, substantially as and for the purpose specified.

48,178.—Boy's Sleds.—David G. Hussey, Nantucket, Mass.:

I claim the constructing or forming of the sled of a plurality of parts attached respectively to the separate frame pieces, a and a', aternately arranged in one plane as represented in the drawings so as to constitute a level floor or bed and in such a manner, that said parts may be extended in a greater or less degree to increase the capacity of the sled as may be required.

Second, The combination of the pivoted steering frame, E, mounted on a pair of runners, C C, and the levers, F and H, constructed, arranged and operating as described in connection with levers, I, or equivalent means for actuating the lever, H.

Third, The combination of the sliding foot piece, L K and k, and elastic brake teeth, h h, all constructed, arranged and operating substantially as and for the purpose set forth.

48,179.—Horse Rake.—David G. Hussey, Nantucket, Mass.:

I claim the curved arms, b, provided with two or more sockets, c, and teeth, d, inserted therein, substantially as described.

[This invention relates to a new and improved mode of forming or constructing the rake heads and in the means employed for operating, raising and lowering the same, so that the rake may be kept perfectly adjusted to its work, in order to gather or rake up a load and readily adjusted in order to discharge the same.]

48,180.—Radiating Attachment for Stoves and Furnaces.—Jacob B. Hyzer, Janesville, Wis.:

I claim, First, The combination of the flue, g, and damper, h, with the flue, g', and central smoke pipe, D, substantially as and for the purpose set forth.

Second, The combination of the outer and inner radiating cylinders, G and O, and the radial plates, f f' and f'', producing ascending and descending flues, with the inner unconfined hot-air space, c; ventilated above and below, substantially as and for the purpose set forth.

Third, The combination of the flue, L, cylinders, G and O, and radial plates, f f' f'', with the flues, g, damper, h, smoke pipe, D, and inner unconfined hot-air space, C', when constructed and arranged substantially as and for the purpose set forth.

48,181.—Wood Bending Machine.—Samuel Keeler, Lancaster, Pa.:

I claim the arrangement and combination of the devices, C D E H L M and N, as herein described, and for the purposes set forth.

48,182.—Churn.—R. Keese, Cardington, Ohio:

I claim the rotating winged beaters, L, cross arms or beaters, h, in combination with the sweep, f, when arranged and operating as and for the purpose set forth.

48,183.—Clothes Dryer.—D. J. Kellogg, Rochester N. Y.:

I claim the stop and retaining flanges, i, g, in combination with the bracket, A, and clothes bars, B, substantially as herein specified.

48,184.—Stove Pipe Drum.—Werner Kroeger, Milwaukee, Wis.:

I claim the cylinder, A, provided with the two internal cylinders, E E, having long and short plates, c c' d d', attached to their exterior surfaces and having disks, F G, at their ends provided with openings, a c, all arranged substantially as shown with the dampers, G K, to operate substantially as and for the purpose set forth.

[This invention relates to a new and improved heat radiator designed more especially for stove pipes to arrest the heat passing through the same and radiate it into the apartment so that it cannot escape into the flue with the products of combustion.]

48,185.—Planing Machine.—Henry A. Lee, Worcester, Mass.:

I claim, First, The combination with the horizontal cutter cylinder of a molding machine of an adjustable automatic pressure stand whereby the pressure of the shoe upon the stuff remains the same whether the stand is removed to or from the cylinder, substantially as and for the purposes stated.

Second, The combination with the adjustable stand, L, of pressure bar, I, screw shaft, P, and weighted levers, P, substantially as and for the purposes specified.

Third, In combination with the adjustable pressure bars, K, the adjusting screws, P, and screw, nuts, m, operating against the rounded ends of the bar, C, as and for the purpose specified.

Fourth, In combination with the stand, M, the slotted flanges, d, when secured to the standard, T, of the cutter cylinder, D, to make it adjustable thereon as and for the purposes specified.

Fifth, In combination with the cutter cylinder, E, working under the bed, B, the adjustable mouth piece, p, in the bed plate, by which moldings can be cut on the lower corners of the stuff, while the sides and face are worked, as herein shown and described.

48,186.—Leather Dressing Machine.—Richard Lee, Newark, N. J.:

I claim the rolls or rubbers with their semicircles, tilt springs and spring bearings constructed in the manner and for the purpose specified, the manner of alternating the action of the table, substantially as shown, and the whole machine with the various parts combined, arranged and operated in the manner and for the purpose herein above set forth.

48,187.—Incendiary Compound.—H. W. Libbey, Cleveland, Ohio:

I claim an incendiary compound composed of the ingredients herein named and compounded in the manner substantially as herein specified and set forth.

48,188.—Ladies' Boot.—H. Libby, Evansville, Wis.:

I claim a boot for ladies and misses use, made with a heel piece, d, and extensions, r r, constructed substantially in the manner herein shown and described.

[This invention relates to a novel improvement in ladies' or misses' boots, whereby a neat and perfect fitting as well as easy feeling boot to the foot is obtained.]

48,189.—Flour Sifter.—Joseph H. Littlefield, Cambridge, Mass.:

I claim the arrangement and combination of the case, B B C C, sieve, G, the two side pieces, D D, and the equilateral triangular shaft, A, or its equivalent, provided with the grooves, I I, and the elastic strips, E E E, substantially as described and for the purpose set forth.

48,190.—Egg Cooker.—Wesley Loucks, Schoharie, N. Y.:

I claim the within described egg cooker as a new article of manufacture.

48,191.—Car Seat.—Edwin Lockwood and George W. Pitman, Bordenstown, N. Y.:

I claim the seat, B, provided with the adjustable rods, C, arranged substantially as shown, in connection with the reversible back, H, applied to the seat by means of the bars, I G, substantially as and for the purpose specified.

[This invention relates to a new and improved adjustable car seat for sleeping cars, and it consists in constructing and arranging the back and the seat in such a manner that both may be inclined to suit the occupant when desiring to sleep or to be in an inclined position, and both the seat and back rendered capable of being adjusted or reversed, to suit the direction in which the car is running.]

48,192.—Grape Box.—O. Mallory, Rochester, N. Y.:

I claim an improved article of manufacture, a grape box composed of an inflexible, or wooden bottom, B, having a bevelled edge cut under from the face, or inside of the bottom, for the purposes set forth, and being arranged and combined with the straw-board hoop or side, A, in the manner shown and described.

48,193.—Photographic Camera Stand.—Hervey Manger, Philadelphia, Pa.:

I claim in combination with the rigid and main supporting frame of a camera stand the hinged beams, C C H, endless screw shafts, G, and table, C, substantially as and for the purposes specified.

I also claim in combination with the main supporting frame of a camera stand that hinged beams, B, C, H, endless screw shafts, G, L, and table, E, substantially as and for the purposes specified.

48,194.—Fruit Knife and Nut, Pick.—George Mayland, Brooklyn, N. Y.:

I claim an improved article of manufacture a combined fruit knife and nut pick, composed of a fruit blade, C, and nut pick, D, placed in one and the same handle, A, at opposite ends thereof, and arranged relatively with a spring, B, of such form as to act upon both the blade and pick, and admit of the same opening and closing at opposite edges of the handle, substantially as described.

48,195.—Broom Head.—Chas. E. Miller, Cincinnati, Ohio:

I claim, First, Connecting the jaws of a metallic broom head by a detachable or caper hinge or articulation, at the point of the head, or that part of the same further from the handle.

Second, In combination with the above, I further claim the sockets, G C, and pintles, e c, when formed upon the ends of arms projecting downward from the lower bars, D D', as and for the purposes specified.

48,196.—Ash Sifter.—Chas. T. Miller, Providence, R. I.:

I claim the combination and arrangement in a coal and ash sifter of the hopper, B, vibrating sieve, G, deflecting board, g, inclined ash board, c, arranged reversely to the sieve, g, and doors, D E and F, substantially as and for the purposes specified.

[This invention has for its object to provide a coal and ash sifter, which may be operated with ease, and in the use of which the operator will not be annoyed by the rising of dust and fine ashes, nor will these be permitted to escape into the apartment in which the apparatus is placed.]

48,197.—Hand Corn Planter.—Jacob Morris, Auburn, Missouri:

I claim the employment or use of the rod or bar, H, when used in connection with the two side plates, A A', pivoted together and provided with plates, I I, and also provided respectively with the hopper, E, and the slide, F, substantially as and for the purpose herein set forth.

[This invention relates to a new and improved corn planter of that class which are operated directly by the hand, and it has for its object the obtaining of an implement of the kind specified which will, during the planting operation, scatter the seed so that it will be sown at suitable distances apart in the hills and admit of the

stalks being sufficiently far apart that they will not interfere with each other in growing.]

48,198.—Liniment.—James H. M. Morris, Reading, Ill.:

I claim the liniment composed of the ingredients compounded in the manner and in the proportions herein described.

48,199.—Machine for Pointing Paper Hangings.—Francis S. Munroe, Jr., Grantville, Mass., and Thomas Mason, Boston, Mass.:

We claim the endless series of ink rolls, k, and the tablet, r, when combined and arranged to operate together, and in connection with the linking apparatus and the elastic printing cylinder, c, substantially as set forth.

48,200.—Detachable Oven.—Aaron B. Nott, Fairhaven, Mass.:

I claim the combination and arrangement of the oven, O, the two flues, A G, the induction and eduction pipes, F F', the opening, e, and the dampers, D d d, the whole being substantially as specified.

I also claim, in connection with the oven and its flues, arranged as described, the four ledges, a a a a, arranged and applied to the four sides of the interior of the oven.

I also claim, in connection with the oven and its flues, arranged as described, the boiler openings, f f f f, applied to one end and one side of the outer flue case, for the purpose specified.

48,201.—Magazine Fire-arm.—B. F. Parkinson, Washington, Pa.:

I claim the lowered, removable magazine, B, constructed and operated substantially as described, for the purpose set forth.

Second, The spring pin, a, for releasing the pawl, enabling the arm to be cocked without rotating the cylinder, or rotating the cylinder without the intervention of the hammer or trigger.

48,202.—Pump.—J. Peabody, Dixmont Centre, Maine:

I claim the arrangement of the valve, o, the valve chamber, D, and its discharge passage, b, with the piston, B, and its rod, C, and the pump barrel, its other valves and valve passages, and the eduction passage, l, the whole being substantially as specified.

48,203.—Hydrometer.—Henry Petrie, Chicago, Ill.:

First, I claim the adjustable bottom, 3 and 4, when used for the purposes specified.

Second, A hydrometer with the table, B, attached to the case thereof, substantially as set forth.

48,204.—Sewing Machine.—Louis Planer, New York City:

I claim the combination of the shaft, 12, with its arm, 13, journal piece, 7, arms, 6, and 14, screw, 9, link, 5, arranged and operating together to lift and adjust the presser foot of a sewing machine, substantially as described and for the purposes set forth.

48,205.—Feed-wheel for Sewing Machine.—Louis Planer, New York City:

I claim, First, The combination with the feed-wheel of the slotted link, P, arranged to grasp the feed lever and dog and hold the dog in proper position upon the flange of the wheel without other fastening, substantially as described and specified.

Second, I claim in combination with a feed-wheel, L, lever, M, with its arm, N, slotted link, P, and dog, o, making the apparatus adjustable, substantially as described and specified.

Third, In combination with a feeding mechanism, constructed substantially as described, I claim the rule or scale upon the arm, G, of the rocket shaft, whereby the machine can be readily set to sew any described number of stitches to the inch, substantially as described and specified.

48,206.—Feed-wheel for Sewing Machine.—Louis Planer, New York City:

I claim in combination with feed wheels of a sewing machine the dog, c, lever, a, and arm, b, provided with an adjusting mechanism for regulating the feed, substantially as described and specified.

48,207.—Carriage Wheel.—John Raddin, Lynn, Mass.:

First, I claim the thimble, O, in combination with the screw, N, and elastic packing, M, applied to the spokes and felly of a carriage wheel, substantially as and for the purpose specified.

Second, The metallic thimble, F, applied to the felly end of a wooden spoke, in combination with the screw, J, packing, M, thimble, O, and fixed screw, N, substantially as shown in Fig. 3, and for the purpose specified.

Third, The fixed screw, J, in a wooden hub, operating in combination with an internal screw cut in the end of a spoke, substantially as and for the purpose specified.

Fourth, The socket, W, provided with a clasp entirely surrounding the felly, when used in combination with a spoke rendered adjustable by means of a screw, and the elastic packing, M, substantially as and for the purpose specified.

Sixth, The combination of a hollow metallic spoke with a thimble, O, screw, N, and elastic packing, M, substantially as and for the purpose specified.

48,208.—Holding and Filling Bags.—George E. Randall, Yaphank, N. Y. Antedated June 6, 1865:

I claim, First, The combination of the two shafts, C C', fitted with pointed pins, c c, and furnished with arms, j and c', the notched lever, D, and spring, I, substantially as herein described, for the purpose of holding and extending open the mouth of the bag.

Second, The lever, F, bar, E, platform, G, and measure, H, in combination with each other, and with the devices for holding and extending open the mouth of the bag, substantially as herein set forth.

48,209.—Lock.—H. D. Richardson, Florence, Mass.:

I claim a lock, when constructed and arranged substantially in the manner described.

48,210.—Extension Ladder.—John L. Ripley, Fremouth, Ohio:

I claim the combination of the rollers, d and g, plates, e and c, hooks, f, eyes, i, pin, b, with the ladders, A B and C, when constructed and arranged as and for the purposes specified, constituting a combined step and extension ladder.

[This invention consists in a combination of a series of ladders arranged in such a manner that they may be adjusted together and extended with the greatest facility, so as to form a long ladder, to be used against buildings, etc., and be also capable of being adjusted together so as to form an extensive step-ladder when the latter is required.]

48,211.—Spring Balance.—Herman Saloshinsky, New York City:

I claim the combination of platform rod, D, cross bar, B, springs, S and S, rack, m, pinion, n, and dial handle, p, when arranged and operating together in the manner and for the purpose substantially as set forth and described.

48,212.—Horse-power.—Gelston Sanford, New York City:

First, I claim the construction, combination and arrangement of the quadruple bearing, e, and bearings, a a' a' a', substantially as in the manner and for the purposes herein set forth and described.

Second, The center-piece, B, constructed substantially as herein described.

Third, The plate, A, provided with bearings, g and f f, in combination with changeable wheels, L and M, in the manner and for the purpose specified.

Fourth, The hanging shaft, O, and universal joint, P, in combination with the driving shaft of a horse-power, operating substantially as described.

48,213.—Hardening and Tempering Steel.—Elliot Savage and Henry Stratton, West Meriden, Conn.:

We claim the use or employment in hardening steel of metallic solutions, in the manner and for the purpose substantially as set forth.

48,214.—Roller for Trunk.—John Schmadel, Newark, N. J., and John A. Lieb, Essex, N. J.:

We claim the combination of the flexible plate, A, with punched ears, a, and the roller, B, with solid journals, b b, the whole being constructed and employed in the manner and for the purposes herein specified.

48,215.—Casting Coffin Handles.—Denning W. Sexton, East Hampton, Conn.:

I claim the within-described device, consisting of the triangular mold or drag, 33, with the respective hinged copes, constructed substantially as and for the purpose herein described.

48,216.—Grinding Faucets and Valves.—Thomas Shaw, Philadelphia, Pa.:

I claim the employment of a series of mandrels rotating alternately in opposite directions, when constructed, arranged and operated substantially as and for the purpose set forth.

48,217.—Copying Press.—Walter Shriver, New York City:

I claim the method above described for forming the connection between the screw and the platen, by casting the two together, as described, for the purpose set forth.

48,218.—Ejector for Steam Boiler Furnaces.—John N. Snowden and Henry Wilkins, Brownsville, Pa.:

We claim the combination of the nozzle, A, the nozzle, B', and the nozzle, C', placed concentrically one within the other, the nozzles, B' C', being connected respectively with a steam boiler and with an oil or other reservoir, substantially as above described.

[This invention has for its object to promote combustion in furnaces of steam boilers and other furnaces, and it consists in an apparatus so constructed as to inject oil or water and air by means of and along with a current of steam into a furnace, and thereby promote the more perfect combustion of the gases and products of the fuel.]

48,219.—Submerged Pump.—H. M. Stoker, Watson, Ill.:

I claim, First, In double-acting submerged pumps, the combination of the movable cylinder, C, having inlet valves in both its heads, D D', with the hollow piston rod and hollow piston, the inlet passages of said cylinder being governed by the same annular valve, substantially as described.

Second, I also claim making the hollow piston, H, with solid heads, perforated as shown, and with elastic sides, substantially as above described.

[This invention relates to that class of pumps the cylinder and valves of which are to be submerged, so as to be protected from the action of frost.]

48,220.—Submerged Pump.—H. M. Stoker, Watson, Ill.:

I claim in double-acting submerged pumps, with uncovered piston chambers, making the body or shell of the cylinder of potter's ware, molded in one piece, combined with a valve chamber, B, of metal, constructed and arranged substantially as described.

[This invention relates to that class of submerged pumps, the upper ends of whose cylinder are open, so that the water rests always upon the upper heads of the pistons.]

48,221.—Paint for Ships' Bottoms.—James Gamage Tarr and Augustus Henry Wenson, Gloucester, Mass.:

We claim the composition, or a paint, in which metallic zinc forms the basis, and is alloyed or in contact with metals which dissolve less readily in sea water, substantially as set forth herein.

48,222.—Hat.—Daniel K. Albright, Philadelphia, Pa., and Leo H. De Lange, Burlington, N. J.:

We claim enlarging a hat near the brim, so that an annular space may be formed within the enlargement, in the manner and for the purpose specified.

48,223.—Suspended.

48,224.—Coal Breaker.—Philip Umholtz, Tremont, Pa.:

I claim making the toothed roller of the coal breaker, with an occasional row of large teeth set at distant intervals, substantially as and for the purpose described.

48,225.—Horse Fastener.—Felix Vogel, Newburgh, N. Y.:

I claim, First, The falling shutter, operated by any suitable lifting and lowering apparatus, and furnished with means for attaching animals thereto, substantially as and for the purpose described.

Second, The combination of the surcingle, the fore and aft straps, and the head straps, for attaching the animal securely in a vertical position, irrespective of the devices for prostrating the animal.

Third, The combination of the straps, b b, with the surcingle straps or their equivalents, and the roller, H, by means of which combined devices the animal may be suspended for treatment or discipline.

Fourth, The combination of the straps by which the body of the horse is secured, those pertaining to the hobbling of the feet, and the cross-bar and strap to which a foot is secured for shoeing, etc., forming in this connection a device for the compulsory acquiescence of the animal in the operation of shoeing or other treatment in which such position of the foot or limb is desirable.

48,226.—Apparatus for Separating Metals from Ores.—J. D. Whelpley and Jacob J. Storer, Boston, Mass.:

We claim, First, The separating of metals from mixtures of earth and metal by the application of gravity in counter action to currents of air in an upright pulverizing mill, the air moving upward to carry off the finer dust of earthy matter, while the metal falls by its superior gravity, substantially as described.

Second, The tangential conductor, E, leading from the periphery of the mill, in combination with the pocket, B, or its equivalent, substantially as and for the purpose specified.

Third, The shorter pipe, I, within the larger and longer pipe, m, when arranged in reference to the mill, A, and pocket, C, or their equivalent, substantially as set forth and for the purpose specified.

Fourth, The employment of a water tank and a draft and spray wheel, substantially as set forth, and for the purpose specified.

Fifth, The pipe, F, in combination with the pocket, B, pipes, l m, and pocket, C, substantially as and for the purpose specified.

Sixth, The windage post, w, in the pocket, B, substantially as and for the purpose specified.

Seventh, The windage post, n, in the pocket, C, substantially as and for the purpose specified.

Eighth, The air post, v, in combination with the mill, A, tangential conductor, E, pocket, B, and pipe, F, substantially as and for the purpose specified.

Ninth, The valves, k and i, at the top and bottom of the mill to change the direction of the currents of air through the same, substantially as described.

Tenth, The shelves or partitions, t, arranged in the exit or chimney, D, substantially as and for the purpose specified.

48,227.—Cartridge Retractor for Breech-loading Fire-arms.—H. H. Wolcott, Yonkers, N. Y.:

I claim the combination of the shell drawer, F, tongue, g, laterally projecting rim, i, and pin, h, all constructed and arranged substantially as and for the purpose set forth.

[This invention consists of a new and improved shell drawer for breech-loading fire-arms, which is operated by means of the swinging of the breech-plate.]

48,228.—Wagon Lock.—John F. Yates, Mooresville, Ind.:

I claim the combination of the tongue, K, the tongue bolt, k, the stop bolt, x, the front rod, N, the lever, M, king bolt, h, braces, O, rear rod, P, the rod bars, g and H, with their connecting pulleys, a, a, slides, R R, the hounds, D D, the drop lock, i, with the snake iron, b, all arranged and operating substantially as described, and for the purpose set forth.

48,229.—Corn Planter.—E. M. Wright, Wilmington, Ohio:

I claim the combination and arrangement of the spiral seed box, D, reversible seed wheel, G, conducting tube, h, and pointed seed scatterer, substantially as and for the purposes herein specified.

I also claim the double-curved lever, I, in combination with the connecting cords, or their equivalents, working around the periphery of the curved arms thereof, substantially as and for the purpose specified.

I also claim the guide rod, H, arranged so as to be properly adjustable to the eyes of the attendant, substantially as and for the purpose herein set forth.

I also claim the construction of the graduated roller, M, substantially as and for the purpose herein specified.

48,230.—Mode of Lubricating Car Wheels.—Walter Youmans, Lansingburg, N. Y.:

I claim the employment or use in connection with a box, D, of a car wheel, of a series of holes or openings, b, in the hub, C, encompassing the box, D, and the latter provided with slots or openings, C, the holes or openings, b, being filled with cotton waste saturated with oil or other proper lubricating material, and all arranged substantially as and for the purpose herein set forth.

I further claim, in connection with the parts aforesaid, the oil receptacle, I, applied to the outer end of the hub, substantially as and for the purpose herein specified.

48,231.—Drum Stove.—D. M. Younkman, Fremont, Ohio: I claim the drum stove herein set forth as a new article of manufacture.

[This invention relates to the class of stoves known as drum stoves, which are heated by means of currents of hot air and of the products of combustion, and it consists in an improved arrangement of flues and other parts, whereby a more economical use is made of the heat which it is to be the medium of distributing.]

48,232.—Broom Head.—Frederick C. Bolender, Lima, Ohio, assignor to himself and Wm. F. Doggett, Indianapolis, Ind.:

I claim the arrangement of the screw stem, A B C, binder, E F G, sheath, H I, and ferrule J, or their equivalents, to form a metallic broom head, substantially as set forth.

48,233.—Grain Separator.—S. K. Ayres (assignor to himself and B. A. Wilder), Delton, Wis.:

I claim, First, The combination of the oval cam, D, spring, F, rod, E, shaft, H, arms, I P, and rods, J L, for the purpose of operating the screens, or giving a shake motion to the same, as set forth.

Second, The hanging or suspending of the shoe, N, on the adjustable bar, A, by means of a hook arm, P, and vibrating or reciprocating bar, K, as set forth.

48,234.—Door-bell or Gong.—A. G. Dexter, San Francisco, Cal., assignor to himself and Thos. Mackell, Palmyra, N. Y.:

I claim a gong for a door, the hammer of which is operated through the medium of a plate or handle at the outer side of the door, so arranged or connected with levers and the hammer shaft that the latter will be actuated and the gong sounded, by pressing said plate or handle in a direction toward the door, substantially as herein set forth.

I further claim the arrangement of the hammer shaft, J, bent lever, F, with yielding plate, M, attached, lever, B, and plate or handle, D, or its equivalent, with the springs, H L, and gong, I, substantially as and for the purpose set forth.

[This invention relates to a new and improved gong, applied to a door in such a manner as to serve as an improvement on the ordinary door-bell, it being more readily applied, less liable to get out of repair, and sufficiently sonorous to be heard all through a house.]

48,235.—Machine for Brushing Hats.—Cyprien Faure (assignor to himself and Henry J. Yates), New York City:

I claim, First, The brushes, F, and reciprocating rod, C, constructed and arranged substantially as herein described.

Second, The combination of a guide groove, G, and pin, X, or their equivalents, with the reciprocating rod, C, and brushes, F, substantially as and for the purpose set forth.

Third, The application of the joint, F, in combination with the rod, C, brushes, F, and blocks, Z, substantially as and for the purpose described.

Fourth, The adjustable rings, D, in combination with the felted blocks, Z, constructed and operating substantially as and for the purpose specified.

[The object of this invention is to perform by machinery the operation of brushing felt hats, caps, etc., which usually is performed by manual labor, and requires great exertion and much time.]

48,236.—Buckle.—Chas. B. Hatfield (assignor to Eugene H. Richards), Boston, Mass.:

I claim a buckle for fastening shoes and other articles, constructed and applied substantially in the manner herein shown and described.

[This invention relates to that class of buckles designed for fastening shoes, skate straps, etc., and it consists in forming the buckle of two separate parts, one of which is a square or other shaped frame, having suitable lips on its under side, to enable it to slide along on the strap, and secures it to the tongue; said tongue constitutes the other part, and it is attached directly to the article itself; it has a flange on the end of the side, which gradually increases in depth toward its end, over which flange the lips of the other part slide, and thus the two parts of the article are secured together.]

48,237.—Nutmeg Grater.—Joseph Lovvendale (assignor to himself and John Bloomgrist), Boston, Mass.:

I claim, First, The hopper, A, in combination with the springs, C, or their equivalents, constructed substantially as herein shown and described.

Second, The plunger, B, in combination with the cover, D, and hopper, A, arranged substantially in the manner and for the purposes herein specified.

[This invention consists in arranging in a box of any desirable form, at hopper, for receiving the substance to be grated, having expanding sides, for the purpose of permitting larger or smaller articles to be thrust through them, to be subjected to the action of a revolving grater, and yet retain a hold upon such article sufficient to prevent their displacement by the grater, said grater being arranged in the interior of the box; I also consists in the employment or use in connection with such a hopper of a plunger having a spiral or other suitable spring arranged around its stem, for throwing it upward after it has been depressed, for the purpose of forcing the nutmeg or other substance upon the grater.]

48,238.—Channelled Sole.—Gordon McKay, Boston, Mass., assignor to James Purinton, Jr., Lynn, Mass.:

I claim a channelled sole, in which the channel is formed by displacement of the material by pressure, substantially as set forth.

48,239.—Water-proof Collar and Cuff.—George W. Ray (assignor to Ray & Taylor), Springfield, Mass.:

I claim a paper collar or cuff when enamelled with the composition and by the process herein described.

48,240.—Stove.—Thomas Scott (assignor to Thomas Scott, Sr.), Carrollton, Ill.:

I claim, First, Protecting the interior of sheet-iron or other thin stoves, with removable cast-iron linings, constructed and applied within the stove substantially as described.

Second, I also claim the arch, B, in combination with the lining, C, substantially as above described.

[This invention relates more particularly to stoves for heating purposes, but the principle of the invention is applicable to stoves for cooking purposes. The invention consists in a novel way of combining cast-iron linings within a sheet-iron stove, whereby the walls of the latter are protected from the fire, and the heating capacity of the whole structure is increased.]

48,241.—Buckle.—Dwight L. Smith (assignor to the Waterbury Buckle Company), Waterbury, Conn.:

I claim as a new article of manufacture the combination of the hinges, h h, with the ears or rests, c c, on which the broad end, d, of the lever is supported, when the whole is constructed, arranged and fitted for use, substantially as herein described, and set forth.

48,242.—Door-bell.—Andrew Turnbull (assignor to P. & F. Corbin), New Britain, Conn.:

I claim the combination with the hammer lever, m, of a device, which in being moved by the outward and inward movement of the knob or handle, shall actuate the lever, m, and its hammer, and thus cause the bell to be rung during each of said movements of the knob or handle, as herein described and represented.

48,243.—Manufacture of White Lead.—Wm. Baker, Sheffield, Eng.:

I claim the substitution for acetic acid as now used in the Dutch method for the manufacture of white lead, salts of acetic acid from which acetic acid may be produced or liberated by the employment of either sulphuric acid or hydrochloric acid or mixtures thereof, or by the employment of the acid sulphates of the alkalies.

48,244.—Circular Brick-kiln.—Frederick E. Hoffman, Berlin, Prussia:

I claim the employment or use of a continuous arch, divided in a num-

ber of sections, each provided with an opening to fill and empty it, and with apertures for introducing the fuel, in combination with a movable partition, with radiating flues and smoke stack, constructed and operating substantially as and for the purpose specified.

Also the continuous smoke chamber, in combination with the flues, dampers, smoke stack and sectional arch, constructed and operating substantially as and for the purpose specified.

48,245.—Machine for Upsetting Wagon Tires.—Gideon Huntington, Norwichville, Canada West. Antedated June 7, 1865:

I claim, First, The self acting keys or wedges, acting in the loops or bevelled mortises, as above described.

Second, The combination of the keys and mortises with the various parts of this machine, and for the purposes herein set forth.

48,246.—Knapsack.—Antoine Perrin, Paris, France:

I claim, First, The peculiar combination of garment and bag, in the manner and for the purposes hereinbefore described.

Second, The peculiar construction of garment, combined or not with a sack or bag, as and for the purposes hereinbefore described.

48,247.—Grate for Steam-boiler Furnace.—Johann Zeh, Vienna, Austria:

First, The combination with the transverse grate bars, r, of the rods, m and o, and their operating devices, for the purpose of imparting to the grate bars an oscillating movement independent of their supporting rods.

Second, The combination of the coal hopper, a, inclined furnace grate, b, cinder conduit, c, and ash pit, constructed and operated as herein described.

Third, The combination with the transverse grate bars, r, of the rods, m, and their operating devices, for the purpose of imparting to the entire grate bodily a backward and forward motion, as herein specified.

48,248.—Sewing Machine.—John J. Sibley, New York City, assignor to Bruen Manufacturing Company of New York:

First, I claim the attachment described, adjustable to a Wheeler & Wilson sewing machine, to make a stitch of three or more threads, substantially in the manner set forth.

Second, I claim the combination of the attachment described, with the needle, rotating hook, bobbin and other operative parts of a Wheeler & Wilson sewing machine, except the ring slide.

Third, I claim the ring slide, j, constructed and operating substantially as described.

Fourth, I claim the combination of the needle, l, bobbin, k, thread carrier, d, and ring slide, j, constructed and operating together, substantially as described.

Fifth, I claim the step, y, constructed and operating substantially as set forth.

REISSUES.

1,989.—Distilling Hydro-carbon Oils.—William Archer (assignor to himself and William P. Downer), New York City. Patented Sept. 6, 1864:

I claim the continuous and fractional distillation and separation of hydro-carbon and other oils and volatile substances by the direct application of superheated steam or hot air to the surface of a flowing sheet, column, or shower of the substance to be distilled, in the manner described, or any modification thereof by which the same result may be accomplished.

I also claim the combination of the leading tube, b, with the deflecting and receiving discs, c and e, with the spiral or straight feeding tube, d, in the manner and for the purposes described.

1,990.—Hoisting Machine.—William G. Brower, New Brunswick, N. J. Patented May 25, 1858:

I claim, First, The combination in a machine for hoisting of a coupling, J, or its equivalent, for connecting and disconnecting the driving power to and from the windlass, with the sliding bars, K N, levers, O O, substantially as and for the purpose above described.

Second, I also claim the devices mentioned in the preceding clause of the claim, in combination with means for holding the article to be raised, substantially as and for the purpose above described.

Third, I also claim withdrawing the levers, O O, from their engagement with the sliding bar, K, by means of the hoisting rope or chain, and the cross-bar, P, and rods, g, or their equivalents, so as to connect the windlass with the driving power by means of the descent or weight of the rope or chain and its attachments, substantially as described.

1,991.—Machine for Peeling Willow.—George J. Colby, Waterbury, Vt. Patented Oct. 12, 1858:

I claim, First, The application and use of vulcanized india-rubber, or other yielding elastic substances, for rollers, to admit various sizes of osiers or willow rods, to be drawn in between, rubbed and wrung, to loosen the bark for peeling and discharge the rods, as herein specified.

Second, I claim the serrated metal roller, B, in connection with an elastic or yielding roller, B', they both having end chase, or a lateral vibrating motion, to mangle and rub rods without crushing them, for the manufacture of willow ware.

Third, I claim the rack or comb, N, for separating the loosened bark from the rods, in combination with the feed rollers, L M, and the faster speed rollers, H H', for discharging the peeled rods, as herein set forth.

1,992.—Mode of Fastening India-rubber Rolls to Metallic Shafts.—George J. Colby, Waterbury, Vt. Patented April 1, 1862:

I claim the process of forming a cement to fasten vulcanized india rubber, gutta percha, or other similar gums, to metal, woods, or other substances, by heating the surface of the gum sufficient to melt it to a sticky state, and then applying it in that state to other heated substances, and cool off, as herein specified.

1,993.—Steam Boiler.—Edward N. Dickerson, New York City. Patented March 1, 1864:

I claim, First, A superheating steam boiler, constructed and operating substantially on the principles described.

Second, Combining in a boiler an evaporating apparatus so constructed and arranged as to convey the water in divided streams from one water space to another across the column of hot gases ascending from the fire, with a superheating apparatus placed above it so constructed and arranged as to convey the steam in divided streams across the same column of hot gases, in an opposite direction from that in which the water first passed, in order that it may be superheated on its passage to the engine, substantially as described.

Third, Specifically and as the best elements for constructing my new boiler, I claim the arrangement of the tubes in the evaporating apparatus which convey the water in divided streams across the current of hot gases and other tubes still farther removed from the fire through which the hot gases pass and around which the steam flows in divided streams, substantially as described.

Fourth, I claim so arranging the steam delivery aperture, leading the steam out from the surface of the water in an inclined straight water tubular boiler, in reference to the descending channel which supplies with water the lower ends of the water tubes, that the steam shall be drawn out above the descending column of water, so that the tendency of water to rise up to an aperture through which steam is being drawn, may be counteracted by the counteracting tendency to descent in the sinking column of water, substantially as described; and this I claim, whether a superheating apparatus is used or not.

Fifth, I claim the perforated sheet or other equivalent device through which the products of combustion are passed from the space above the evaporating apparatus to the chimney, so constructed and arranged that the hot gases will be drawn to the chimney through the apertures extending along the length of the evaporating apparatus in divided streams so as to disperse the heat over the evaporating surface equally, by drawing it equally from the grates, and also to diminish its intensity on the superheating apparatus, substantially as described.

Sixth, I claim, in combination with a superheating apparatus inside of a boiler, and forming a part of it, straight water tubes for evaporating the water, opening at their opposite ends into ascending and descending water channels, so that the water may ascend in the channel at the higher ends of the tubes, and descend in the channel at the lower end, substantially as described.

Seventh, I claim so arranging the evaporating apparatus with reference to the water level that the highest end shall be under the entrance end of the superheating apparatus, in order to compel the steam to pass through the superheating apparatus, substantially in the manner and for the purposes set forth.

Eighth, Arranging the delivery ends of straight water tubes so that they shall open against a reflecting plate so as to neutralize the tendency of the water to jet out of the tubes and to be forced out of the boiler along with the steam when in combination with a superheating apparatus which shall receive the steam from the hot water after it has been reflected from the plate, substantially as described.

Ninth, So arranging the superheating apparatus that any water which enters it at its entrance end, may drop out of it at its delivery end, and not be carried to the engine, substantially as described.

1,994.—Turning Lathe.—Nathan Harper, Newark, N. J. Patented, Feb. 14th, 1865:

I claim, First, A rest constructed so as to move freely in a straight line at right angles with the axis of the material being turned, in combination with springs or weights, and shaping patterns, substantially as described.

Second, A rest constructed so as to move freely in a straight line at either an acute angle with the axis of the material being turned substantially as described.

Third, A compound rest when composed of the functions above described in combination with the rest having only a horizontal motion, substantially as described.

1,995.—Manufacture of Dextrine, Sugar, Etc.—Theodore A. Hoffmann, Beardstown, Ill. Patented May 25, 1858:

I claim, First, The combination of steam and acids for converting starch, corn and other cereals into dextrine, sugar and vinegar or alcohol thereof, when said grain is subjected to the action of different acids and water, and the temperature of the mash is elevated to from 235 to 350 degrees (below 350 degrees) Fahrenheit.

Second, Also the use of a closed mash tub of such strength as to be able to sustain the pressure due to the temperature of 225 to 350 degrees Fahrenheit, substantially as herein described, for the purpose of mashing starch.

1,996.—Cultivator.—R. A. Leeper and Z. B. Kidder, San Jose, Ill., assignor to Dills, Kern & Co., Atlanta, Ill. Patented Feb. 12, 1861:

First, We claim suspending the share standards, I I, upon pivots or bolts at their upper ends, substantially as and for the purposes shown and described.

Second, We claim the combination and arrangement of the share standards, I I, slotted supports, j j, and beams, L L, jointed at their front ends, as and for the purposes specified.

Third, We claim the employment of the crank shaft, M, provided with the arms, s and r, arranged and operating substantially as and for the purposes specified and described.

Fourth, We claim the combination of the oscillating standards, I I, beams, L L, crank shafts, M M, provided with the arms, s, and rods, t, arranged and operating as specified and described.

Fifth, We claim, in combination with said standards, I, beams, L, connecting bar, K, crank shaft, M r s, and rod, t, the rod, g, and lever, N, arranged and operating as and for the purposes specified and shown.

Sixth, We claim the combination and arrangement of the oscillating standards, I I, supports, j j, cross bar, k, rods, l l, and beams, m m, substantially as and for the purposes specified.

Seventh, We claim in combination with said oscillating standards, I I, uprights, j j, cross bars, k, rods, l l, and beams, m m, the employment of the fulcrum, h, upon the cross bar, g, lever, F, and rods, i i, all arranged and operating substantially as and for the purposes set forth.

Eighth, We claim the arrangement of the spindles, a a, bars, b b, and slotted plates, D D, with the frame, A, and seat, E, all arranged as and for the purposes shown and specified.

1,997.—Coat and Hat Hook.—Jas. T. and Horace A. Pratt, New York City, assignees of Geo. F. J. Colburn. Patented Nov. 1, 1864:

We claim a coat or hat hook, so constructed as to adapt it to be slidden and adjusted upon its sustaining bar, substantially as herein described.

DESIGNS.

2,083.—Photographic Card.—Augustus E. Alden, Providence, R. I.

2,084.—Statuette of Abraham Lincoln.—J. A. Bailly, Philadelphia, Pa.

2,085, 2,086.—Comb.—Elias Brown, Wappinger's Falls, N. Y. (Two cases.)

2,087.—Skirt Border.—Robert M. Bailey, Boston, Mass.

2,088.—Music Stand.—M. H. Elmore, Buffalo, N. Y.

2,089.—Trade Mark.—A. F. Goodnow, New York City, assignor to the Lamson & Goodnow Manufacturing Company.

2,090.—Plate of a Stove.—James Horton and John Martino (assignors to Stuart & Peterson), Philadelphia, Pa.

2,091.—Statuette of Shakespeare.—Edward J. Kuntze, New York City.

2,092.—Lamp Chimney.—John Letchworth, Philadelphia, Pa.

2,093.—Plate of a Stove.—John Martino (assignor to Stuart & Peterson), Philadelphia, Pa. Antedated May 30, 1865.

2,094.—Portable Stove.—John Martino and John Currie (assignors to Stuart & Peterson), Philadelphia, Pa. Antedated May 30, 1865.

2,095.—Monument.—James W. McLaughlin, Cincinnati, Ohio.

2,096.—Bust of Abraham Lincoln.—Wm. H. Philip, Brooklyn, N. Y.

2,097.—Medallion Head of Abraham Lincoln.—James Powell, Cincinnati, Ohio.

2,098.—Cook Stove.—Isaac A. Sheppard and Julius Holger, Philadelphia, Pa.

2,099.—Cook Range.—Isaac A. Sheppard, Philadelphia, Pa.

2,100.—Flange of a Stove.—Phineas Smith, New York City.

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