SCIENTIFIC AMERICAN

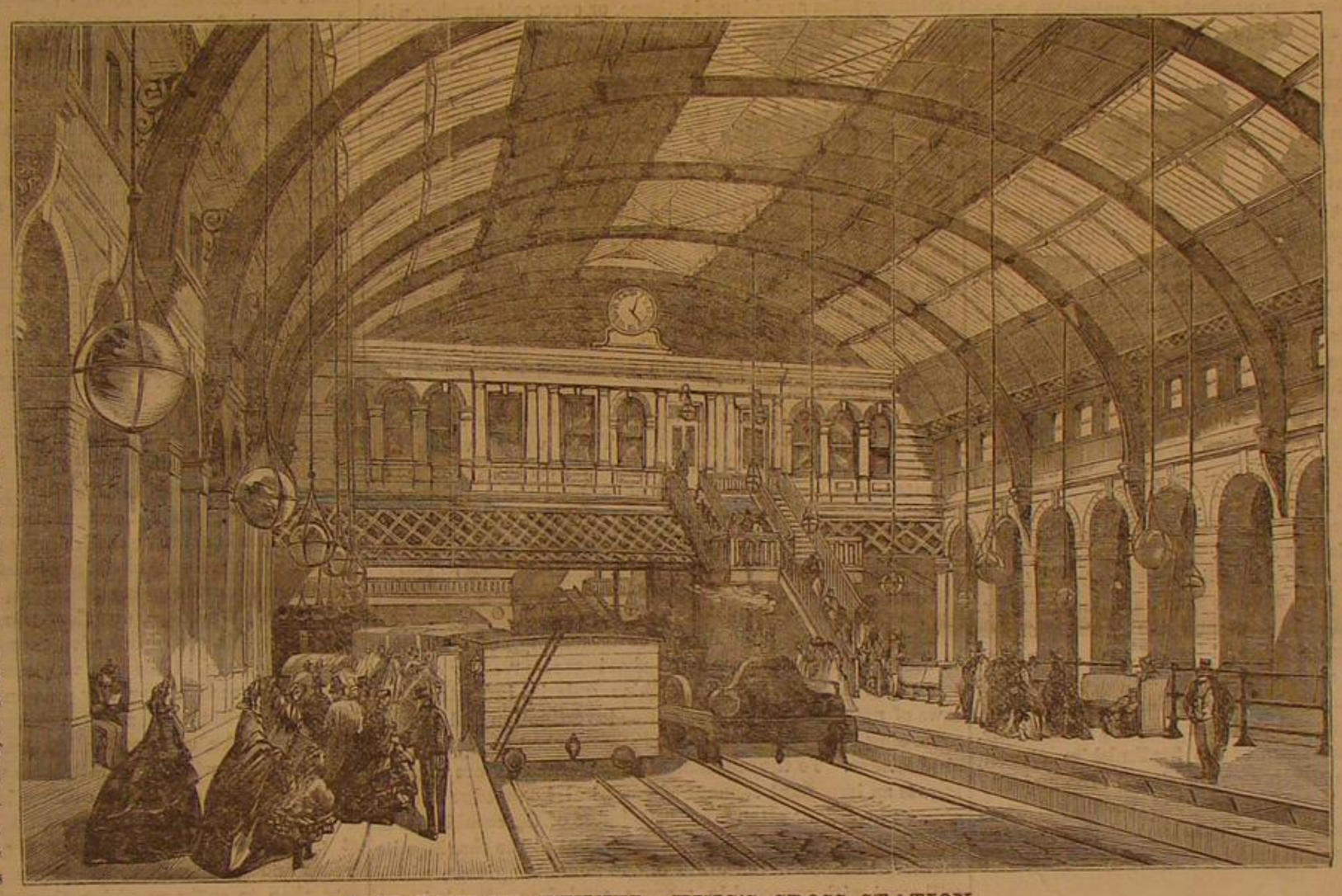
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

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The London Underground Railway.

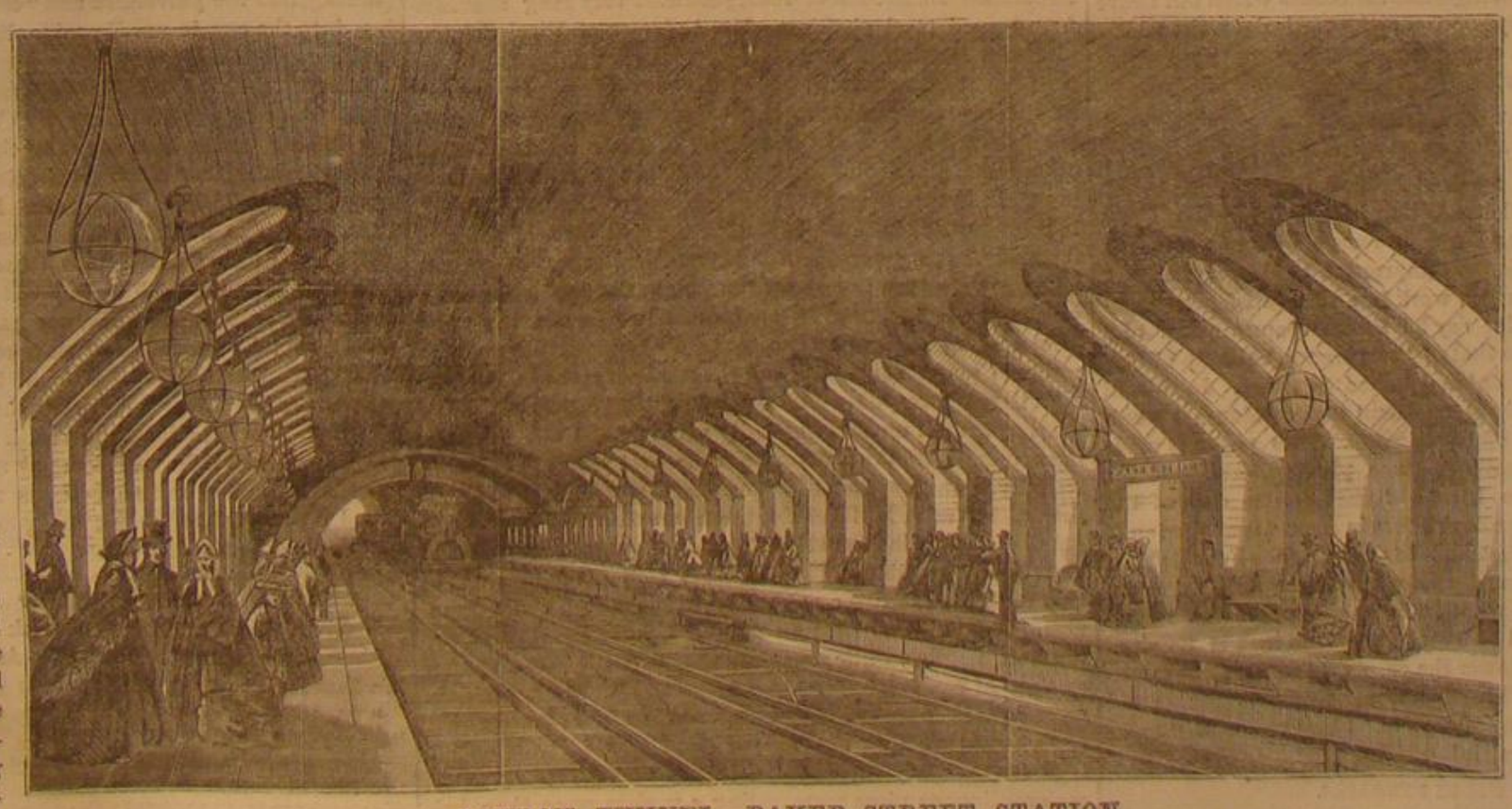
We have several times referred to the progress and success of the tunnel system of intercommunication as introduced in London, and we give herewith two illustrations, one representing the station at Kings Cross and the other that at Baker street. The line was first opened in January, 1863, and during the first year the number of passengers who availed themselves of its conveniences was nine and a half millions, which the next year was increased to eleven and three quarters millions. The cars are drawn by locomotives and each carriage accommodates 60 passengers. The line is a cordon railway, encirling London and communicating with the roads which radiate from the metropolis.

The engraving of the Baker street station will give an idea of the form of the tunnel, which is constructed of durable masonry, the stations being lighted from the surface streets by means of areas, and provided with gas to be used when needed. The success of the scheme is encouraging for those who advocate a similar system here, and proves that tunnel traveling is practicable, as not a single accident has occurred since the line went into operation. The same difficulties of locomotion within the limits of the metropolis existed in London that annoy the people of this city. It was easier to go thirty miles outside the city than five within. All this is changed by the tunnel railway, and passengers and goods can be sent with certainty and celerity to any point, free from the annoyances and hindrances of over crowded streets.



THH LONDON TUNNEL.—KING'S CROSS STATION.

Something of the sort must be adopted here if New York expects to be able to accommodate the increase in her population and business which is inevitable within the next quarter of a century, to look even no further into the future.



LONDON TUNNEL.—BAKER STREET STATION.

What is Charcoal?

We are accustomed to use the word charcoal as a mere synonym for impure carbon; but the analyst to the Geological Survey of New Zealand, Mr. W. Skey, impugns the correctness of this assumption, in a paper which we find in *The Chemical News*, maintaining that carbon in charcoal must exist, in part at least, in chemical combination with the oxygen, hydrogen and nitrogen, which the latter is known to contain, and which cling to it at high temperatures with a tenacity unknown in any compounds formed among themselves. He suggests, therefore, that charcoal is a carbonaceous compound, or more probably, a series of such, comprising both acid and basic substances in equipoise, so as to form a neutral salt or salts. The remarkable absorbent capacity of charcoal, under this theory, would no longer be assumed as mechanical, but would be explained chemically. For if charcoal consist of carbonaceous salts, the constituents, acid or basic, will be as insoluble in water as the combination, and consequently their affinities will be feeble even for each other, and when other substances present themselves, possessing superior acid or basic properties, they will immediately attach themselves to these supposed constituents of the charcoal.

American Shoes in Paris.

The sixty styles of ladies' shoes, prepared for the Paris Exposition by Mr. Edwin C. Burt, of this city, are really worth seeing. All the work being by the regular hands and machinery of the establishment, the exquisite result will be a true as it is a creditable specimen of the state of American art in one of the specialties of Paris. Finer stitching can hardly be seen anywhere, for we found it difficult to see some of this, in the sense of discerning its parts. It is the work of the Howe sewing machine, run by a sort of master in that line who earns rather stunning wages on the more expensive work of this manufacturer. To produce stitching of this extreme fineness the flat of the needle blade is set oblique to the line of seam, so that the slightly elongated holes may not run into each other but lie parallel like the slats of a Venetian blind. The seam thus obtains an apparent twist, looking like a delicate cord tracing the intricate embroidery now so fashionable in fine shoes. We are told that the patterns and styles are American, not Parisian. Visitors to the Exposition will be interested in comparing the rivals. The half-formed work showing the operation of the admirable American machinery by which all these shoes are soled, will be interesting in Paris or anywhere. A sole is sewed on, with a pull of 70 lbs. on every stitch, in less time than a man can "point" a thread. Men earn from $18 to $20 per week, and all hands in the shop, and outside number about 250, turning out forty cases weekly, or $40,000 worth of goods per month: the fine shoes to which this establishment is devoted, averaging in price about $250 per case.

Copper Direct from the Ore.

Dr. F. Le Clerc, of Paris, has patented an invention for treating copper ore at a red heat with a fine shower of water. When the white vapors disengage the heat is increased and the mass is fused and run off. On cooling, it is broken in pieces, and the process repeated, with a large supply of air, until metallic copper is apparent in all parts of the mass, when fusion is again effected, and a mixture of powdered charcoal and lime is added, the whole thoroughly agitated and mixed, the surface scoriæ removed, and air infected into the interior of the metal. With the purer gray ore, one melting will suffice.

Skeleton Leaves.

Many of our readers who have admired the exquisite tracery of leaf structure displayed in the denuded skeletons of plants, may be glad to know how to make such preparations for themselves. The following method has been communicated to the Botanical Society of Edinburgh, by Dr. G. Dickson:—

A solution of caustic soda is made by dissolving 3 ounces of washing soda in two pints of boiling water, and adding one and a half ounces of quicklime previously slacked; boil for ten minutes, decant the clear solution and bring it to the boil. During ebullition add the leaves; boil briskly for some time—say an hour—occasionally adding hot water to supply the place of that lost by evaporation.—Take out a leaf, put it into a vessel of water, and rub it between the fingers under the water. If the epidermis and parenchyma separate easily, the rest of the leaves may be removed from the solution, and treated in the same way; but if not, then the boiling must be continued for some time longer. To bleach the skeletons, mix about a drachm of chloride of lime with a pint of water, adding sufficient acetic acid to liberate the chlorine. Steep the leaves in this until they are whitened (about ten minutes), taking care not to let them stay in too long; otherwise they are apt to become brittle. Put them into clean water, and float them out on pieces of paper. Lastly, remove them from the paper before they are quite dry, and place them in a book or botanical press.

[From our Foreign Correspondent.]

THE IRON MANUFACTURE---SMELTING.

CARDIFF, Jan 12, 1867.

IMPROVED STRUCTURE OF FURNACES.

Probably in no branch of engineering has the progress been so remarkable as in the production of iron and steel. A comparison of the weekly amounts produced in Great Britain at the present time with the product ten years ago is astonishing, but hardly less so than the increase of economy that has been attained. In the manufacture of iron in blast furnaces this is due,

1. To the increased temperature of the blast.
2. To the enlarged dimensions of the furnaces.
3. To the utilization of all the escaping gas in heating the hot-blast stoves, and the boilers for the blowing engines.

Where temperatures of 500° or 600° were but recently considered high for the blast, it is now regularly worked at 1,100°. The difficulty that formerly stood in the way of higher temperatures, viz., the burning out of the stoves, has been overcome by giving a considerably increased surface to the pipes; it being now usual to allow from 1,000 to 1,250 square feet of heating surface for every 1,000 cubic feet of blast delivered per minute. In some cases the gas for heating the stoves is not burned directly in contact with the pipes, but in a separate chamber, the products of combustion being passed thence into the stove, but it is more usual to have the pipes enveloped in the flame.

It is in the Cleveland district, in the neighbourhood of Middlesboro-on-Tees that the increase in the dimensions of blast furnaces has been carried to the greatest extent. The coke here used is of a degree of strength which will allow of a great burden without crushing, or choking the blast and "gobbing" the furnace, and by successive experiments engineers have found it possible to increase the hight of the furnaces to 60 feet 75 feet, and now even to 102 feet with boshes of correspondingly enlarged dimensions viz. 23 feet to, in the latter case 27 feet with a capacity of about 26,000 cubic feet. So long as the materials will sustain the burden arising from such a hight, the advantages of it are obvious in enabling the heat to be more fully taken up by the charge, thereby reducing the quantity of coke required.

REDUCED COST OF SMELTING.

The ore in its raw state contains about 31 per cent of iron, and after calcination 42 per cent, and the consumption of coke per tun of iron produced has in some cases, with these furnaces been brought as low as 21 cwt.

The calcination is carried on in kilns varying from 24 feet to 35 feet in hight, and from 4,500 to 8,000 cubic feet capacity. The ore remains in about 2½ days and the quantity of fine coal consumed is one tun for 20 to 24 tuns of ore. They have not been able as yet to apply gas to these kilns, as the supply is not greater than is required for the boiler and blast stoves. The facts now given represent the best practice in this line. Were we to take the working of the Staffordshire district, we should not find the results as good, since in the majority of cases the gases are allowed to escape at the tunnel head, and separate fires are maintained in the hot blast stoves and under the boilers; though in many works the more economical plan is adopted.

ARRANGEMENT OF GAS SAVING FURNACES.

In the Cleveland furnaces the arrangement commonly known as the "cone and bell" is used for taking off the gas, and as now constructed it does not interfere with a good distribution of the materials in the furnace. The furnaces are usually worked with three tweers of 4 inches or 4½ inches diameter, and a pressure of blast of 4 lbs The hearth is about 8 feet diameter and 8 feet high and the boshes widen out above this at an angle of say 20° from the vertical to the widest part, and then contract very gradually till near the top where the diameter is more suddenly decreased.

ELEVATORS FOR CHARGING.

For elevating the materials for charging the furnaces a considerable variety of forms of hoists are in use such as water balances, inclined planes, blast-pressure lifts acting like a gas tank, steam lifts, and a more recent form of pneumatic lift worked by exhaustion or compression of air under a large piston. These latter, which work in a very satisfactory manner consist of a cylinder say 36 inches diameter and of a hight corresponding to that of the furnace, built up of convenient lengths bored out and bolted together. In this, fit loosely a piston of a weight sufficient to overbalance by half a tun the platform and empty barrows. This piston is made air tight by cupped leathers. The platform surrounds the cylinder, and wire ropes 1 inch diameter from each of the four corners pass over pulleys 8 feet in diameter at the top of the cylinder and are fastened to the piston. Four barrow loads of materials are usually raised at a time weighing from 1 to 2 tuns according to whether it be coke or ore and to lift this, an exhaustion of 1 to 3 lbs. per square inch is required under the piston. To lower the empty barrows, air is forced in to 1 lb. pressure. These hoists are very manageable and work with great economy of repairs. Similar ones of greater power are used for the calcining kilns.

THE WELSH FURNACES.

In South Wales the practice is modified by the use of the excellent coal which is there found, instead of coke. This coal is free burning, more like our semi-bituminous, but will not stand the great burden now usual in the North. At the Dowlais works, to which I have to day enjoyed the pleasure of a visit, the furnaces are none more than 50 feet high with boshes 20 feet in diameter and a capacity of 11,000 or 12,000 cubic feet. The more usual size being of slightly less hight with 16 feet boshes and 8,000 cubic feet capacity. The hearths are 8 feet 6 inches diameter and of the same hight. These furnaces yield from 200 to 280 tuns per week with a consumption of from as little as 20 cwt. of coal to 30 cwt. per tun of metal produced. The difference in economical working of furnaces appears to be a matter of some little mystery as two apparently similar furnaces will give very different results—hence the wide margin that I have just stated.

The blast is heated to the melting point of lead by the gas taken off from the furnaces and is introduced generally through 3 or 4 4-inch tweers, under a pressure of 3 lbs. per square inch, but sometimes as many as 7 tweers are employed. The contents of the furnace are from 36 to 48 hours in coming down, but in some cases if the furnace is being worked with good blast only 24 hours are required, No less than 25 different kinds of ore are used here, brought from all parts of Europe. That dug near the works contains only about 25 per cent of iron before calcining and 30 after but is a good quality for mixing with other ores, the average of a mixture being perhaps 35 per cent. Some of these furnaces have been in blast for twenty-three years without intermission except for ordinary stoppages, and whatever the shapes may have been that their builders intended them to have, they have long since assumed a figure that would be difficult to lay down on a drawing board, yet it is to be questioned whether their performance is not all the better for the change. The calcining kilns are oblong in shape, or even rectangular, with a V section transversely, the calcined ore being withdrawn through square holes in the bottom. The hoists, where such are required, are the ordinary water balances.

There are also a few anthracite furnaces in this region. They are experimenting at Dowlais with tolerable success in puddling by machinery. The apparatus employed consists of an ellipsoidal vessel mounted on trunnions, and revolved by a steam engine. It is lined inside with 6 inches of fire brick, and the flame enters at one end and escapes at the other; the openings being about two feet in diameter while the vessel is 6 feet in diameter at the center, and 8 feet long. The metal is charged into the vessel and melted, and the vessel is then revolved, slowly at first, then increasing to 20 revolutions per minute, and again decreasing in speed as the metal comes to nature. The iron produced is of good enough quality, but the trouble is to get any lining to stand the grinding action of the contents. These works, which are perhaps the largest in the world, extend over several miles of country, and are situated in a most beautiful hilly region which it seems almost wrong to disfigure with such unsightly objects. But in comparison with the iron district of Staffordshire this is still a garden of beauty. SLADE.

Metal Shavings.

There is a remarkable degree of uniformity and regularity in the shape and structure of all shavings removed by cutting tools from metallic surfaces. This regularity indicates strict laws of nature, capable of scientific investigation and a most promising field for research almost untouched as yet by physical science. To the mechanical engineer the nature of shavings is an important element of empirical knowledge and an object of constant attention. "To judge of the capabilities of a workman, I do not look at the work, but at the shavings he makes." These are the words of an eminent engineer, which will meet with approval in many a workshop. But it is not only the skill of the workman, and the quality of the cutting tool, it is also the nature of the material operated upon which can be judged by the character of the shavings, with more certainty and readiness than by any other test. It is a general practice with steel-makers or ironworkers to exhibit continuous shavings of very great length as proofs of the uniformity and malleability of their materials. Mr. Bessemer at the international Exhibition of 1862, produced very long shavings from turned steel shafting. Mr. Anderson of Woolwich, exhibited a shaving from a wrought-iron gun, supposed to be the longest ever made in one continuous piece. In the Enfield factory the continuity of the shavings from gun barrels is considered a proof of the solidity of their welds. On the other hand, cracks and flaws can be detected from the shavings. In the reparing shops of the Cologne-Minden Railway, in Germany, for instance, in testing the soundness of axles after their having passed over a certain mileage, the process followed is to turn the parts running in the bearings with a very sharp tool, removing an extremely thin shaving only. This shaving is carefully observed. Its continuity is an indication of perfect soundness, and the smallest crack in the axle, even if not perceptible under the microscope, will cause the shaving to split up longitudinally when turned off. In planing armor-plates, the shavings are the best proofs of the malleability of the iron and of the powerful machines in use. At the Atlas Works, in Sheffield, there are shavings from their armor-plates six inches wide taken off the whole length of a plate in one continuous piece. Cast iron gives shavings of very different character, according to the degree of its hardness. The cuttings from a chilled roll have the form of the thinnest needles, while soft gray iron will produce a curved cutting of some length. At Lowmoor Ironworks, cast-iron guns have been turned with tools some 12 inches broad at the edge, removing thin shavings of equal width. These shavings are regularly curved up in coils of very small diameter, each continuous piece representing a surface more than half an inch long, traveled over by the tool in removing it. The length of a shaving, if uncoiled, is much smaller than the length of surface from which it has been removed, owing to the crushing action of the tool upon the shaving This action will be increased by the bluntness of the cutting edge, so that to a practiced eye even the state of the cutting-tool will be clearly visible, from the nature of the cuttings removed by it. The smallest shavings known are those removed by the scraping-tool from planes of great precision. They are of microscopic smallness, and, from the limits of accuracy which their removal is capable of effecting, we must conclude that their thickness is less in fine scraping than the one millionth part of an inch.—*Engineering.*

Cause of Potato Rot.

A paragraph in general circulation among our exchanges states that a French naturalist has recently discovered by microscopic examination that there are 200 ferocious animals, of a coleopteric form, in a space as large as a pin's head, where the surface of a potato is raised and discolored by the rot. These animals, it is added, bite and tear each other with great fury.

It is no news to our readers that the potato rot is characterized if not caused by parasites. We have examined with the microscope various specimens of the potato at different stages of rot. In no case did we fail to discover—what was discoverable in no other condition of the potato—according to the stage of the disease, either the eggs or the developed insects in great numbers, and both are often visible to the naked eye. We became perfectly satisfied, from all the phenomena taken together, that the insect is the cause of the disease, that it is communicated from the seed potato to its posterity, and that its ravages after the harvesting are hardly more and often much less destructive of the crop than its effect in checking the growth of the potato from the sprout upward. As to the character of the insects, we cannot confirm the coleopteric form nor the ferocious disposition. Neither are they microscopic animalculæ, 200 of which can occupy a pin's head; but when fully developed can be distinctly seen by the naked eye. The body is white, egg-shaped, and in appearance not unlike the parasites usually found on dried figs and other fruits. They appear to be sufficiently harmonious, and too busy in devouring and poisoning the food of man to spend their time in quarreling among themselves. Mr. Lyman Reed, of Massachusetts, we believe, claims to have perfected a cheap preparation which may be applied to the seed potato so as to kill the parasite and not the tuber, doubling the growth and insuring it against decay. We have not learned what results, if any, were realized the last season by his remedy.

Adulteration of Sugars.

Mr. W. E. Demarest of this city writes us that he has been engaged during the last sixteen years in the business of pulverizing loaf sugar by machinery, and can say on oath that there has never been an ounce of *terra alba* or any other substance put in the many thousands of barrels turned out in that time. We do not question it—never did—and in giving the writer this gratuitous advertisement of both his business and his honesty, in his own words, we do not wish to be understood as recognizing any grievance to be righted on our part, for the honest men whoever they are, in the sugar, candy, spice, coffee, milk and other trades. They must settle their accounts with the adulterators who bring suspicion and loss upon whole classes and callings by their pestilent contact. If such men can be driven out of trade, we shall rejoice; but at present they seem to have a growing vantage in all trades, and are more likely to drive out all honest men or all honesty, than to suffer expulsion themselves. As to pulverized sugar, anybody can buy it in a palpably impure state, perhaps one time in three, perhaps not so often, of our ordinary grocers. Our experience has proved that the purest and most economical sugar is the "granulated," when found in bright, hard and even-sized crystals, clean and free of pulverized particles. It is consumed with less waste than any other form of sugar, because it measures more uniformly and exactly by bulk; not packing, like the pulverized and "coffee" sugars, nor blundering into the cup in unadjustable lumps like the crushed or loaf.

Our correspondent admits that some lozenges are adulterated, "but they are sold as such." We hope he does not call the latter a saving clause. It is the common excuse of all these villainies, that nobody is deceived, adulteration is notorious, people will have them, etc. Dealers buy to sell, and knowingly take adulterated articles that they may seem to sell cheap: but at last hands, there is always fraud. The consumer does not wish to buy water at ten cents a quart to dilute his twelve-cent milk, nor pea meal at fifty cents a pound to take the edge off sixty-cent pepper. Ignorant of actual values, as well as of tests, he takes the low-priced stuff and refuses the full-priced, because he knows no other rule of selection. Label each honestly with its ingredients and their proportions, and if he will then pay more for half a pound of a genuine article mixed with as much more of trash and called a pound, than for the half pound in its pure state, our mouth shall be stopped.

Testing Boiler Iron.

Referring to an account of a weak steam boiler published with comments in the SCIENTIFIC AMERICAN No. 2, Vol. XI., Mr. Samuel Marsden, of Mo., writes:

"We know there is such a thing as counterfeit greenbacks, and it appears from a portion of this article, there is in existence counterfeit A No. 1 charcoal boiler iron. Of the two the last is the more dangerous counterfeit. A series of experiments, to ascertain the tension strain of the boiler iron manufactured at the various manufactories in this country would be of vast importance. It will pay well the owners of steam boilers to pay three times the price for good iron instead of bad. Under such circumstances the manufacturer ought to warrant the tensile strength of it. If found wanting attach the penalty."

BETTER be right than to conquer in an argument. Better bear the assumptions of ignorant men than waste your dear-bought experience on fools.

COMMISSIONERS TO THE FRENCH EXHIBITION.

The Washington *Star* says there is a considerable quarrel between the thirty Commissioners appointed to represent the Government of the United States at the Paris Exposition. A plan has been suggested that ten of the Commissioners shall be paid and twenty unpaid—the ten to be the controlling directory, and the twenty to be a subordinate as well as a superfluous tail to the kite. The ten fortunate ones are to be selected by Congress, but the apprehension is that they have already been designated by the Secretary of State.

If it be true, as the *Star* asserts, that the Commissioners have already commenced to quarrel about rank, the contest is likely to break out more fiercely when all these official dignitaries get to Paris. The trouble, it appears to us is, that there are too many Commissioners, and so far as the appointment of paid ones is concerned, they have not been selected as a general thing with reference to qualification for the duties expected of them. There is not in the whole list of paid Commissioners a practical scientific mechanic or engineer. They are generally ornamental gentlemen of recognized intelligence and high social position. These ten paid officials are expected, of course, to perform all the labor of the Commission—the honorary appointments being not only useless, but liable by virtue of their position, to do injury. Thirty Commissioners! Of what possible service can they all be? Twenty extra officials swelling about Paris and other parts of Europe under the title of "*Commissaire Etranger*," will make our country appear ridiculous.

We hope Congress will abolish this honorary caudal appendage, and provide only for a limited number of paid Commissioners who possess the qualifications necessary to make the exposition valuable to our country in a practical sense.

Editorial Summary.

BREECH-LOADING SMALL ARMS FOR NEW YORK.—The State Board of Officers on this question recorded the following results:—The Robert breech-loader fired eighty-four balls in six minutes (fourteen in one minute), all striking inside the target, and penetrating fifteen one-inch planks. The Sharpe's rifle and carbine expelled one hundred balls in less than seven minutes, and penetrated the thirteenth plank. The Milbank rim-fire gun expelled ninety-nine balls in six minutes and a half, penetrated the eleventh plank and sent nine balls inside the target in one minute. The Lampson gun fired twelve balls in one minute, eight of them striking inside the target. Balls' carbine expelled seventy-five balls in nine minutes and a half, using the magazine and making twenty-four blanks. The Prussian needle gun was tested, and proved in every way inferior to recent inventions. It sent a ball through the eleventh plank, and did not develop a rapidity of fire beyond six or seven per minute. The Poultney gun penetrated the thirteenth plank. The Remington breech-loader fired one hundred shots in six minutes and fifty-five seconds, and sent a ball through the eleventh plank. It expelled eleven balls in one minute, six entering the target and five striking outside. The Board will reassemble for final examination and trials at the State Arsenal on Tuesday, the 19th day of February, at 10 o'clock A. M., those having arms which they desire to have entered for examination will present them on or before that day, and it will be necessary that for each arm presented 200 cartridges to be furnished.

CHINESE IMMIGRATION.—The opposition to the Chinese on our Pacific coast is giving way before the consideration of commercial amity with China, and the growing importance of cheap and plentiful Chinese labor in the manufacturing and other industries of that region. The woolen mills, it is admitted, could not have succeeded but for the Chinese, and railroad building has a similar need of them. The leaders of public sentiment in California now advocate fair treatment of the (fallen) celestials, and take pains to show that their tenacious attachment to their native country, from which they never transfer their political relations, and to which they never fail to return, alive or dead, is sufficient guaranty against their entering as a further corrupt element into our governing population.

INCREASED TELEGRAPHIC FACILITIES.—Mr. Cyrus W. Field, has gone to England, on the business of the Newfoundland Telegraph Company, to order a submarine cable from Placentia Bay to Sydney in Cape Breton, or to some point nearer on the coast, where it will meet the Western Union lines, thus saving the risk of the long land lines in Newfoundland. These lines, however, are to be kept up and as soon as Spring opens, a new line is to be built over the old road cut through the forests by the Newfoundland Company 10 or 12 years ago. There will then be three perfect lines, which should prevent any failure hereafter in the prompt transmission of news. With these improved land lines, and the new submarine cable to Cape Breton, the chain of electric communication with Europe will be complete.

STEAM DREDGING.—A late number of *The Engineer* illustrates and describes a very powerful steam dredging machine in use on the Clyde. It has an endless bucket chain or elevator, containing thirty-nine buckets of thirteen cubic feet each. The great arm or bucket frame which holds and directs this moving column of deep diggers, is 91 feet long, with its upper end attached to a frame of adjustable elevation and its lower end on the bottom to be excavated. The machine lifts 300 tuns of earth per hour. The hull is of iron, length 161 feet, breadth 29 feet, and depth 10 feet 9 inches. The engine is a single cylinder marine engine of 75 horse-power, 48 inch cylinder and 3 feet stroke.

NEUMEYER'S INEXPLOSIVE GUNPOWDER—inexplosive, that is, except under confinement—has been subjected to a microscopic examination by an inquisitive Englishman, who finds that it differs from ordinary gunpowder, in being a coarse instead of an intimate mixture of the same materials. The ordinary powder, having been macerated to a thin paste, appeared as a uniform grayish mass, the particles of charcoal and sulphur being indistinguishable; whereas the Neumeyer powder under the same conditions appeared to consist of roughly intermingled grains of charcoal and sulphur. The ingredients being thus imperfectly mixed, a slow rate of combustion is the result: but in confinement, the gases liberated by this slow combustion become explosive. It seems evident that this result cannot approach in force or quickness the explosion of good gunpowder. An experiment reported with a shot gun, if true, confirms the apparent worthlessness of the invention: a charge of shot at thirty yards hardly reached the plate, and the few that struck it were hardly flattened at all. An experiment in blowing up a small building, also confirmed the theory: the fizzing and smoke of the powder being first observed, and the roof being lifted by the gases, some seconds later. Official tests will soon give us the truth of the matter.

CHEESE FOR MEAT.—We remarked not long since upon the superior nutritive qualities of this food, as evidenced by the experience of laborers in certain countries, where it forms the strongest staff of life. We have since observed certain researches of a French chemist, M. Charles Mene of Lille, from which we learn that certain cheeses, specified as Dutch, Gruyère and Roquefort, contain from 26 to 40 per cent of nitrogenized matters, which are considered the most highly nutritive constituents of food. Consequently these cheeses are from twenty-five to a hundred per cent more nutritive than bread or meat, which is set down at 22 per cent of nitrogen. In the combustible or fatty elements for heating the body by respiration, cheese yields only to butter or other fats. Again, in point of mineral nutrition, cheese is found pre-eminent, containing 7 to 8 per cent of ashes, whereas meat and bread contain only one per cent. The very richness of this article, however, prejudices its utility in delicate stomachs, where it is often found indigestible. The strongest food suits only the strongest digestion. The attention now given to an improved, economized and increased manufacture of cheese, is justified, and will naturally be stimulated, by these facts.

FROM BANE TO BENEFIT.—Owners of copper-smelting works in England have been repeatedly mulcted in damages by their neighbors for the pernicious effects of copper smoke upon crops and cattle, and an act was passed at the late session of Parliament requiring such parties to consume their smoke or the deleterious parts thereof. The arsenical deposits from such works have completely denuded of vegetation considerable portions of land in their vicinity. A process has now been devised and set in operation by Mr. Vivian, a copper smelter and member of Parliament, by which the copper smoke is condensed for the manufacture of sulphuric acid and is employed with phosphates, to produce a valuable superphosphate for fertilizing purposes, said to be almost unequalled for green crops. Mr. Vivian expresses confidence that he will be able to supply fertilizing matter from his works for 40,000 acres of land.

AMERICAN CEREALS FOR THE EXPOSITION.—A circular from the Commissioner of Agriculture recites the resolution of Congress to provide for the exhibition of the cereal productions of the United States at the Paris Exposition, and urges all who have fine specimens of wheat, corn, and other grains, to forward small samples by mail forthwith, each distinctly marked with the name, donor's name, place, county and state where grown. Addressed to the Hon. Isaac Newton, Commissioner of Agriculture, Washington, D. C., they will go free of postage. None should be sent by express, unless prepaid, as no money is appropriated for such expenses. Only a few days will be available for action, and not a day should be lost by those who wish to be represented in the Exposition.

THE FRENCH PINE WOOL.—This curious novelty in manufacture, lately noticed among our patents, is said to be already in active manufacture and sale in Paris. As wadding it is recommended as adding to those usually demanded in that article highly medicinal qualities for catarrh, bronchitis, sore throat, rheumatism, etc. As mattress stuffing, it is but half the price of wool and hair, and better still, its resinous principle gets it the abhorrence of bugs. As flannel for all purposes, it peculiarly promotes the functions of the skin. The etherated pine oil prepared at the same time is highly praised as an application for incipient paralysis and apoplexy, recent burns, worms, fits, etc., etc.

COMFORT FOR HOUSEWIVES.—In No. 11, Vol. XV., we gave an illustration of White's Mop Wringer. It is, as we stated, a great relief to the housewife in the unpleasant work of floor washing. We learn that wherever introduced it has been well appreciated, and that rights to a large extent have been already sold. We do no more than justice to our readers as well as to the inventor in calling attention to his advertisements on other pages. It can be applied to any common bucket, and obviates the necessity of soiling the hands.

AMERICAN MANUFACTURES IN EUROPE.—Mr. Ross Winans has received a contract from Russia to build cars and locomotives for that Government. Messrs. Smith, Hall & Buckland, cartridge makers, of Springfield, Mass., have just shipped 80,000 cartridges for the Austrian Government, through the firm of Baumgartner & Co., Bucharest. If satisfactory, the firm expect an order for not less than a million.

ABSORBENT QUALITY OF IRON.—Recent investigations by Mr. Graham, the master of the British Mint, have led to the conclusion that pure iron is capable of absorbing, at a red heat, and of retaining when cold, 4·15 times its volume of carbonic oxide gas, and that wrought iron in the course of its preparation may thus *occlude* six or eight times its volume of the gas, which is carried about with it ever after. Mr. Graham found in his experiments that a wrought iron wire gives off this gas freely at a red heat, and again, at the same temperature in an atmosphere of carbonic oxide, as freely absorbs it. The further pursuit of this suggestive discovery will very likely have an important bearing on the improvement of iron and the manufacture of steel. The decomposition of carbonic oxide at a high temperature for the production of steel, with the fact developed by Mr. Graham, that the gas is most freely absorbed by iron at a low red heat, suggested to him the possibility that the conversion might be promoted by frequent alternations of temperature.

ICE MACHINE.—A simple instrument for making artificial ice is now manufactured in Paris, by which a beautiful cylinder of ice is produced in ten minutes, or a bottle of wine or other article can be reduced to the freezing point of water in the same receptacle. The instrument consists of two metallic cylinders united, one within the other, the space between them being devoted to the freezing mixture, and the interior of the smaller cylinder, to the water or other article to be cooled. These being introduced, the cover is put on, and the cylinder is rolled to and fro on a table by the hand. The chemicals consisted formerly of one part each of water, sub-carbonate of soda and nitrate of ammonia: but for the latter a cheaper salt not mentioned is now substituted, and the mixture is put up in quantities sufficient to make seven lbs. of ice (if we reckon correctly from the indirect statement before us) for 50 centimes or less than one dime. The instrument costs ten francs. It is called the *glacier roulante*.

THE great California rain continues to develop "items." A meteorologist of Sacramento (Dr. Logan) states that the fall at San Francisco was at the continuous average rate of 0·386 inches per hour for twenty hours—a greater rain than he had been able to find on record in any part of the world; yet which sinks into mediocrity in comparison with a rain reported at Nevada City a week later (Dec. 27th) when three and seven-eighths inches fell in less than three hours. The course of the storm was east-north-east until it reached a certain point, where it turned nearly at a right angle and proceeded a short distance, after which it made a second turn and resumed its former direction. In a distance of less than 100 yards, 70 or 80 large trees were counted, that had been prostrated by the storm. A cedar four feet in diameter was twisted into laths.

GOING TO SCHOOL.—Nearly as many children are found at school, on an average, in the Quaker City (according to the *Public Ledger*) as in New York, although the rolls of the latter place exhibit three times as many pupils. The figures are, in New York, 222,527 enrolled, 91,986 average attendance: Philadelphia, 75,833 enrolled, 65,017 in attendance. Better discipline at school or at home, or in both places, alone can account for this difference in favor of Philadelphia. We suspect the difference is more at home, than at school; yet the pitiful average of a little over four months attendance *per annum* to each pupil in the New York schools, is a phenomenon which the Legislature would do well to look into before declining to interfere with our present elective system. The management of education is the very thing of all others least proper to be committed to the uneducated mass of mankind and to the corrupt influences of ward politics.

AMERICAN INDUSTRY.—The value in gold of the annual products of the people of the United States for the year 1866 was in round numbers as follows: those engaged in agriculture $1,609,000,000; manufactures, including all processes between the raw material and consumption, $917,000,000; mining, $100,000,000; fishing, $13,000,000; hunting, $2,000,000; wood cutting, etc., $25,000,000; domestic commerce, $1,500,000,000; foreign commerce, $190,000,000; net annual earnings or gross increase of money value derived from exchanging products with foreign countries, engaging in improving the face of the country and subduing it to the purposes of society, $2,400,000,000; total in gold value, $6,756,000,000, the same reduced to currency, 9,458,000,000.

INDIA is endeavoring to spin its own cotton in modern fashion. Among the earliest countries in the primitive growth and utilization of this staple, it is thus coming in among the latest, though by no means the last, in economizing it by machinery. The Goosery Cotton Mills, lately started by a company in Calcutta, contain or will contain when fully furnished, 15,000 spindles and 144 looms; the surplus of the spinning to be sold as twist. It already gives employment to some 280 women and boys, and its products meet with a ready sale at prices fully equal to Indian cotton goods manufactured in England.

DE-PHOSPHORIZATION OF IRON.—Mr. Warren De la Rue (Eng.) has patented an invention which consists in the introduction of lead, metallic or oxide, into the converting vessel so as to be thoroughly diffused in the fluid metal, combining with the phosphorus in the iron, and the compound driven off by oxidation. Molten lead is introduced as soon as the blast has been turned into the converting vessel. Compounds are entered with the blast, in the shape of powder.

FRICTION CLUTCHES.—Volney W. Mason, Providence, R. I., who manufactures a friction clutch that is worth having, says in a letter to us "I wish you to continue my advertising until forbidden, as yours is the most profitable that I have." Mr. Mason confirms the testimony of hundreds of others.

FERRIER'S DOUBLE ACTION CHURN.

The object of churning is to break up the vescicles of the milk which contain the fatty particles, and the more rapidly this is done, under the proper temperature, the quicker will the operation be completed. That is evidently the object of this improvement in churns. The top which supports the gears and their standard is secured by hook latches, A, when the machine is in operation. There are two upright shafts, one revolving within the other, and each carrying on its upper end a bevel gear. Another bevel gear is attached to the horizontal shaft, B, which has a crank, and all these gears mesh together. It will be seen that as rotation is given to the crank shaft one set of dashers, C, will rotate in one direction, while another set, D, will revolve in an opposite direction. Of course the agitation thus produced must greatly aid in breaking up the vescicles and shorten the process of butter making.

The machine appears to be well adapted and designed for its work and where used is stated to give excellent satisfaction.



Churning is at best a labor when performed by human muscles and any device which will shorten that labor must be a blessing. This churn was patented through the Scientific American Patent Agency, Aug. 7, 1866, by Wesley S. Ferrier of Indiana, Pa., whom address for business particulars.

STREET RAILROADS.

One of our English mechanical exchanges says: "The plan for the re-introduction of street railways into London is being pushed forward as rapidly and energetically as possible. In connection with this matter a number of reports on the working of tramways have been obtained from officials in the various cities and towns of America, into which the system has been introduced. The general testimony thus obtained is to the effect that the tramways do not interfere with the ordinary street traffic, though laid down in some of the most crowded thoroughfares. Opposition is said to have died out in almost every district,, and, to crown all, the expenses incurred by the local authorities in repairing the roadways have been very materially lessened by the fact that the companies who use the tramways take the responsibility upon themselves of keeping such part of the road as their vehicles run upon in good condition."

Part of this paragraph is entirely correct, but when it is stated that street railroads "do not interfere with the ordinary street traffic," there may be some objection on the part of those who are compelled to drive heavily-loaded teams through these "crowded thoroughfares," or to guide their family carriages among and over these net-works of iron. Opposition has not "died out in almost every district," but, on the contrary, it is deep seated, intense, and breaks out occasionally, as now, in projects for other methods of city communication. As to the repairs of the roadway in those portions occupied with the tramways, the city had better by far assume the expense than to leave it to the corporations who swindle the people and defy the authorities.

If our opinion could affect the introduction of street railroads in London, or in any city, it would be an adverse one, judging from the results daily under our own eyes. Apart from the nuisance these iron rails are to the vehicular traveling portion of our people, these companies, controlling the avenues of transit in a city, compel those who pay them for transportation to submit to all manner of inconveniences and to the insolence of employés so that street railroad traveling has become almost a terror. As to keeping the streets in repair, any one who makes a mile trip on our street cars can judge for himself. It is a succession of bumps and jolts from one end of the route to another.

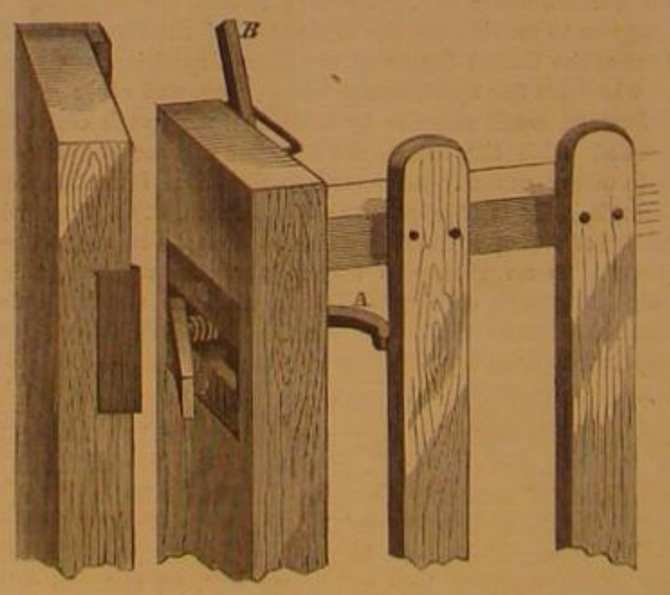
Street railroads, properly managed, may be a convenience and a public accommodation, but to fairly decide that question one should be enabled to test it under different circumstances than exist in any town or city in this country with which we are acquainted. So far as we have tested them they are simply nuisances and instruments of extortion.

Fighting Snow with Fire.

The difficulty of the Londoners with their "white elephant," the snow storm, when contrasted with our aggravated experience of the same thing in the northern American cities, illustrates the marvelous efficacy there is in being used to a thing. With four inches of snow on the London streets, business and locomotion appear to have been in great part suspended. The General Omnibus Company and nearly all the cabmen kept their horses and vehicles within doors, and the population were driven to the underground railway. To foot it seemed almost out of the question. In St. Pancras, Mr. Scott, the chief surveyor, went to work on his own responsibility and set 300 men and 120 carts at work removing the snow. He cleared 9½ miles of streets, at an expense of five or six thousand dollars, and made a vast mound of snow on the intended site of the Cobden monument. But the sun came out, after two or three days, for a novelty in London, and by that special interposition of Providence the snow was all carried away into the sewers. This gave London an idea. Why might not the snow be got into the sewers *without* a special interposition of Providence? "The snow *might* have lasted a week," exclaims one able journal, yet "every winter we resign ourselves helplessly and hopelessly to this recurring visitation! Why should there not be horse-drawn snow plows to scoop it up rapidly into heaps near the sewer holes? And why should it not be rapidly melted there by steam or heating apparatus of some kind?" Then follow scientific calculations showing that 10,000 tuns of coal might be sufficient and might be profitably used, to melt away a single fall of snow from the streets of London. It is impossible to conceive the plight of a Londoner, much more a London population, under a snow like that in Boston the other day, where some of the narrow streets and courts were literally filled up; or worse still, under the conditions of New York, where the snow not only *will* fall, but *will* soften under southern breezes into a semi-liquid slush a foot deep, remaining so for many days together. Undoubtedly they would collapse and lie down in despair. Yet we get on about as usual, with no special astonishment, only rather universally and uncommonly wet and dirty.

THE BUCKEYE GATE LATCH.

A simple, neat, reliable gate latch, which when once attached will not get out of order and refuse to operate, is a blessing on a farm where the security of cattle and the preservation of crops depend so largely on a closed gate. The fastener herewith represented is simplicity itself in construction and operation; while a child can open it, the most sagacious horse or cow used to lifting latches and letting down bars might try in vain.



The catch is a bell crank lever, the long arm projecting through the gate, as at A, and the shorter end engaging with rebuff plate on the post. A spiral spring let into the plate in which the latch plays keeps the catch out to be acted upon by the rebuff, which throws it into the recess as the gate is closed, and by a projection forms a stop for it. The simple lever, B, can be attached if desired for convenience of opening the gate from horseback. It merely engages with the arm, A, of the lever and pulls the latch in. If a post sags there is elasticity sufficient in the spiral spring to keep the latch engaged with the rebuff plate. The simplicity and apparently durability of the device, will recommend it to all.

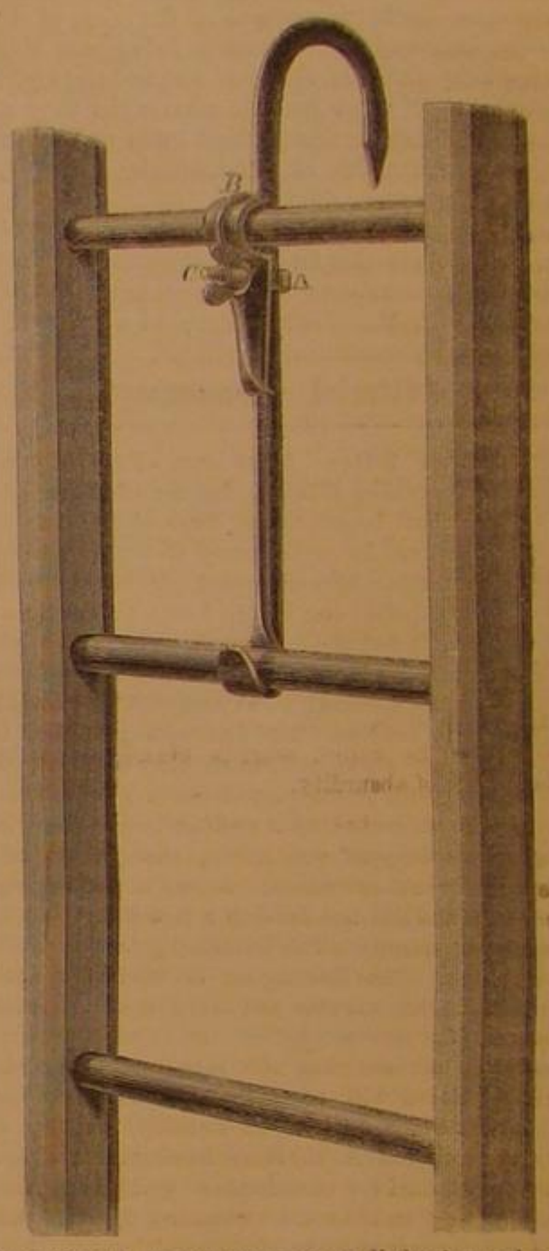
It was patented, Dec. 12, 1865, by Webb Broomhall, and is now owned and manufactured by James Harsha & Co., Circleville, Ohio, whom address for further particulars.

Perishable Submarine Cables.

It is announced in *Engineering* that the cable laid in 1861 between Malta and Alexandria by the British Government as a part of the telegraph line to India, is going rapidly to destruction. Scarcely is one section repaired before another breaks down, and it is anticipated that the increasing weakness of the cable must soon make it impossible to lift it for repairs at all; like the Cagliari and Bonah cable of similar structure, laid in 1857, which in two years became so much disintegrated by corrosion that the attempt to lift it is compared to picking up a length of macaroni from the bottom of the sea. The protection of both cables is about the the same, consisting only of eighteen No. 11 ungalvanized wires, which in the latter case were scarcely kept from rusting through in places before the cable was laid. *Engineering* attributes the responsibility of laying cables like these to the manufacturers, who had the chief vote in the mode of construction, and who perhaps objected to the roughness and occasional bits of spelter to be found on galvanized wire. The Atlantic cables are both of substantially the same construction, and although the successful recovery and working of the first cable, after a year of submersion, encourages a better hope of its durability, the result of the five years' experience of the Malta cable, it must be confessed, is somewhat ominous.

FARRAR'S ADJUSTABLE LADDER HOOK.

Ladders with hooks attached are indisputable conveniences



to house painters. carpenters, masons, lightning-rod men, and all others who are compelled to work on the outside of buildings. But those ladders which have the hooks permanently attached to their sides are inconvenient when required for ordinary use. The device shown in the engraving is a hook which can be attached or detached at will to any ladder, large or small, and one may be used or two if desired. It is simply an iron hook as seen, the small end grasping a rung and the upper portion secured to the rung by the loop, A, the shank of which passes through the movable hook, B, and is secured by the thumb-nut, C.

The advantages of this contrivance are obvious. In cases of fire, hook ladders are not always attainable, while common ladders are usually at hand. With one of these hooks the ordinary ladder may be used for traversing the slant of a roof. Painters and those who repair roofs can carry a hook instead of lugging about heavy ladders, as any ladder can then be made a hook ladder. It was Patented April 9, 1861, by Willard T. Farrar. For further information address Parmenter & Co., Waltham, Mass.

The monthly supply of milk from the country into London is 508,000 gallons. The western counties contribute 140,000 gallons; the eastern counties transmit 125,000 gallons; the northern counties, 95,000; Hants and Berks, 55,000 gallons; and from other districts the daily supply is augmented by 18,500 gallons. Kent and Sussex are the lowest contributing counties; and at the present daily averages, 6,604,000 gallons of milk are annually brought from the country to London; and this is increased by metropolitan dairymen to an extent of another third, and is daily retailed out to about 260,000 customers. The aggregate supply of milk consigned to London is the produce of 20,000 cows in the country. The wholesale prices charged are at an average of 2s. per barn gallon (eight quarts); and the value of milk brought to London for consumption represents a sum of £660,400 per annum.

The Lake Country of England, referred to by our London correspondent, in connection with the project for an aqueduct for the metropolis (like our Croton) contains what is said to be the wettest spot in rainy England. The rain fall in the valley of Borrodaile has attained to upwards of 180 inches in a year.

MOLTEN AND FLUID STATE OF THE GLOBE---ARTESIAN WELLS.

[For the Scientific American.]

There are many abstruse and inscrutable secrets of nature, constantly meeting the inquirer into the arcana of creation; yet it is perfectly legitimate to speculate upon all subjects and draw conclusions from known facts that coincide with evident results.

The molten and fluid state of the globe seems so palpable and conflicts so little with settled principles, that it has been received for a long time by the ablest reasoners as a settled fact; yet there are various speculations by able men, adverse to these views.

The thickness of the crust of the earth, the constantly and universally increasing temperature, as we descend by means of shafts, deep mines, and artesian wells, the numerous volcanic issues of melted fluid matter, the geysers and hot springs, render that assumption a fair and rational deduction.

The thickness of the crust before it reaches the fluid or semi-fluid center, is estimated at about 30 miles, covering the entire globe, like the shell of an egg, which forms a self-sustaining arch so strong and resisting that no one can crush it endwise between his clenched hands. A globe of paper filled with any yielding fluid, would resist more than its own weight; therefore it is preposterous to assume that the earth must be solid to bear up the weight of the Alpine and Himalayan Mountains, which are not even five miles in hight: for it is reasonable to presume that the crust would sustain mountains of its own thickness.

The position, that heated or melted matter begins first to cool at the center, is entirely fallacious. During the war of 1812, the project was started to cast bomb shells and take them out of the molds as soon as the surface was chilled, tap the surface and run out the molten center; but it left so ragged and unequal a center that the project was abandoned.

The writer saw a large hammer cast for a pile driver and when uncovered it was a perfect casting. A workman heedlessly struck it with a hammer, when two or three hundred pounds of melted metal ran out, before it could be turned down and stopped. It was again filled and was a serviceable article for years.

These facts being admitted, the presumption of the inability of the assumed thickness of the crust of the globe to sustain the mountains, and the doctrine that the entire globe is a solid mass, deduced from the false position that heated bodies begin to cool at the center, must be abandoned, for they are the embodiment of absurdity.

ARTESIAN WELLS.

The theory advanced by your correspondent, D. C., does not meet the views of many speculators on that subject. That there are locations where the rocks have a strong inclination, with breaks, gulches and croppings out of the strata, where it would be impossible to succeed, is surely admissible: but that position is so rare, that it cannot be admitted as a rule.

Water from borings rises as freely on high table lands, where there is no higher land within leagues, as in the lowest valleys. To assert that water only rises from the perforation of veins and fissures between strata that have a strong dip from higher lands will not bear examination; as water from boring will rise in all situations if prosecuted to a proper depth, even in the primitive rocks, which are without any stratification. It is perfectly absurd to presume that every boring which has hitherto been made, must have struck and perforated a perfectly close impervious tube, or fissure—an inverted siphon, filled from a higher position and without issue for all time past.

The ascending power of these wells has been ascribed to the great superincumbent pressure of the rocks on the water contained in fissures and laminated joints, and an issue being created by boring and relieving the pressure, it rises by the law governing fluids in these circumstances: but in this case it is fair to presume that the source would become exhausted in time and fail to produce if there was not a provision for a constant production. The production and ascension of water in these wells may be accounted for by the production of steam from the heated masses of the rocks below—the water to produce it, from the pressure of the great masses of water in the seas by some disturbance forced into the heated regions and driven back in steam, penetrating natural fissures and crystalline portions of the whole suite of formations, where it is condensed under great pressure and forced upward. The hot springs are a strong position in support of this presumption. Water may be constantly forming in the great alembic of nature by synthesis of its original gases.

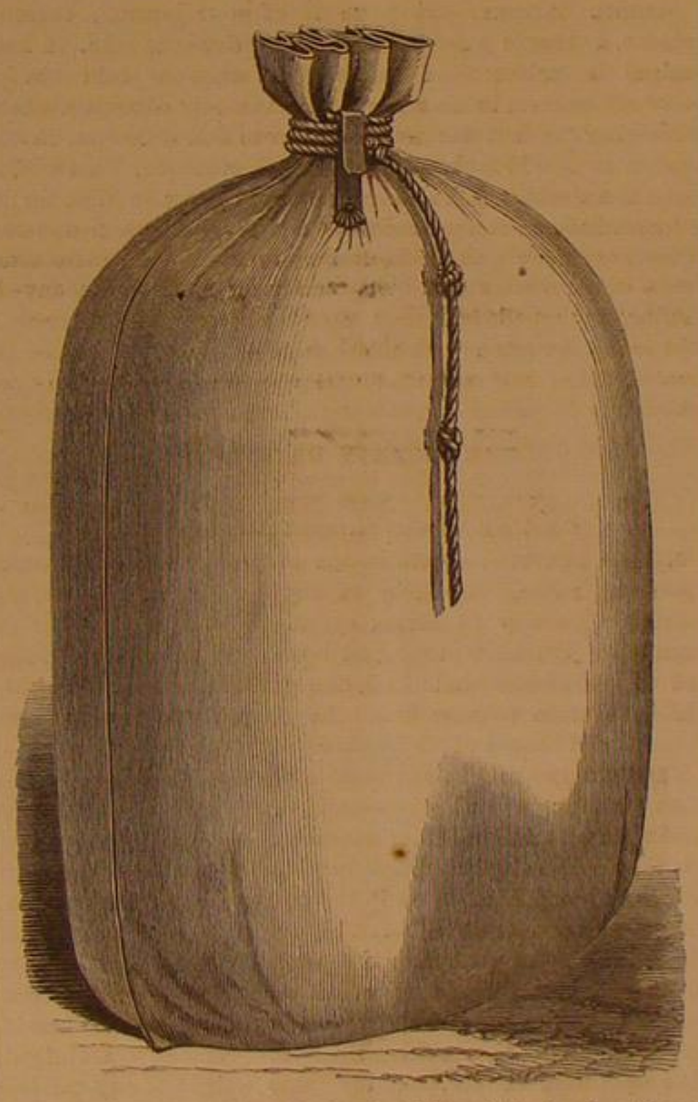
The constant cooling and contracting of the crust of the earth, of which there are numerous indications, would produce an immense pressure on the inferior portion and exert a powerful influence to cause water to rise whenever its sources were penetrated. All of these causes have been in constant action from the Creation. L.

A Prize Establishment.

A letter to *Punch* thus describes one of the industrial and social organizations that may come in for the $20,000 prize of the Paris Exhibition:—"I read your reply to the ladies of Wolverhampton on my return from visiting one of the great iron founderies of France, which, though under one proprietorship, is a small 'black country' of itself. I will tell you what I saw in that great French factory. I saw a town of 25,000 inhabitants, wholly built and owned by the miners and ironworkers themselves, who buy their land in fee simple from their employers as they require it for building. I saw 10,000 of these people, some few of them women, who do light outdoor work, go daily to their duties, and 4000 of their children go daily to their schools. I saw drawings and attended historical and scientific examinations in the higher classes of these schools which would have done credit to Rugby and Eton, and heard, with a longing wish that it were so in England: how none were allowed to leave the school for the workshop till they could read and write well and do some arithmetic; and I heard, with no surprise, that several of the higher boys have passed up into the school of Government Engineers in France. I saw the château of the proprietors standing in the very midst of this town of workmen, and within it, assembled round the venerable founder of this great industry, a little society, principally composed of the officials of the place, which in refinement and intellect would have done honor to any capital in Europe. I saw all this, Sir, but I did not see a policeman or a soldier. I believe there were in the place (of course not near the areas) three of the former, but none of the latter; and finally, during a ten days' stay, I did not see a drunken man, though I once heard one. This is no community of hammer-men in Utopia—no black country of Cloud-land—but an actual translation of Bilston, Tipton, or Dudley, out of the vernacular of our Black Country, into French. This happy valley is called Le Creusot, situate in the department of Saône-et-Loire. The proprietors are not angels, but plain men, trading under the designation of 'Schneider et Compagnie,' and the head of the firm is M. A. Schneider, Vice President of the National Assembly. Will some great firm, or cluster of firms, in our Black Country go and do likewise?"

GOFF'S BAG FASTENER.

The engraving explains the object of this simple catch so fairly that a verbal description is hardly necessary. A cord is fastened to the upper part of a metal hook and also to the bag, and when the bag is filled the cord is passed twice or thrice around the mouth of the sack and secured by being slipped under the loop, which is sewed or riveted by its lower end to the bag. Knots may be tied in the cord as a security



against slipping, although the elasticity of the hook will generally be found sufficient to hold the bag firmly closed. It is a convenience which will be appreciated by farmers, millers, and others who use sacks for any purpose, as the means of fastening are always at hand, being attached to the bag itself. The cost can be but trifling, and the relief from the annoyance of looking for a missing string just when it is most wanted, and of tying up the mouth of a bag, sometimes under difficulties, as when the fingers are numb with cold, is worth some consideration. A patent is pending on this device to J. M. Goff of Ionia, Ill., who will furnish information as to rights, etc.

Soda Ash.

A firm in Detroit, during the season of navigation, ship sulphurets of copper in large quantities to England, to be there used in the manufacture of soda ash and reshipped to this country, for consumption in the various forms of salts of soda. Michigan has in her salt and sulphurets the elements of the manufacture of soda ash. A trifling increase of the present duty on the imported articles only half a cent a pound would suffice to establish in the Saginaw district the profitable business of making this article of indispensable necessity. England has the monopoly of supplying us. In Jan. and Feb. of 1866, owing to the prevalence of head winds and gales which drove back to England the vessels loaded with soda ash, and wrecked many of them, the stocks in the United States got exhausted—several glass factories had to stop—and the price of ash advanced from 4½ cents per pound to 11, 13, and 15 cents, and remained there for nearly sixty days! Not a pound of soda ash is now made in the United States. What would the price of it be if we got into a war with Great Britain?—*N. Y. Tribune.*

FOREIGN AND HOME BUILT MACHINERY.

The article copied from a North Carolina paper and published in our issue of the 2d inst., in regard to the superiority of European machinery for the manufacture of cotton and wool, has awakened considerable interest. From several letters which have reached us we feel pretty certain that our suggestion that the article in question was an advertising dodge for the agency of some foreign manufacturers, is correct. One of our correspondents, James E. Hooper, of Woodberry, Baltimore County, Md., writes:—

I am a cotton manufacturer, spinning about 12,000 lbs. of yarn per day of ten hours, on yarns from No. 7 to No. 13, and I do this on American made and American patent machines. Concerning the throwing out of American and substituting English machines, I have heard of a few such, but they have all expressed themselves sorry for the foolish act.

There are mills in and around Philadelphia that are throwing out *new English machines* and substituting American. One of my neighbors (who is considered one of the best manufacturers in our State) was induced last year to put in his new mill English cards, drawing frames, slubbers and speeders. He says he wishes he had never seen or heard of English machinery. He has given the Lowell Machine shop an order for new speeders, to take the place of the English speeders bought last year.

I have no doubt our *Southern* English friends can buy as much new English cotton machinery as they want without going very far for it, and at about one half the cost of American. The English machinery is heavy and clumsy, hard to keep clean, and hard to manage. I can card as much on the cards made by the Bridesburg Manufacturing Company, per inch, and make it better than can be done on any English card that was ever run.

It has been proved that the speeders made by the Lowell Machine Shop can turn off more work at less expense, and do it as well as the most approved English speeders. As regards spinning, Mr. Wm. Higgins, of Higgins & Son, Manchester, the great English card and fly frame builders, said he saw more and better work produced on the frame made by the Bridesburg Manufacturing Company than he ever saw on the best English frame. The ring spinning is an American invention, and the patent card stripper was invented by an American.

Taking all things into consideration, I think the American machinery is neater, as durable, easier to manage, and cheaper to run, and turns off more work of as good quality as any English machinery ever built, and no doubt our Southern friends will find out to their sorrow that they have made a great mistake.

As concerning Mr. Johnson being *the* best manufacturer in the country, it is all "bosh," because you know as well as I do that there is just as good fish in the sea as were ever caught.

From a long communication by Thomas Pray, Jr., of Providence, R. I., we make some salient selections. Referring to the statement of the writer of the article which we copied, that with two sets of 48-inch English cards running night and day he produced 5,073 pounds of clean scoured wool, he says:—

I have three sets of 40-inch American cards running only ten hours per day, and I card on them 4,500 pounds every six days.

With all deference to his purchase of 86 mules, I can explain to the satisfaction of every cotton spinner who is "posted" the probable reason why this was done. English machinery can be imported about 27 to 30 per cent cheaper than our makers can or will sell it new.

His assertion of throwing out "Whitons"—which should be "Whitins"—lappers may all be perfectly sensible, the lapper being the machine that has to do its work in dirt, wears out about two sets when very well used to one of cards, drawing, or speeders, and it is very probable that he replaced old lappers by English, because he could do it cheaper.

Perhaps the writer of this article referred to can give us Mr. Johnston's address and the location of his mills: all good or prominent manufacturers love to show other manufacturers their good mills or their recent improvements.

The oldest firms do not use much English cotton machinery. Some, however, give the English lappers the preference; but it is oftener where capitalists desire to humor their whims and have something foreign in their mills than because their practical knowledge teaches them foreign machinery is better for them as regards quality of work or economy of management.

If my friend of the article referred to is a practical operator I would like to ask him if he can produce an English lapper that will do more work or do it any better than the iron frame three-beater lappers made by John C. Whitin, Whitinsville, Mass., or produce an English mule that will do as much work and as well as Wm. Mason's improved self-operating mule. If so, I am open to conviction, and when I see the thing done, will acknowledge the "corn."

I admit that during the season of immense profits of the last four years many men commenced the manufacture of cotton and woolen goods, and as it was more from matters of pecuniary interest, and the earlier procuring of machinery, they have procured the bulk of their machinery in England. Neither do I dispute the fact that in some respects perhaps some kinds of English machinery are superior to American of the same kinds, from the very fact that some branches of the woolen manufacture have not been introduced into this country long enough to allow our mechanics and machine builders to learn what was wanted.

And again, during the war our machine shops were crowded with work, and the owners assumed an arrogant tone, and in many cases, as I know from personal experience, parties wanting machinery were coolly told to leave their orders and wait until they could get it, or not.

All these causes may have tended to drive men to procure their machinery in England or go without from six to eighteen months.

And now I would ask any candid practical operator if any mills in the country are doing better work than the Atlantic Delaine Company, at Olneyville, R. I., and does my Southern friend know of any better goods than those of the "Arkwright" or the "Williamsville," the James Steam Mill and the Hill Manufacturing Company, and does he know of mills that have paid handsomer dividends? The cotton thread of Green & Daniels or the Stafford threads are know as American productions, as well as the Willimantic Linen Company's standard thread, and in every establishment which I have named there is little or no English machinery.

I shall take the bold ground of challenging the author of the article in question to show the actual production of any of his Southern mills with English machinery and improvements to equal in quantity or quality of cotton goods some of our best purely Yankee machinery cotton mills, and I shall contend that it is not so much the advantage derived permanently as it is the temporary financial advantage gained that has induced the importation of English cotton machinery.

If I am not getting too prolix, I would ask him if the speeders made by Thomas J. Hill, of this city, are to be beat by any English machine? Mason, of Taunton, Mass., builds most excellent geared speeders, and the Whitins, of Whitinsville, Mass., have recently commenced their manufacture. James S. Brown, of Pautucket, R. I., has introduced some very valuable improvements in the geared fly frame, and the mechanics of Lowell have not been idle in the same line. If men choose to build first-class mills and fill them with the best machinery built, they are not of necessity compelled to go over the water for it: it is here, and our mechanics are continually improving upon it. Men that left the cotton manufacture ten years ago as thorough practical operators, are to-day nowhere. This shows that to keep posted you need to keep moving: but you need not go to England, France, Austria, nor Prussia.

The writer has spent his whole life in the actual operation of American and English machinery, and is now engaged in planning two new enterprises, and he asks only a fair and impartial looking over of the facts in the case, believing that with a candid and impartial examination, he will be sustained in every assertion made.

D. S. Esten, of Monson, Mass., referring to the statement in regard to the carding feat, says:—

The carding of 5,073 pounds of woo on two sets of 48-inch cards in one week, running day and night, is only 222 pounds to each set for twelve hours, not half of which could be done on American cards according to the writer in the North Carolina paper. Now 225 pounds of some kinds of wool is only an average days' work on a set of cards of that width made in Worcester, Mass. This includes all the necessary time for cleaning, repairs, etc. The next peculiarity of his statements is that the goods made from the wool from these cards should find such a ready sale. Having been a practical manufacturer of woolen and cotton goods most of the time since 1837, I have seen the operation of not only English but other European as well as American machinery, and say that the machinery imported before they adopted some of the improvements of American mechanics was of very novel construction and better calculated for a museum of curiosities than a woolen factory—100 lbs. on a set of those cards being considered a great days' work. But he says he intends this for those of his Southern friends who intend to commence making goods so they may *start right*, which I know by experience is very important. The question is, which is that right way? I would say, as there is a difference of opinion between us, look for yourself; come to Massachusetts, where more goods are made than in all the southern States, and talk with the proprietors of mills. They will be ever ready to give you all the information in their power, and you will not only be pleased but benefitted by this tour.

Trueing Grindstones.

J. G. Garland, of Me., and John King, of Conn., both send similar instructions for trueing grindstones when first hung and also when worn out of round. The plan, which is as follows, appears to be feasible: In the same frame with the stone to be used suspend another—a nearly worn out stone will do—so that the faces shall run together. The small stone has a cam on one end of the shaft and journals longer than the boxes so that it has a traverse across the face of the larger stone. The faces of the stones are adjusted by right and left screws for setting up the boxes of the razing stone.

Science Familiarly Illustrated.

Apprentice's Work.

One of our correspondents desires us to speak in this department of the manner in which mechanics apprentices should employ their time in order to derive the greatest amount of benefit from the term of their novitiate. We do not like to be harping upon facts known to all, nor to re-state old truisms which have been iterated and reiterated over and over, but we cannot refrain from drawing somewhat from experience as well as observation and endeavoring to incite a proper degree of ambition, in apprentices and young men.

The apprentice should determine on becoming a first-class workman. There can be no insurmountable difficulty in the way of this. He has only to apply himself to perfect himself by practice in what he has learned by precept. If an apprentice desires to attain a proper and honorable position in his chosen vocation he should endeavor to employ his leisure time in studies or practice, which will advance him, or tend to advance him to the point he desires to reach. If he is contented with getting through his day's work with the approbation of his employer, and looks for no other commendation, he will generally find himself at the close of his apprenticeship merely an ordinary workman and nothing more.

There are books to be read, treatises to be studied, problems to be solved which may occupy his evenings, giving him at the same time practical and theoretical information invaluable in his after career. But without trenching on this proper department of his education there are many processes and manipulations used in the shop, which can be successfully reached and acquired only by persistent practice. In the machinist's business, for instance, it requires a long practice to draw a file straight. In spite of his own judgment and in contradiction to the testimony of the straight edge, the apprentice will swing instead of drawing his file, producing a convex instead of a level surface. Only practice can overcome the combination of habit and want of judgment in such a case. We know an apprentice who employed his leisure noonings and before working hours in the morning in practicing with the file. The result was that he became a first class filer. We saw, the other day, a shoe knife as it came from the anvil. It was one taken at random from a day's work of over one hundred, forged from the bar by a smith. Examined under the microscope not a mark could be seen on its planished surface to denote that only the ordinary hammer and anvil were employed in its production. Its surface was almost like that of finished gun work after being blued. This workman, for his superior skill, obtains twice as much for his work as ordinary workmen. To be sure, he has attained his present perfection by long practice, but close attention and the exercise of good judgment were also necessary

The joiner's apprentice should never be satisfied until he can grind and set a plane iron so it will cut clean, and not scrape; until he can drive a finishing nail home and not leave the mark of the hammer. The machinist's apprentice should be determined to be able to grind and set a tool properly in the lathe or planer to do good work, to draw a file straight and keep it from scratching. So we might mention plenty of instances, but our only object is to show the necessity of the-old-time axiom: Whatever is worth doing at all is worth doing well.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Warming and Ventilating Farm Houses.

Messrs. Editors:—As your journal claims to aid the farmer as well as the mechanic, I venture to suggest the above subject to your attention, hoping that you or some of your correspondents can throw some light upon the subject.

Fuel is getting scarce and high, coal is taking the place of wood, and air-tight stoves are now all the vogue, especially with us farmers of moderate circumstances, who cannot afford the kitchen range, together with the furnace in the cellar, and other expensive arrangements for the first-class houses of the merchant, manufacturer, etc.

We want some arrangement whereby we can warm economically and healthfully one or two rooms in addition to our kitchen; a sitting room, library or family room. As the parlor is but occasionally used, it is not of so much account. As before intimated, the coal or wood air-tight stove is now used for this purpose, with scarcely any provision for ventilation. The supply of oxygen to support the combustion in these stoves, is obtained entirely from the room, and what remains is breathed over and over again, much rarified by the heat of the stove, and sometimes filled with gases from it. The only fresh supply must gain access through the crevices of the doors and windows without any warming and in just the condition to give colds to the inhabitants of such an atmosphere if they chance to be exposed directly to one of these currents.

When the open fireplace was used, there was an ample escape of the foul gases through the open flue caused by the current produced by the fire, but this carried off much the larger part of the heat also and is too expensive.

It appears to me that the method of passing a current of fresh air which has been previously heated through the room is the most perfect and is the best, provided it can be done economically.

We of course expect to keep a fire in our cooking stove or range in our kitchen, and if this stove or range could be also made to serve the purpose of a furnace as above alluded to, and a current of warm air could be carried from it to an adjacent room on the same floor (farmers' kitchens are not down stairs) it would be what is wanted. Then the escape of foul air from the room in question could be easily provided for either through an open fireplace or an opening in the chimney near the top of the room or even through the same crevices around the doors and windows which before let the cold air in.

But the question now arises, and it is the one on which I wish most to obtain light, how can this current of a sufficient quantity of warm air be carried from the source of heat in the kitchen to the family room on the same floor. I can suggest no mode in my own mind except to take a pipe from it through which steam or hot water can be carried down into the cellar beneath, protected by inclosing it in a box tube filled with ashes or other poor conductor, to an inclined air passage-taking fresh air from the outside of the building, and descending, ing to near the bottom of the cellar, and then again ascending gradually to a register in the family room. The steam or hot water pipe is to enter a little above the lowest point in this passage, and ascend within it to near the register, again descend, and, if desirable, run up and down until the whole amount of heat has passed from it to the air in the passage, which by being heated will rise into the room above. One or more jets of steam or hot water could be emitted from this pipe to give the air a proper amount of moisture.

Whether the above plan can be adopted economically where a supply of water is at hand or whether any other can be suggested I leave with you to decide. S. N. Beers.

Sandy Hook, Conn., Jan, 28, 1867.

[Wherever there are rooms warmed above the kitchen the pipe should pass through them and be enlarged into a dummy. The air of the kitchen is not materially vitiated by the breathing, but is made offensive by the fumes of cookery and washing. Whenever the cooking and washing is not going on it is reasonable economy to pass the excess of heated air to other apartments. Mr. Beers shows himself to have ingenuity enough to carry out practically his very good theory.—Eds.

The Mint Corrected.

Messrs. Editors:—On page 71 of your journal, current volume, I observe a notice of the new five-cent coin. I had noticed the statement in the "dailies" that the coin was to be 20 millimeters in diameter, and was sorely disappointed on measuring the first one that appeared to find it 20·5 m. in diameter, or 0·8075 inches diameter U. S. standard. This would make the decimeter 4·035 inches. According to Webster it is 3·9368 inches; it also accords very nearly, with two scales in my possession, and by different makers, one of which is no doubt of French origin. The weight I have no means of testing, but hope it is much nearer the truth. The three-cent coin is, by the same scales, 17·8 m., equal to 0·715 inches diameter. Men are rare that will work nearer than the five-cent coin. It surely ought not to be so, especially on coins designed as standards measure, either length or weight.

Progress.

Casting in Green and Dry Sand.

Messrs. Editors:—I saw in one of your back numbers, a statement, made, I think, by an engineer, relative to the oil becoming gummy in steam cylinders. Thus: of a pair of locomotive cylinders that had been treated exactly alike and with the same kind of oil, one worked clean and bright, while its mate became foul, the oil becoming thick and gummy, and caused much trouble.

There are two methods of molding steam cylinders: one is what is known as green-sand molding, and the other method is what is called dry molding. By the first method it is the next thing to impossibility to make a solid casting: the iron when cold is coarse in the order of its crystallization, porous, and generally full of what are called blow-holes, and when heated the oil enters the pores, and the piston in passing to and fro assimilates with the oil in the pores, and soon creates a dirty mess. In a cylinder cast in a dry mold the iron is close in the grain, approaching the nature of steel, wears bright with a polished surface, and the same weight of dry-molded iron is fully one-fourth stronger than the first named. I think one of the cylinders above referred to was cast in a dry mold. F. S.

Expansion of Steam.

Messrs. Editors:—As there seem to be various opinions about expansion please allow me to propose mine as follows: I remember that in answer to a query of one of your correspondents, you demonstrated quite to my satisfaction that there is no loss of power in the steam engine, by the use of the crank. From this it seems necessarily to follow, that a given length of movement gives an equal proportional result at any part of the stroke.

During the discussion of the *Winooski and Algonquin* trial, there was a remark in one of your editorials from which I inferred, that so far as either possesses any advantage above the other, the advantage is in favor of using steam at a high pressure. I also get the impression from the pressure used in that trial by a very high authority among those who have no faith in cut-offs, that 20 lbs. is not too low for fair results.

Now assuming the truth of these propositions if we take an engine of any given size, running with steam at 20 lbs. the work performed, will be the contents of the cylinder in inches, multiplied by the revolutions and rate of pressure, and divided by the unit of power. But according to Bourne, the sum of latent and sensible heat, is the same at all pressures, and proposition No. 2 assumes that 60 lbs. is a more economical pressure than 20 lbs. Let us then raise our pressure to 60 lbs. we shall according to proposition No. 1 have accomplished as much work at one third stroke, as in the former case at full stroke,

If then we exhaust at this point, we have lost nothing, as compared with the other case, and the query arises do those who question the utility of expansion, believe that it would be good economy to exhaust at the point of cutting off, rather than to use the expansive force for the remaining two-thirds of the stroke.

Let them show this, and they have the case, but if they fail they are reduced to the alternative of showing that whatever advantage arises from the expansion of steam from one volume to three is overbalanced by some disadvantages arising from the use of a pressure of 60 lbs. during the first part of the stroke.

If some of your scientific readers will oblige me with a carefully considered answer, he will contribute to the solution of an important question, and will confer a favor upon many beside myself. S. H. W.

Central City, Col.

Scalding Hogs---How Should the Water Be?

Messrs. Editors:—Some two or three months ago I read in the "Scientific" an account of the improved slaughter house for supplying the New York market. You say that hogs after being killed are plunged into a vat of boiling water. Is it really so? Are the proprietors or operators at that institution uninformed as to the proper temperature of water for scalding hogs? It had been long thought by me that the proper degree of heat was 160° Fah. and I should have immediately written you on the subject had I not learned from your valuable advice and general writings that careful experiment is the only true means of arriving at a result accurately. When "hog killing" came I tried the experiment on seven hogs using a Wilders Thermometer. The result was that a temperature of from 160° to 170° was found best. Many of your subscribers although mechanics have at least a pig to kill and may be benefitted by knowing how hot to heat the water and thereby be able to do a "good job" at butchering as well as in the shop. M. L. Baxter.

Batavia, Ill., Jan. 20the, 1867.

Compasses in Iron Ships.

Messrs. Editors:—The error of compasses in iron ships has led to many disasters and caused the destruction of immense amounts of property and the loss of many valuable lives. It seems to me that by very simple means such errors might in most cases be avoided. For this purpose I would suggest that all iron ships be furnished with a permanent magnet of sufficient power and a number of compass cards with unmagnetized needles. A few simple instructions, and easily understood, would teach any one how to charge the needles. In order to correct the ship's compasses, let one of these cards be magnetized aloft and as far from the local attraction of the ship as may be convenient from time to time. The fresh needle would always indicate the magnetic meridien. The expense of the magnet and cards would be comparatively trifling. H.

INTERESTING PATENT OFFICE DECISION---IMPROVEMENTS IN MODE OF SINKING WELLS.

This was an interference declared between the application for a reissue of the patent granted to Byron Mudge in October, 1865, the application of N. W Green for a patent and the patent granted to James Suggett in March, 1864, and, on appeal to the Board of Examiners-in-Chief the decision of the Examiner awarding priority of invention to Suggett and denying Mudge's application for a reissue was overruled and said Mudge allowed his reissue.

Several important questions have arisen in the case. The following abstract from the written opinion of the Examiners-in-Chief will give a very clear idea of the controversey respecting this valuable and interesting discovery.

DESCRIPTION OF THE INVENTION.

Instead of digging and walling up a well in the manner hererofore practiced, a piece of gas pipe, shod with an iron point and pierced with holes near the bottom to admit water, is driven down into the earth, and a pump attached to the top, completes the well. In hard ground, an iron bar is first driven into the ground and withdrawn before the tube is inserted.

By these means there is accomplished in a few hours, perhaps in half an hour, what before was the work of weeks or months, and the very extensive use of which it is susceptible, renders it one of the important improvements of the day.

WHAT GREEN DID—GENERAL SUGGESTIONS DO NOT INVALIDATE A PATENT.

1st. It is said that Green instead of Mudge was the inventor, and that consequently the latter is not entitled to a patent. The testimony on this point is somewhat contradictory, but we think the weight of it sufficiently establishes that the conceptions of Col. Green were quite immature and imperfect, and that he relied upon others to give them a practical form, rather than supposed that he himself had perfected an invention. His idea seems to have been that a hole could be made in the earth by driving an iron bar; that the water would rise in it as in a common well, and could be pumped out by a pump with pipe attached in the ordinary manner, and in this way all the first experiments were made but with temporary and indifferent success.

General suggestions, whether oral or in books, do not invalidate a patent to one who has carried them into practical effect. The Marquis of Worcester's Century of Inventions affords several examples of the application of this principle. The rule as stated in Alden *vs.* Dewey, 1 Story, 336, and Pitts *vs.* Hall, 2 Blatch, 234, is that the suggestions to invalidate a patent must be so full and complete as to have enabled the patentee to construct the device without further invention. Tested by this rule, we do not think that the suggestions to Mudge should deprive him of a patent. Green is entitled to the merit of the first conception but he had not perfected a practical mode of carrying it into effect, and it probably would have died with him without benefit or advantage to the public, but for the subsequent experiments and inventions of Mudge. A very different question would have been presented had Green himself been engaged in experimenting upon and maturing his conception, and others had appropriated his ideas without his consent.

MUDGE NOT ANTICIPATED BY A PRIOR USE—"LOST ARTS" ARGUMENTS ADVANCED.

2d. It is also objected that Mudge was anticipated in his invention by Stephen A. Hunter. It appears that the latter, in the summer of 1851, inserted a copper pipe into the ground about 10 feet, and drew water from it to supply a steam boiler by a pump attached to the top. It was worked down into the ground by means of a pointed iron rod inserted within it. It operated successfully until the following spring, when the pump and pipe were removed to make room for another building that was erected on the same spot. Nothing more was done by Hunter in relation to the matter until he made application for a patent in 1865. His success does not appear to have been such as to induce him to follow up his first trial with any further experiments, or to make any attempt to mature his invention. It was abandoned and apparently forgotten for more than ten years before Mudge commenced his experiments, and would probably have never been brought to light again but for the labor and success of others. If it is not to be regarded as an abandoned experiment, we think that it will at least come within the case of Gaylor *vs.* Wilder, 10 Howe, 500, where such a prior use was held not to invalidate a patent.

WHAT SUGGETT DID—RIGHTS OF ONE WHO CARRIES OUT MERE CONCEPTIONS

3d. In October, 1861, Suggett was employed by Mudge to assist him in making two wells with the double tubes. In the following year he (Suggett) made some wells in the same way, and in September he made a successful well with a single tube of gas pipe, with shoe, holes and pump, as described in his patent. And it appears that he had some time previously reflected upon the subject of dispensing with the digging of wells and obtaining water by pipes. In the following month, October, Mudge, having returned from the army, made a successful well by using the same pipe and fixtures that he had prepared the fall before for the use of the regiment. It thus appears that Mudge was the first to construct, if not to use, the apparatus in question.

An application for a patent by one who has been employed to assist another in experimenting upon and perfecting his invention, is always regarded with much suspicion and disfavor.

The conceptions of the inventor usually receive much modification and and change of form, as experiment and reflection disclose the necessity of it,

He is authorized to employ the skill and experience of others to aid him. They necessarily become possessed of his views and plans, and to allow them to become the patentees of essential features of the invention would render their employment dangerous and retard the progress of improvements.

Under all the circumstances we think that as between the two, the priority of invention must be accorded to Mudge.

SERIOUS OBJECTION TO MUDGE CASE—MORE THAN TWO YEARS DELAY—QUESTION FOR A JURY.

4th. The most serious objection to the reissue is that Mudge has abandoned his right to a patent by a delay of more than two years to make his application for it after the invention has been introduced into public use. In the fall of 1862, and in the spring and summer of 1863, both Mudge and Suggett made several wells in the way specified in the application, and they have been in successful an public use up to the present time, and Mudge delayed to make his application until August, 1865. This, as a general rule, would be conclusive against him. But he alleges in answer that, although his devices were effectual in the gravelly soil of Cortland village, he could not thence infer that their operations would be in other soils and under different circumstances. That it also required time to test the durability and permanent success of his method. That in many cases he had failed, and in quick sand and clayey soils, other modifications are required which have not yet been fully matured; and that the uses of his device previous to his application were necessary experiments to perfect the invention and make it generally usef l.

The question thus presented can be much more properly investigated and determined by a court of law than by us, and the only way in which it can be presented to such court is by he allowance of the applicant's claim. The unusual difficulties and complication of the case, and the great merit of the applicant, to whom the public are much indebted for a valuable improvement, have induced us to give this direction to the case.

Recent American and Foreign Patents.

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

THE SHAW AND JUSTICE HAMMER.—We have published illustrations with descriptions of this hammer and the advertisement of the manufacturers is to be found on another page. A few days ago we had an opportunity to witness its operation. It was a 100-pound hammer set up at the Morgan Iron Works, this city. In three minutes an ingot of six inch square wrought iron was drawn down to two inches, although the heat was not a perfect one. The experiment was witnessed by a number of practical men, who expressed themselves well satisfied with the operation of the hammer. It appears to be an excellent auxiliary to the work of the forger and is rapidly coming into favor.

DEVICE FOR ROASTING CORN AND OTHER SUBSTANCES.—N. L. Whitney Effingham, Ill.—This invention has for its object to furnish an improved apparatus for roasting coffee, and similar uses, which shall brown the article roasted evenly and thoroughly, and shall at the same time prevent the aromatic flavor of the coffee from being dissipated by the heat.

VALVE COCK.—Thomas Barber and John Barber, Brooklyn, N. Y.—This invention consists in so constructing and arranging the parts of a valve to be used for steam water or gas, that no packing shall be required to keep it tight when it is in use.

NECK YOKE TRUNDLE.—A. H. Cole, Sylvania, Ohio.—This invention has for its object to furnish an apparatus by means of which the breast strap of harness may be preserved from being so quickly worn out by the friction of the neck yoke rings.

AERIAL RAILROAD.—J. A. A. Fontaine, New York City.—This invention relates to a novel application of steam power to a railroad car which is propelled on an elevated track, the weight being diminished or rendered negative by the attachment of a balloon to the said steam car.

WATER WHEEL.—Geo. Arrison, Trenton, N. J.—This invention consists in the arrangement of additional buckets between the ordinary buckets of water wheels, said additional buckets being adjustable by means of set screws in such a manner that by raising or lowering said adjustable buckets or gates, the water spaces of the wheel can be regulated according to the aggregate amount of water passing through the wheel and said water can be used to the best advantage.

CULTIVATOR.—W. F. Clark, Hagamans Mills, N. Y.—This invention consists in a novel and improved construction of the cultivator, whereby the ground will be acted upon in the most efficient manner and the device be under the complete control of the driver.

SOAP.—Justin Ryan, Waukegan, Ill.—This invention relates to a soap compound which is cheap and has superior detergent qualities and which is of such a nature that it hardens in very short time and is fit for use a few hours after it has set.

SAW MILL.—Wm. Yaman, Connersville, Ind.—The nature of this invention consists in constructing a saw mill in such a manner that flat or square pieces may be sawed from the log one at a time until the whole log is worked up.

PLOW ATTACHMENT.—H. B. Smith, Eureka, Ill.—This invention relates to a sulky attachment for plows, and it consists in a novel construction and arrangement of parts, whereby any ordinary plow may, with a very moderate expense, be converted into a sulky plow or have a sulky attachment applied to it and one which will admit of the driver having complete control over the plow.

PADDLE PROPELLER.—Jordan H. Phillips, St. Louis, Mo.—This invention has for its object to furnish an improved apparatus for propelling vessels so constructed and arranged that the paddles shall enter the water without any jar and leave it without lifting any water, the whole power being expended in propelling the vessel.

WINDOW-SASH SUPPORTER.—Benjamin Britten, Galena, Ill.—This invention relates to an improved device for supporting window sashes in the frame and consists in a combination of two levers with a spring attached to a metal case which is let into the window frame horizontally, one supporter for each sash. The supporter for the upper sash has its thumb piece for depressing the catch within the seat of the lower sash, lying flat and flush with the frame so that it presents no obstacle to the movement of the sash up and down.

TEAKETTLE, ETC.—William A. Munn, Milwaukee, Wis.—This invention consists in attaching the spout to the side of the vessel with a double seam.

COMBINED GRAIN SEPARATOR AND STRAW CARRIER.—Alvin T. Dunbar and Archibald McNaught, Alba, Pa.—This invention has for its object to furnish an improved apparatus, durable and simple in construction, for separating the grain from the straw as they come from the threshing machine.

HORSE HAY RAKE.—Orris Pier, Winhall, Vt.—This invention has for its object to improve the construction of Pier's horse hay rake patented September 13, 1859, so that it may better adjust itself to the roughness and inequalities of the ground.

CAST-IRON FENCE POSTS.—Richard Ketcham, South Dansville, N. Y.—This invention has for its object to furnish an improved cast-iron fence post so constructed as to hold the boards or rails of the fence securely without the use of nails.

GATE.—Jerome Hibbard, Prospect Lake, Mich.—This invention has for its object to furnish an improved gate, simple in construction and convenient in operation.

JOINER'S GAGE.—George T. Lape, New York City.—This invention relates to joiner's gages for the purpose of rendering them more useful and convenient, and consists in combining two rectangular bars which are tongued and grooved and form a square gage bar on which a h ad block moves by rack and pinion in such manner as to admit of the nicest measurements on a graduated scale between the head block and the marking point. The double gage bars are also made to slide upon each other so as to separate two marking points to any required distance for gageing a mortise or any similar work with two parallel lines.

STEAM BOILERS.—J. Wyatt Ilied, New York City.—This invention consists in constructing a steam boiler in such a manner that a greatly increased steam generating surface shall be obtained without materially increasing the size or interfering with the most compact form of boiler.

PNEUMATIC SEWERAGE.—Charles T. Llerneer, Frankfort on-the-Main.—The object of this invention is to empty privies and their pipes at any moment by connecting them with an air-tight reservoir sunk in the street by means of pipes which are provided with stop cock in such a manner that when all the stop cocks are closed the air can be exhausted from said reservoir and by opening one of the stop cocks after the other, the contents of the several privies are sucked into said reservoir without the least inconvenience from the emission of a bad odor.

CALIPERS AND DIVIDERS.—Andrew V. D. Westervelt, New Brunswick, N. J.—This invention consists in attaching a worm and worm wheel to a pair of calipers, dividers or compasses, for the purpose of opening and closing the legs and graduating them exactly in making measurements of either internal or external work.

CLOTHES LINE AND FASTENER.—Albert D. Rust, Vernon, Mich.—This invention consists in forming the line of wire in a series of links which allow it to be folded up in small compass for packing away and transporting, and in connection therewith a wire fastener or holder so constructed that any number required may be hung on the wire line and all remain suspended permanently in a yard unaffected by the weather.

SELF-ADJUSTING SCRAPER.—Ira Munson, Wayne, Mich.—This invention has for its object to furnish a self-adjusting scraper so constructed that the team can be driven and the scraper operated by one man, thus dispensing with the services of the one or two additional men required when an ordinary scraper is used.

DEVICE FOR STIRRING, HEATING AND COOLING LARD, ETC.—Giles B. Williams, New York City.—This invention relates to a device for stirring lard, during the process of heating and cooling and also for stirring and agitating various liquids and it consists in the employment of a horizontal screw placed in the lard receptacle and arranged in such a manner as to keep the lard in constant motion. The invention also consists in using in connection with the screw a double-walled lard receptacle through which hot or cold water or steam may be passed for the purpose of heating and cooling the lard.

WASHING MACHINE.—Milo J. Parsons, Hillsdale, Mich.—This invention consists in the combination and arrangement of the crowned springs, flat springs or bars and standards, by means of which the rollers are suspended and held up against the stationary revolving cylinder in such a way that they can adjust themselves to the varying thickness of the clothes passing between them and the said cylinder.

CORN HARVESTER.—August Moravek, Rosnyo, Hungary.—This invention relates to a machine for harvesting maize or Indian corn, and it consists in a cutting device, endless elevating apron, and a discharging platform, all arranged and applied to a wagon, so as to operate in a perfect manner.

FOOT REST FOR HORSES.—John E. Tucker, Montfort, Wis.—This invention is designed for a rest or block, on which to place a horse's foot whilst dressing the hoof, clenching the nails, etc., in horse shoeing.

FASTENER.—P. Rosenblatt, Greenville, Tenn.—This invention relates to a fastener for doors and windows which is exceedingly cheap to manufacture, simple in construction, and very efficient and reliable in operation.

GATE FASTENING.—James D. Bourne, Dewitt, Iowa.—The object of this invention is to provide a fastening for a gate, which can be readily operated, so as to free the gate by a person either walking or riding on horseback, and which, when performing its function as a fastener, will hold the gate secure against its being opened by any kind of cattle or stock, or by the action of the wind.

CULTIVATOR PLOW.—G. W. Hatfield, Holton, Ind.—This invention relates to the construction of a cultivator plow, whereby the implement is rendered capable of being adapted to various kinds of work, and by a very simple adjustment of parts.

ATTACHING THILLS AND DRAFT POLES TO AXLES.—David Dalzell, South Egremont, Mass.—This invention relates to a thill and pole coupling of that class in which the connection is made directly to the iron axle, and not to the wooden bed thereof. The invention has for its object the avoidance of wear and tear, and the consequent rattling of the parts composing the coupling, the exclusion of dust from the internal parts, the impossibility of a casual disconnection, and a perfect lubricating of the same at all times.

PNEUMATIC BRAKE FOR RAILROAD CARS.—Charles R. Peddle, Terre Haute, Ind.—This invention relates to a means for operating the brakes of railroad cars by compressed air forced into the air cylinders underneath the cars by the locomotive, without any essential modification of the working parts of the latter, a valve and air pipe being simply connected to the steam chest of the steam cylinder. The object of the invention is to obtain a simple and economical means for operating instantaneously the brakes of all the cars of a train, and placing the brakes under the complete control of the engineer.

HANDLE ATTACHMENT FOR SHOVELS, ETC.—James N. Pease, Panama, N. Y.—This invention consists of a handle constructed and arranged in such a manner that it may be applied to the handle or stale of a shovel, manure fork, hay fork, or other similar implement, and greatly facilitates the manipulation thereof.

SECURING BOXES IN METALLIC HUBS FOR WHEELS.—James B. Stuart, Bunker Hill, Ill.—This invention relates to a mode of securing boxes in metallic hubs for the wheels of carriages and other vehicles, and has for its object the securing of the box in the hub, in such a manner that they may be adjusted concentric with each other, and without any possibility of the box slipping within the hub, and the former rendered capable, if worn by use, of being readily removed from the latter and a new one inserted in its place.

CULTIVATOR AND SEED SOWER.—Thomas L. Whitbeck, Kenosha, Wis.—This invention consists in so combining a seed sower and cultivator, that each may be used separately or both at the same time, as the nature of the work to be done may require. It more particularly consists in the simple, cheap, and novel manner by which the slide in the bottom of the seed box is operated for agitating and regulating the flow of seed to the openings of the discharge cylinder, by the vibration of the tongue or pole by which the machine is drawn.

GAS APPARATUS.—James F. Spence, Williamsburg, N. Y.—This invention consists in the arrangement of a series of S-shaped pipes in the interior of a hollow drum which revolves in the interior of a vessel partially filled with oil, in combination with a suitable oil supply pipe and with a steam pipe, in such a manner that by the action of the steam the oil or volatile hydrocarbon liquid in the vessel is vaporized, and as the drum revolves a mixture of steam and hydrocarbon vapors is blown out through the S-shaped pipes in the upper space of the outer vessel, whence it is conducted through a suitable pipe to the burners.

BURGLAR PROOF LOCK.—Joseph Corbett, Utah Territory.—This invention relates to a burglar proof lock of that class which are provided with annular rotating tumblers combined and arranged in such a manner as to be capable of being adjusted to effect a great number of changes, that is, different manipulations of the knob in order to unlock the lock.

CULTIVATOR.—Thomas Jobe, Clarksville, Ohio.—This invention relates to a cultivator for general purposes, which may be used for plants grown in hills or drills, or used for eradicating weeds and rendering the earth light and pliable preparatory to the sowing of grain.

CLOTHES LINE STAND.—J. E. Elliott, Grand Rapids, Mich.—This invention consists in a novel construction and arrangement of the clothes line stand, whereby when so desired, the said arms can be tilted, for the better and more convenient passing of the line around it, and the hanging of the clothes upon such line.

SAW TEETH.—James E. Emerson, Trenton, N. J.—This invention relates to an improvement on a swage, and consists in a modification of the swage, whereby the implement is adapted for forming and sharpening a tooth, having a cutting edge of peculiar and improved form.

GRAIN DRILL.—Peter Schmitt and Peter Jacob Schmitt, Waterloo, Ill.—This invention relates to the construction and arrangement of the longitudinal shaft, which is placed with the seed box, said shaft being provided with blocks by which the holes in the bottom of the seed box are alternately closed and opened, whereby the feed is made regular and equal, and is not affected by the jars and jolts of the machine. To each of these blocks is secured one or more metal pins, whereby the grain is well stirred and fed to the seed holes, and whereby the latter are also kept clear from obstructions.

PLOW.—William Cooley, Bunker Hill, Wis.—This invention relates to a plow of that class designed for plowing stock ground, and commonly termed "stubble plows." The invention consists in constructing the plow in such a manner that the line of draft will be central and direct, nearly parallel with the land side, so as to insure an easy draft, uniformity in the width of bur row, a complete turning under of stubble, straw, stalks, etc., and the avoidance of the clogging or choking up of the plow.

NURSE STOVE.—L. A. Plumb, Biddeford, Maine.—This invention relates to a portable lamp stove designed more especially for the nursery and for heating substances in a small way. The object of the invention is to obtain a device for the purpose specified by which the benefit of both the light and heat radiated from the lamp may be obtained, and have a more simple, convenient and desirable article for the nursery than those hitherto devised.

SOWING MACHINE.—James G. McGrew, Caledonia, Tenn.—The object of this invention is to construct a machine by which seeds particularly weak may be sown in drills among standing corn so that the corn may be left standing until the spring frosts are over, thereby protecting the young wheat plant from being injured by the winter and spring frosts.

MACHINE FOR THINNING COTTON PLANTS.—Charles A. McCaughan, Moscow, Tenn.—The object of this invention is to save hand labor, and expedite the work of thinning cotton plants growing in rows to the proper distances apart for hills, as usually cultivated on the plantations in the Southern States.

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

J. K., of Ill.—Burgh gives as a rule seventeen and a half square inches per horse-power on the piston, and one square inch per horse power area of port. Eight inches area is therefore too small to work sixty nominal horse-power in a cylinder of only fifteen and a half inches. In fact we do not know how that amount of power can be got from such a cylinder. Bourne says the same thing in general terms and gives the following rule to find the area of steam (inlet), or eduction (outlet) ports: Multiply the square of the diameter of the cylinder in inches by the speed of the piston in feet per minute and by the decimal ·032 and divide the product by 140

The quotient is the proper area of the port in square inches. The fact is that engineers err too often on the side of contracting the area of ports. With a proper consideration of the friction of the common slide valve, the more generous the area of ports the easier the engine works. There should be no cramping of the steam either on its inlet or outlet.

Sundry Answers:—W. R.—The English law does not require the working of the patent within any specified period——A. B.—The electric light has been illustrated in back numbers of the SCIENTIFIC AMERICAN.——G. W. L. Grand Rapid Mich, without knowing the position of your piston with reference to your diagram, it is difficult to answer your question definitely. We think however that your trouble is in the position of your eccentric, in other words the setting of your valve.——S. D. P.—If you increase the steam pressure the quantity of steam being the same of course you get more heat. See table of pressure and degrees of heat in our book——E. W. D.—In the same book you will find the rule for calculating horse power of steam engines.

U. S., of Mo.—Any salt water carried up by a waterspout or hurricane will on falling, bring all the salt with it. There is nothing in the sky to separate and keep up the salt. "All that goes up must come down, on your head or on the ground."

C. E. J., will find the information he desires as to the speed of the electric current on page 19 of our work on patents.

F. C. D., of Tenn.—Put tartrate of lead in an iron or glass tube stoppered with clay and subject it to a low red heat for about an hour. The product is a phosphorus which never fails. The contents of the tube while heating must be kept excluded from the air while at the same time opportunity is given for the gases generated to escape.

H. A. M., of N. Y.—It is not easy to find a soap (oleate of soda) and glycerin which will answer well for the bubble experiments. We have had good success in this way: Dissolve castile soap in strong alcohol; let it settle or filter and take the clear solution from which evaporate the alcohol. The solid residue is oleate of soda. To this add half its weight of Price's glycerin and sufficient water to give the proper consistency. The beauty of the experiments if you succeed, will reward you for all your trouble.

D. J. C., of Pa., wants a better draft for a furnace which warms a church. The church is 41x65, chimneys at the side, terminating at the eaves. The furnace in the basement 4 feet under ground level. The number and dimension of chimneys, used and where the furnace pipes enter them are not given. It is possible that the furnace has horizontal flues and that the gases of combustion have too great a space to traverse before reaching the outer atmosphere and thus become cooled and lose their ascensive power.

G. D. M., of Me., asks how are the "water marks" in paper made? Paper is made by the deposition of the pulp in a thin layer on a seive of fine wire. Any device may be woven into the net work and being above the general surface the sheet will be thinner there and transmit the light.

C. C. E., of Wis.—Crayons of all colors for carpenters' use may be obtained at almost any tool store. They will be found to be better than either chalk or charcoal.

J. W., of Ill.—The department in the SCIENTIFIC AMERICAN under the heading "Science Familiarly Illustrated" will from time to time contain among other information useful hints for mechanics' apprentices.

J. W. P., of Ill.—Something more than the diameter of your cylinder is necessary to be known to determine its horse-power capacity. The length of stroke, at least must be given to reach an approximation of the truth.

A. R., of Wis.—Common isinglass melted in water as ordinary glue, with a little alcohol added and applied hot is a good belt cement. We know of none better, although a mixture of shellac varnish and dissolved India-rubber is recommended by some.

T. H. L., of Ohio.—We cannot inform you how the Berlin iron workers produce such delicate castings. It is probably a secret Castings are made so fine and small that it requires 10,000 to weigh one pound.

J. K. G., of Wis.—We consider a "right hand" horizontal engine to be one the shaft of which projects from the right hand side of the bed when the observer stands at the cylinder end facing the crank. The diagram you send is that of a right hand engine.

W. D. R., of Pa.—The substance you describe is probably a variety of clay. Correspondents who wants our opinion of the nature or quality of mineral and other substances should inclose a sample whenever practicable. 10 grains of a mineral are better in such cases than pages of written description.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

C. C Force, Hagerstown, Md., wishes to know how a cracked church bell can be restored to its original tone.

The Newark Manufacturers Agency, 85 Centre street, New York City, have for sale low one of Roper's Patent Hot-air Engines. They are very economical where less than two horse-power is required. A ton of coal will run one nearly a month and keep the shop warm besides.

Pattern Letters for founderymen, machinists, and others are made in the best styles by H. W. Knight and Brother, Seneca Falls, N. Y.

T. M. Schleier, Nashville, Tenn., wishes to correspond with Rolling Mills on his patent "Indented Rail" for street cars.

Device for Turning Tapers.

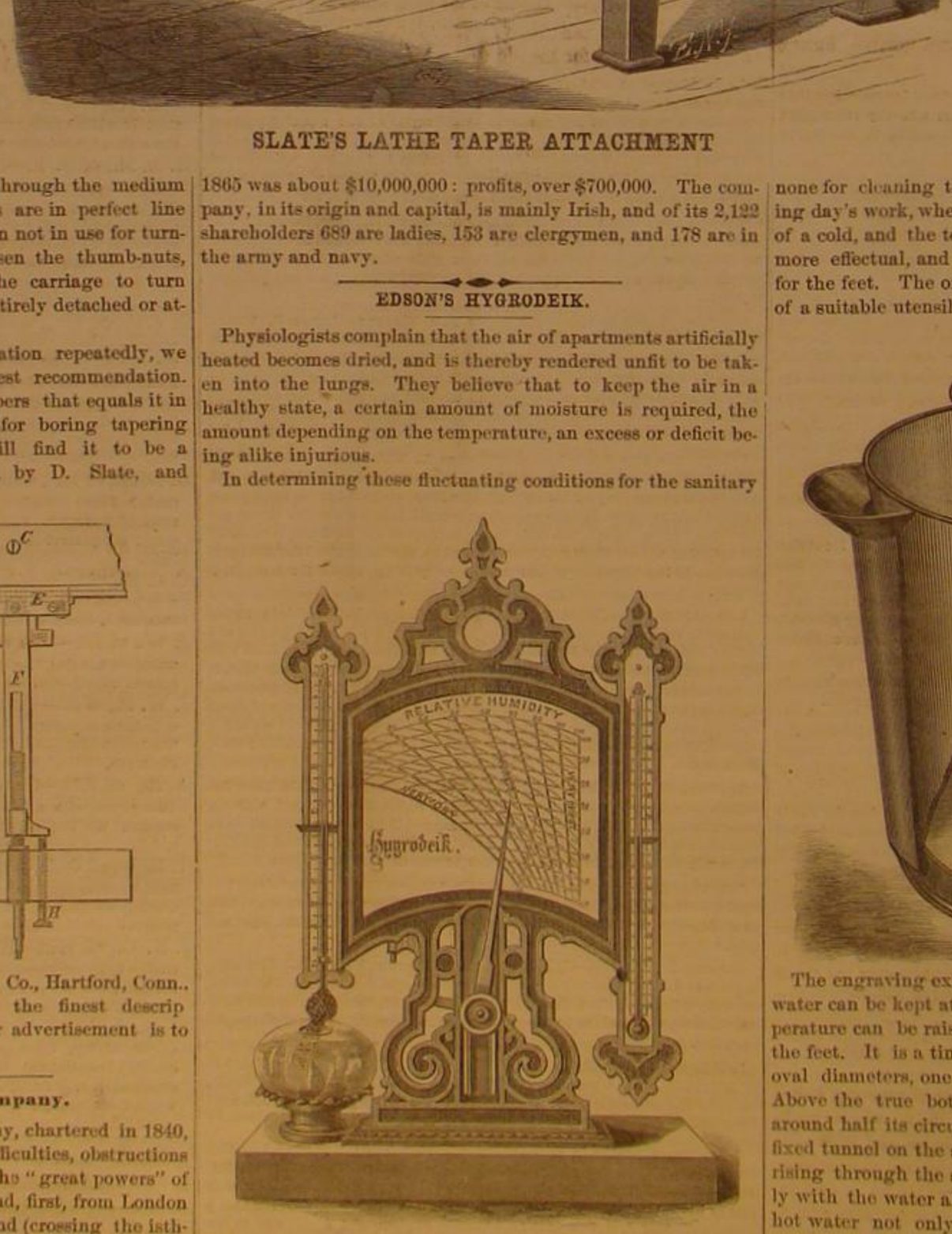
A great annoyance to the machinist is the wearing of the centers of his lathe when the dead center is set over to produce a taper, especially when using hardened steel arbors. The dead center is soon put out of shape by having an annular groove cut around it back of the point. Another objection to this change in the relative position of the two centers, is that while the set may be correct for the required taper on one piece, it is wrong for that on another if there is the slightest variation in the length of the two; so the workman must be continually re-adjusting the taper and taking off test chips at the expense of time. In turning out tapering holes this change of the relations of the centers is entirely valueless; some other contrivance is necessary. The device here shown, however, obviates both these difficulties.

Fig. 1 is a perspective view of the lathe to which this device is attached. The view is taken from the rear of the lathe. The most visible and apparent portion of the improvement in this figure is the bar, A, supported by the brackets, B, which are secured to the lathe bed. Fig. 2 is a top plan of the whole attachment, the upper and lower part of rhe carriage being removed. The same letters indicate like parts in both figures.

A, represents what may be called an adjustible bar, pivoted at the center at C, and allowing some swing by the T-shaped slots in the end brackets and the bolts the heads of which traverse in those slots. These bolts are lightened up and held by the nuts, D, a pointer, not shown, in connection with a scale on the end of the bar indicating the exact taper required. The front edge of the bar is rabbeted on both sides, making a double channel, in which the slide, E, traverses. The portion marked F, on Fig. 2 is a sliding piece that plays in a groove planed in the lower part of the carriage and is pivoted to E. By this that part of the carriage carrying the tool post is guided. G, is an adjusting screw for setting the taper bar to the proper inclination, and H, is a stop screw on the front of the carriage.

When the adjustible bar, A, is placed at an incline to the lathe ways it imparts an absolute motion to the upper portion of the tool carriage, in or out from the center line of the head centers through the medium of the slide, E, so that while the centers are in perfect line the tool may traverse an angle. When not in use for turning tapers all that is necessary is to loosen the thumb-nuts, D, and the tool post will move with the carriage to turn straight, although the device can be entirely detached or attached in an instant.

Having seen this attachment in operation repeatedly, we have no objection to give it our heartiest recommendation. We know of no device for turning tapers that equals it in efficiency, handiness, or simplicity, and for boring tapering holes it is invaluable. Machinists will find it to be a great desideratum. It was patented by D. Slate, and



SLATE'S LATHE TAPER ATTACHMENT

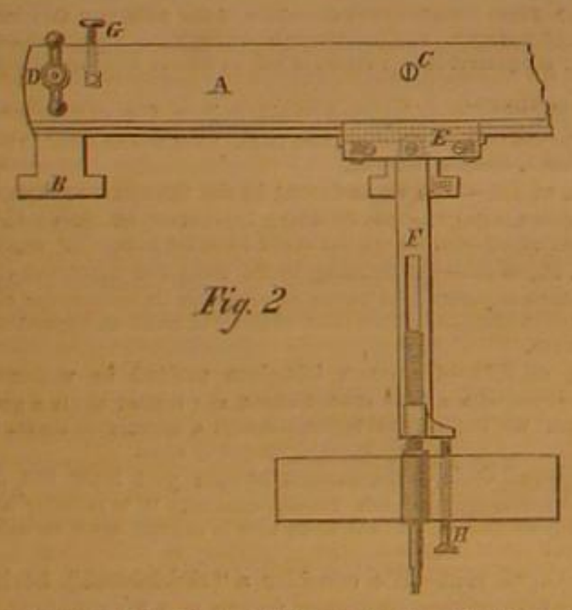


Fig. 2

is manufactured by Pratt, Whitney, & Co., Hartford, Conn., well known as the manufacturers of the finest description of machinist and gun tools. Their advertisement is to be seen on another page.

A Great Steamship Company.

The Peninsular and Oriental Company, chartered in 1840, has grown up slowly, through great difficulties, obstructions and vicissitudes, until it is now one of the "great powers" of the commercial world. Its routes extend, first, from London and from Marseilles to Alexandria; second (crossing the isthmus by railway, pending the completion of the French canal), from Suez to Bombay; third, from Suez to Point de Galle and Calcutta; fourth, Bombay to Calcutta; fifth, from Point de Galle to Melbourne and Sidney; and sixth, from Point de Galle to Singapore, Hong Kong, Shanghae and Yokohama. The annual mileage of its vessels is about a million and a half knots, or, with a small allowance for stay in port, from 5,000 to 6,000 miles per day of running-time. The average speed of ocean steaming is between nine and ten knots per hour, on these as well as other lines, giving say 225 miles for a day's work, and thus at least 25 steamships or their equivalent must be in the employ of this company. The average stock of coals kept at fourteen ports for the use of these steamships is 90,000 tuns, and a fleet of 170 sailing ships is employed in conveying the supply to the several depots. The company feeds about 10,000 persons daily on board ship—8,250 employees and 1,750 passengers—consuming 14,500,000 lbs. of provisions annually, including ice and fodder for cattle. Total consumption of cattle, 180,000 head; of lemonade, wines, beer, etc., 1,500,000 bottles. The total number of employees, afloat and ashore, is 12,601. The total revenue for 1865 was about $10,000,000: profits, over $700,000. The company, in its origin and capital, is mainly Irish, and of its 2,122 shareholders 689 are ladies, 153 are clergymen, and 178 are in the army and navy.

Edson's Hygrodeik.

Physiologists complain that the air of apartments artificially heated becomes dried, and is thereby rendered unfit to be taken into the lungs. They believe that to keep the air in a healthy state, a certain amount of moisture is required, the amount depending on the temperature, an excess or deficit being alike injurious.

In determining these fluctuating conditions for the sanitary

heating of dwellings, schools, and churches, our ever-varying feelings, as experience has shown, furnish no trustworthy guide, and the necessity has long been felt for some simple and reliable instrument whereby the state of the atmosphere as regards humidity can be seen at a glance. To meet this want is the design of the apparatus herewith represented.

The essential part of the Hygrodeik consists of two ordinary thermometers, the one on the right of the engraving having a dry bulb for measuring the actual temperature. The bulb of the other is covered with cotton wicking, which by capillary attraction draws up water from the glass reservoir and thus keeps the bulb always moist. The difference noted by the mercury in these thermometers depends directly upon the amount of moisture in the air. If the atmosphere is saturated with aqueous vapor there will be no difference in the readings; but as the air becomes dry the inequality increases. To find the relative humidity, the small knob shown in the center of the engraving is raised or lowered, the index on the right is thereby moved up or down until its edge coincides with the mercury in the tubes; then turning the knob to the right or left, by a suitable connection not shown in the engraving, the pointer on the left is in like manner placed coincident with the mercury. Thus adjusted, the central index hand will indicate on the dial plate the relative humidity, dew point, absolute amount of moisture present, and weight of water in the form of vapor in each cubic foot of air, expressed in grains and tenths; another set of numbers shows in inches of water, the force of vapor. Dry air, it has been found, does not check radiation, while moist air does in a very marked degree: the inference is plain then, that a saving of fuel is effected by keeping the air in a moist condition.

As thus constructed the Hygrodeik has already received most flattering testimonials from the President and Professors of Harvard College, also from the leading physicians of Boston, and has been ordered into the public schools of that city.

This instrument has been patented in England, France, and the United States. For further information address N. M. Lowe, 103 Court street, Boston, Mass., or S. N. Ufford, 162 Greenwich street New York City.

Isaac's Improved Foot Bath.

There can be no reasonable doubt but that if as regular and careful attention was paid to washing the feet as the face and hands, people generally would be healthier. And probably one reason why it is not more regularly practiced is that while we have excellent facilities for laving the upper extremities we have none for cleaning the lower. After a hard walk, an exhausting day's work, when threatened with fever, in the annoyance of a cold, and the torment of a headache there is no simpler, more effectual, and less harmful remedy than a warm bath for the feet. The only drawback to its enjoyment is the want of a suitable utensil.



The engraving exhibits a convenient foot bath in which the water can be kept at the same temperature or rather the temperature can be raised as the water cools without removing the feet. It is a tin vessel about fifteen inches high and of oval diameters, one twelve and the other fourteen inches. Above the true bottom is a false bottom with perforations around half its circumference. The water is poured in at the fixed tunnel on the side and passes between the two bottoms, rising through the small perforations and mingling gradually with the water already in the vessel. By this means the hot water not only mixes evenly with the cooler, but the stratum of water under the false bottom prevents rapid cooling from the floor. It appears to be excellently well adapted to its object. Patent papers were issued for this improvement to I. A. Isaacs, Dec. 18th, 1866, whom address for additional particulars, at 35 Warren, corner of Church street, New York.

Small steel implements, after hardening, may be drawn to temper on a buff wheel.

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TRADE MARKS.

It is not unusual for a firm to bring suit against trespassers on their right to a distinctive trade mark by which their productions may be designated and recognized. The use of trade marks and peculiar devices for giving a distinctive mark to goods of a firm or an individual is quite old, but has of late years been more extensively used in this country than heretofore.

Upton says:—"A trade mark is the name, symbol, figure, letter, form or device adopted and used by a manufacturer or merchant, in order to designate the goods that he manufactures or sells, and distinguish them from those manufactured or sold by another; to the end that they may be known in the market as his, and thus enable him to secure such profits as result from a reputation for superior skill, industry or enterprise." Property in trade marks, exclusive and absolute, has existed and been recognized as a legal possession, which may be bought, sold, and transmitted, from the earliest days of recorded jurisprudence.

As the true interests of manufactures and commerce have been more perfectly developed and more fully understood and appreciated, it has been found that an exclusive property in trade marks and its adequate protection by courts of equity not only imposes no restraint upon the freedom of trade, but that its tendency is to promote and encourage that laudable competition in which lies the true interest of the public.

The love of possession, the proper pride in our own production, the desire to preserve a character for fairness, honesty, and straight-forward dealing as a defense against the attempts of swindlers, are adequate causes for the adoption of some peculiar and individual symbol by which one's handiwork may be known. When the order of masonry numbered among its votaries only those who were practical craftsmen each man had his own cipher which he cut into the choice stones that formed part of the edifice he helped to build. The old structures scattered all over Europe bear in their walls thousands of these monograms, evidences at once of the workman's pride in his art and his desire to write himself down a competent workman.

A similar pride of occupation and honest vanity of success moves the modern manufacturer to adopt some peculiar symbol as a sign of his honor and a surety to the purchaser that he gets what he intends to buy. That the producer has the sole right to this symbol is indisputable. Its recognition is not only a defence of his character for fair and honorable dealing but a protection to his patrons. So it has come to be the well established doctrine that the exclusive property of the manufacturer or merchant in his trade marks is of that nature and character that its adequate protection and security by the highest power of the courts, is an imperative duty as well for the safety of the interests of the public as for the promotion of individual justice.

Trade marks were formerly representative characters, being the name of the manufacturer with the place where made and the quality of the goods, or a similar device, and thus were as legible to the uninitiated purchaser as to the maker. But within a few years there has appeared to be a general disposition to copy the usages common centuries ago, and to adopt some arbitrary and irrelevant character or symbol. Thus we see griffins, sphinxes, and other fabulous monsters adopted to designate the products of firms, as well as monograms formed of legible characters and also of untranslatable ciphers. Yet in whatever form, these marks are as undeniable property as any other possession, and to the conscientious manufacturer a trade mark becomes in time an exceedingly valuable possession, giving him an immense advantage over the producer of an inferior article, while it is a guaranty to the public of genuineness.

QUALIFICATIONS FOR PUBLIC BUSINESS.

The important question of reform in the mode of appointment and tenure of office in the civil service, is again before Congress in the bill of Mr. Jenckes which proposes to subject all appointments and promotions to the test of a competitive examination of candidates as to fitness. Every branch of the civil service would thus become a profession, in which permanent position may be secured by studious fidelity, and promotion and distinction by perseverance and excellence. The reform demanded is in fact vital to the existence of our government. Under the present system of party corruption, it is only a question of time when the organization at Washington will become as rotten as that of this city, and as much more intolerable as it is more extensive.

By way of illustration and example, the conditions affixed by the Government to appointment to the telegraphic service in India, happen to lie before us in a late English paper, and will be found rather striking in contrast to the looseness of our appointments of all kinds. Among the primary conditions of nomination are a medical certificate of a constitution sufficiently vigorous to withstand exposure and fatigue in a tropical climate, and a certificate of past good character and conduct. Then follows the intellectual examination, involving 300 marks (minimum of 200 good) in English reading and writing from dictation; 250 each in English, Roman and Greek or Indian history; 350 each in Indian and general geography; 500 each in arithmetic, algebra and geometry; 750 in plane trigonometry, etc; 250 each in mensuration and book-keeping; 500 each in Latin, Greek and some modern foreign language. After passing this examination satisfactorily, the nominee will be required to give a bond with security for the fulfillment of the future conditions. He will then join a physical class for the purpose of qualifying for a final examination in chemistry, electricity and other sciences related to the telegraphic art. If found duly proficient in physics, he must then join an authorized telegraphic engineer and receive full instructions in the practical details of construction, testing, etc. Having mastered all these conditions to the satisfaction of the examiners, he will be furnished with his passage expenses to India and will join the telegraph department as a fourth class assistant superintendent at a salary of £240 or a little over $1000 per annum. Among us, a youth expects something like that salary, who has been in a telegraph office two or three years and can barely read and write, but not spell, and who could not for his life tell whether he was transmitting correctly or not the name of one foreign locality in a thousand. It should be added, however, that the English papers ridicule unmercifully the official arrangements for practical training, and show up the ignorance and inefficiency of the whole past administration of the telegraph system in India in a most humiliating light.

INGENIOUS BULL.

The Englishman's chronic and comical despair of any way to stop a railway train on emergency, is explained partly by his repugnance to that open democratic fashion of doing things which is the best security for general good behavior—he calls this dignity, privacy, and what not—and partly by his dogged reluctance to submit to a new evil however slight, in getting rid of an old one however serious. Lest somebody should stop a train for fun or mischief, without detection, the English people endure the constant risk and occasional experience of robbery, rape and murder on their trains, not patiently only, but proudly. All the discomforts and outrages they suffer appear to be sauced perfectly to their taste by the always repeated conclusion that "Englishmen never can descend to the promiscuous American fashion of traveling," which is the only known condition under which an engine bell cord can be safely placed within reach of every passenger.

The long debate on all sorts of remedies for this deadlock between the right of exclusiveness and all other rights and interests of human nature, is only less amusing to plain easy people in America than the old absurdity around which it circles. Invention never begat another such series of fantastical suggestions as have beaten the British brain for a quarter century past. For example, in turning over an old volume of the *Mechanics' Magazine*, the other day, we recognized our friend, Captain Norton, in the act of propounding to the British public his plan for communication from the guard to the engine driver by means of a bow and arrow. His arrow was to be tipped with a squib to explode on falling, and to convey a variety of signals by colored fire. The advance from this to the latest invention, described in our London letter a few weeks since—that of torpedoes to be thrown upon the track—can perhaps be appreciated by the discriminating reader.

No, there is a later contrivance, tested in the presence of railway dignitaries, and described in the *Times*. It has so much the advantage of previous inventions in point of practicability, if not of outlandishness and absurdity, that we may presume John Bull feels he has hit it at last. It is patented. By converting the ordinary passage ticket into a mild sort of infernal machine, tipped with a chemical igniting compound, each passenger by inserting the tip in a slit over his head, can have the satisfaction of firing off a rocket from the top of the car, and of displaying a colored light in the same position for some minutes, whenever he feels like taking the responsibility. And the responsibility is not easily to be dodged, without going to the expense of an extra ticket; that is, until some curious chemist has had time to discover the composition, so that it shall become accessible to anybody who wants it. For, mark you: if the engine driver happens to hear the noise and to look around, he can probably tell which car carries the portentous signal; after the train is stopped, examination will discover over what compartment the signal was fired; and finally the guard will unlock the very crib in which you are confined, and if you are already garroted or worse, the case will be perfectly clear, and even if otherwise, the disfigurement of your ticket, if the guard can find it, or if you have not taken the precaution to provide yourself with an extra one, will reveal the individual for whose accommodation the train was brought to. On the other hand, if you have taken the proper precaution, you can now get out unchallenged at the precise spot where the directors would have placed a station if your convenience had been uppermost in their designs. We think John Bull may properly cry *Eureka* at last.

GEOLOGY OF NORTH AND SOUTH AMERICA—PROFESSOR AGASSIZ' LECTURE.

The first lecture of Prof. Agassiz' course on South America before the New York Association for the Advancement of Science and Art, was delivered to a large audience on the 5th of February. In substance it was a general statement of the geological origination and structure of the continent, North and South, with a somewhat too hurried elucidation of the general principles of geology through which its history is revealed.

A remarkable analogy was traced between the geological histories of North and South America, each revealing three grand structural epochs, three successive upheavals of the crust of the earth, and three continental walls thus successively erected in the form of a triangle. In both divisions, this triangular framework stands in about the same position, like an italic *V*, as we view the map, with its open top closed. The side first erected, in both cases, was the northern, extending from east to west, constituting the northern (central) United States, British America, etc., in the one, and the plateau of Guiana in the other.

The vast contraction of the crust of the molten globe in cooling and thickening progressively—beneath the boiling ocean which still cooled it and still by its increasing coolness was more and more condensed upon it from the enveloping vapors—this tremendous contraction could not but cause the violently compressed mass within to burst its shell and make room for itself, wherever the shell was weakest. At the same time, the cooling and contraction going on upon the exterior surface of the crust while the interior surface still lay half fused upon the molten mass within, necessarily parted the exterior surface in great fissures, weakening the crust and permitting a grand upheaval along the line of fissure to relieve the pent and laboring ocean of fire beneath. Precisely in accordance with this effect we find the crust disposed in many mountainous districts, of which the Jura is a beautiful example. Passing over successive mountains and valleys varying thousands of feet in elevation, we trace one undulating crust of identical rock throughout, but broken at the summits and falling off each way like the roof of a building from its ridge.

It is worthy of remark that the oldest upheavals in the northern parts of North and South America respectively, appear to have been broader, less violent and less sharply defined, while the later upheavals have been narrower and loftier, and the latest, narrowest, sharpest and loftiest of all. This is what would naturally result from the causes above stated. In proportion as the crust of the earth was younger and thinner, in the earlier stage of its contraction, the inclosed molten contents would lift and stretch the yielding superincumbent crust in vast tracts, and thus make room for themselves with less difficulty and convulsive violence. Hence the oldest system of hills in both parts of the continent, is altogether the lowest: not to speak here of the longer continued abrasion, which but partially accounts for their more rounded form. Afterward, when the crust of the earth had grown much stronger, and contracted upon the molten world within with greater power and persistency, the force beneath accumulated until it burst up the crust with great violence under the line of an exterior fissure or rather series of fissures, extending northeast to southwest; and the second great wall, the Alleghanian system, then a vast promontory dividing the North Atlantic from the North Pacific, was erected. Any one who ever noticed the series or system of fissures produced by contraction in a solidifying surface, irregularly huddled, and yet running generally in one direction, may observe just such another system in the mountains on the map of our Atlantic states. (It is but fair to remark that we are not attempting a report of Prof. Agassiz' lecture, but a sketch of his leading points, with explanations and amplifications designed for the instruction of our readers, for some of which he is not responsible.)

At the same time with the Alleghanian system—as proved by the cretaceous formation abutting upon the primitive rock alike in both regions—the plateau of Brazil rose above the water, forming in like manner the southeastern wall of South America, and dividing the South Atlantic from the South Pacific. North and South America, at this time, were two great *L*-shaped islands, with the ocean flowing unobstructed all around and between them, and in their then form incapable of embosoming a basin of productive land for the sustenance of organic nature and of man.

The next step in the task of Providence was to throw up a third barrier which should complete the necessary enclosure. After a contraction of the now strengthened crust, far more persistent and tremendous than it had ever before been capable of, a fissure system was opened on the exterior surface which may be traced on the map through all its intricacies, in the branching and interlacing of the mountains all the

way from Cape Horn to Bhering's Straits; and now the intolerably compressed interior shot upward with the suddenness of explosion, all along that fissure system, lifting the sharp volcanic peaks of the Andes and the Sierras to the sky, and finishing at one stroke the continental frame of this western world. A receptacle was now framed for land, soil, vegetation, animal life, and man: a wondrous "coffer dam" erected in the globe of waters, for Nature henceforth to work in undisturbed, to pulverize the rocks, mix and impregnate the elements, and clothe the stony skeleton with blooming flesh. How this was done, was to be the subject of the second lecture.



ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING FEB. 5, 1867.

Reported Officially for the Scientific American.

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

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
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☞ 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.

61,699.—Method of Starting Street Cars.—James Adams, Newark, Del.

I claim the weight, F, in combination with the chain, H, the roller, K, the rod, I, the ratchets, E E, and ratchet wheels, C C, and the spring, L, the whole arranged, constructed, and operating substantially as herein set forth.

61,700.—Sheep-shearing Instrument.—Philander Anderson, Kalamazoo, Mich.

First, I claim the construction of a portable sheep-shearing instrument whereby to be enabled to use air under pressure so as to operate the engine and perform the functions, substantially as herein set forth.

Second, The combination and arrangement of the engine with the case and cutting device, substantially as described.

Third, The combination of the cross head of the piston rod of the engine directly with the shear lever, D, so that this lever shall receive a vibrating motion from the piston rod, substantially upon the principle and in the manner as herein set forth.

Fourth, The shear lever, D, pivoted to the plate, A, by means of an adjusting screw, c, located outside of the case or handle, A B, of the instrument, substantially as described.

Fifth, The construction of a handle or case for a pair of sheep shears of two concavo-convex parts, A B, substantially as described.

61,701.—Corn Planter.—Albro Barber, Port Byron, Ill.

First, I claim the frame, D, having both a vertical and horizontal adjustment for the purpose of controling the operation of the seed-dropping mechism and adjusting the vertical position of the furrow openers, substantially as described.

Second, I claim the combination and arrangement of the movable frame, D, stationary frame, C, lever or handle, R, arms, a' a', shaft, Q, levers, h, slotted arms, l, rods, S, springs, S', and shaft, V, as herein described and for the purpose specified.

Third, I claim the crank shaft, V, arms, X X, and connecting rods, X' X', in combination with the slides, Y Y a a, spring valves, I I J J, and discharge tubes, G G, all arranged and operating in the manner and for the purpose set forth.

Fourth, I claim the pivoted frames, N N', and roller, M, in combination with the springs, P, and rods, j, all constructed and operating in the manner and for the purpose specified.

61,702.—Expander.—S. M. Barnett, New Orleans, La.

I claim the band, B, provided with handles, A A, whether the latter are made hollow or not, substantially as described for the purpose set forth.

61,703.—Carriage Wheel.—N. S. Bean, Manchester, N. H.

I claim the peculiarity of construction of the mortises of the metallic hub, and of the tenons of the wooden spokes, substantially as and for the purpose set forth.

61,704.—Harvester Rake.—Edwin L. Bergstresser, Hublersburg, Penn.

First, I claim the hinged slats of the platform, arranged so as to rise and let the teeth pass up, and also assist in carrying the sheaf off as herein described.

Second, I also claim the construction and arrangement of the rake teeth so as to pass under or in the platform at one end thereof, and raise the free ends of the hinged slats, as they rise at the other end to carry off the sheaf.

Third, I also claim the combination of a platform provided with two or more hinged slats and an automatic reciprocating rake, substantially as herein described and for the purposes set forth.

61,705.—Cotton Cultivator.—James C. Bethea, Blakely, Georgia.

First, I claim the mode, substantially as described, of fastening together the standard brace and share by a shackle and wedge.

Second, The mode of adjusting the pivoted standard by slipping forward the shackle and the upper end of the brace upon the beam.

Third, The relative lateral adjustment of the beam by means of the bolts with their collars, washers, and set nuts, substantially as represented.

61,706.—Apparatus for Smelting Zinc Ores.—Alfred Borgnet, Swansea, England.

I claim the several improvements and combinations herein described.

61,707.—Ornamenting Coffin Screws.—P. Bradford (assignor to Sargent & Co.), New Haven, Conn.

I claim the cap, F, provided with a tongue, N, so as to be secured to the plate, A, substantially in the manner and for the purpose herein set forth.

61,708.—Sash Lock.—E. K. Breckenridge, West Meriden, Conn.

I claim the combination of the plate, C, the lever, E, and the spring, G, with the keeper, D, when the said spring, G, is applied to and operates upon the the said lever, E, substantially as set forth.

61,709.—Fruit Picker.—Wm. Brown, Worcester, Mass.

First, I claim the combination of the hinged mouth piece, C, with the back, B, and bag, E, substantially as set forth.

Second, The combination with the mouth piece, C, of the ropes or cords, d d and G, as and for the purpose set forth.

61,710.—Tinsmith's Seaming Machine.—Andrew Buckham and Joseph Evans, Newark, N. J., assignors to Andrew Buckham.

First, I claim the die, A, figs. 1 and 2, in combination with the guide plate, B, figs. 1 and 2, when constructed in the manner and for the purposes set forth.

Second, The revolving mandrel, C, and sliding guage, D, figs. 1 and 2, in combination with the die, A, and guide plate, B, when constructed in the manner and for the purposes set forth in the above specification.

61,711.—Button-hole Sewing Machine.—Emil Cajar (assignor to himself and Charles Sichel), New York City. Antedated Jan. 28, 1867.

First, I claim the stitch regulator, F, to act in conjunction with the needle thread, substantially as and for the purpose set forth.

Second, The arrangement of two longitudinally sliding bobbins, S S', in combination with the looper, L, constructed and operating substantially as and for the purpose described.

Third, The cam groove, q, and double crank, h l, in combination with the looper, L, constructed and operating substantially as and for the purpose set forth.

Fourth, The barrel, r, surrounding the bobbin, S or S', in combination with the central tension screw, s, which is provided with concave centers, substantially as and for the purposes described.

Fifth, The sliding yoke, J, with disks, v v', in combination with the bobbins, S S', and spool holders, I I' I", constructed and operating substantially as and for the purpose set forth.

Sixth, The oscillating arm, K, in combination with the two bobbins, S S, spool holder, I, needle, n, and looper, L, constructed and operating substantially as and for the purpose described.

Seventh, The longitudinally sliding and revolving cloth holder, N, in combination with the slide, m2, and with the cloth plate, A, constructed and operating substantially as and for the purpose described.

61,712.—Elliptic Spring for Carriages.—Edward M. Chaffee, Providence, R. I.

I claim the introduction of india-rubber, or similar elastic substance, between the leaves or lifts of elastic springs, substantially as and for the purpose specified.

61,713.—Bolster for Railroad Cars.—James Christy, Philadelphia, Pa.

First, I claim the bolster, composed of the within described longitudinal and transverse beams, diagonal braces and stay rods, the whole being arranged and connected together, substantially as and for the purpose herein set forth.

Second, The combination of the strap, b, adapted to the longitudinal and central beams, the adjustable bolts, d and d', and plate, c, and stay rods, n and n'.

Third, The combination of the longitudinal and transverse beams, the adjustable or self-accommodating braces, G G' and H H', rounded at the lower ends, and bolts, l and k.

61,714.—Grinding Mill.—D. R. Clem, Front Royal, Va.

I claim the driver, composed of the central piece, A, and the arms, B, united and arranged to operate, substantially as and for the purpose set forth.

61,715.—Pipe Wrench.—John W. Close, Buffalo, N. Y.

I claim the sliding jaw block, c, in combination with the diverging jaws, b c, and lever, A, substantially as and for the purpose set forth.

In combination therewith, I also claim the use of the spring, g, or its equivalent, operating substantially in the manner and for the purpose described.

61,716.—Churn.—De Witt Clough, Auburn, N. Y.

I claim the vertical air chamber, F, with the horizontal openings, 1 2 5 6, as above set forth.

61,717.—Beater in Baling Press.—Frederick F. Cornell, Jr., New York City.

I claim, First, Forming the grooves or slots, f f f f, in the ends of the beater, B, and providing the inner faces of the narrow ends of the press chamber with the track, e' e' e' e', and continuing the same upon the inner faces of the superstructure, for the purposes herein described.

Second, Forming the slots, c c, in the ends of the pressure arms, C C, through which the ropes, I and J, may play freely.

Third, Carrying the ropes, I and J, one at either end, down within the framing of the press between the posts, G G G G, sheeting, m m, and shanks, b b.

Fourth, The levers, L L, segmental shanks, b b, shank pins, o o, guards, d d d d, and concave lugs of pressure arms, C C, all combined and arranged for the purposes hereinbefore specified.

Fifth, The rope, I sheeves, K K H H H and F, arranged to operate and control the levers, L L, as described.

61,718.—Baling Press.—Frederick F. Cornell, Jr., (assignor to himself and Edwin M. Wight), New York City.

First, I claim the use of the beater, B, as a follower, when operated as such by the levers N N, located at the ends of the press.

Second, The use, in a baling press, of stirrups or crossheads located outside of the lining of the press chamber, but within the framing of the press as a means of communicating motion to the follower when the same has arms or beams projecting through slots in the lining of the press chamber for the purpose of forming a connection with mechanism used for compressing, located and operating at the sides or ends of the press framing.

Third, The use, in a baling press, of toggle levers, located outside of the framing of the press when the feet of the radii of the levers are below the plane of the top of the finished bale and the points of connection between the upper ends of the levers and the rods, chains or their equivalents, connecting the same with the arms or beam of the pattern are above the said plane.

Fourth, The use of the guides, g g, to control the motion of the levers, N N, when operated substantially as herein described.

Fifth, The use of the guides, t t, cross beads, Q Q, ropes, S S, and counterpoises, R R, when used and combined for the purposes herein described.

Sixth, Making a close press chamber in a baling press, operated by means of a follower, having arms or beams projecting through the lining thereof, to form a connection with the compressing mechanism by means of removable sections of said lining, which, when in position, render the press box tight on all sides, but when removed, allow the said arms or beams to move freely in the openings formed thereby.

Seventh, The removable sides, I I, in combination with the tongues and grooves, f f f, arms, C C, and crossheads, Q Q, substantially as and for the purposes described.

Eighth, The levers, N N, radii, O O O O, sheaves, U U U U, chains or ropes, S S S S, crossheads, Q Q, arms, C C, and follower, B, combined, substantially as and for the purposes hereinbefore described.

Ninth, The use in a baling press of two horizontal drums so located under the press framing that a vertical plane passing through the points in the ends of the toggle levers located at the ends or sides of the said framing to which the chains or ropes used for operating them are attached will be tangent to their perimeters for the purpose of winding the said ropes or chains and yet retaining them always in the same vertical plane.

Tenth, The use in a baling press of the drums, D D, gear wheels, E E, driving pulley F, and ropes or chains, X X and Y, substantially as and for the purposes hereinbefore described.

Eleventh, The use of a hollow beater, B, with the arms or beams, C C, bolts or pivots, c c, and head beam, L, so constructed and arranged that the said arms when allowed to turn freely on the bolts, c c, will of their own weight assume a position entirely within the exterior lines of said beater, but when drawn upon by the cord, Z, will assume a horizontal position with their inner ends held firmly by the head beam and their outer ends projecting a sufficient distance beyond the exterior lines of the beater to engage with the mechanism used to operate it as a follower.

61,719.—Press for Compressing Bales Already Formed.—Frederick F. Cornell, Jr., and Edwin M. Wight, New York City.

We claim, First, The use in a press designed for the compressing of bales already formed or of goods requiring no press box to retain them in position between the platen and the head block and not provided with sides or ends for the purpose of forming such chamber or press box, of toggle levers, the fixed fulcrum points of whose radii are located above and upon the head block or head beams of the press.

Second, The use in a toggle-lever press not provided with permanent sides or ends for the purpose of forming a press chamber of a platen suspended by means of rods or bars passing down through the head block or between the head beams thereof from the ends or shanks of toggle levers located on and above said head block or the beams thereof.

Third, The use in a toggle-lever press not provided with permanent sides or ends of posts located two at either end and so arranged that while serving as supports for the head block and its superincumbent weights they shall also act as guides to retain the motion of the platen in right lines by engaging with suitable notches or slides in the same, substantially as hereinbefore described.

Fourth, The use in a toggle-lever press having the fixed fulcrum points of the radii of the levers thereof located on and above the head block or the beams thereof of a vertical guide attached to the center of said head block and furnished with a slide provided with horizontal bars attached thereto and extending to and connected by joints with the shanks of the toggle levers on either sides and so arranged as to prevent the same from altering their relative position and retain their motion in perpendicular and parallel lines when operating the platen.

Fifth, In a press having a platen suspended from toggle levers located above and having the fixed fulcrum points of their radii resting upon the head block or the head beams of the press extending the lower portions of said levers downward from the center pins a sufficient distance to allow the moving power to be applied thereto at points, n n, whose distance from the center pins, g g (when the radii are brought into a perpendicular position) shall be equal to the elevation of said center pins above the lower faces of the guide sheaves, a a, located in the ground sills of the press.

Sixth, The sheaves, a a b b o o, chains, c c, levers E E, draw rods, G G G G, horizontal connecting bars, H H, shank pins, h h, and slide, I, all arranged and combined as and for the purposes hereinbefore specified.

61,720.—Cradle.—David Cox, Cincinnati, Ohio.

I claim the combination of the cushions, E e, with the rockers, B c, and the straps, F f, as and for the purpose explained.

Second, The combination of the treadle, G, and cushioned rod, H h, with the cradle, A B, and convex rocking surfaces, E, substantially as and for the purposes specified.

Third, The combination of the turn bar, I, cradle, A B, and trestle, C D E, as and for the purposes specified.

Fourth, The combination of the inclined planes, K K', with the turn bar, I, cradle, A B, and supporting trestle, C D E, for the purpose described.

61,721.—Childrens' Building Blocks.—Charles M. Crandall, Montrose, Pa.

I claim a new and useful improvement in childrens' building blocks which consists in so indenting the blocks (which may be of any size, shape, or material) by tongueing and grooving or other similar process that the indented parts of each block will closely fit into the indented parts of any of the other blocks forming when placed into each other a substantial fastening or joint flexible in two directions, easily put together and removed at the will of the operator.

61,722.—Breech-loading Fire-arm.—Silas Crispin, New York City.

I claim the employment of a solid plane-faced vibratory (or rotating) breech block having its axis at its anterior inferior portion in combination with the lever, G, and spring catch when there is no connection between such parts and any portion of the lock work, and the whole is arranged to operate as specified.

I also claim the combined arrangement as set forth of the extractor with the breech block and swinging lever or long arm, for the purposes set forth.

61,723.—Spinning Mule.—George Crowther, Philadelphia, Pa.

First, The combination of the loose pulleys, 1 and 2, constructed and applied as described with the driving shaft, C, for giving the inward motion to the carriage and winding the yarn on the spindles, the said pulleys acting through the pulleys, 3 and 3' the band, F, and cord, e, for giving an inward motion to the carriage, and the pulleys, 4 5 7 8 and 9, and bands, G I R and S, or their equivalents, for operating the spindles, as above set forth.

Second, The combination of pulley, 1, with pulley, S, by means of the cross belt, F, for operating the shaft, E, substantially as described and for the purpose specified.

Third, The combination of pulley, 2, with pulley, 5, on shaft, J, by means of the intermediate double pulley, 4, and belts, G and I, for operating said shaft, substantially in the manner described and for the purpose specified.

Fourth, Constructing the back catch, L, with the shoulder, b, and combining with said catch the vertical rod, M, lever, N, and rod, Q, or its equivalent, the said parts being arranged for joint operation substantially as described and for the purpose set forth.

61,724.—Bed Bottom.—James W. Davis, Washington, D. C.

First, I claim the curved wooden springs, G G', interlocking with each other secured at their upper ends and having their lower ends free, which ends pass through slots in guide bars, c c', substantially as described.

Second, The guide bars, c c', provided with mortises, H H', and pins, e e', working in slots, d d', substantially as described.

Third, The plates, b, b, in combination with the pivoted head and foot bars, F F', for the purpose and in the manner described.

Fourth, The combination of the wooden springs, G G', bars, F F', plates, b b', guide bars, c c', provided with mortises, H H', and pins, e e', slots, d d', and mattress, C, substantially as and for the purpose set forth.

61,725.—Farm Gate.—John Dickason, Vevay, Ind.

I claim the combination of the rack, J j j, with the brace, G G', pin, I, lever, L, and detaining bar, M, all arranged to operate in the manner and for the purposes set forth.

61,726.—Well Tubing.—Andrew J. Edgett (assignor to himself, J. W. Ferry, and Alonzo Graves, Hornellsville, N. Y.

I claim a driving point for tube wells composed of two parts, A and B, having openings, a2, and b3, screw shank, b2, and each having a clutch formation, b1, all arranged and operating in the manner substantially as herein described.

61,727.—Cotton-bale Tie.—Henry Fassman, New Orleans, La.

I claim the bale tie buckle, constructed with an opening in one loop with chamfered corners, a b, and with a ridge or ridges, c c, on one or both sides, substantially as and for the purpose described.

61,728.—Piston for Steam Engines.—L. B. Flanders, Philadelphia, Pa.

First, I claim the within-described packing composed of blocks and springs constructed and arranged alternately on a piston between the annular rib, d and split rings, e, substantially as described.

Second, The keys, l l, arranged between the blocks and annular rib, d, for the purpose specified.

Third, The key, m, applied for expanding the packing, in the manner described.

61,729.—Cast-iron Frame for Toy Looking Glasses.—Russell Frisbie (assignor to G. and E. Stevens & Co., Cromwell, Conn.

I claim the fastening of the glass into the cast-iron frame of a toy looking glass by means of small pieces of tin, sheet-iron, or other suitable metal, cast into the edge of the frame, as herein described.

61,730.—Medical Compound for Cure of Catarrh.—Frances P. Gardiner, New Haven, Conn., assignor to herself and L. W. Eaton, Bridgeport, Conn.

I claim the herein-described compound prepared substantially as set forth.

61,731.—Water Elevator.—Franklin T. Gilbert, Elgin, Ill.

First, I claim the hollow double lever, B, when operated or held in place by balls, substantially as specified.

Second, The jointed lever, P P', constructed substantially as set forth in combination with the weighted lever, B.

Third, The combination and arrangement of the double weighted lever, B, jointed lever, P P', and ratchet, S, with the loosely revolving cylinder, T, miter wheels, L L' N, well cords, straps, e, friction roller, i, buckets, A, and discharging bail, x, when constructed and arranged substantially as specified.

61,732.—Clay Pipe Machine.—George D. Goodrich, Joilet, Ill.

First, I claim the wheels or rollers, T', cross roller, u, and platform, N N', in combination with the trough, O, substantially as and for the purpose specified.

Second, The wheels, I, when provided with the arms, e, and cams, k, substantially as and for the purposes specified.

Third, The sliding bar, K, provided with the arms or stops, d.

Fourth, The spring, g, provided with the hook, h, in combination with the catch, l, and cams, k, of the wheel, I, constructed and operating with the shaft, J, and sliding bar, K, substantially as specified.

Fifth, The bent arms, e, and cutting wires, f, arranged and operating substantially as set forth.

Sixth, The head, P, of the side elevator when provided with the cams, p and n, upon each side.

Seventh, The head, P, constructed substantially as described in combination with the bent arms, l.

Eighth, The bent arms, w, when provided with the points or projections, k

Ninth, The arms, w, in combination with the springs, z, projections, k' x and head, P, of the elevator arranged and operating substantially as and for the purposes specified.

Tenth, The combination and arrangement of the side elevator constructed substantially a set forth with the guide post, D, and automatically operating arms, and rest, w.

Eleventh, The conical or wedged-shaped block, t, when attached to an elevating cord, rope or chain, substantially as and for the purposes specified.

Twelfth, The spring, n, provided with the ledge or catch, y, in combination with the lever, w, having its head or upper end enlarged, substantially as and for the purposes specified.

Thirteenth, The combination and arrangement of the cylinder, R, lever, w, spring, u, rope, q, and block, t, with the elevator, P, and automatical rest, w, constructed and arranged substantially as and for the purposes specified.

Fourteenth, The stand or post, E, provided with the T-shaped guides, Z, substantially as specified.

Fifteenth, The double wedge or conical block, f', when attached to the cord, a', for the purposes specified.

Sixteenth, The double acting friction clutch, d', arranged and operating substantially as specified.

Seventeenth, The combination and arrangement of the rollers, g', and clutch, d, with the cord, a', and double acting block, f.'

Eighteenth, The dumping platform, X, when provided with a hinge, c, on one side and guides, m', on the other, substantially as specified.

Nineteenth, The platform, X, in combination with the bent bar, Y, and sliding head, h', constructed and hinged, substantially as specified.

Twentieth, The bent bail, b', when so bent as to pass the back of the platform, X, and hinge or attach to it near the front at e, substantially as and for the purposes specified.

Twenty-first, The combination and arrangement of the platform, X, hinged bent bar, Y, sliding head, h', with the bail, b', cord, a', and standard, E, substantially as and for the purposes specified.

Twenty-second, The combination and arrangement to two dumping platforms constructed substantially as specified with a single guide standard so that one will elevate the other and bring its opposite one into position while dumping a trough.

Twenty-third, The receiving platform, F, provided with rollers, v, located on the same plane as the rollers, u, of the receiving frame, substantially as specified.

Twenty-fourth, The screws, a a, for adjusting the hight of the receiving frame to the different sizes of pipe being made.

Twenty-fifth, The use or employment of rollers or carriers for supporting and carrying a trough used to receive and carry off clay pipes which are forced from the die, continuously and cut while in motion.

Twenty-sixth, The arrangement of the cutting wires in combination with a receiving trough so that both ends of the section of pipe will be cut and the wires while cutting take the same motion as the pipe and trough and produce a square cut across a continuous pipe while in motion.

61,733.—Mode of Taking Copies of Manuscripts, etc.—Mark B. Hardin, New York City.

I claim the process hereinbefore described of copying manuscripts, maps, etc., which have been written with common ink, substantially as above set forth.

Second, In the copying of manuscripts as herein contemplated which have been long written with common ink, I claim the use of a weak solution of oxalic or other equivalent acid, substantially in the manner and for the purpose hereinbefore described.

61,734.—Refrigerator.—Robert A. Harris (assignor to himself and B. S. Harris), Philadelphia, Pa.

I claim the combination of the ice chamber, D, its openings, r, and perforated end, q, the compartments, G and F, channel, j, at the bottom of the ice chamber and the opening, n, the whole being arranged as and for the purpose described.

61,735.—Steam Engine Air Pump.—Andrew Hartupee, Pittsburgh, Pa. Antedated Jan. 20, 1867.

I claim the horizontal or inclined steam engines, the combination of the link, S, and lever, L, with the head, K, piston rod, I, and slides, G G, arranged as described and for the purpose specified.

61,736.—Apparatus for Handling Hogs in Slaughtering.—Henry P. Haskin, Roscoe, Ill.

I claim the bars, D and d, in combination with the lever, C, revolving socket, B, and post, A, when constructed substantially as described, when arranged and operating as and for the purpose specified.

61,737.—Snap Hook.—B. B. Hotchkiss, New York City.

First, I claim in a snap hook having a rigid internal tongue operated by a separate spring, the interlocking of the root of the tongue and the confining of the locked parts by the same spring which operates the tongue, substantially in the manner and for the purpose herein set forth.

Second, I claim in combination with a rigid tongue mounted and operating in a hook, as described, the slot or recess, a, having parallel sides adapted to guide the tongue near its point and resist side strains, substantially as herein set forth.

61,738.—Dressing Grind Stones.—George C. Howard, Philadelphia, Pa.

I claim the combination of long bearings for cutting wheel, b, the rests, F, the lip, c, and cars, s, as set forth and for the purposes described.

61,739.—Apparatus for Carbureting Air.—Elias S. Hutchinson, and Hugh L. McAvoy, Baltimore, Md. Antedated Jan. 19, 1867.

First, We claim a revolving drum partially submerged in hydro carbon fluid and provided on its interior or exterior periphery or both, with buckets, receptacles, reticulations or depressions which raise portions of the fluid for the purpose of moistening the surface which is exposed to the air in the carburetor.

Second, We claim the combination of the inner and outer drums revolving together and between whose moistened surfaces the air is conducted, substantially as described.

Third, In combination with a revolving drum provided with devices for raising the fluid, we claim the hood, C, which compels the air to traverse the outer periphery of the drum as described and represented.

Fourth, In combination with the air forcing machine, we claim the two concentric series of fluid raising devices and the hood arranged substantially as described and represented.

61,740.—CART BRAKE.—Silas Y. Ives, Meriden, Conn.

First, I claim the combination and arrangement described of the shoes, G, the levers, H and L, with the equalizer, M, and the rod, N, substantially in the manner and for the purpose specified.

Second, In combination with the above, I claim the bar, P, and rod, R, constructed and arranged to operate substantially in the manner and for the purpose specified.

Third, I claim the combination of the shoe, G, and lever, H, when linked together so as to operate substantially as and for the purpose specified.

61,741.—LIGHTNING ROD.—Clark Jillson, Worcester, Mass.

First, I claim the combination of the iron conducting rod with the copper strips secured in a groove formed in said rod, substantially as shown and described.

Second, The combination with the ends of the sections or pieces forming a joint of copper or other metal washers, substantially as set forth.

Third, I claim making the connecting pieces, C, with slots, b, as shown and described.

61,742.—INSOLES FOR BOOTS AND SHOES.—Moses A. Johnson, Lowell, Mass.

I claim an insole composed of layers of felted or woven material, or of thin leather or their equivalents, and margined by a wire or its equivalent secured to the edge of the insole, substantially as described.

61,743.—MANUFACTURE OF IRON.—J. J. Johnston, Alleghany City, Pa. Antedated Jan. 18, 1866.

I claim treating iron during the puddling or boiling process with a chemical compound composed of the ingredients herein named, in about the quantities specified, and prepared and used in the manner and form described and for the purpose set forth.

61,744.—GATE LATCH.—George W. Large, Yellow Springs, Ohio.

I claim the reversely gravitating lever latch constructed and operating substantially as and for the purpose set forth.

61,745.—CURTAIN FIXTURE.—Henry and Albert Lovie, Philadelphia, Pa.

We claim in the sliding screw rod, C, having a pulley cage, D, formed in it, in which the pulley, d, is contained, substantially as specified and described.

61,746.—TILE AND BRICK.—Robert O. Lowrey, Talor, Iowa.

First, I claim a plastic cement for roofing and other purposes, which is composed of marl and coal tar, mixed together in suitable proportions, substantially as described.

Second, A roof which is composed of unglazed and unburned slabs or tiles which are secured firmly down upon the roofing boards, and then covered with a cement consisting of marl and coal tar, substantially as described.

Third, A roof covering which consists of a bottom layer of dry clay, a second layer of clay, marl, and coal tar, and a top or surface layer of marl and coal tar, applied to roofing boards, substantially as described.

61,747.—ICE PITCHER.—E. B. Manning, Middletown, Conn.

I claim, in combination with bottoms, D and B, the plate, a, constructed and arranged so as to support the bottom, D, substantially in the manner and for the purpose set forth.

61,748.—CARRIAGE HORSE CONTROLLER.—Francis Marlow, Cleveland, Ohio.

I claim the line, F, spool, B, and shaft, A, in combination with the pawl and ratchet, G D, attached to a carriage, as and for the purpose set forth.

61,749.—SCREW-MAKING MACHINE.—Benjamin A. Mason, New York City.

First, I claim the arrangement of the slide, 12, inclined ways, 8, and retainers, 13 and 14, to supply the blanks, one at a time, to the machine, substantially as set forth.

Second, I claim the arrangement of mechanism for actuating the screw drivers, l, consisting in the revolving cam ring, m, rods, o, levers, o', and shackles, in combination with the sleeve gears, k, for rotating said screw drivers, as set forth.

Third, I claim the chucks, 11, for holding the blanks, in combination with the screw drivers for revolving such blanks, and the cutters for forming the thread, as set forth,

Fourth, I claim a series of screw drivers and screw blank holders, arranged in a circular position, in combination with a series of cutters moved around outside the screw blanks, and acting to cut the thread on such blanks by progressive cuts, the cutters being caused to move lengthwise of the screw blanks, and then pass to the next screws, substantially as set forth.

Fifth, I claim the tool guides, u, supported by the blocks, u', and adjusted by the screws, 32, in combination with the sliding cutter stocks, t', and cutters, t, substantially as set forth,

Sixth, I claim, in a screw-cutting machine, a series of cutters, t, formed as specified and attached to the stocks, t', in combination with the series of rollers, 31, gradually increasing size, as and for the purposes specified.

Seventh, I claim the pawl, r, carriage, s, and plate, 24, in combination with the tool carrier, n', and bed, q, for the purposes and substantially as set forth.

Eighth, I claim the bed, q, tools and carrier, n', and cams, p p, in combination with mechanism, substantially as set forth, for rotating the screw blanks, whereby the screw threads are formed by the descent of the carrier, n', with a speed proportioned to the rotation of the screw blanks.

Ninth, I claim the bolt, 21, and actuating lever, 22, in combination with the pawl, r, lever, s, and tool carrier, n', arranged and operating substantially as and for the purposes specified.

Tenth, I claim the raiser, 34, and lifting jaws, v', fitted and actuating substantially as and for the purposes specified.

Eleventh, I claim the tool carrier, n', to which a progressive rotary movement is imparted, in combination with the bed, q, to which a rising and falling movement is given, substantially as set forth, so that the tools may have imparted to them a movement parallel with the axis of rotation as well as a progressive rotary movement, as specified.

Twelfth, I claim the head block, c', formed with a cavity, w, for water or other liquid, and from which jets pass to the screw blanks as specified.

51,750.—FLEXIBLE SYRINGE.—Morris Mattson, New York City.

I claim the application and use in syringes, having an elastic bulb or air chamber and a flexible discharge pipe, of a rigid inflexible inlet or suction tube or pipe, to serve as a rest or support for the hand, when such inlet tube is constructed in sections as described, so as to allow of being extended or contracted in length, substantially as and for the purposes set forth.

61,751.—BREECH-LOADING FIRE-ARM.—Isaac M. Milbank, Greenfield Hill, Conn.

First, I claim the wing, h, in combination with the swinging breech block, c, and hammer, k, for the purposes and substantially as set forth.

Second, I claim the locking projections, n and o, in combination with the hammer, k, and wing, h, of the swinging breech block, as and for the purposes set forth.

61,752.—HANDLE FOR SAD IRON.—Henry Mitchell, Dayton, Ohio.

I claim the construction of the handle, C, socket, E, spring catch, G, and thumb piece, H, or their equivalent, when arranged, combined, and operated as herein described, for the purpose of having a movable and cool handle at all times.

61,753.—VESSEL AND TANK FOR HOLDING HYDROCARBON AND OTHER LIQUIDS.—Joseph G. Moody, New York City.

First, I claim the method of discharging the gases generated within the tank, or other receptacle, containing the hydrocarbon liquid, into an uninflammable liquid medium, substantially as shown and set forth.

Second, The combination with a floating tank, or other receptacle, for hydrocarbon liquid, of a gas discharge tube attached to the dome or upper part of said tank, and having its mouth or open end immersed in and surrounded by water, substantially as and for the purposes described.

61,754.—MECHANISM FOR OPERATING THE PICKER STAVES OF LOOMS.—Samuel Mortimer, Leicester, Mass., assignor to Charles W. Gilbert.

I claim the combination with the arms or tappet, H, mounted at angles with lever or arms, F, arranged to operate the picker staffs, substantially as shown and set forth.

61,755.—BOOT AND SHOE BLACKING MACHINE.—M. A. Myer, Decatur, Ill.

I claim in combination a polishing brush having a reciprocating motion, a blacking brush also having a reciprocating motion, and capable also, whilst in motion, of being thrust down for a supply of blacking, and rising again whilst it continues to vibrate or reciprocate, substantially as herein described and represented.

61,756.—MODE OF CONSTRUCTING SHOVELS.—Henry M. Myers, Allegheny City, Pa.

I claim forming the straps on and socket (for the handle) in the stock or blank from which the shovel blade is formed, said straps and socket being formed in the manner herein described for the purpose of avoiding the old practice of forging and welding.

61,757.—BED BOTTOM.—S. E. Pettee, Bethlehem, Pa.

I claim the helical spring, A, having at the top projections or lugs, l, arranged to embrace, but not to project above, the slat, B, and forming eyes for receiving pins, m, to be driven into the edges of the slat, all as set forth for the purpose specified.

61,758.—GLOBE VALVE.—James Powell, Cincinnati, Ohio.

I claim in the described combination with a valve stem adapted to maintain an axial position, independently of its screw, and provided with a self-adjusting valve, I claim the locking piece, K, or its equivalent, adapted to operate as set forth.

Second, I claim in the described combination the following elements, to wit, a valve stem having guides for preserving its axial position when released from the screw cap, a self-adjusting valve, and the tongued and adjustable piece, K, adapted to enter the cavity, J, in the valve, and to be secured either in or out of lock, substantially as and for the purpose set forth.

Third, The loose guide collar, F' and K', which permanently occupies a cavity in the valve, and is secured in or out of lock by a set screw, b', in the manner described.

61,759.—SHAFT COUPLING FOR CARRIAGES.—Asa R. Reynolds, N. Y.

I claim a shaft coupling composed of a loop bar or bolt wrought in one and the same piece, with the loop and strap and an under and upper piece fitting over or against it, and a tightening bolt controlling said under and upper piece to adjust their frictional contact with the loop or draw bar or bolt, substantially as and for the purpose described.

61,760.—CORN CULTIVATOR.—W. A. Rhinehart and H. Felker, Miami City, Ohio, assignors to themselves and O. P. Russell.

We claim the plows, C C', when constructed substantially as described, and their arrangement with reference to the plow, D, and frame, in the manner and for the purpose specified.

61,761.—THILL COUPLING.—S. G. Rice, Albany, N. Y.

First, I claim a ball and socket thill coupling, which is so constructed that the thill iron will serve, when in an elevated position, as a means for preventing a casual disconnection of this iron, substantially as explained.

Second, The combination of the parts, A B, with the sections, C C', slot, c, and a bayonet fastening, b, substantially as described.

61,762.——PLOW.—M. Richards and J. Vandegrift, Princeton, Ill.

First, We claim the combination of the beam, C, support, B, land side, A, and mold board, A', as set forth.

Second, The arm, D, in combination with the beam, c, plugs, h, clamp, F, and mold board, A, as described and set forth.

61,763.—GATE LATCH.—Clark Robert, Winchester, Ill.

First, I claim the pendulum, A, and guard, c, constructed and arranged substantially as described and for the purpose set forth.

Second, The pendulum, A, and guard, c, in combination with the attachment, D, substantially as described.

Third, The pendulum, A, and guard, c, in combination with the lever, F, substantially as and for the purpose set forth.

Fourth, The pendulum, A, in combination with the guard, c, lever, F, attachment, D, pin, S, and thumb piece, n, arranged substantially as described and for the purpose set forth.

61,764.—SHUTTER FASTENER.—Joseph L. Routzahn, Frederick, Md.

I claim the construction of the hinge with its square notches at the top, and its semicircular bar with corresponding notches, when combined and operated as herein described and for the purposes set forth.

61,765.—GRAIN DRILL.—J. R. Rude, Liberty, Ind.

First, I claim the combination of the movable plates, L L, the levers, F, the rods, X X, the toothed bar, J, the levers, F and H, and the spring, I, the whole constructed, arranged, and operating in the manner herein specified.

Second, The lever, O, the straps, P P P P P, the rollers, 22, in combination with the drills, G G G G G, when constructed in the manner and for the purpose herein specified.

Third, I claim the seed box, A, when constructed so as to extend over the wheels, D D, in combination with the tubes, N N, the levers, F H and O, and the drill rods, K K, for the purpose of feeding over wheels, when constructed as in the manner and for the purpose herein specified.

61,766.—HINGE.—Joseph Schafer (assignor to himself and George Heydt), New York City. Antedated January 27, 1867.

I claim a hinge composed of two parts, A B, which are united by pins, a b, and slots, c d, and otherwise constructed and operating substantially as and for the purpose described.

61,767.—LOOM.—James Schofield (assignor to himself and Osgood Plummer), Worcester, Mass.

First, I claim the combination and arrangement of the hinged arms, H H', hinged eveners, G G', connecting rods, l, arm, f, and connecting rods, e and g, substantially as set forth.

Second, I also claim the combination of pins, 1 and 2, with the slotted ends of arms, H H', to retain the ends of said arms in proper position, and at the same time allow them to have a slight longitudinal motion to prevent binding of the parts, when the loom is in operation.

61,768.—ILLUMINATING COMPOUND.—James Scott, Washington, D. C.

I claim an illuminating compound, composed of the ingredients heretofore mentioned in about the proportions stated, and compounded substantially as set forth.

61,769.—DEVICE FOR SUPPORTING CARRIAGE THILLS.—Alonzo Sedgwick, Poughkeepsie, N. Y.

I claim a device for the purpose specified, consisting of a frame, A, and catch, D, arranged and operating substantially as described.

61,770.—COMPOUND VACUUM RECTIFIER FOR ALCOHOLIC AND OTHER LIQUIDS.—Thomas Simmons, New York City.

I claim the use of the cylinder, D, when used in combination with one or more cylinders for receiving the rectified liquor, for the purpose of creating a partial vacuum in the receiving cylinder without the introduction of steam, substantially as specified.

61,771.—CAR COUPLING.—Henry Soggs, Columbus, Pa.

I claim the flat spring in the upper side of the mouth of the coupling head, and the outside of the head, when arranged, constructed, and operated as herein described and for the purposes set forth.

61,772.—CHURN.—M. V. B. Steinmetz, Annville, Pa.

First, I claim a case, B, having four sides, in combination with a dasher composed of the spindle, G, having arms and blades, and constructed and operating substantially as described.

Second, The dasher composed of the spindle, G, with its arms, h k, perforated blades, m m', and solid blades, n n', when the said blades are inclined in respect to each other, as and for the purpose specified.

Third, The cases, A B, and shaft, G, with its arms and blades in combination with the standards, C C', cross piece, D, keys, c c', or their equivalents, and driving shaft, E, the whole being constructed substantially as described.

61,773.—MACHINE FOR PULLING OUT HAT TIPS.—Joshua Stevens, Chicopee Falls, Mass. Antedated January 21, 1867.

I claim the stretchers, c c, standards, E E, and slides, D, in combination with each other, and with a supporting table, A, or its equivalent, substantially as and for the purpose herein specified.

61,774.—BROOM HEAD.—William D. Stroud, Oshkosh, Wis.

I claim the combination of the metallic broom head, with the bars, r and l, connected by means of the screw bolts, and the projections, k k, forming female screws, substantially as described and for the purpose herein set forth.

61,775.—BED BOTTOM.—D. M. Thomas, Dowagiac, Mich.

I claim a spring seat or bed bottom, which is composed of inclined springs, that are supported and held in place by means of transverse bars, B, substantially as I have herein described.

61,776.—FIFTH WHEEL OR WHIFFLE TREE ATTACMENT FOR CARRIAGES.—Frederick Van Patten, Auburn, N. Y.

I claim a fifth wheel, or whiffle tree connection, for carriages, composed of the plates, C D D', with the hub and collars, constructed and operating substantially as and for the purpose described.

61,777.—CHAIN.—William Wallace, Ansonia, Conn.

I claim a chain formed by uniting hollow balls and double headed bars, substantially in the manner hereinbefore described.

61,778.—ARTIFICIAL FUEL.—James and R. C. Walrath, Chittenango, N. Y.

We claim the compound prepared substantially as herein described, for fuel. Also, cakes, lumps or bricks, pressed and dried, made from the within described compound.

61,779.—WINDOW BLIND FASTENING.—Auffustus J. Warner, Brooklyn, N. Y., assignor to himself and James E. Conor.

I claim a shutter or blind holder, or fastener, having the slot, b, and face, l, constructed and operated substantially as herein described.

61,780.—ARTIFICIAL LEG.—Alex. T. Watson, New York City.

I claim the connection of the foot with the leg, by means of the joint, substantially as described, in combination with the springs extended both ways for action at the heel and at the toes, substantially and for the purposes described.

I also claim the toe piece hinged to the front part of the foot, substantially as described, in combination with the spring, which controls the movements substantially as described.

I also claim the leg made in two parts, and adjustable in length substantially as described, or any equivalent thereof, for adjusting the length of the leg.

I also claim the adjustible longitudinal straps, and the adjustible hoops, in combination substantially as described, as a means of fastening the artificial leg to the thigh, or to the stump of the leg, as described.

I also claim the knee joint, substantially as described, in combination with the leg and foot, or their equivalents.

61,781.—WHIFFLETREE.—Oliver N. Weaver, Dover, Ky., assignor to himself and G. W. Winter, Augusta, Ky.

I claim the spring whiffle tree, A, adapted for fastening in rear of the shafts cross bar, its ends being provided with the yokes, D D', and terminating in hooks or other devices, for the attachment of the tugs as set forth.

61,782.—UNHITCHING HORSE FROM VEHICLE.—Oliver N. Weaver, Dover, Ky., assignor to himself and G. W. Winter, Augusta, Ky.

First, I claim in the described combination a provision of the snaps, A, on the hip strap, and of the eyes, rings, or loops, B b, upon the breeching and tugs, for ready hitching and unhitching as set forth.

Second, The provision of the snaps, A, at the lower ends of the hip straps, for the purpose set forth.

Third, In combination with the elements of the first clause of claim, I claim the hook, C, projecting from the inside of the shaft to temporarily support the breeching when the horse is unhitched.

61,783.—CORN PLANTER.—Finley F. Westerfield (assignor to himself and C. Westerfield), Fort Dodge, Iowa.

I claim the combination of a corn planter constructed as herein above set forth, and operated by means of the bent lever, E, with a double shovel plow, or sod plow, substantially as described.

61,784.—SNOW SHOVEL.—James E. Wheat, Rochester, N. Y., assignor to himself and Otis Cole.

I claim the combination of the auxiliary handle, b, with the blade, B, and handle, b, substantially as herein shown and described.

61,785.—FARM GATE.—Thomas B. Wickham, Granville, Ohio.

First, I claim supporting the gate upon bar, E, and roller, G, together with the movable roller, H.

Second, cutting away or dividing slat, K, and leaving space at the top and bottom rails for passing through the grooves, m m'.

Third, making a mortise in sill, O, through which passes bar, E, also forming grooves, m m', for supporting the gate in position, all as substantially described, and for the purposes set forth.

61,786.—CAR WHEEL.—Charles Wilson and J. H. McNall, Clinton, Pa.

We claim the construction of the wheel, with its circular recess, C, collar, D, operating in the recess, and circular plate, H, arranged and combined as herein described, and for the purposes set forth.

61,787.—ROOFING.—James R. Woodworth, Nunda, N. Y.

I claim the combination of the ingredients substantially as and for the purpose set forth.

61,788.—GAS STOVE.—C. M. Young and E. M. Benster, Detroit, Mich.

First, We claim the combination and arrangement of the fixed ring, A', with the fire cup, B, for the purposes described.

Second, The combination and arrangement of a movable combustion disc, C, with the wrought iron or copper generating chamber, D, substantially as and for the purposes set forth.

Third, The movable combustion disc, C, as described.

Fourth, the fire cup, B, as described.

61,789.—PISTON ROD PACKING.—John Young, Brooklyn, N. Y.

I claim a metallic packing formed by inclosing an ordinary hemp or other packing, or its equivalent, in a netting of brass wire, by either winding weaving, or braiding the inclosing wire around it, substantially as and to the effect described.

61,790.—COOKING STOVE.—Federal C. Adams and Joseph Peckover, Cincinnati, Ohio.

First, We claim the concavo-convex oven top, A, substantially as and for the purpose described.

Second, The concavo-convex oven top, A, in combination with the spiral strengthening rib, or its equivalent, substantially as described.

Third, The short fire back, B, with its air holes, z, and air tubes, w, substantially as described.

Fourth, The sides, C C, with their flanges and air holes, v s, in combination with the air passages on the sides of the stove, substantially as described.

Fifth, The combined duster and blower, D, in combination with the grate and the projections, n o, or their equivalents, at the top and bottom of the front opening, substantially as described.

Sixth, The quadrant shaped doors, E E, arranged, attached, and operating substantially as described.

Seventh, Holding the fire back in place by the overlapping sides of the end lining plates, so as to dispense with the use of catches, and permit the fire back to expand and contract freely, substantially as described.

61,791.—MACHINE FOR JOINTING STOVE PIPES.—J. N. Adams, Bloomfield, Iowa.

I claim the combination with the projecting arm, C, of the adjustable holder, D E, substantially as and for the purpose described.

61,792.—WATER WHEEL.—George Arrison, Trenton, N. J.

I claim the gates, D, made adjustable by set screws, a, and slots, b, in combination with the buckets, C, of a water wheel constructed and operating substantially as and for the purpose described.

61,793.—CARRIAGE WHEEL.—Charles C. Ayer, Chelsea, Mass., assignor to himself and Henry A. Breed, Lynn, Mass.

I claim the combination as well as the arrangement of the two springs, g h, their separate chambers, f i, the head, a, and the beam, e, with the wheel felloe, A, and the spoke, C, applied to the hub, B.

And in combination therewith, I claim the spring, l, and its chamber, k, arranged with respect to the spoke as set forth.

I also claim the combination and arrangement of the follower, c, or the same, and the check nut, d, with the series of annular springs, and the spoke made and applied to the felloe, substantially as set forth.

61,794.—GLOBE VALVE.—Thomas and John Barber, Brooklyn, N. Y.

First, We claim the combination of the cap, F, the socket, G, and the valve stem, D, constructed and arranged substantially as described.

Second, We claim the guide piece, E, with the chamber, h, and with the feather seat at j, substantially as set forth.

Third, We claim the spiral spring, o, in combination with the guide piece, E, and the socket, G, substantially as described.

Fourth, We claim the lubricating hole, p, with the tapering socket, G, substantially as herein shown and described.

61,795.—HEATING STOVE.—George W. Beard, Baltimore, Md.

First, I claim, in combination with a stove, an air-heating chamber, constructed and arranged substantially as described.

Second, In combination with the foregoing a grate, with the rake, S R, constructed and operating substantially as described.

61,796.—GANG PLOW.—James C. Bethea, Blakeley, Georgia.

First, I claim the standard, A, with flanges at the front and rear edges, adapted for the attachment of a right or a left share, substantially as described.

Second, In combination with the standard, A, I claim the reversible landside, constructed and applied substantially as described and represented.

61,797.—HEMP BREAK.—Carl August Biermann, Waterloo, Ill.

First, I claim the combination and arrangement of the stationary post, A, and the sliding head, C, substantially as described and set forth.

Second, I claim the stationary beaks, a, and the operating beaks, c, when constructed and operated as described and set forth.

Third, I claim the combination of the sliding head, C, and its beak, c, with the stationary beaks, a, as and for the purpose set forth.

61,798.—HINGE.—Eli S. Bitner and J. B. Hopkins, Lock Haven, Pa.

We claim the combination of the edge block, B, and spiral incline planes G G, with the projections, D, and groove, H, all constructed as and for the purpose described.

61,799.—CALIPER.—H. A. Boardman, New Haven, Conn.

I claim the barrel or collar, C, when made in one entire or continuous piece, and independent of the caliper arms, and secured thereto, substantially as and for the purpose described.

61,800.—GATE FASTENING.—Jas. D. Bourne, De Witt, Iowa.

First, I claim the combination with a gate having elongated rails, c c, of the front post and the swinging arm, D, substantially as shown and described.

Second, The combination of the spring, E, with the swinging arm, D, and post, C, substantially as shown and described.

61,801.—WINDOW-SASH SUPPORTER.—Benjamin Britten, Galena, Ill.

I claim the arrangement of the compound levers, a b, combined with the flat thumb piece, c, and the spring, e, when applied to a sash supporter in the manner herein described.

61,802.—MEDICAL COMPOUND.—Anson R. Brown, M. D., Litchfield, Mich.

I claim the medical compound substantially as described.

61,803.—CARPET STRETCHER AND TACK DRIVER.—William Brown, Springfield, Mass.

I claim, First, The combining and arranging together the tubes, B and D, to form a compound carpet stretcher and tack conductor, as described.

Second, The combination of the tube, B, formed as a carpet stretcher with the tube, D, as a tack conductor, and the plunger, E, and the jaws, G, constructed and operating in the manner and for the purposes described.

Third, The construction of the plunger with different dimensions in its different parts in combination with the corresponding parts of the interior of tube, B, as described, by which the action of the plunger is controlled and the tack held back in the tack conductor and then conducted point downward into the jaws when required.

Fourth, The manner of constructing and operating the jaws, G, in sections for receiving the tack, in combination with a plunger for driving, operating together in the manner and for the purposes described.

Fifth, I claim the combination of the plunger, spring, and the cord with the tubes, B and D, and the jaws, arranged and operating as described.

Sixth, The forming of a bevel bottom to the tack conductor, D, by which the tack is by it gravity turned with its point toward the opening from the tube, D, to that in tube, B, for the purpose and in the manner described.

Seventh, Making the ends of the tubes, D and B, removable and adjustable by box or sliding covers, for the purpose and in the manner described.

61,804.—EDGE PLANE FOR BOOTS AND SHOES.—A. B. Clark, Auburn, Mass.

I claim, First, The combination with the sides, E E', of the plane, F, and the screw bolt, J, and thumb nut, I, substantially as set forth.

Second, The combination with the sides, E and E', of the adjustable mouth piece, G, and side guide, k, with the adjustable screws, d and j, and nuts, f and h, substantially as set forth.

61,805.—CULTIVATOR.—W. F. Clark, Hagaman's Mills, N. Y.

I claim the plank, A, grooved at its under side to receive the bars, B B', which have the teeth standards, C C', attached as shown, in combination with the levers, F F, having the wheels, I I, attached to the plank, A, pivoted between their front ends and the driver's seat, H, secured to a cross bar, G, attached to the rear ends of the levers, all arranged substantially as and for the purpose herein set forth.

I further claim the perforated segments, J K, attached respectively to the levers, F F, and plank, A, substantially as and for the purpose specified.

61,806.—PRUNING SHEARS.—Geo. H. Clinton and D. H. Harris, New Haven, Conn.

We claim the construction of pruning shears with a circular revolving knife, b, attached to the jaw or handle as described, as the cutting edge of said shears, and the curved grasping jaw or handle, operating as described and for the purposes specified.

61,807.—NECK-YOKE TRUNDLE.—A. H. Cole (assignor to M. T. Cole), Sylvania, Ohio.

I claim an improved neck-yoke trundle formed by combining the two roll-

crs, C, with the notched frame, A B, the whole being constructed and arranged substantially as described and for the purpose set forth.

61,808.—Lumber Rack for Wagons.—Chas. C. Comstock, Grand Rapids, Mich.

I claim, First, The combination of the lever stakes, C, and rollers, D, with each other and with the frame, A, of the rack, substantially as herein shown and described.

Second, The combination of the connecting bars, F, ropes, G, chains, I, crank, N, shaft, H, and spring, N, with the lever stakes, C, and with the frame, A, of the rack, substantially as herein shown and described.

Third, The combination of the shaft, H, and chains, I, with the frame, A, of the rack, for the purpose of binding the load, substantially as shown and described.

61,809.—Plow.—Wm. Cooley, Bunker Hill, Wis.

I claim the securing of the handles, D D', in the position shown and described, by means of the bar, C, bent as shown, and attached to the land side, the two handles and to the beam, substantially as and for the purpose set forth.

61,810.—Permutation Lock.—Joseph Corbett, Salt Lake, Utah.

I claim, First, Constructing the shell, C, and the arbor, D, of plates or pieces of steel and other metal arranged alternately in position, welded together or otherwise secured and the steel hardened by tempering, substantially as and for the purpose set forth.

Second, Inclosing or partially inclosing the tumblers by means of a case or chamber, K, substantially as and for the purpose specified.

Third, The tumbler case or chamber, K, when used in combination with an arbor, D, arranged so as to be connected with the tumblers by pulling or drawing it outward from the lock case, as and for the purpose specified.

Fourth, The slide, I, provided with the projections, I I', and arranged with the bolt, B, and tumblers, I, substantially as and for the purpose specified.

61,811.—Water Closet.—Hugh H. Craigie, New York City.

I claim, First, The adjustable standard and drip cup in combination with the cock, f, and jet pipe, k, substantially as and for the purposes set forth.

Second, I claim the thimble, 2, in combination with the cock, f, jet pipe, k, and plug on the pipe, 3, for allowing said pipe, k, to be turned, but keeping the joint water tight, as set forth.

Third, I claim the horned cam, l, and segment, l, in combination with the cock, f, and pipe, k, for the purposes and as set forth.

61,812.—Lens for Photographic Purposes.—John Henry Dallmeyer, London, Eng.

I claim the construction of compound lenses suitable for photographic use with a negative lens of flint glass covex on one face, placed intermediate of crown or plate glass lenses, substantially as described.

Also, I claim the construction of compound lenses suitable for photographic use, with a negative lens of flint glass placed intermediate of two crown or plate glass lenses, when the anterior crown or plate glass lens has its anterior face concave, substantially as described.

61,813.—Making Carriage Wheels.—David Dalzell, South Egremont, Mass.

I claim, First, The arrangement of the semi-cylindrical eye, c, on the thill iron, H, and between the collars, E E', journal, G, tube, I, axle, F, and box, B, when constructed as herein set forth, as and for the purpose specified.

I further claim the key, J, passing through the thill iron, H, and fitting in the b, in the tube, I, substantially as and for the purpose set forth.

61,814.—Machine for Pouncing Hats.—Mahlon S. Drake, Newark, N. J.

I claim combining the various parts in one whole, in the manner and for the purpose specified, as a new article of manufacture or a new implement for use.

61,815.—Apparatus for Expanding and Fastening Boiler Tubes.—Richard Dudgeon, New York City.

I claim the combination in an expanding tool of the following herein described implements, viz: the roller, roller stock and free expanding instrument, these three operating in combination substantially as set forth.

I also claim the combination in an expanding tool of the following implements, viz: the roller, roller stock, expanding instrument, and cutter for trimming the tube, all operating in combination sub tantially as set forth.

I also claim the combination in an expandin: tool of the following implements, viz: the roller, roller stock, cutter, and a ratchet handle for turning it, all operating in combination substantially as set forth.

I also claim the combination in an expanding tool of the following implements, viz: the roller, roller stock, cutter, and screw feed therefor, all operating in combination substantially as set forth.

61,816.—Combined Grain Separator and Straw Carrier.—A. T. Dunbar and A. McNaught, Alba, Pa.

We claim the separator boards, G, perforated with holes, one side of each hole being beveled off as herein described, the reciprocating beaters, E, attached to the frame, F, upon the crank shaft, B, so that at each revolution of the said crank shaft, B, all the beaters may pass at the same time through the separator boards, when all are constructed and arranged as herein set forth.

61,817.—Clothes Dryer.—J. T. Elliott, Grand Rapids, Mich.

I claim the combination of the arms, C, pivoted and adjustable upon the projecting arms, F, of the head block, D, mounted on a tilting arm and operating substantially as described, for the purpose specified.

61,818.—Swage for Sharpening Saws.—J. E. Emerson, Trenton, N. J.

I claim a swage for sharpening saw teeth provided with the adjustable die B, having one or more recesses e, formed with a central ridge f, substantially as described for the purpose specified.

61,819.—Steam Engines.—John M. Enos, St. Joseph, Mich.

I claim, First, The arrangement of the generating cylinder or chamber with the steam cylinder of a steam engine when connected by one or two parts and operating substantially as and for the purposes set forth.

Second, The arrangement within the generator of one or more removable cylinders, E F, substantially as and for the purposes specified.

Third, The arrangement of the generator with respect to the furnace in such a manner that after the water is converted into steam in one part thereof said steam passes through an intensely heated chamber and becomes superheated in its passage in the steam cylinder substantially as specified.

Fourth, The arrangement of the cold air passage, A, with respect to the generator and steam cylinder substantially as and for the purposes described.

61,820.—Ventilating Pipes for Houses &c.—Dand Estes, Newton, Mass.

I claim a ventilator made of two seperate flues, one located within and surrounded by the other, when each flue is provided with independent openings into the enclosed space which is to be ventilated, and is otherwise constructed and arranged substantially as described,

61,821.—Carriage Axle.—Thomas Falvey, Racine, Wis.

I claim casting or forming an irregular thread upon the skein, A, for the purpose of firmly receiving and stationing the collar, D D, which are cast over said irregular thread, substantially as herein specified,

61,822.—Butter Worker.—Edward Farnum, Blackstone, Mass.

I claim the improved butter working machine above described consisting of the case, A, with its foraminous partition a and drawers b, for the plunger, C, and lever, D, or its equivalent, as and for the purpose set forth,

61,823.—Husking Machine.—Edward Farnum & George W. Scott, Blackstone, Mass.

We claim the improved stripping and husking machine as composed of fluted rollers, e e, the holdback bars, r r, the endless aprons, q q, the bridge, b1, and the horizontal bars, a' a', combined and operating in connection with the hopper or chute, d, substantially in manner as specified.

I also claim the peculiar construction and arrangement or combined action of the two stripping rollers, e' e', and bars, r r, essentially in manner and for the purpose as before described.

I also claim, in combination with this arrangement of the rollers, e e', and with the chute, d, the inclined bars or "hold" backs, r r, substantially as before explained.

I also claim the employment of the two endless aprons, q q, as a means of husking or completing the husking of the ears of corn, in manner and for the purpose as set forth.

I also claim in combination with the endless aprons, q q, the transverse bars, a' a', as and for the purpose before set forth and explained.

61,824.—Aerial Rail Road.—J. A. A. Fontaine, New York, N. Y.

First, I claim the combination of the baloon car, A, with the structure, C, driving shaft, F, sail M, when arranged and applied in connection with an elevated track, K, substantially as and for the purpose herein shown and described.

Second, I claim the posts, L, provided with arm, l, and, l', for the purpose of continuing the track, K, substantially as herein shown and described.

61,825.—Corsets.—Cathrine A. Griswold, Willimantic, Conn.

I claim the body supporter, consisting of the strips, A, extending around the shoulders and provided with the straps, C, and, D, and the cord, a, all arranged for joint action substantially as herein shown and described,

61,826.—Water Indicator for Boilers.—Alfred Guthrie, Wardell Guthrie & Thomas L. Humes, Chicago, Ill.

We claim the combination of the floating weight with its equivalent counter balance weight operating in the manner and for the purpose herein set forth and described.

61,827.—Fruit Jars.—William L. Haller, Carlisle, Penn.

I claim a glass jar having a conical neck having a rubber ring moveable on its exterior and depressed by the shoulder, a, of the lid, C, whose groove a2, in connection with the lip, a, forms a nearly tight joint to keep the fruit from contact with the rubber, the whole arranged substantially as described and represented.

61,828.—Cultivator Plow.—G. W. Hatfield, Holton, Ind.

First, I claim the loop, B, clips, C, and keys or wedges, D all arranged to secure the front ends of the beams, A, together, substantially as and for the purpose herein set forth.

Second, The beams, A A, handles, E E, brace, K, held together by the clips, F F, and key, G, when all are combined and arranged as herein set forth.

61,829.—Device for Converting Motion.—Jarad Hawthorn, Coshocton, Ohio.

I claim the reciprocating rack frame, A A', B B', guided in an oscillating yoke, F, and engaging alternately with opposite sides of a pinion, H, so as to impart continuous rotation thereto su stantially as described. I further claim the tappet, C C', to reverse the position of the rack-frame as described.

61,830.—Door Steps.—T. Hazard and J. M. Richardson, Wilmington, Ohio.

We claim the combination of the case, A, C, and shouldered elongated cushion, B, when constructed and adapted for use in the manner and for the purposes herein shown and described.

61,831.—Matting for Carpet Lining, etc.—Herman C. Heermance, Claverack, N. Y.

First, I claim a matting composed of straw, grasses, rushes, or other similar vegetable growths sewed together in the manner substantially as and for the purposes set forth.

Second, The combination with a matting constructed as herein described of sheets of paper or other thin fabric secured upon one or both sides thereof by means of the sewing that constitutes the warp thereof, substantially as herein set forth for the purposes specified.

61,832.—Gates.—Jerome Hibbard, Prospect Lake, Mich.

First, I claim pivoting the gate, I, by means of the swing bar, I, to the cross bar, C, connecting the two rear posts, A, and, B, substantially as described and for the purpose set forth.

Second, The swing bar, I, and downwardly projecting arms, J, and, K, constructed, arranged and operated in the manner described in combination with the rear and front gate posts, A, B, D, E, and with the front uprights, 12, 13, of the gate, L, substantially as described and for the purpose set forth.

61,833.—Damping Apparatus.—Philip Hill, (assignor to self and W. B. Curry), Philadelphia, Pa. Antedated Jan. 28, 1867.

First, I claim the cup, A, band, a, and roller, B, or its equivalent, the whole being constructed and operating substantially as and for the purpose described.

Second, The reservoir, D, in combination with the cup, A, and the roller and band, or their equivalents for the purposes set forth.

61,834.—Shutter Fastening.—William B. Horward, Baltimore, Md.

I claim the arrangement of the tumbler bracket, C, D, and the check bracket, F, G, E, constructed and operating substantially as described and represented.

61,835.—Hoisting Machines for Cellars.—James Ingram New York, City.

I claim the arrangement of the shaft, b, gears and handle for rotating the screws, c, c, in combination with the guide bars, b b, and platform, l, as set forth to form a hoisting machine for cellars or buildings as specified.

61,836.—Cultivators.—Thomas Jobe, Clarksville, Ohio.

I claim the arrangement of the plow beams, G, and levers H, applied to the frame of the device in combination with the adjustable bar, J, at the rear of the axle, B, all arranged to operate substantially in the manner as and for the purpose set forth.

61,837.—Toy Cross Bow.—James M. Keep, New York, City.

I claim the construction of a bow and stock or handle, with the arrow guide, substantially as and for the purposes herein described.

61,838.—Fence Posts.—Richard Ketcham, South Dansville, N. Y.

First, I claim the combination of the iron spikes or stakes, B, with the flangers, a3, of the posts, A, substantially as herein shown and described and for the purpose set forth.

Second, The iron brace, G, notched bar, F, in combination with the post, A, when all constructed and arranged as herein set forth as and for the purpose specified.

61,839.—Gate Latch.—J. E. Klein, Oskaloosa, Iowa.

I claim the plates, a, and, a', constructed as described and used substantially as and for the purposes herein set forth.

61,840.—Carpenter's Gage.—Geo. T. Lape, New York City.

I claim an improved joiner's gage formed of two sliding longitudinal sections, A A', combined with the rack, a', and pinion, a, the set screws, g g', the head block, B, and the double marking points, d d', arranged and operating as and for the purposes herein described.

61,841.—Washing Shield.—Chas. E. F. Lewis, Washington, D. C.

I claim the corrugated or ribbed shield or guard, when so constructed and arranged as to to protect the inside of the hand and forearm and to perform the functions of a wash board, in the manner and for the purpose set forth.

61,842.—Sewer.—Chas. T. Larnicer, Frankfort-on-the-Main, Germany.

I claim the method herein described of cleaning privies, sinks, etc., consisting of an air-tight reservoir, A, sunk in the street and connecting with several privies and sinks by pipes, B, provided with stop cocks, a, substantially as and for the purpose set forth.

61,843.—Hand Stamp.—Wm. B. Mason, Boston, Mass.

I claim the disk, N, with a notch, in combination with the pawl, P, to hold the inking pad clear of the type and plate when they are raised.

I claim so arranging and operating the plate, D, that it shall release the pawl, P, and let the inking pad swing against the type plate and ink it, substantially as described.

61,844.—Car Brake.—Samuel McCambridge, Philadelphia, Pa.

I claim the combination of the chain, E, connected at each end as described, with the sheaves, e, in the ends of the levers, D, and the fixed sheaves, d, arranged as described, the chain taking a half turn around each sheave throughout the whole train of cars, substantially as described and for the purpose specified.

61,845.—Machine for Thinning Cotton Plants.—Charles A. McCaughan, Moscow, Tenn.

I claim the double scraper, F, attached to the suspended frame, E, combined with the double transverse cutter, g, operated by the swinging frame, h, for the purpose of thinning cotton plants in a row at one operation, constructed and operating substantially as herein described.

61,846.—Whistle and Bird Call.—Samuel McClain, Philadelphia, Pa.

I claim the construction and arrangement of pieces, A A B and C, substantially in the manner and for the purposes set forth.

61,847.—Seeding Machine.—James G. McGrew, Caledonia, Minn.

First, I claim the application of the traction wheel, C, provided with spokes, O, to the triangular frame, A, and to the axle, C', of the cylinder, D, substantially as and for the purpose herein shown and described.

Second, I claim the application of the shovel plows, a a, to the triangular frame A, when in combination with the wheel, C, substantially as and for the purpose herein shown and described.

61,848.—Process of Treating Straw and other Materials for the Manufacture of Paper Pulp.—Harrison B. Meech, Fort Edward, N. Y.

First, I claim the composition and manner of constituting my boiling liquor in the manner and for the purpose hereinbefore substantially set forth and described.

Second, I claim the manner of applying a boiling liquor to the stock by first producing the vacuum, in the manner and for the purpose as is hereinbefore described.

Third, I claim the combination of my improved liquor with the manner of applying the same by the production first of a vacuum, substantially in the manner and for the purpose above described.

61,849.—Composition for Making Elastic Hand Stamps.—George H. Mellen, Alexandria, Va.

I claim the combining of the above ingredients to form when boiled a new and useful composition of matter for the purposes above described and the coating of the same when set and cold with a varnish of shellac to render the face of the composition impervious to dampness and the immediate effects of the weather and so that the composition produces a clear and sharp edge and surface from the mold or matrix without blow holes or other imperfections, substantially as described.

61,850.—Churn.—A. J. Mills, Scott, N. Y.

I claim the arrangement of the square or oblong box, A, with its ridge, x, formed by the interior bottom, C C, shafts, G H, with their interlapping arms, l, and exterior gear wheels, D E and F, when constructed, arranged, and operating as set forth.

61,851.—Cooling Animal Coal.—William Moller, New York City.

I claim the arrangement and combination of the diagonal plates, B and D, forming chambers for the purpose of facilitating the cooling of animal coal, substantially as set forth and described.

61,852.—Corn Harvester.—August Moravek, Rosnyo, Hungary.

I claim the movable portion, I, of the bottom of the wagon body, in combination with the endless elevating apron, G, stationary cutter, E, and rotary cutters, f, f, all arranged to operate substantially as shown and described.

61,853.—Mode of Attaching Spouts to Sheet Metal Vessels.—W. A. Munn, Milwaukee, Wis.

I claim attaching the spout to the body of a sheet-metal vessel with a double seam, substantially as herein shown and described.

61,854.—Scraper.—Ira Munson, Wayne, Mich.

I claim the frame, B, tongue, A, lever catch, D, arms, b', and shovel, C, all constructed, arranged, and operating as herein set forth for the purpose specified.

61,855.—Saw Set.—William Nash, New Britain, Conn.

I claim the circular-jointed paris, A and B, with their guides, dies, set screws, and spring, when constructed, arranged, and used for forming a saw set, in the manner as specified.

61,856.—Curved Springs for Hat Brims.—Enos S. Nichols, New Haven, Conn., assignor to J. H. Puntice, Brooklyn, N. Y.

I claim producing a curvature or tendency to curvature in springs adapted for sustaining the brims of hats by passing them through rolls adapted to draw the edges alternately on one side and the other, substantially as and for the purpose herein specified.

61,857.—Tape Drivers or Spinners.—Charles Page, West Meriden, Conn.

I claim the combination of the cord or tape with the pressers or rollers and the driving spindle arranged in the handle of the driver, for operation substantially as specified.

61,858.—Washing Machine.—Mary E. Parsons, Hillsdale, Mich., administratrix of the estate of Milo J. Parsons, deceased.

I claim the combination and arrangement of the crowned or curved springs, H, the bars or springs, E, and standards, J, with each other and with the box, or tube, A, and cylinder, C, substantially as herein shown and described.

61,859.—Adjustable Handles for Shovels and Forks.—James N. Pease, Panama, N. Y.

I claim the supplemental handle attachment, constructed substantially as shown and described for the purpose of being applied to the stale or handles of shovels, manure forks, and other similar implements, as set forth.

61,860.—Pneumatic Brake for Railroad Cars.—Charles R. Peddle, Terre Haute, Ind.

I claim the combination of the steam cylinders, steam pipes, and steam chests of a locomotive with air pipes, E H, extending the whole length of a train of cars, the valves, F, in the steam chests, and the air cylinders, K, provided with pistons, L, connected with the brake mechanism of the cars, to operate in the manner substantially as and for the purpose set forth.

I also claim the lever, N, connected to the rod, M, of piston, L, and to the bent or right-angular levers, P P, to which the rods, c c, of the levers, Q, are connected for the purpose of transmitting the power to the brakes, substantially as shown and described.

61,861.—Propeller.—Jordan H. Phillips, St. Louis, Mo. Antedated, Jan. 30, 1867.

I claim the combination and arrangement of the paddles, G, levers, E, eccentrics, E, rods or bars, H, levers, I, and rods, K, with each other and with the driving shaft, B, substantially as described and for the purpose set forth.

61,862.—Horse Rake.—Orris Pier, Winhall, Vt.

I claim, the bar, H, pivoted at its center to the frame, D, having the connecting bar, L, of the lever, J, pivoted on its upper side and the connecting rods, I, of the rake head, G, pivoted at its rear, substantially as described, for the purpose specified.

61,863.—Nurse Stove.—Luke A. Plumb, Biddeford, Me.

I claim, First, The combination of the lamp chimney, C, heating vessel, D, tube, F, and skeleton frame, c, arranged and operating in the manner and for the purpose herein specified.

Second, In combination with the above, I claim the reflector, E* constructed and applied in the manner herein represented and described.

61,864.—Spike Machinery.—D. and R. Pratt (assignor to J. Marcus Rice), Worcester, Mass.

I claim, First, The divided holding die, B, hinged together and made with handles and of tapering shape from top to bottom with a shoulder on the outer surface.

Second, In combination with the holding die, B, I claim a revolving socket made fast to one of the revolving wheels with a corresponding tapering surface on the inside and a shoulder to receive the pressure of the heading die while the head is being formed in the bar of metal.

Third, In machines for heading bars of metal in which rolls are used substantially as herein described, I claim placing the blank at such an angle in the die that when the end of the blank or bar comes in contact with the heading die the pressure will be in a line coincident with the axis of the blank or nearly so as set forth.

61,865.—Breech-loading Fire-arm.—James W. Preston, Newton, Mass., assignor to A. B. Ely.

I claim inserting the solid plug in the barrel of the gun instead of the breech when constructed, arranged and operating in the manner substantially as described.

Second, The combination and arrangement of the plug constructed and inserted substantially as described with the locking bolt, constructed, arranged and operating substantially as set forth.

61,866.—Mode of Treating Auriferous and Argentiferous Ores.—Julio H. Rae, M. D. Syracuse, N. Y.

I claim the within described process of treating auriferous or argentiferous rock by exposing the same to the combined action of a current of electricity and of suitable solvents or chemicals, substantially such as herein specified or any others which will produce the same effect.

Second, Separating gold or silver from the rocks containing the same by the action or aid of electricity, substantially as described.

Third, Using the agitator, B, as an electrode, substantially as and for the purpose set forth.

61,867.—Regulator for Time Pieces.—George P. Reed, Boston, Mass.

I claim the combination of an adjusting screw and spring with the index lever of a common watch regulator, substantially in the manner and so as to operate such lever as described.

61,868.—Fastening for Bale Hoops.—Jacob Reese, Pittsburg, Pa.

I claim the loop, c, constructed and attached substantially as described to one end of a metallic hoop and of a sufficient size to admit the opposite end of such hoop, so that when such opposite end is passed through and folded back in either of the forms described it will be held in place either by the outward pressure of the bale or by sleeves, n n', one or more.

Second, Compressing the folded end of a hoop at or near the point of folding by the joint action of the loop, c, and bale or of the loop, c, and sleeve, n, for the purpose of preventing the slipping of the hoop at the point of fastening, substantially as described.

Third, The sleeves, n n' of a metallic hoop in combination with the loop, c, for the purpose of fastening bale hoops, substantially in the manner described.

61,869.—Steam Generator.—J. Wyatt, Reid, New York City.

I claim the arrangement of the flues, C C' removable cap, E, shell, B, jacket, A, and furnace, D substantially as and for the purpose specified.

61,870.—Fertilizer.—Francis C. Renner, Ladiesburg, Md.

I claim the combination of the several ingredients as previously described, or in any manner substantially the same, and for the purposes set forth the effect of which is to furnish a cheap fertilizer, and at the same time one which may be economically used, and yet supply the soil with the largest amount of ammonia.

61,871.—Machine for Cutting Straw and Hay.—Daniel T. Robinson, Boston, Mass.

I claim the special adaptation to the purposes of a hay cutter, of the mechanism before described, consisting of the lever, a, swinging arm, d, knives, e and f, and spring, g, applied to and supported by the bracket, b, substantially as described.

61,872.—Lock-up Safety Valve.—Robert Robinson, New York City.

First, I claim the plates, K and L, separately removable when so arranged as to afford access to either chamber, F or G, without opening the other.

Second, The combination and arrangement of the valve chamber, F, weight chamber, G, partition, E, blow off, C, valve, D, and lever, H, substantially as and for the purposes set forth.

61,873.—Railroad Car Truck.—D. B. Rogers, Pittsburg, Pa.

I claim an improved car truck, to which is attached the spring, g, or its solid counterpart, when the same is pivoted or otherwise applied at R, and its central connections controlled and supported by means of metallic springs, inclosed in a casing with the lid, H, and catch, I, or their equivalent, to hold them in position as and for the purpose herein described.

Also, in combination with the devices mentioned above, I claim the side bars, K, when bolted to either side of the journal box vertically in the manner and for the purpose herein set forth.

61,874.—Door and Window Sash Fastener.—P. Rosenblatt, Greenville, Tenn.

I claim the fastener, A, consisting of a plate or bar, B, tapering in thickness at one end, and at the other provided with a series of teeth or prongs, a, substantially as described for the purposes specified.

I also claim the corrugations, C, of the fastener plate, B, substantially as and for the purpose specified.

61,875.—Clothes Line and Clamp.—Albert D. Rust, Vernon, Mich.

I claim a clothes line formed of links of wire, galvanized in combination with a wire clothes fastener, arranged and operating in the manner herein described.

61,876.—Manufacture of Soap.—Justin Ryan, Waukegan, Ill.

I claim a soap made of the ingredients herein specified, and mixed together substantially in the manner and about in the proportion set forth.

61,877.—Holder for Re-touching Photographic Negatives.—Napoleon Sarony, New York City.

I claim the combination of the adjustable main frame sections, A B, mirror, b, and independent frames or holders, C C, substantially as and for the purposes specified.

Also, The combination with the same of the hinged support, h, essentially as shown and described.

61,878.—Felt Roofing.—John Scanlan, Chicago, Ill.

I claim, as a new article of manufacture, the roofing composed of the materials and arranged as herein specified.

61,879.—Grain Drill.—Peter and Peter J. Schmidt, Waterloo, Ill.

We claim, First, The metal or wooden blocks or valves, x, which are se-

cured to the feed bar, D, and the pins, o, which are attached to the blocks, n, substantially as and the purpose herein shown and described.

Second, The slotted crank, p, of the feed bar, D, operating substantially as and for the purpose herein shown and described.

Third, The slotted lever, K, which is pivoted to the seed box, A, and whereby the flow of the seed may be automatically regulated, substantially as herein described and shown.

Fourth, The thumb screw, i, in combination with the slot, m, in the wheel, f, for the purpose of securing the bar, B, in any desired position, substantially as herein shown and described.

Fifth, The hand, i', and index, i'', in combination with the rod, i, wheel, f, and handle, h, all made and operating substantially as herein shown and described.

61,880.—APPARATUS FOR COLLECTING FLOATING OIL.—John J. Serrell, Hudson City, N. J.

I claim, First, The combination of a floating vessel containing a tank for the reception of oil, with an arm or arms placed diagonally to the motion of or through the water, substantially as and for the purposes set forth.

Second, Combining with an oil collecting apparatus a movable boom or arm, fitted substantially as specified, so as to be drawn or extended, substantially as and for the purposes set forth.

Third, In combination with an apparatus for collecting surface oil, substantially as herein described, I claim a pump for producing a violent agitation of the oil and water, for the purpose of removing the oil from foreign substances, as set forth.

Fourth, In combination with an oil-collecting apparatus, substantially as set forth, I claim a vat and pipe, in which the pipe opens below the surface of the oil, so that impurities will be separated, as set forth.

61,881.—STEAM GENERATOR.—James Seward, Clitherol, and Henry Smith, Enfield, England.

We claim a sediment or scum collector for steam boilers, provided with a series of compartments divided from each other by partitions of gradually increasing hight, and communicating with a discharge pipe or pipes substantially in the manner herein set forth.

61,882.—ROTARY PUMP.—Z. B. Shannon, Port Washington, Ohio.

I claim the combination and arrangement of the elevator, A, penstock, D, and cheek paddles, H, constructed and operating substantially as described, and for the purposes set forth.

61,883.—GUARD FOR CARRIAGE.—J. M. Singer, Paris, France.

First, I claim a carriage guard or hood covering, or extending over the sides and top of the tire, or rim of the wheel, substantially as shown and described.

Second, The combination with a wheel and axle, or the equivalents thereof, whose positions relatively to the body of the wagon or other vehicle are variable, of a carriage guard so arranged as to constantly maintain the same proximity or relative position to the wheel, substantially as set forth.

Third, The combination with a carriage guard or hood covering the top and sides of the wheel, of the arms or supports by which the said guard is held, substantially as shown and set forth.

Fourth, The method of uniting the guard with the arms or supports, by which it is held, by means of an elastic and detachable connection, substantially as shown and for the purposes set forth.

61,884.—MACHINE FOR CUTTING CRACKLINGS.—Ames Smith, Cincinnati, Ohio.

I claim a cutter for reducing compressed animal matter, constructed substantially as described.

61,885.—PLOW ATTACHMENT.—H. B. Smith, Eureka, Ill.

First, I claim the tongue, O, attached to a curved bar, M, on the plow beam, A, by means of a clip, N, in such a manner that a universal joint connection will be obtained substantially as and for the purpose set forth.

Second, The attaching of the plow beam, A, to the frame, D, through the medium of the clip, H, attached to the frame, and having the plow beam fitted in it substantially as described.

Third, The adjustable wheel, E, fitted on the crank arms, a, and adjusted by the lever, F, substantially as and for the purpose set forth.

Fourth, The bar, K, or an equivalent chain attached to the clip, H, and extending along underneath the plow beam, and connected at its front end to the clevis at the front end of the plow beam, substantially as and for the purpose herein set forth.

61,886.—MOISTENING, COOLING, AND WARMING AIR.—Daniel E. Somes, Washington, D. C.

First, I claim securing and regulating a high or low temperature of air, substantially as and for the purpose described.

Second, moistening and purifying the air substantially as set forth.

Third, The combination of the devices herein described for moistening, with the devices for cooling and warming air.

Fourth, The series of skylights constructed with air spaces between them, substantially as and for the purpose set forth.

Fifth, The false roof above the skylights, substantially as described, in combination with the series of skylights as and for the purpose set forth.

61,887.—GAS APPARATUS.—James F. Spence, Williamsburgh, N. Y., assignor to himself and Alfred Philips, New York City.

I claim the S-shaped pipes, G, in combination with the revolving hollow drum, C, vessel, A, steam-pipe, D, and liquid supply pipe, E, all constructed and operating substantially as and for the purpose described.

61,888.—FORGING MACHINE.—Joseph Stone, Chicago, Ill.

First, I claim in combination with the alternating hammers, C D, the sliding anvil, E, when arranged and operating substantially as and for the purpose set forth.

Second, In combination with the vertical hammer, C, and the anvil, E, constructed substantially as described, I claim the arrangement of the hooks, S S, or their equivalents, substantially as set forth, operating as and for the purposes specified and shown.

Third, I claim, in combination with the anvil, E, constructed as described, and the horizontal hammer, D, the employment of the spring, s s, or their equivalent, arranged and operating as and for the purposes set forth.

61,889.—ANIMAL TRAP.—Alfred Storm, Brooklyn, N. Y.

I claim the spiral cam, J, levers, I K, stop bolt, H, spring, L, catch rod, M and bait hook, O, operating in combination with the revolving lever, F, substantially as and for the purpose specified.

61,890.—HUB.—James B. Stuart, Bunker Hill, Ill.

I claim the securing of boxes, D, in metallic hubs, by means of the screws, c and d, substantially as and for the purpose herein set forth.

61,891.—HARNESS TREE.—Charles M. Sturgess, Washington, Iowa.

I claim the combination of the two-part nut, E E, pad tree, A, and yoke, C, substantially as and for the purpose set forth.

61,892.—CHURN.—J. B. Sweetland, Pontiac, Mich.

I claim the cover, D, provided with the ventilating door, G, dropped below the opening cut through said cover, whereby a free circulation of air is had to and from the churn box, around the sides of the door, used in combination with the churn box dasher shaft screw, H, or shaft pinion, I, and spring, L, the whole being arranged in the manner substantially as specified.

61,893.—SAWING MACHINE.—J. B. Sweetland, Pontiac, Mich.

I claim the wheel, H, and worm sleeve, F, when used in combination with the clutch, d, and coupling, E, for revolving the shaft, D, and saw, I, all constructed and operating substantially as described.

61,894.—MACHINE FOR POLISHING METAL TUBES.—John A. Thomas, Buffalo, N. Y., assignor to himself and Henry J. Miller, Dunkirk, N. Y.

I claim the combination of the series of stationary cutter mandrels, m m, on the sliding carriage, O, with the pinions, H H, and their sockets, J J, adjustable bearing frame, K, and driving wheels, D E, arranged and operating substantially in the manner and for the purpose set forth.

61,895.—CREAM FREEZER.—E. S. Torrey, New York City.

I claim the fixed plate, or casting, b, sustaining the fly wheel, with the plate, d, jointed thereto so as to permit the shaft, h, and its gearing, to be removed from and connected with the fly wheel shaft, substantially as and for the purposes set forth.

61,896.—BOLT HEADING MACHINE.—Philip P. Trayser (assignor to Richard W. Tyson), Baltimore, Md.

I claim the heading tool, F, working within the die, D D', and so secured within the tool carrier as to be capable of adjusting itself within the die, substantially as and for the purpose herein set forth.

61,897.—FOOT REST FOR HORSES.—John E. Tucker, Montfort, Wis., assignor to himself, Thomas Tucker, J. H. Lincoln, and A. P. Hammon.

I claim the device herein described for blacksmiths' use in shoeing horses, said device consisting of the foot rest, A, supported on the block, B, so as to revolve, the legs, C, having feet, b, all constructed and arranged substantially as shown and described.

61,898.—METHOD OF REFINING AND BLEACHING SUGAR, SIRUP, ETC.—William Van Wyck, Belleville, N. J.

First, I claim in this new method of mine the keeping at a high heat (say about 212° Farenheit), the filter, the filtering material in the filter, also the sugar, sirup, and molasses, during the entire operation of filtration.

Second, I claim the application of the steam jacket, or its equivalent, in the refining of sugars, sirup, and molasses, for the purpose of keeping to a high heat (say about 212° Farenheit), the filtering vessel, the filtering material, and the sirup, sugar, and molasses, to be filtered.

61,899.—ROOFING.—J. C. Wands, Nashville, Tenn.

I claim the mode of fastening the edges of the fabric, by lapping between the angular strips, B, and the bent metallic plate, D, substantially as described and represented.

61,900.—HUB FOR CARRIAGE WHEEL.—Almon Warner, Hamden, Conn.

I claim the combination of the ring, B, formed with its mortices, a, and flanges, C C, with a wooden hub, A, substantially in the manner herein set forth.

61,901.—BED BOTTOM.—William Weaver, Phoenixville, Pa.

I claim the combination of the spiral springs, E, curved wires, F, provided with buttons, f, and loops, g, washers, P, links, L, supporting wires, H I, and looped wires, K, substantially as and for the purposes described.

61,902.—CALIPER.—A. V. D. Westervelt, New Brunswick, N. J. assignor to himself J. W. Westervelt and H. Smith, Jr.

I claim, First, The pivot, c, fitted on one end to the leg, a', forming the bearing for the two legs of the calipers, provided at the other end with the spur wheel, b, operating with the worm, c, mounted on leg, a, substantially as and for the purpose specified.

Second, The leg, a, provided with standards, d, bearing the worm, l, and the leg, a, to which the pivot, c, is secured, in combination with the pivot, c, to which the wheel, b, is secured, constructed and operating in the manner and for the purpose specified.

61,903.—GRAIN DRILL.—S. H. Wheeler and W. Tuttle, Jr. Dowagiac, Mich.

We claim, First, The arrangement of a divided axle with the seed box discharge spouts, E E, and shoes, I I, the several parts being constructed in the manner and used for the purpose specified.

Second, The arrangement of the frames, F F, provided with the shoes, I I, in such a manner that the said shoes shall run substantially in the relative position to each other herein described for the purpose set forth.

Third, The arrangement of the chains, m m, with the shoes, I I, as and for the purpose herein specified.

61,904.—COMBINED SEED SOWER AND CULTIVATOR.—T. L. Whitbeck, Kenosha, Wis.

First, I claim the bars, N N, in combination with the bifurcated bars or braces, H H, so they can be adjusted to form a center draft and to vary the bearing or pressure upon the caster wheels.

Second, I also claim the circular brace, P, and pin, I, in combination with the seed box and frame, A, substantially as shown and described.

Third, A combined cultivator and seeder is combined and arranged that the seed box, M, together with the traction wheels, B B, may be elevated upon the pole and carried without impeding the operation of the cultivator for the purpose and substantially as herein described.

Fourth, A seeder where the slide in the seed box is worked and operated by the pole, W, through the medium of the lever, o, or its equivalent for the purposes and substantially as herein set forth.

Fifth, The pole, W, lever, o, slide, E, and cylinder, M, in combination with the spur wheel, F, pinion, G, shaft, d, and traction wheels, B B, all for the purposes and substantially as described.

61,905.—COFFEE ROASTER.—N. L. Whitney, Effingham, Ill.

I claim, First, The cup, G, in combination with the cylinder, C, substantially as described and for the purposes specified,

Second, The combination and arrangement of the polygonal cylinder, C, shaft, D, supporting tray, A B, plate, F, and cup, G, in the manner and for the purpose specified.

61,906.—CULTIVATOR.—Chas. Willard, Newtown, Pa.

I claim, First, The combination of the adjustable arched couplings, N and O, with the frames, A and B, and rigid plungers and rigid tongue, all constructed, arranged and operating substantially as and for the purpose set forth.

Second, The combination of the plate, R, carrying cultivator teeth or plows with the frames and with the rod, U, when arranged to operate substantially in the manner and for the purpose set forth.

61,907.—APPARATUS FOR STIRRING AND COOLING LARD.—Giles B. Williams (assignor to Elisha M. Allen), New York City.

I claim the continuous flanges, C, secured to the shaft, B, by arms, a, leaving an opening, b, between the flanges and shaft, in combination with a receptacle, A, whose bottom is curved concentrically with said shaft, substantially as described, for the purpose specified.

61,908.—DITCHING AND GRADING MACHINE.—Wm. S. Worley, Tuscola, Ill.

I claim First, The bars, A A, constructed as herein described, whereby they may be adapted to a ditching and grading frame, substantially as specified.

Second, The plate, E, used in combination with the bar, A A, fig. 2, for the purpose of making an excavating and grading frame, as and for the purpose specified.

61,909.—GRAIN DRYER.—Michael H. Wright, Chicago, Ill. Antedated, Jan. 25, 1867.

I claim passing the fire flue of a furnace through a series of revolving cylinders in a grain-drying apparatus, arranged and operating substantially as herein specified and shown.

61,910.—SCRUBBING BRUSH.—Robert Wyatt, Brooklyn, N. Y.

First, I claim the attachment of the brush, A, to the handle or staff, C, by means of the plate, d, screw, e, and spring, g, substantially as herein set forth, whereby the brush may be adjusted at any desired angle to the said staff or handle.

Second, The collapsible bag or purse, m, arranged in relation with the opening, k, of the reservoir, B, substantially as herein set forth for the purpose specified.

Third, The combination of the reservoir, B, brush, A, springs, h, and straps c', substantially as herein set forth for the purpose specified.

61,911.—SAD-IRON HEATER.—F. G. Wynkoop, Cornring, N. Y.

I claim the body, A, cast in one piece, inclined pins, I, directing the heat against the part, J, thereby relieving proportionally the part, K, of the flat iron, and the lid, H, when arranged and constructed as herein shown and described.

61,912.—SAW MILL.—William Yaman, Connersville, Ind.

First, I claim the carriages, H and I, in connection with shaft, L, pawl, K, ratchet, J, and curved shaft, M, substantially as and for the purposes described.

Second, I also claim the lever, O, and upright standard, Q, and pendent, P, in combination with the spring, N, substantially as described.

Third, A self-setting carriage, operated by means of the curved shaft, M substantially as herein shown and described.

61,913.—MODE OF PREVENTING FRAUD ON THE REVENUE DERIVED FROM SPIRITS AND MALT LIQUORS.—Edmund Johnson and August Steuernagel, Washington, D. C. (assignors to themselves, John W. Parsons, David R. Smith, D. W. Bliss, and Marcus P. Norton.

We claim, First, The saccharometer, A, containing scale, B, when applied to and used in combination with the scale or table, "sheet two" of the drawings, to prevent frauds in the distillation or manufacture of whisky or other similar liquors, in the manner substantially as herein described and set forth.

Second, We claim the employment of said scale or table, sheet two, of said drawing, constructed and operated in the manner and for the purposes substantially as herein described and set forth.

Third, We claim the process or means herein described and set forth, for detecting and preventing frauds in the distillation of whisky or other similar liquors, by distillers, substantially as herein described and set forth.

REISSUES.

2,472.—REAPING AND MOWING MACHINE.—Peter V. Staats, Adam R. Reese, C. S. Melick, Andrew J. Farrand, Geo. Sweeny, John W. Dean and Rufus Sliker, assignees by mesne assignments of John G. Dunham.

First, We claim the removable piece, L, attached to the shoe or cutter bar and extending over and in advance of the cutter bar, in combination with a caster wheel, M, attached to said piece, L, substantially as and for the purpose specified.

Second, Attaching the sickle bar to the main frame by means of the sliding arm, I, and slotted frame, J, the latter being longitudinally and laterally inclined so that the hight of the cut may be regulated without materially altering the relation of the guards to the knives, substantially as set forth.

Third, The combination of the caster wheel, M, and a series of sockets, l l, when the latter are attached to the piece L, and the power so arranged that it may turn under the platform, substantially as and for the purpose set forth.

2,473.—MODE OF FASTENING DOOR KNOBS TO THEIR SPINDLES.—Darius Skidmore, Seneca Falls, N. Y. Patented July 15, 1862.

I claim covering or inclosing the end of the coupling pin of the knob shank and spindle, wholly or partially, by the socket or eye of the rose, substantially as and for the purpose herein specified.

I also claim a smooth coupling pin, b, retained in its hole by its gravity, in combination with the covering thereof by the socket or sleeve of the rose, substantially as herein set forth.

DESIGNS.

2,566.—COACH LAMP.—Thomas Boudren, Jersey City, N. J., assignor to himself and A. P. Deboursney, New York City.

2,567.—KNIFE-EDGED FORK.—Arthur W. Cox, Malden, Mass.

2,568.—TRADE MARK.—N. Fairbrother and G. S. Fales, Pawtucket, R. I.

2,569.—TRADE MARK.—George H. Lincoln (assignor to the Lincoln Manufacturing Co.), Providence, R. I.

2,570.—BUCKLE.—J. F. Markland, Newark, N. J.

2,571.—CONFECTIONERS' CORNUCOPIA.—Christian W. Quanz, New York City.

EXTENSIONS.

TEMPLE FOR LOOMS.—Sarah Dutcher, Waukesha, Wis. administratrix of E. Dutcher, deceased, and W. W. Dutcher, Milford, Mass. Letters Patent No. 9502. Dated Dec. 28, 1852.

We claim the arrangement of parts so that the temples have a reciprocating action corresponding with the motion given to the cloth by the beat of the lay, substantially as herein set forth.

SCYTHE FASTENING.—Pinckney Frost, Springfield, Vt. Letters Patent No. 9531. Dated Jan. 11, 1853. Reissue No. 524. Dated Feb. 9, 1858.

I claim the combination of the loop bolt and set ring constructed and operating substantially in the manner above described and set forth.

OPERATING THE TREADLE OF LOOMS.—Rob. W. Andrews, Staffordsville, Conn. Letters Patent No. 9540. Dated Jan. 18, 1853.

I claim operating the treadle by means of a mover having two outwardly acting cam surfaces of unequal lengths combined in one piece and producing the movements and retentions, substantially as herein set forth.

I also claim such a form and arrangement respectively of the treadles and their movers, that the treadles can be reversed in their positions upon their fulcrums, and thereby cause a reversal of the movements and retentions of the treadles, substantially as herein set forth.

PORTABLE GAS APPARATUS.—Wm. and Matthias Stratton, Philadelphia, Pa. Letters Patent No. 9568. Dated Feb. 1, 1853.

We claim in the construction of the stove of removable gates, c c, in the ends of B, for the introduction of the retort and the movable section, G, under the rosin holder in the manner as set forth and shown.

Foreign Patents.

American Inventors should bear in mind that, as a general rule, an invention which is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. In England the law does not protect the right of a foreign inventor as against the first introducer of an invention from abroad. For twenty years past the great majority of patents taken out by Americans in foreign countries have been obtained through Munn & Co's agency. Patents are secured with the utmost dispatch in Great Britain, France, Prussia, Belgium, Russia, Austria, Italy, The Netherlands, Spain, Sweden, Australia, and other foreign countries. Models are not required, but the utmost care and experience are necessary in the preparation of applications. Patentees who intend to take out Foreign Patents should send to us for a Pamphlet of full advice. Address

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PATENT BRICK MACHINE.

The Gard Patent Brick Machine has been awarded the First Premium for BEST BRICK MACHINE in all the State and County Fairs where exhibited last fall.

It has received Eight State Fair First Premiums, and has never failed to take first premium wherever exhibited.

It is of that class where bricks are molded direct from the pug mill or chamber, where the clay is tempered, without passing through other processes. It is extremely compact in form, and has but few details, and those not of a complicated character.—Eds. Scientific American.

In reply to the numerous inquiries concerning this Machine, herein are set forth some of the prominent features of its construction, operation, etc:

1. The weight of the machine is about two and a half tons.
2. Two horses work it with ease.
3. Any number of machines desired can be run on one line of shafting by the application of steam power.
4. The capacity of each machine, by steam power, is from 20,000 to 30,000 bricks per day. By horse-power from 10,000 to 15,000
5. It is substantially made, and exceedingly simple in its construction.
6. It uses clay directly from the bank, water being used if not sufficiently moist.
7. The machine tempers its own clay, presses it into the molds, strikes the brick, lifts them from the molds, and turns them on edge ready for removal.
8. The clay used is so stiff, and under pressure so great, that the brick can be hacked directly from the machine, risk of destruction by rain being obviated.
9. All the labor required in making brick by this machine is to shovel in the clay and remove the brick for hacking as they issue from the molds.
10. It requires one man to shovel the clay, one boy to remove the brick to the truck, one boy to run off the truck, and one man to hack the brick.
11. It makes fine pressed brick, worth in market one-third more than common brick.
12. No sanding of the molds is required.
13. The brick are molded in molds made either of steel or brass, permanently set in a revolving wheel.
14. The price of the machine is $1000, exclusive of patent right.
15. Yard Rights, exclusive Township, and County Rights sold, as parties may desire.

Office of Gard's Patent Brick Machine Manufactory, 53 South Jefferson street, Chicago.

This is to certify that I have been running my Patent Brick Machines in Chicago this season. I commenced running them first by horse power, and the demand for the brick so increased that I was compelled, in order to supply the demand, to attach steam power, and since then I have had four running on one line of shafting attached to a small engine. The capacity of each Machine is from 20,000 to 30,000 per day, and, in the several million of brick that I have made, the clay has had no preparation whatever, except when taken from the bank, if it is too dry to adhere and be thoroughly tempered, water is thrown over it before it is thrown into the machine. All that is required is to shovel in the clay, and put the brick into the hack, where they are hacked nine high, directly from the machine.

In addition to the manufacture of brick, I am also running a large machine shop, where from thirty to forty men are employed exclusively in the manufacture of my Machines, which I have spared no labor or expense to get up in the best possible manner. E. R. GARD.

I certify that I am personally acquainted with Mr. E. R. Gard. I have visited his Yard and Manufactory, and witnessed the operations of his Machines, and believe the above statement to be correct and true. L. J. GAGE, Cashier Merchants' Savings Loan and Trust Company.

I am acquainted with Mr. Gard. I have visited his Yard several times during the season, and have seen his Machines in operation when they were turning out splendid brick at the rate of 23,000 per day each. I have used several hundred thousand of his brick, and do not hesitate to say that they are the best brick in this market.

I know the above statement of Mr. Gard to be true.
CHAS. McMILLAN, Contracting Mason, Chicago.
Chicago, Jan. 31, 1867.

Mr. E. R. Gard, Chicago, Ill.,
Dear Sir:—It affords me much pleasure to be able to bear testimony to the splendid quality of the brick manufactured by you on the "Gard Brick Machine" which I used in my large Warehouse—now complete—at the corner of 16th and State streets in this city.

Having paid you Ten Thousand Six Hundred Dollars for the brick used in that building, and believing that they are by far the best brick in this market, I now wish to contract with you for one and one-half millions for use next summer. Your machine I consider a grand success, and congratulate you on having, in my judgment, the best Brick Machine in the world. Your Truly,
R. McCABE.

Eagle Works Manufacturing Company.
Chicago, Sep. 10, 1866.

To Whom it May Concern—Greeting:—

This is to certify that we have been engaged in the manufacture, for the inventor, of Gard's Patent Brick Machine since the 15th of April, 1866, and while doing so, with our large facilities, have been entirely unable to supply the demand, having made about Twenty-five Thousand Dollars' worth of the Machines between the 15th of April and the 4th of June. Indeed, so great has been the demand, and such has been the satisfaction on the first seeing them at work, to all who have visited our shop, that Mr. Gard has been compelled, in order to meet the demand, to engage the services of several other manufacturing establishments in this city. In our judgment, these Brick Machines are without a rival. So simple in construction they can be operated by anybody with little or no skill or experience. So cheap that every neighborhood can afford to buy one. They receive the clay in its native state from the bank and turn out easily twenty thousand splendid brick each ten hours. Prepared by these machines, the brick are ready for hacking up as they come from the machine; and no loss whatever is suffered from the bad weather. P. W. GATES, President.

North-Western Manufacturing Company.
Chicago, October 30, 1866.

This is to certify that we have been engaged in the manufacture of the Gard Brick Machine, and during six weeks last spring, turned out about Twelve Thousand Dollars' worth of them. As far as we have heard they have given perfect satisfaction. We consider the machine the best in the market. North-Western Manufacturing Company, R. T. CRANE, President.

Office of the Board of Public Works.
Chicago, Sept. 10, 1866.

E. R. Gard, Esq., Chicago, Ill.:
Dear Sir:—The Board take pleasure in bearing testimony to the good qualities of the brick furnished by you to the city, which were manufactured by Gard's Patent Brick Machine.

Their contract with you this season was for Two Millions of these bricks.

We find the brick of excellent quality, and superior in strength and smoothness to any furnished in this market. We regard the machine as one of much value, and know of no other so good.

J. G. GINDELE, FRED. LETZ, O. J. ROSE, } Board of Public Works.

The contractor of the famous Chicago Lake Tunnel, having used a large quantity of the brick made on the "Gard Machine," says they are the best brick in the tunnel, and in fact are the only brick he ever saw put together just right.

We have purchased the Right of Kenton County, Ky., for Gard's Brick Machine, and are now running one by steam, and with this we are putting brick in the kiln, ready for burning, at a cost of $1.50 per thousand. We have no doubt that with two or three machines running (which we intend doing), we can put them in the kiln at $1.00 per thousand. We know they are better than hand-made brick, for the clay is more thoroughly tempered and forced into the brass molds under heavy pressure, so that there is more material in them than can be put in any other way, they are consequently a more solid and durable brick, and worth from one to two dollars per thousand more in this market, for fine work, than hand-made brick. With the one Machine we are making from 1,800 to 2,000 per hour, regular work, but can make 3,000 per hour with additional hands. We cheerfully recommend this Machine to any who may wish to embark in a paying enterprise, as a good investment.
WM. F. SIMRALL & CO.

Covington, Ky., Aug. 1, 1866.

Messrs. B. Having & Co., brickmakers, adjoining Simrall & Co.'s yard, say, "Our brick, made by hand labor, are costing us $3.50 per thousand in the kiln, ready for burning, without counting loss by weather or teams used."

Covington, August 6, 1866.

I believe brick made by the Gard Machine are worth, and will sell in any market for at least $1 per thousand more than hand-made brick, and it will make them cheaper than any Machine I have ever seen. I have made brick here for twenty-five years. E. Y. SHEPARD.
Cincinnati, July 27, 1866.

The Gard Brick Machine, and the bricks manufactured by it, we regard as the best Machine and the best manufactured bricks which have come under our observation.
ANDERSON & HANNAFORD, Architects.
Cincinnati, Aug. 6, 1866.

Little Miami and Columbus and Xenia Railroad Office.
Cincinnati, Aug. 6, 1866.

I have examined several brick machines, and the brick made by them, and I consider the Gard Machine more simple, far more economical, and less liable to accident or breaking than any I have seen. The brick is well formed; the clay is well tempered, and burns in the kiln as well as from any other machine, or from hand molds.
L. S. COTTON, Civil Engineer.

I have been a bricklayer and builder in this place for twenty years, and am satisfied that the brick made by the Gard Machine are the best I have ever seen manufactured in this part of the country, in every particular, as to a building material. E. T. BUSK.
Covington, Ky., Aug. 11, 1866.

Covington, Ky., Oct. 29, 1866.

James Hopkins, Esq.:
In answer to yours of the 26th inst., I would state that I have been running one of the Gard Brick Machines in this city part of the summer, and am still running it at this time, and I am well pleased with it, having made over seven hundred thousand brick of a most superior quality. The working of the machine I consider a perfect success as a brick machine. So well pleased am I that I am now laying my plans to make about one hundred thousand brick per day next summer. You can judge of my faith in the machine by what I intend doing. I am truly yours,
A. L. GREER.

From the Dayton Journal of Oct. 19, 1866.
The Ohio State Fair.

GARD'S PATENT BRICK MACHINE.—It made little difference what was going on elsewhere, Gard's Patent Brick Machine drew a large crowd of admirers all day long. It is acknowledged on all hands that it is the most complete machine of the kind in the world. The brick are molded, raised on edge, ready to be removed from the platform, with edges as sharp as a knife, nice enough to lay the fronts of the finest residences. It is substantial, simple in construction, perfect in operation, and makes easily and excellently from twenty thousand to thirty thousand brick per day, driven by steam power. A pair of horses can run off from ten thousand to twelve thousand per day. Of course this machine got the first premium easily. It has gotten the first premium everywhere it has been entered, and this year again at Illinois, Iowa, Missouri, Ohio State Fairs It took the first premiums, and was the admiration of all admirers.

Clinton, June 25, 1866.

Mr. E. R. Gard—Sir: The machine which I bought of you has arrived, and is running and turning out splendid brick at the rate of 18,800 per day. It is a perfect success, and must supersede the old style of brick making in this county. WILLIAM WEAVER.

Moultier Nye, one of the principal brick makers in Chicago, says:
"I am now making brick on Gard's Brick Machine, and can say I never saw anything operate as well as it does. The brick are far better than any I ever saw made by any other machine, or by any other process."
Messrs. Holden & Harlan, of Chicago, say:
"We have made brick on Gard's Machine, and burned them, and can say they are the best brick ever made in Chicago."
In addition to the above, hundreds of testimonials can be produced to prove that the Gard Machine stands without a rival. Parties wishing to purchase Machines or Territory, or desiring any information whatever concerning the machine will please call at the office, No. 53 South Jefferson street, Chicago, or address
E. R. GARD, Chicago, Ill.

FOR HYDRAULIC PRESSES, HYdraulic Pumps, Steam Heaters, and all kinds of Linseed Oil Machinery, address
8 6*] McGREGOR & CALLAHAN, Dayton, Ohio.

LATHE CHUCKS OF ALL KINDS and sizes, with new improvements, made by
A. F. CUSHMAN, Hartford, Conn.
Send for cuts and price lists. 8 eow

IMPROVED POWER TAGGING MACHINE—For putting tags on shoe lacings; measures and cuts to any length. Address Post-office Box 451, Waterbury, Conn. 8 2*

A COMPOUND PLANER AND GEAR Cutter—both new, splendid tools—for sale low by
HAWKINS & JAMES,
8 4] 54 S. Wells street, Chicago, Ill.

CHASE'S IMPROVED DOLLAR MICROscope—Adapted to counterfeit money, cloth, seed, flowers, pictures, minerals, living insects, etc. Sample sent by mail on receipt of $1, with directions, etc. Address O. N. CHASE, 3 Lime street, Boston, or FOWLER & WELLS, New York. 8 4

$5,000 OR $10,000.—A MAN WITH this amount to assist in introducing Sill's Stamp Affixer. Patent now pending; illustrated in Scientific American of 9th inst. Correspondence solicited. Address C. B. SILL, 308 North 16th st., Philadelphia. 1*

FOR SALE—A 25 HORSE-POWER Steam Engine, Corlie's make, with fine boiler, steam pump, heater, pipes, and connections, all in complete order, to be delivered by the 1st of May next. May be seen in daily operation.
R. HOE & CO.,
1*] Nos. 29 and 31 Gold Street.

A PORTABLE RAILROAD.—THIS Patent Railroad is particularly adapted for excavations, filling up swamps, grading grounds, making roads, transporting building materials, coals, etc. It is easily laid and easily taken up again; can be laid over rough or swampy grounds. Portions of 100 to 5,000 feet for sale, or can be hired by the week, with the cars to suit the kind of work to be done. Address A. PETELER, New Brighton, Staten Island, N. Y. State rights for sale. 8 2*

IMPORTANT TO HOUSE OWNERS, Builders, and Hardware Dealers.
BUTTERWORTH PATENT WINDOW SPRING.
(Patented April 16, 1861.)
After a thorough trial of more than five years, these springs have proved and are universally acknowledged to be the best Window Spring, Sash Supporter and Fastener ever brought before the public. They are a perfect substitute for cords and weights, at one fourth their cost. For further particulars and circulars please address
J. C. BUTTERWORTH, Jr.,
8 311 Eddy street, Providence, R. I.

TO FARM MACHINERY MANUFACTURERS AND DEALERS.
Fourteen years of experimenting has perfected a Thrasher and Separator much more complete in all its details than the Pitts machine.
It has neither apron nor screws; has a self-regulating blast and no vibrating movements. It is cheaper to build and will outlast two of any other kind in use. This machine has been extensively introduced both East and West, and the early patents extended. Machines and Territory for sale by W. W. DINGEE,
1*] Racine, Wis.

WANTED—AGENTS—$75 to $200 per month, everywhere, male and female, to introduce throughout the United States, the GENUINE IMPROVED COMMON SENSE FAMILY SEWING MACHINE. This machine will stitch, hem, fell, tuck, quilt, bind, braid, and embroider in a most superior manner. Price only $18. Fully warranted for five years. We will pay $1,000 for any machine that will sew a stronger, more beautiful, or more elastic seam than ours. It makes the "Elastic Lock Stitch. Every second stitch can be cut, and still the cloth cannot be pulled apart without tearing it. We pay agents from $75 to $200 per month and expenses, or a commission from which twice that amount can be made. Address
SECOMB & CO., Cleveland, Ohio.
CAUTION.—Do not be imposed upon by other parties palming off worthless cast-iron machines, under the same name or otherwise. Ours is the only genuine and really practical cheap machine manufactured. [8 4—C.

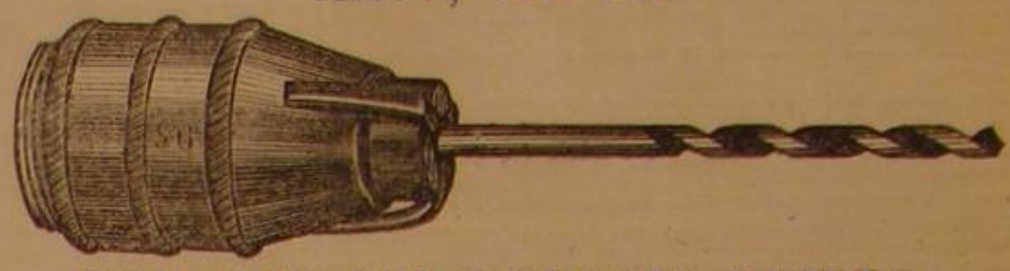
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— MACHINERY. —
FOR SALE—Six Double Engines, Boilers, etc., 50-H. P., made in England, first-class work, complete and new. Will be sold at much less than cost.
6 4*] ODER NANSON & CO., 43 Broad street.


TWIST DRILLS,

SOCKETS,

FOR TAPER SHANK DRILLS.

ALSO, CHUCKS

FOR STRAIGHT SHANK DRILLS.


MADE AND FOR SALE BY
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NEWARK, N. J.

PRICES:

Taper Shank Drills.		Straight Shank Drills		Wire Drills.		
Diam. of Drills.	Cash Price per Drill.	Diam. of Drills.	Cash Price per Drill.	Nos. of Wire the Drills are made from.	Cash Price per Drill.	Cash Price per Dozen
INCH.		INCH.				
1/8	60	1/8	14	1 to 5	20c	$2.15
1 3/32	65	5/32	16	6 to 10	19	2.05
7/16	70	3/16	18	11 to 15	18	1.95
1 5/32	75	7/32	20	16 to 20	17	1.85
1/4	80	1/4	25	21 to 25	16	1.75
1 7/32	85	9/32	30	26 to 30	15	1.60
9/16	90	5/16	35	31 to 35	14	1.45
1 9/32	$1.00	11/32	40	36 to 40	13	1.30
5/8	1.10	3/8	50	41 to 45	12	1.20
2 1/32	1.20	13/32	55	46 to 50	11	1.10
1 1/16	1.30	7/16	60	51 to 60	10	1.10
2 3/32	1.45	15/32	65	Set of Sixty-nine [69] Stubs' Wire Drills, from No. 60 to 1/4 of an inch diameter, mounted on Stand, with No. marked on Stand to designate size of each Drill.....$10 00		
3/4	1.60	1/2	70			
2 5/32	1.75	17/32	75			
1 1/16	1.90	9/16	80			
2 7/32	2.05	19/32	90	The 11-32 and 3-8 Drills in the set of 69, have the shank turned to 5-16 diameter, that they may be used in the No. 2 Chuck.		
7/8	2.20	5/8	$1.00			
2 9/32	2.35	21/32	1.10			
1 1/8	2.50	11/16	1.20	Set of Sixty [60] Stubs' Wire Drills, from No. 1 to No. 60, mounted on Stand, with No. marked on Stand to designate size of each Drill.....$8 00		
2 11/32	2.65	23/32	1.35			
1	2.80	3/4	1.50			
1 1/32	2.95			Universal Chuck (No. 2), made entirely of steel, to accompany either of above sets of Wire Drills, (holding all sizes, from No. 0 to 5-16 diameter.).....$6 00		
1 1/16	3.10					
1 3/32	3.25			Set of 29 Taper Shank Drills, from 1/8 of an inch to 1 1/4 inch diameter, varying by 32ds of an inch.....$36 00		
1 1/8	3.40					
1 5/32	3.55			Set of 4 Steel Sockets, to accompany above set of 29 Drills.....$6 00		
1 3/16	3.70					
1 7/32	3.85			Set of 21 Taper Shank Drills, from 1/8 of an inch to 1 1/4 inch diameter, varying by 32ds of an inch, above 1/8 to 1/4, and varying by 16th of an inch above 1/4 to 1 1/4.....$36 00		
1 1/4	4.00					
Set of 4 Steel Sockets to accompany above set of 21 Drills.....6 00						
				$42 00		
Set of 15 Taper Shank Drills, from 1/8 of an inch to 1 1/4 inch diameter, varying by 16ths of an inch.....$30 00						
Set of 4 Steel Sockets to accompany above set of 15 Drills.....6 00						
				$36 00		
Set of 21 Straight Shank Drills, from 1/8 of an inch to 1/2 inch diameter, varying by 32ds of an inch.....$13 00						
Drills of extra length made to order.						

UNIVERSAL CHUCKS for holding Wire Drills, etc.

The No. 1 Chuck is particularly adapted for the work of Jewelers, Watchmakers, and other similar trades, requiring a very light and accurate tool. It carries all Wire Drills, from 0 to 1/8 of an inch diameter, weighs 2 1/4 ounces, is 1 1/4 long, and 1/4 diameter. Price, $6 00.

The No. 2 Chuck carries all Wire Drills, from 0 to 5-16ths of an inch diameter. It also carries drills of 11-32nds and 3/8ths diameter, having the shanks turned down to 5-16ths. Price, $6 00. Price of Solid Steel Shank, 60c.

For the convenience of Screw makers and others, requiring Chucks capable of having the rods used in making screws to pass through them, we are making our No. 2 Chucks hollow, with hollow Steel Shank accompanying them. The hollow space in the center of the Chuck and Shank will admit the passage of wires 5-16ths diameter down to 0.

The Shank is 6 inches long and 1/4 of an inch in diameter. It is cylindrical in shape, but can be turned by the buyer to a taper, corresponding to the spindle of his lathe. A plug accompanies it, which is fitted to that end which enters the body of the Chuck. By these arrangements, the Chuck can be used as if it had a solid center, or by removing the plug the Chuck and the shank become hollow throughout their length. Price of Hollow Chuck $6 50. Price of Hollow Shank $1 20.

These Chucks and Shanks are made entirely of the best cast steel, and for accuracy of workmanship, durability, convenience, and cheapness, have no rival.

☞ Goods delivered in New York City free of charge

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ARMINGTON, GARDINER & DRAKE, Providence, R. I.
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PLATINUM—ALL SHAPES, FOR ALL purposes. Platinum scrap and ore purchased.
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TO CONTRACTORS AND MINERS.—The Commissioners on the Troy and Greenfield Railroad and Hoosac Tunnel, acting for the State of Massachusetts, invite proposals, until the 10th day of March next, for excavating said tunnel at three different sections of that work. This tunnel, when completed, will be about 4 1/2 miles in length, extending from the town of Florida, through the Hoosac Mountain, to the town of North Adams. The Eastern End has been penetrated from the grade of the railroad 3,500 feet; 2,400 feet of which consists of an opening of about 10 cubic yards to each lineal foot, the same to be enlarged to a section containing about 17 cubic yards to each foot; the remaining 1,100 feet being heading—now measuring upon an average 4 cubic yards per running foot—to be enlarged to the full section; making some 25,000 cubic yards to be removed. A further section of the work will also be let to the successful bidder for the above-named enlargement, if satisfactory terms shall be offered. The Western End is worked from a shaft 518 feet deep. The easterly heading from this shaft—of about 6 cubic yards to each lineal foot—extends 1,100 feet, and is to be enlarged to a section containing 17 yards per foot, requiring the removal of 12,000 cubic yards. Bids for that amount, and for an extension in either direction of the heading and enlargement at this point will be received. The central Shaft, of an elliptical form, 27 by 15 feet, now 400 feet in depth, is to be sunk to grade, 1030 feet from the surface, requiring the removal of about 9000 cubic yards.

All the work to be done is in Talcose Slate, and will require neither masonry nor supports of any kind. Buildings, machinery, and means of ventilation, all of the most substantial character, have been provided, and will be furnished to contractors. Ample sureties will be required from parties who may be contracted with, and the commissioners reserve the right to reject all offers that may be made. Plans and specifications may be seen on application to ALVAH CROCKER, at the Engineer's Office, North Adams, Mass.; and other information may be obtained from JAMES M. SHUTE, Room 10, No. 13 Exchange street, Boston, to whom proposals may be directed.

JAMES M. SHUTE, ALVAH CROCKER, CHARLES HUDSON, } Commissioners.
Boston, January 30, 1867. 1

WANTED.—Partner in an established Machine Shop, with $5,000, to take the place of the retiring one. Address L. D., Station C, N. Y. City. 7 3*

WROUGHT-IRON NUTS (HOT pressed), of superior quality, manufactured and for sale at low rates by
1*] J. H. STERNBERGH, Reading, Pa.

FISH BROTHERS, Racine, Wis., Manufacturers of Wagons, Carriages, etc. All work warranted in every particular. 6 4*

HANDLES, BENT WORK, ETC.

West's Improved Automatic Tapering Lathe.
Warranted to turn unequal diameters in wood at the rate of 1000 to 2000 running feet per hour, according to finish desired.

Durkee's Automatic Sawing Machine.
Warranted to saw small stuff from the log at the rate of 1000 to 2000 running feet per hour. Send for illustrated circulars. JOHNSON & COMPANY,
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THE BEST POWER HAMMER MADE is the Dead Stroke Hammer of Shaw & Justice. Sizes suited for manufacturing awl blades or engine shafts; consume but little space, and require but little power. Manufactured by PHILIP S. JUSTICE,
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SHAW & JUSTICE'S POWER HAMMER is Moderate in Price, is driven with one-tenth the power used by other Hammers, and will not cost the one-hundredth part of what is usually spent in repairs. Its power is far in excess of any Hammer known. Manufactured by PHILIP S. JUSTICE,
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Knits not only Stockings, but more than THIRTY other useful articles of Apparel, and will earn a living for any family. Agents wanted.
Send for circular, inclosing stamp, to the
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SPECIALTY:—All the Latest Improved Machines used in the manufacture of woolens. Offers his services to exhibitors, purchasers, sellers, and visitors generally. Correspondence in English, French, and German. Address as above, or to Henry Kayser, Esq., New York, or J. O. Hundt, 46 Dey street (up stairs), New York 4 8*

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THE SLIDE VALVE PRACTICALLY CONSIDERED. By N. P. Burgh, author of "A Treatise on Sugar Machinery," "Practical Illustrations of Land and Marine Engines," "A Pocket-Book of Practical Rules for Designing Land and Marine Engines, Boilers, etc., etc., etc. Completely illustrated. 12mo.....$2.

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☞ The author has carefully avoided theorizing on the subject on which he treats; all his remarks have been deduced from practical demonstrations — assumptions have not been admitted—therefore the data given will be found correct.

☞ The above, or any of our books, sent by mail, free of postage, on receipt of price.

☞ My new Catalogue, complete to Jan. 1, 1867, sent free of postage to any one who will favor me with his address.
HENRY CAREY BAIRD,
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SHEET AND ROLL BRASS.
German Silver, Brass, and Copper Wire, etc. Especial attention to particular sizes and widths for Machinists and Type Founders.
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WOODWORTH PLANERS, BARLETT'S Patent Power Mortise Machine, the best in market. Wood-working Machinery, all of the most approved styles and workmanship. No. 24 and 26 Central, corner Union street, Worcester, Mass.
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Manufacturers of Woodworth's, Daniell's, and Gray & Wood's Planers, Sash Molding, Tenoning, Mortising, Upright and Vertical Shaping, Boring Machines, Scroll Saws, and a variety of other Machines and articles for working wood.
Send for our Illustrated Catalogue. 1 25*

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PATENT SHINGLE, STAVE, AND Barrel Machinery, Comprising Shingle Mills, Heading Mills, Stave Cutters, Stave Jointers, Shingle and Heading Jointers, Heading Rounders and Planers, Equalizing and Cut-off Saws. Send for Illustrated List.
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5 tf—C.] 282 and 284 Madison street, Chicago, Ill.

T. F. RANDOLPH & BRO.,
—MODEL MAKERS.—
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HARRISON STEAM BOILER.
NO MORE DESTRUCTION OF LIFE AND PROPERTY BY STEAM BOILER EXPLOSIONS.
GREAT REDUCTION IN PRICE.
From the rapid manner in which the HARRISON STEAM BOILER is coming into use, but little need be said of its conceded merits.
They may be summed up briefly as follows:—
Absolute safety from explosion, as it cannot be burst under any practicable steam pressure.
Less first cost.
Economy in fuel equal to the best in use.
Facility of transportation.
It occupies but about one third the ground area of ordinary boilers, with no increase in hight.
In consequence of recent improvements in its manufacture, this Boiler can be furnished to the public AT LESS COST than heretofore, and is now much the cheapest article in the market.
For Price and Circular apply to
JOSEPH HARRISON, JR.,
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5 12*] Gray's Ferry Road, Philadelphia.
Branch Office, 119 Broadway, New York, Rooms 9 and 10
I. B. HYDE Agent

INSTITUTE OF DRAWING, Surveying, and Civil Engineering, at Tolleston, Lake county, Ind., 26 miles from Chicago, crossing of M. C. and P., Ft. W. and C. railroads. Opens April 15, until Sept. 15.
$30 to be a draftsman; $50 a surveyor; $60 a civil engineer. Drawing teachers sent to clubs of 10 to 20 scholars. Address A. VANDER NAILLEN, for circular. 6 5*

A MESSIEURS LES INVENTEURS—Avis important. Les inventeurs non familiers avec la langue Anglaise, et qui préféreraient nous communiquer leurs inventions en Français peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toute communications recived in confidence.
MUNN & CO.,
Sci American Office, No. 37 Park Row, New York

TO OWNERS OF FOUNDERIES.—GREAT IMPROVEMENT IN CUPOLA FURNACES. We are now prepared to furnish any size of our Patent Cupola, in relation to which we present the following testimonial:—
Messrs. J. & T. INSULL, Gents:—The Patent Cupola which you furnish us works admirably, and we firmly believe it will save one-third of the fuel used by any other furnace.
L. E. OSBORN & Co., New Haven, Conn.
Address [7 4*] J. & T. INSULL, New Haven, Conn.

IRON PLANERS, ENGINE LATHES, Drills, and other Machinists' Tools, of Superior Quality, on hand and finishing. For Sale Low. For Description and Price, address NEW HAVEN MANUFACTURING CO., New Haven, Ct. 1 tf

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FIRST-CLASS MACHINISTS' TOOLS.
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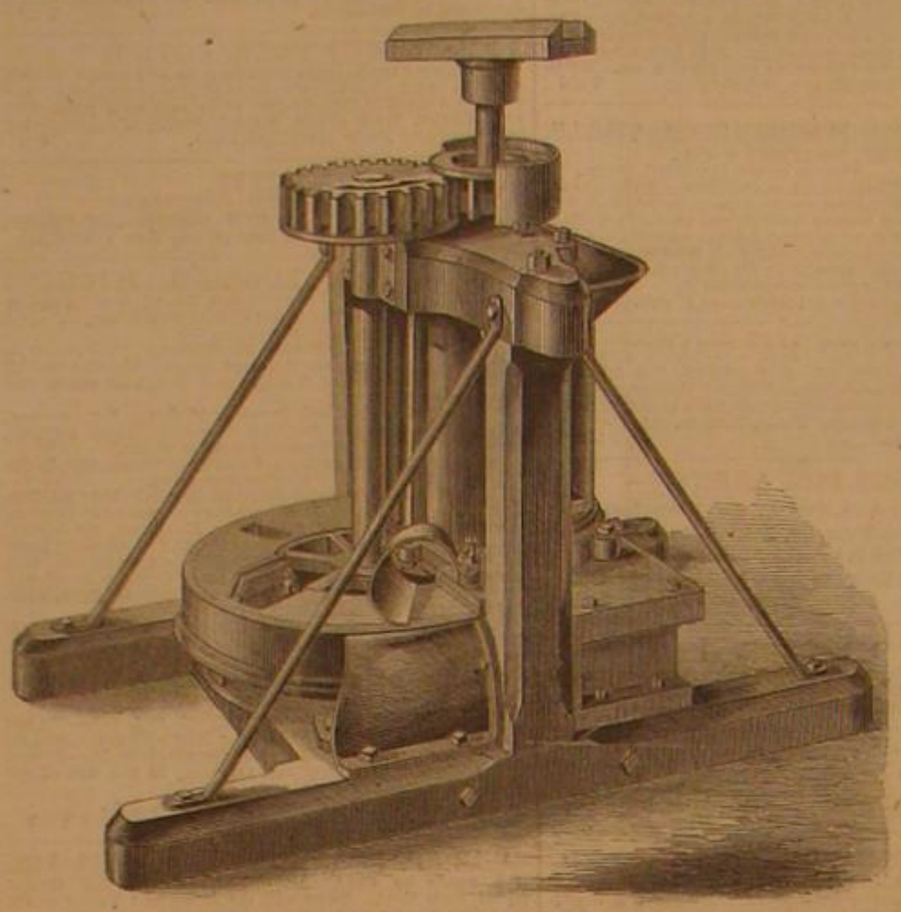
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Improved Brick Machine.

The accompanying engraving is a perspective view of a brick machine, another view of which with description appeared in No. 15, Vol. XIV of the Scientific American, last April. Since then it has been tested under favorable and also adverse circumstances, and from the recomendations and the certificates received, appears to be eminently fitted for its work.

It is a pug mill and brick press combined, the upright shaft in the mill being armed with radial blades set at an angle with a horizontal plane, and having also at the bottom, two curved blades which force the clay into the mold boxes, the openings of which are to be seen on the upper surface of the horizontal wheel that runs under the upright mill. The action of the radial and curved blades forces the material very closely into the molds, while a curved spring with a sharp edge strakes off the upper surface of the clay smoothly. But the delivery of the bricks is the most remarkable peculiarity in this machine. Under the horizontal wheel is a cam the circumference of which is two inclined planes, their higher connections being in the front of the machine and the lower point at the rear. Traversing this cam are the mold bottoms, which, consequently, rise and fall as they traverse from front to rear. When directly in front a lifter pushes up the bottom together with the molded brick, and the bottom being hinged is lifted and canted on the hinged edge placing the brick on edge to be hacked.

This machine with the work of two horses is said to make from 10,000 to 15,000 bricks per day and withsteam power 20,000 to 30,000. The molds are of steel or brass, and the bricks are worth more in the market than common bricks. It has received eight State Fair premiums and has always taken the first premium wherever exhibited.



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Probably the chief actual cause of death in coal-mine explosions is crushing—not by the collision of solids, but by the instantaneous compression of air. While those in the immediate vicinity of the explosion are burned as well as crushed, those at a comparative distance suffer the latter fate, while even in remote parts of the mine others are stunned, and in that condition overtaken by the "choke damp" or de-oxygenized air mingled with products of combustion. Some of the sufferers in the recent explosions were found lying dead near the shafts, with the placid appearance of sleep, like the drowned; dead from mere want of air. Energetic ventilation always in action would prevent this class of deaths, but no practicable amount of ventilation will ensure the timely removal of the explosive gas. This fact has prompted the excellent suggestion that coal mines be illuminated by the electric light transmitted by an arrangement of lenses and reflectors. Ventilation by compressed air, through pipes, as practiced in tunnelling, is also recommended. Ansell's fire-damp indicator, an improved safety device now attracting attention, is based on the fact that the dangerous gas will instantly pass through porous obstructions of earthern-ware or india-rubber, in the effort to diffuse itself, and hence a vessel closed with such a substance is made to betray and even to measure and register the fire damp present in the surrounding atmosphere. In the improved instrument the expansion of the contents of the vessel from this cause is made to raise the mercury in a connected tube to contact with a platinum point so as to complete an electric circuit and ring an alarm bell. It is evident that this instrument would need to be nearly ubiquitous in order to insure safety. Another contrivance has also been produced by which a safety lamp is infallibly extinguished by the act of opening.

Crystallization of Glycerin.

We learn from *The Chemical News*, that about five tuns of glycerin were recently imported from Germany by an English firm, in casks containing about 8 cwt. each. When they left the factory, the contents of the casks were in their usual state of viscid fluidity; but on arriving in London, they were found to have solidified to a mass of crystals, so hard that it required a hammer and chisel to break it up. A large block of this solid glycerin, weighing several hundred weight, suspended in a somewhat warm room, took two or three days to liquefy. Some of the crystals were as large as a small pea. They were brilliant and highly refracting, and so hard as to grate between the teeth. The original glycerin was pale brown; the crystals nearly white; the liquid drained from among them, dark brown, and the liquid obtained by fusing the crystals as pure as possible from the mother liquid, was clear and nearly colorless, slightly more viscid than usual, and deficient in none of the qualities of pure glycerin. With the temperature reduced to zero for several hours, this liquid remained unchanged, except in becoming slightly more viscid. The cause of the crystallization is conjectured to have been the vibration of the railway journey, accompanied by intense cold, and enabling the particles to arrange themselves in a regular form, in analogy with the crystallization of wrought iron under the influence of vibration, and that of platinum salts by the aid of a stirring rod. Experiments were to be tried upon glycerin at a low temperature with agitation, to determine the truth of this theory.

Great Fall of Meteorites.—It is reported that a remarkable fall of meteoric rocks and stones, from a perfectly serene sky, took place at Kniahynia, Hungary, between four and five o'clock, P. M., on the 9th of June, 1866. With a detonation like that of a hundred cannon, a gray cloud-like body passed in view, seeming enveloped in smoke, but not luminous; and within two or three minutes a noise like the rattling fall of a multitude of stones was heard, continuing (its echoes doubtless included) ten or fifteen minutes. About sixty of the smaller stones were picked up quite hot. The largest, weighing 550 lbs., was broken in two by the shock, and buried itself eleven feet in the earth. Eye witnesses twelve miles to the west of the place (between the phenomenon and the sun) describe the meteor as of a luminous yellow and orange, followed by a train of a blue tint.

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SCIENTIFIC AMERICAN

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Foot Bridge across Broadway.

Not only the inhabitants of the metropolis but the people of the country—the thousands of strangers who daily crowd our streets—will rejoice at any attempt to relieve the jam which appears to be now the normal condition of some of our streets, especially Broadway. It is no uncommon thing that pedestrians, desiring to cross Broadway in the vicinity of Fulton street, are compelled to go down below Trinity Church before they can get an opportunity to do so. The corps of policemen, always ready to assist the young, old, and the weaker sex, are insufficient to reduce the annoyance to a minimum.

We present, herewith, a fine engraving of the proposed bridge across Broadway, from Fulton street east, to Fulton street west. The view is taken from the corner of Fulton, at St. Paul's Church, looking down Broadway. The artist has introduced a large number of figures to represent the crowded state of the street, but the engraving does not do justice to the vehicular and pedestrian crowd which, day after day from early morning to night fall, surge and push through the main thoroughfare.

The bridge is of iron—wrought and cast—elevated 17 feet 8 inches over Broadway. The length of the bridge is 57 feet at Knox's corner, and 54 feet at the other; the width is 14 feet. The bridge has two longitudinal beams, a combination of wrought and cast iron, one a flange and the other a lattice, each calculated for 46 tuns breaking weight; but on trial the bridge is found capable of sustaining 101 tuns, one-third of which is the permanent weight of the bridge. As set up in the yard, 100 men passed over it at one time producing no perceptible vibration. Loaded with 50 tuns, the depression was less than three-eighths of an inch. The bridge is reached by four flights of steps, each 19 feet high, five feet wide, having to each flight three landings, the steps of each numbering 34. Both the lattice work of the stairways and of the bridge proper are lined with sheet iron to a hight of three feet; the intersections of the lattices being ornamented with rosettes. Four iron columns 14 inches diameter, with broad bases, sustain the bridge, and shorter columns the stairways. These higher columns will be used as lamp posts. The bridge will be permanently secured at one end and the other will rest on rollers to provide for contraction and expansion. The steps of the stairs will be of oak, as well as the deck of the bridge, which will be calked to make it water tight.

Ritch & Griffiths, Architects, 153 Broadway, are the designers and contractors. The contract price was $15,000, but the builders state the actual cost at $22,000. When located, which is expected by the 1st of March, it will be an ornament to the street as well as a convenience to the people.

The work of laying the foundations of the end columns is already in progress, a corps of laborers being employed at the corners. The bridge will accommodate those who desire to cross Fulton street on either side of Broadway, as well as those who would cross Broadway itself.

Our reporter feels indebted to Mr. J. M. Duclos for facilities afforded him in procuring the facts in relation to the structure and dimensions of the work.



THE BROADWAY BRIDGE FOR PEDESTRIANS.

Chilled Shot.

Messrs. Hick, Hargreaves & Co. are now making shot and shell of Bessemer steel for rifled cannon of 9-inch bore. The shot are solid cylindrical flat-fronted projectiles, and are slightly tapered at the fore end. They are 14 inches long, and are fitted at the back with a disc of soft brass, (containing a preponderence of copper), which is intended for filling the rifling of the gun by expansion. The brass disc has at its back a projecting rim of about three-sixteenths of an inch thickness, and an equal depth, which forms an expanding cap, the sides of this cap being driven out laterally and forced into the grooves of the gun by the explosion of the powder. The pressure of the gases in the chamber of the gun is also made use of to secure the disc to the shot. The base of the latter is provided with 12 radial grooves, the segments between these forming incline planes. The brass is forced into these grooves by the explosion, and is firmly combined with the shot itself. The shells are of similar shape to the shot. but are but are bored out of solid Bessemer steel cylinders, and fitted with cast-iron hemispherical fronts. The workmanship of these projectiles is very fine; and each of them is carefully packed in a separate wooden case for transport. Their destination is unknown. A considerable number of chills for casting Palliser shot are also in course of manufacture at the above works, to the orders of the British Government. They are made of soft gray cast-iron and have a pair of trunnions cast on them, so that they have the appearance of small mortars. The trunnions are carefully turned, and then made use of for fixing the chill to the face-plate of the lathe in temporary bearings for boring. The pointed bottom of the bore, corresponding to the nose of the Palliser shot, is finished with a tool carefully ground to a template from a flat piece of steel, this tool being inserted in the front of the boring bar, and held fast in its position by a pair of screws. Great numbers of such chills are in request, as they are rapidly destroyed in the casting of chilled shot. There is no doubt but that these carefully-finished chills must considerably enhance the prime cost of chilled shot.

SOMETHING ABOUT CLOCKS.

Clocks may be considered a modern invention. Even within a few years great improvements have been made in their manufacture by which they may be ranked among the commonest articles of household convenience because of their cheapness, while at the same time their value as accurate timepieces is not impaired. This result is due to the employment of machinery instead of hand labor in their construction, by which rapidity, exactness, and the reduplication of parts is secured.

The first time-measurers of which we have any historical knowledge were sun-dials, similar probably to those now used merely as curiosities. But before that period, time was undoubtedly measured by the observation of natural objects, particularly the relative length of shadows cast by fixed objects. In the book of Job, one of the oldest of preserved writings, he refers to this mode of measuring time when he says, chap. vii, 2–4:—

As a servant earnestly desireth the shadow and as an hireling looketh for the reward of his work, so am I made to possess months of vanity and wearisome nights are appointed to me. When I lie down I say, When shall I arise and the night be gone. And I am full of tossings to and fro unto the dawning of the day.

This custom has obtained even to our own days. Many now living remember how, in the country, where no more for

liable means were at hand, the dinner hour and the time re-ceasing labor on the farm were determined by the length of shadows cast by familiar objects. The sun-dial, however, in some shape, has been used for many centuries. We remember when in the school room we watched lines on the window sill, scratched with a pocket knife, to cheer the tedium of the "hope deferred" by anticipating the welcome hour of dismissal, or the time of recess.

An improvement on the sun-dial was the clepsydra, a vessel containing water which found its way, drop by drop, through a minute aperture. These water clocks appear to have been of very early invention. They were used by the Chaldeans, and introduced into Europe by the Romans. The hour-glass was a great improvement, and was used within the memory of persons now living, as measurers of time, especially in the school room, and these cannot forget the couplet in the "New England Primer"—

"As runs the Glass,
Our Life doth pass."

Sand glasses registering three or four minutes are now used as attachments to egg-boilers, and also at sea for some nautical calculations.

We have no certain data for fixing the invention of clocks which were in any degree similar to those now used. Indeed, the only characteristics of these early time-measurers which they have in common with ours, is that they had wheels, one or more pointers, or a bell, and were moved by weights. Such or a similar machine is spoken of as being sent to Frederic II., by the Sultan of Egypt. Calmet in speaking of the customs of the Cistercian monks in 1120, alludes to the striking of the clock to awaken them to attend to their devotions. Dante, who died in 1321, speaks of the striking of a clock. About 1364 Henri de Wyck, a German mechanician, erected a clock in the palace of Charles V., of France. Most of the historical evidence which is reliable seems to point to this period as the first introduction of clocks, and to the fact that the Germans were the most successful clock makers.

The discovery of the isochronism of the pendulum by Galileo and its application to the regulation of clock work by his son, Vincenti, appears to have been the starting point from which the art of horology has reached its present state of perfection. Christian Huygens, however, seems to deserve credit for constructing pendulum clocks, which were really valuable and reliable, although Richard Harris, of London, claims to have antedated the improvements of Huygens by sixteen years, he having used the pendulum successfully in 1641, while Huygens claims are dated 1657.

To come nearer to our own times, who has not seen the Dutch clocks generally brought to to this country by English and German emigrants? They had no cases, only a dial, behind which were the works, the whole being suspended from a nail on the wall near the ceiling. The weights hung by strings, and could descend to the floor, while the clock was wound up by pulling a cord. Still later we have the long-cased clock, so beautifully characterized by Longfellow in his poem, "The Old Clock on the Stairs."

Somewhat back from the village street
Stands the old-fashioned country seat;
Across its antique portico
Tall poplar trees their shadows throw,
While from its station in the hall
The ancient timepiece says to all:
Forever—Never—
Never—Forever.

Halfway up the stairs it stands,
And points and beckons with its hands
From its case of massive oak,
Like a monk, who, under his cloak,
Crosses himself, and sighs, alas!
With sorrowful voice to all who pass,—
Forever—Never—
Never—Forever.

These old clocks had pendulums beating whole seconds and running eight days, both of which were provided for by the length of the case, which extended from the floor to the ceiling, at least in low ceiled houses, being six or seven feet high. The story of the suitor who hid in the clock case from the prying investigation of the irate father is familiar to all. Many of these old-fashioned clocks showed, in a semi-circle above the face, the changes of the moon, and all were ornamented with quaint pictures on glass. To many of our readers this brief reference to the old-fashioned clock will bring a recollection of pleasant seasons and scenes not to be again enjoyed or viewed.

The last phase of clock making is the introduction of the Yankee clocks, convenient, cheap, portable, excellent time-keepers, and models for workmanship without unnecessary finish. We have seen good clocks sold at retail for seventy-five cents, and even now they can be bought for a dollar or two, while the old-fashioned, long clock was considered a splendid article of furniture and a handsome dower for a bride. These cheaply acquired clocks, however, have not the life-long influence of the more costly ones of preceding generations. Then a clock was one of the household Penates, not to be parted with, but as precious as were her household gods to Rachel when she hid them under her camel's saddle. But the Yankee clocks have not only furnished every house in our land, but from their cheapness have found their way into the cottages of English laborers and the dwellings of the original clockmakers, the Germans.

A NEW METHOD OF SAPONIFICATION.

[For the Scientific American.]

Mège Mouriès, a distinguished French chemist, has recently found that the neutral fats in the oil seeds during germination, as well as in the animal organism during life, take the state of very movable globules, which offer to the action of reagents a great surface. In this globular state fats show very peculiar properties, from which we will only mention those calculated to interest the readers of this journal.

1. In the ordinary state, fat, as for instance, tallow, soon becomes rancid upon exposure to the air: in the globular state and in a milky form, however; or in the dry state, in the form of a white powder, it will remain for a length of time without alteration. For all practical purposes this is easily obtained by mixing melted tallow of 113° Fah., with water of the same temperature, holding in solution 5 to 10 per cent of soap.

2. In the ordinary state it is difficult to combine tallow as well as other fatty bodies with hot salty caustic lyes, but in the globular state they absorb this lye immediately in a proportion varying with the temperature. Each globule, as it is attacked from all sides by the alkali, gives in such a case its glycerin quickly off and in such a degree that in a very short time each globule is transformed into a globule of perfect soap filled with lye. Two to three hours are sufficient for obtaining such a result.

3. These saponified fat globules have the property, when heated over 140° Fah., of running off the surplus lye with which they are swelled or filled, and of retaining only water for ordinary soap. They thus eventually become transparent (semi-liquid) and by stirring, form a layer of melted soap over the lye, containing the glycerin.

4. The saponification of this mass is so complete, that for the preparation of stearic acid it is only necessary to add a corresponding quantity of diluted sulphuric acid, whereupon sulphate of soda will be formed and the fatty acids separated.

It is then only necessary to melt them by the application of steam for the purpose of separating them from the solution of sulphate of soda, to let them crystallize, and to press them cold. Stearic acid will be obtained, unchanged, inodorous, and with a melting point of 136° to 138° Fah., while the oleic acid, flowing off, will be nearly colorless.

The latter is even of a better quality than fat oils, and more desirable and useful for the manufacture of white soaps of first quality either alone or with other fatty substances. By using oleic acid alone (the glycerin being separated) it is only required to neutralize the same with weak lye: the formation of soap then takes place immediately, which can be melted at once. If, however, the oleic acid be mixed with ordinary fats, the process described under (1) must be followed. Saponification can be effected in 6 hours and in the course of 24 hours a soap can be prepared as neutral and good and of the same detersive qualities as the best old olive-oil soap found in commerce. By this method not only is more time saved but no fat is lost in saponification, whereas in the ordinary process no small quantity of fat is wasted by running in the under lye.

Mège Mouriès manufactures at present in his factory near Paris 3,000 pounds of fatty acids daily, separating the whole amount of the stearic acid existing in the fats and using at the same time the oleic acid obtained thereby for the manufacture of soap.

A. O.

THE COTTON MANUFACTURE—RING SPINNING AND DRESSING.

The yarn spun upon the mule is usually intended for the "filling" that portion which carries the threads across the width of the cloth, and is generally softer spun than that for the "warp" or length-wise threads. This warp yarn is spun on the throstle or the ring spinner. The throstle is not materially different in its operation from the fly frame which twists the roving although much simpler in its construction. Like the fly frame it spins and winds the yarn upon spools by means of fliers. The ring spinner is a more modern machine, and it winds the yarn upon a cone-shaped bobbin which, when filled, resembles the cop formed by the mule. This yarn is frequently used, as that of the cop, for filling, as the bobbin containing it is adapted for being carried in the shuttle. The ring spinner is a machine of peculiar construction. The spindles carrying the spools are arranged on the sides of the frame vertically and driven at a high speed. They project through openings in a horizontal bar, each aperture considerably larger than the diameter of the full spool. These apertures have a projecting rim standing above the general surface of the bar, which rim is flanged on the upper edge making a projecting lip. A little coil of thin steel made from strips resembling in size the mainspring of a watch, is slipped or sprung over the lip of the ring and slides around its circumference. This coil or loop of steel is called a "traveler." It is simply a ring of thin steel perhaps one-eighth of an inch wide, the diameter of the ring less than one-fourth of an inch. Being of a fine spring temper the two ends of the ring can be spread and sprung over the lip of the ring in the horizontal bar, the elasticity causing the ends to grasp the ring to prevent flying off.

The object of these "travelers" is to guide the thread on to the spool. As the spindles revolve the thread, passing through the "traveler," carries it around with great velocity, and the horizontal bar traversing vertically back and forth, winds the yarn upon the spools in regular concentric layers. In all these spinning machines the roving is led between rollers, the under ones being of fluted steel and the upper of iron covered with smooth leather and weighted.

It remains now to convert this yarn, both warp and filling, into cloth unless the intention is the production of thread. If this is the object, doubling and twisting, starching and glazing and other processes for preparing it for the market, follow the process of spinning; but our object is to follow the yarn through the most important after processes to convert it into cloth. In some establishments the hard twisted yarn or warp is re-wound on larger spools for "warping." This process is simply winding the yarn on a "beam" or immense spool, the length of which corresponds with the width of the cloth to be woven. Huge "creels" or frames hold the bobbins of yarn, and through suitable guides the yarn is wound upon the beams. The beam, being filled, is taken to a machine called a "dresser." A number of beams are placed in suitable bearings at each end of the machine, and the yarn is led toward the center where it is again re-wound upon other beams. But during its passage of twelve or fifteen feet it has undergone quite a change.

All yarn when first spun is "fuzzy" or bearded, full of fibers sticking out from its surface in all directions. These fibers on the warp yarn would considerably interfere with the weaving, and as they cannot be so readily removed and their removal would impair the "body" of the cloth, they are glued down; or, rather, the yarn is sized or starched. This is done on the dresser. The yarn as unwound from the beam passes through a trough of starch, and as it leaves the trough the superincumbent starch is scraped off by the yarn passing through minute perforations in sheets of copper, while immense brushes traverse back and forth on the web cleaning and smoothing the yarn and brushing off the loosely adhering particles of starch. The yarn is thoroughly dried by suitable heaters, the pipes of which pass close to the web, and by blowers keeping up a constant blast of air. Consequently the yarn is dried very rapidly, and when re-wound on the beam is ready to be placed in the loom. The room where this dressing is done is, of course, kept very hot, but we never heard that the occupation is unhealthy.

In the next and final article we will notice the operation of weaving and the subsequent manipulations to prepare the cloth for the market.

TRADE MARKS—'GILLOTT'S 303."

Our reference to the law of trade marks in an article on the general subject last week, received a happy illustration before it was fairly published, in a decision at the General Term of the (New York) Supreme Court, in the case of Joseph Gillott against Richard Easterbrook and others. "Gillott's 303" has been for many years a household word in this country, expressing an exact description and quality of pen, which was bought and sold by name alone, needing no examination, only an assurance of its genuineness. It is clear that the use of this number had become lucrative, and might be made so by any one who should adopt it, and that its value in either case results from the long sustained and high character of Joseph Gillott's manufacture alone. If any result of labor and skill can be property, the reputation and significance which the number "303" as applied to pens had acquired, was the property of Joseph Gillott. The trespasser in the above case was not charged with forging the name of the rival manufacturer, but with appropriating the mark which he had made valuable, and offering to the public another "303", virtually represented as different only in the manufacturer's name, and thus profiting by the public confidence in that brand, which Gillott's manufacture had inspired. In the absence of a patent, the right arises with the inducement to infringe it, from the value acquired by long and meritorious use—not from the mere prior adoption of a number. The case has been vigorously contested by the defendants from court to court with the aid of very eminent counsel, and although the decision above referred to and preceding ones were all against them, they may yet perhaps carry the question still higher until it shall be settled beyond appeal or debate.

A Near View of the Future.—A sleepy traveller dreamed the other day of riding across the continent by rail, and heard among other sounds the voice of the brakeman at intervals sent through the half-opened door in words like these:

"Chicago. Change cars for New Orleans." "Missouri River. Change cars for Saskatchawan, Leavenworth and Galveston." "Rocky mountains. Change cars for Santa Fe, El Paso, Matamoras and the City of Mexico." "Salt Lake—twenty minutes for dinner. Change cars for Fort Benton, British Columbia, Pah Renegat, Panama, Lima and Valparaiso." "Virginia, Nevada. Change cars for Owyee, Columbia River, Puget Sound and Kamschatka." "San Francisco. Passengers for New Zealand, Honolulu, Melbourne, Hong Kong, and all points of Europe, Asia and Africa, will keep their seats till landed on the wharf of the daily line of the Pacific Mail Steamship Company. Baggage checked through to Pekin, Calcutta, Grand Cairo, Constantinople, St. Petersburg, Paris and Liverpool."

Wet Year.—There was more rain in 1866 than in any previous year since 1831, and 12·29 inches more than the average of that period, while the evaporation was 3·77 inches less.

NEW PUBLICATIONS.

Catalogue of Casts of Fossils from the Principal Museums of Europe and America; with short descriptions and illustrations. By Henry A. Ward, A.M., F.G.S., Professor of the Natural Sciences in the University of Rochester. Rochester: Barton & Andrews, 1866. 8vo. pp. 228.

We value highly this addition to our scientific library of reference. The general reader also will find it "stranger than fiction," and, as it is a little book, a cheap and ready means of becoming acquainted with the old fossil world, so far as it is yet known to man. The author has obtained these casts by the slow labor of years, and copies are now offered for sale.

An Elementary Manual of Qualitative Chemical Analysis. By Maurice Perkins, Nott Professor of Analytical Chemistry in Union College. New York: John Wiley and Son, 1867. Small 8vo. pp. 65.

This little manual consists of a selection of three or four of the most characteristic reactions, with a system of analysis for each of the more commonly occurring metals, acids, and radicals on the plan pursued in the laboratory for the instruction of the Engineering Department of Union College.

Gardening for Profit: A Guide to the Successful Cultivation of the Market and Family Garden. By Peter Henderson. New York: Orange Judd & Co. 12mo, pp. 250.

This treatise is by an experienced Market Gardener, and is a practical, business-like manual of advice: just such a talk as we should wish to have before engaging in gardening, from an intelligent man who had followed the business as a business all his life.

American Horticultural Annual, 1867. A Year Book of Horticultural Progress, for the Professional and Amateur Gardener, Fruit Grower, and Florist, New York: Orange Judd & Co., 12mo, pp. 150.

This beautiful Year Book and Almanac will do well to accompany the above noticed volume.

Editorial Summary.

ITALIAN PETROLEUM.—This valuable mineral product is abundant in Italy, and remarkably pure. The city of Genoa was long lighted with crude mineral oil. In the provinces of Modena and Parma, it issues from the mud volcanoes, or from parts adjacent. A Mr. Fairman, of Pisa, has obtained from the Government the exclusive right of search in the rich oil districts of Reggio and Modena, besides an increased duty on the importation. He is now offering privileges on liberal terms to English capitalists. The U. S. consul at Ancona (Mr. Charles Ribighini), has lately placed upon the English market a very fine oil found in Southern Italy, which he calls from the place of its nativity "Toccolina." It is described as perfectly limpid, of a bright yellow, without smell, and of a gravity of 80° to 85°.

FRENCH COMMERCE.—The returns for 1866 show that France like our own country is at a standstill in shipping, while carrying on a great commerce in foreign bottoms. We learn from a cotemporary that the entering tunnage was 5,117,460, against 4,572,857 in 1865, and 4,312,668 in 1864; and the outward, 3,625,012 in 1866, against 3,249,070 in 1865 and 2,968,720 in 1864. The question is, what became of the tunnage that went in but did not come out? Nothing extra hazardous, we hope, in entering French ports. Apparently two distinct classes of tunnage are referred to without discrimination, or else tuns of freight are meant, instead of tunnage of shipping.

THE PARK HEAD FORGE (Scotland) is among the heaviest workers of its kind. It has two 7-tun hammers, one 6-tun and eleven smaller hammers of one tun and upward. Among its heavy forgings have been the stern frame for H. M. ship *Achilles*, weighing forty tuns, and a double-throw crank shaft lately forged for one of Her Majesty's ships, weighing about thirty-two tuns. This was completed in six weeks and one day. For welding stern frames and other forgings of a similar construction, a hydraulic press is employed, and the weld is made in the furnace while exposed to the heat. There is a vertical drill in the establishment with a spindle 10 inches thick.

THE POPULATION OF EUROPEAN CITIES.—In 1866, censuses were taken in Great Britain and France, and the reports show the following population of the principal cities: London, 3,037,991; Paris, 1,825,274; Liverpool, 484,337; Glasgow, 432,265; Manchester, 358,855; Birmingham, 335,798; Lyons, 323,954; Dublin, 318,437; Marseilles, 300,131; Leeds, 228,187; Sheffield, 218,257; Bordeaux, 194,241; Edinburg, 175,128; Bristol, 163,680; Lille, 154,779; Toulouse, 126,936; Newcastle-on-Tyne, 122,277; Salford, 112,904; Nantes, 111,956; Hull, 105,233, and Rouen, 100,671. New York and Philadelphia have each a much greater population than any of these cities after London and Paris.

OXYGEN AGAIN.—M. Sessier de Mothsey offers as a simple and cheap apparatus for obtaining oxygen from the atmosphere, a tube containing a solution of permanganate of potash or soda and a jet of steam at a certain temperature. Heating the solution to the proper degree, a current of air speedily saturates it with oxygen, the nitrogen escaping; when the jet of steam is thrown in, displaces the oxygen and expels it from the solution. Being heavier than the atmosphere, the oxygen is collected in the tube nearly pure. The operation may be continued indefinitely. The apparatus will be exhibited on a large scale at the Paris Exposition.

NEW HAMPSHIRE GOLD MINING quite distances in excitement that of Vermont, apparently. A correspondent of the *Boston Journal* says that in Lisbon, four companies have been started, aggregate capital reported at $1,000,000. One stamp mill is running on surface ores yielding $6 50 per tun, promising great riches below. At and near Rumney, 25 miles south, over a thousand acres of land have been taken up, on the discovery of a lead which has been traced several miles, and from which gold, silver and lead have been smelted. In Lyman, adjoining Lisbon, large tracts of land have been secured for copper mining.

NOVELTY IN TANNING.—A tannery has been located at Rockford, Ill., in which is employed the patented process by exhausting the air from the vat. The tanning is said to be accomplished in twelve hours, and that of sheep skin in fifteen minutes. The weight of leather from a given weight of hides is ten per cent greater than by the ordinary process, and the cost of the works is but ten per cent that of the old. It is also claimed that the leather is better; but this point can only be determined by wear.

A VOLCANO IN THE MOON is said to be in active eruption. The crater called Linne has been lately observed to be obscured, and it is said that the same darkness was observed on this spot in 1788. The London Spectator says: "The impression is that an eruption is going on, but if so, must not the moon have an atmosphere? Could combustion take place without oxygen? Would the smoke—the carbonic acid gas—rise without some heavier gas, like atmospheric air, to rise in?"

NEUMEYER'S PROCESS for making inexplosive gunpowder, is as follows:—75 parts nitre, 6·25 sulphur and 18·75 charcoal, (the latter prepared from birch wood in a closed retort, soaked in soda lye and dried upon canvas strainers) are mixed in a moist state, and granulated in the ordinary way. English war powder consists of 75 parts nitre, 10 sulphur and 15 charcoal. Sporting powder, 77 nitre, 9 sulphur and 14 charcoal.

AMERICAN CIGARS AND "FINE CUT."—According to the records of the Internal Revenue Bureau, the number of cigars returned by manufacturers throughout the loyal section of the country, amounted to an aggregate of 1,281,359,355 on which tax was paid, between July 3d, 1862, and March 1st, 1866. The gross amount of tax paid on these cigars was $6,500,000. Of chewing tobacco, in the fiscal year of 1863, 15,231,174 pounds were returned, which yielded a tax of over two and one-quarter million of dollars; in 1864, 39,180,634 pounds, tax, $5,877,095; in 1865, 22,462,854 pounds, tax $5,936,101; and for the first nine months of the year 1866, 18,330,647 pounds, tax $7,329,428.

TOBACCO DE-VENOMIZED.—M. Melsens has found that tobaccos from various countries contain nicotine in very different proportions. In tobacco from some parts of France (*e. g.* the department of Lot) there is nearly eight or 7.96 per cent of nicotine, while Havana tobacco contains only two per cent. He proposes to smokers a way of preserving them from the effects of the alkaloid, and advises them to put into the tube of the pipe or cigar holder a little ball of cotton, impregnated with citric and tannic acids: as the smoke passes through the cotton it will deposit the nicotine therein in the shape of tannate and citrate.

PARAFFINE OILS will be injurious to brass bearings and journals if they contain sulphur or its compounds, as a result of the refining process. Dr. Vohl points out a way to detect these elements. He digested the oil for some hours at a gentle heat with a small piece of potassium, and adding water, tested the aqueous solution with nitro-prusside of sodium. The result was a deep purple solution showing the presence of a considerable amount of sulphur. Hydrofluoric acid as a bleaching agent, has been found by Dr. Vohl in the oil, and is very objectionable for lubrication, as it quickly attacks metals, and not less so for burning, as it forms a highly irritating vapor which causes inflammation of the eyes, destroys colors and acts on glass.

CHEAP RIDING.—It has been demonstrated in London, that men can be carried far more cheaply than they can carry themselves. The laboring man is conveyed to and from his home, distances varying from one to six miles, for one shilling per week, or less than two cents a trip. It is easy for him to see that his time and strength saved are worth more than this to him in wages at his work, and that many times this can also be saved to him in rent by fixing his residence out on the railway. Accordingly two of the most costly railways in England command by this policy a laboring men's traffic which is nearly if not quite the most profitable they enjoy.

PHOTOGRAPHY is applied in a very simple manner to register automatically the state of the thermometer or barometer at any regular intervals desired, throughout the day or even the twenty-four hours. An arrangement of clockwork is made to revolve the sensitive plate into position and uncover and close the camera tube at the proper intervals, thus obtaining a picture of the instrument. The movements of the compass, and the path of a ship, are also to be registered or rather pictured by photographic contrivances.

SOLUTION OF ROSINS FOR VARNISHES.—Calcutta copal and its congeners, as well as amber, are found, after heating in a closed vessel to 350° to 400° cent. (660° to 750° Fah.) to have acquired the property of dissolving when cool, in hydrocarbon or vegetable oils, without loss, and producing new and very fine varnishes. The combined influence of heat and pressure is the cause of the novel properties, the latter rising as high as twenty atmospheres.

A MONITOR.—At a recent meeting of the Institute of Civil Engineers, in England, Mr. John Bourne, celebrated engineer, read a paper upon the Navy, in which he demonstrated that the broadside system of iron-clads was a failure, and that the turret system—of which he expressly gave the credit to Capt. Ericsson as its inventor—must eventually be adopted by the English Admiralty, as combining the utmost possible concentration of offence and defence.

ABOUT 8,000 hogs, 2,000 sheep and 150 head of other cattle are now slaughtered weekly at the Communipaw abattoir. The yards will hold 20,000 hogs, 15,000 sheep and 6,000 head of cattle. A new and more merciful mode adopted for slaughtering beeves, is to insert the point of a sharp lance in the back of the neck, at the base of the brain. The death of the animal is said to be instantaneous, and is of course free from terror.

SAWING.—The foreman of Lawshe, White & Co., Osceola, Pa., furnishes us with the equipment of their mill, with which over 11,000,000 feet of lumber were cut in eight months, as follows: 1 slabbing gang; 1 flat gang; 1 muley saw; 1 double-edger. This mill, our informant says, having all the late improvements, can cut more lumber with the same number of saws than any mill within his knowledge.

PORCELAIN.—Since our article on glass, we have seen a report of recent experiments by M. Pelouze, in modifying the substance by varying the proportions of its constituents. Among other results, by increasing the proportion of silica to 400, he obtained a beautiful porcelain resembling the translucent marble called Algerian.

THE pride of position not unfrequently is the parent of injustice. Those mechanics who through perhaps compulsory experience, or by the favor of circumstances, have achieved a position which gives them responsibility and influence, are too often the most unreasonable in their exactions from the uninformed, or the inexperienced apprentice.

THE CLIMATE OF MICHIGAN is materially modified by the great lakes that surround it, softening and moistening the prevailing winds. In consequence, although in about 42 to 46 degrees north latitude, the belt of country bordering on the eastern shore of Lake Michigan for some miles back from the water, is becoming celebrated for the perfection of its fruits and the certainty of the crop. The state owes to the same cause the most extensive and valuable forests of timber now anywhere to be found east of the Rocky Mountains.

NEBRASKA produces twenty-five native varieties of the plum. In early spring, says a report to the Agricultural Bureau, hundreds of acres together of these indigeneous plums display one sheet of white flowers covering the landscape, and loading the air with fragrance. A certain variety has been observed which withstand the attacks of the curculio, and bear abundantly, while all others were thinned out by the insect. Three varieties of gooseberry are also native to this State, one of which is of remarkable size and flavor.

PATENT OFFICE DECISION.—It was omitted to be stated that the able decision, having reference to important improvements in sinking wells, from which an abstract of the points involved was given in last week's issue, was rendered by the Hon. Elisha Foote, S. H. Hodges and S. C. Fessenden concurring.

LONDON has a society for the saving of life from fire, by means of which 89 persons were rescued during the last year, from 610 fires. The force is 100 strong, with 85 escape stations.

"CANNEL."—The origin of this term is doubtful; but it seems to be the general opinion in the mining districts where cannel coal is obtained, that it is an easy corruption of "candle," referring to the free inflammability of the article.

CINNABAR.—Cinnabar of a beautiful vermillion color is found in an unusual form in Idaho, being abundantly spread throughout a gangue so massive, compact and homogeneous, that specimens may be cut and polished like marble.

A GREAT BELT lately manufactured by P. V. H. Van Riper of Paterson, for a cotton mill in Philadelphia, measures 103 feet in length, 28 inches in width, and three-fourths of an inch in thickness. It consumed 100 hides and cost about $1200.

ITALY shows a strong symptom of genuine *renaissance* in the activity and ambition of her manufactures. No less than 1,365 exhibitors are already enrolled from Italy in the Paris Exposition

METALLIC ZINC PAINT.—English papers notice a novel preparation of metallic zinc which is easily pulverized and applied with oil as a paint for ships' bottoms, to prevent fouling.

OBITUARY.

Science in the United States has lost one of its brightest stars by the death of Prof. ALEXANDER BACHE, which occurred at Newport, R. I., on the 17th of February. A more extended notice will be given next week.

Tunnel, Tunnel, Tunnel.

A number of Pittsburgh capitalists have under consideration the construction of a tripartite tunnel from Saw Mill Run to Pittsburgh, Alleghany and Manchester, under the Ohio and Monongahela rivers. A bridge of like character was contemplated some years ago. The impression now is that a tunnel will not cost more than the bridge while the advantages are with the former.

Another tunnel is talked of to pass the trains of the Great Western and Michigan Central Railways under the Detroit River, over which they are now carried by the new iron ice boat. Borings are said to have shown a favorable stratum of clay.

A bill has been passed by Congress authorizing the construction of a tunnel under the Mississippi River at St. Louis

THE MARKETS.

We noticed in our last report the prosperity of the European manufacturing interests, and with the consequent cotton demand of Great Britain and the Continent. It may not be unint resting to note in this place from whence the supply for the year may be reasonably expected.

It is now generally conceded that neither India nor Brazil are to be relied on the present season for meeting this demand on anything like the scale of last year; in the former country the falling away from the unprecedented to furnish thrice as much as last year, but this estimate is now materially reduced. Too much has also been expected from Turkey and the neighboring states, and though some slight increase may be realized both from these quarters and the West Indies, the main supply must still be from the United States. Last season there were shipped from this country to Europe 1,500,000 bales of cotton, of which amount Great Britain absorbed 1,262,000. Estimating the crop of this season at 2,000,000 bales, allowing three-eighths of it for home consumption, there will then be 250,000 for shipment to the Continent, and 1,000,000 for Great Britain, a falling off in the latter's supply of 262,000 bales, and when this is added to the probable deficiency from India and Brazil, it is evident a demand twill be created which must make prices correspondingly and quite uniformly high.

PETROLEUM.—Total foreign exports from the United States from the beginning of the year to the 9th of this month was 4,141,227 gallons, showing a falling off from shipments of the same time last year of 2,923,005 gallons, and an increase from 1865 of 2,473,533 gallons. The market at date is weak, with a fair demand for crude.

COTTON.—A continued falling off in receipts from the interior has had the effect of stimulating exporters and speculators to purchase freely at full prices, in anticipation of an improvement in the Liverpool market.

METALS.—The demand for ingot copper is still very limited, but prices are firm, with very little offering at present rates. The iron market continues dull. Some improvement is at length noted in pig lead. The demand for foreign spelter is light, but the advanced price is well sustained, Silesian selling at 6¾ cents gold. The anticipation of a higher tariff on steel has had the effect of creating considerable activity on the part of purchasers. Pig tin is offered quite freely, and a slight decrease in prices is noted. Zinc continues dull.

PULLEY SUSPENSION HOOK.

It is a dangerous and trying labor to suspend the upper pulley of a horse hay-fork from the meams over the hay mow, and troublesome to shift the point of suspension as the work proceeds. The engraving shows a very simple device to fasten such tackle without the necessity of climbing. It is a double hook of iron, the lower curve holding the pulley, and the upper intended to engage with a beam or any convenient projection. An arm is pivoted at A, which is secured to the wooden lifter, B, by which the hook, pulley and connections may be raised by a pole, C. By the same means the hook and tackle may be removed from place to place as required. This device appears to be adapted for a number of purposes where a hoisting tackle is required. It is the subject of a a patent obtained through the Scientific American Patent Agency, Nov. 13, 1866. All letters relative to the device should be addressed to Miller & Plants, Rollersville, Sandusky Co., Ohio.



KEILER'S LAMP CHIMNEY CLEANER.

The introduction of coal oil as a common illuminator has in a large measure superseded the use of common oil lamps and candles, but while it is vastly superior in light-giving qualities, it has its disadvantages, one of the chief of which is the annoyance of the glass chimney, which must be kept clean that we may derive the full benefit from the lamp; and this cleaning is a nuisance, as it is commonly performed. The implement herewith illustrated is intended to make this labor light, to insure a perfect cleaning of the interior of a shade without the expenditure of much time or the danger of breaking the glass. It is perfectly simple, merely a bladder or a bag of india-rubber, or other elastic, to be introduced to the interior of the glass and inflated to fill the whole space. The bladder is secured to the end of a hollow handle and may be covered with a cloth of cotton or woolen. Air is blown into the hole at A, and escapes through another aperture in the interior of the bladder. When the bladder is filled, which can be done in a breath, the thumb is placed over A and held while the glass is cleaned. This device will recommend itself to all housekeepers, and others who use glass shades and lanterns. A patent was issued for this improvement, Sept. 25, 1866, to Levi Keiler, whom address at Catawissa, Pa., for information in regard to state and county rights, etc.



Petroleum and Paraffine are manufactured in Wales and Scotland from the shale or refuse of the bituminous coal beds. It is estimated that about twenty gallons of crude oil are obtained from a tun of coal, and that between seven and eight millions of gallons per annum are manufactured in the retorts of Scotland alone. The principal supply, however, is from the oilwells of Pennsylvania.

A METHOD OF CONTROLLING THE PRODUCTS OF THE BESSEMER PROCESS.

Prepared for the Scientific American by Dr. Adolph Schmidt.

The greatest and till now unconquered difficulty in conducting the Bessemer process, is to determine exactly the moment when the process has to be interrupted for getting a product combining certain precise qualities. The most experienced engineers and managers in every country where the process is carried on, have not yet been able to find out a mode of working by which it might be possible to obtain with certainty exactly that kind of a product they wish to get at the time. Different ways have been proposed and tried to overcome that difficulty, but all have failed. This will not appear so very astonishing when it is considered that the time during which the process must be interrupted, if any kind of useful material is to be obtained, lasts no longer than about two minutes and a half, and that during this short period the metal passes rapidly through all the chemical and physical conditions between that of a very hard cast-steel and that of a soft and highly ductile wrought iron.

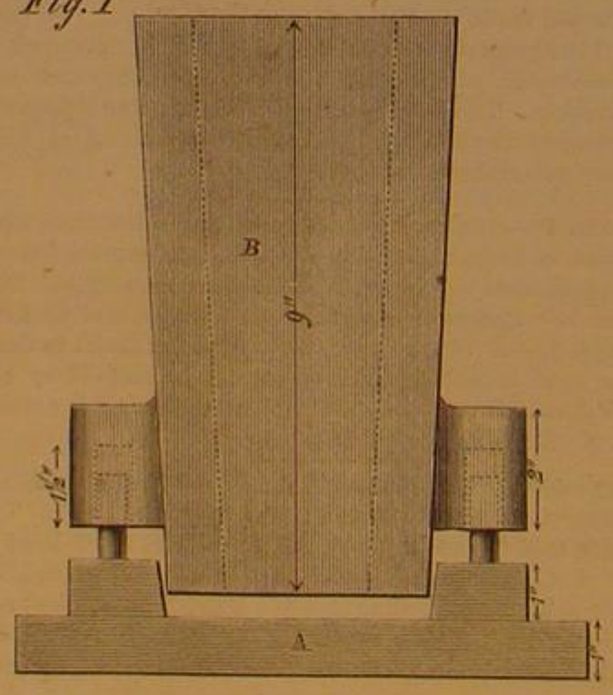
The only important progress that has been made in this respect is by the final addition of spiegel or other pig iron at the end of the process. This method facilitates beforehand, to a considerable degree, the acquirement of the desired result, because the moment when the metal is in the condition of wrought iron, or almost entirely decarbonized, it is easier to be recognized than any other, and the addition of more or less molten pig iron, after this moment has been observed, and the process is interrupted, offers a convenient expedient to effect a partial retrogression of the process and to obtain a more or less hard product. This invention was therefore a real and general improvement.

All the progress that has been made, besides this, in the certainty of the results to be obtained by the Bessemer process, chiefly consists in the practical experiences and observations of men who possess such theoretical knowledge as is necessary for viewing the phenomena occurring during the process, in the right way, and for drawing from the facts the right practical conclusions.

But neither these more local improvements, nor the beforementioned method of working, have been able to overcome sufficiently the uncertainty clinging to the results of the process; and it is an incontestible fact that the quality of its product is generally very unequal, and quite uncontrollable during the course of the process. The consequences of this must evidently be very bad, and as injurious to the manufacturers of the raw ingots as to those who purchase to rework them.

When the ingots are cast, the manufacturers generally do not and cannot know what kind of metal they consist of, what qualities this metal has, nor what purposes it is good for. Only vague suppositions can be made by the manager of the process from the general manner of its going on, from the phenomena it exhibits to his observation during its course, from the appearance of the metal in its fluid and in its chilled state, and from the color and appearance of the slag. But how very uncertain such suppositions are, is known by every one who has often assisted in the process and noticed the illusive character of the phenomena observed. These appearances in the metal and slag are often equally deceitful.

Fig. 1



The ingots are sold afterwards or transmitted to those who have to work them, under the general name of "Bessemer metal" or "Bessemer steel," and it is not discovered of what kind and quality they are until after they have been heated and hammered or rolled, when it is too late to determine for what purpose they would suit best. So it happens in England. For instance, it frequently happens that ingots which would make first-class tires are used for plates, and make bad ones, and ingots which would prove an excellent material for making chisels and other instruments, are rolled out into rails, which prove to be poor and break.

In a word, bad or at least unreliable finished products are the consequence, which necessarily brings discredit on the process, spoils the market, lowers the prices, and, in general, hinders a rapid extension of this important branch of manufacturing business, as well as a rapid increase of the use of its products.

To prevent so disadvantageous experiences by the Bessemer manufacturers of this country, the following communication will indicate a simple and inexpensive method, by means of which every manufacturer can ascertain for himself the qualities of his ingots after every charge that has been made, and classify them according to their qualities. The method is a modification of one used in Austria with eminent success.

When at the end of every Bessemer charge the molten metal has been poured out of the inverter into the large ladle, it has to be left till the ebullition caused partly by the continued chemical action between the metal and the spiegel or pig, partly by the vapors still escaping from the lining of the ladle, has almost ceased. Then one or two ordinary ingot molds should be filled to get the small impurities and the less hot parts of the metal which sometimes stick to the bottom, out of the ladle; then somebody fills an ordinary small casting ladle with metal, and casts from it a small testing ingot, generally between ten and twenty pounds in weight, by pouring the metal into an iron mold prepared for that purpose. This operation may also be done directly from the large ladle by bringing its muzzle over the small mold; but the use of a well-dried and warm ordinary casting ladle is preferable for very small ingots. The shape of the mold is of no very great importance. I think, however, that the best shape is the one represented in the annexed engraving. It is that of a reversed trunk of a four-sided pyramid. The shape is pyramidal—though but slightly so—because the ingot is easier to be taken out of such a mold than out of one made like a straight column. The pyramid is reversed in order that the

Fig. 2

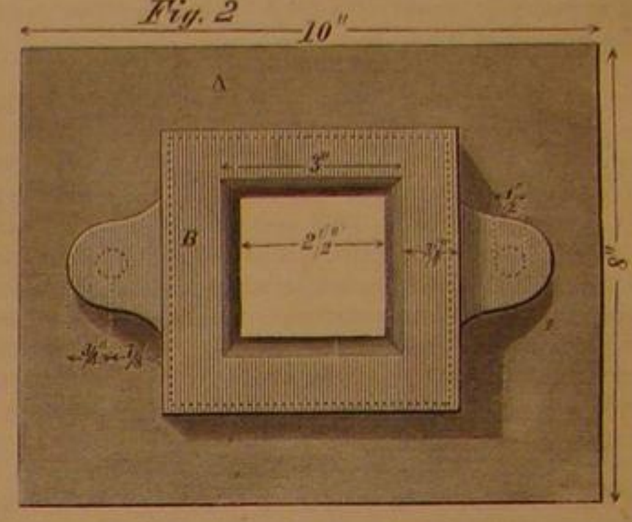
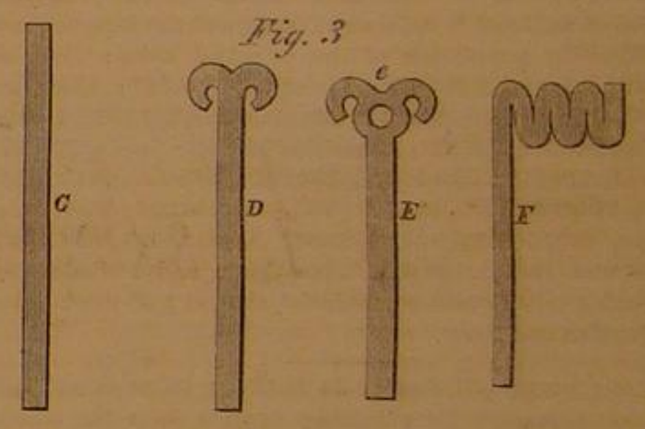


Fig. 3



gases frequently developed during the operation of casting, may have a better escape, and that the slag or other light impurities may find a larger surface to be gathered upon. I propose the section to be quadrangular, because in this form the small ingot is easier to be seized and handled, and easier to be forged and rolled than with most other shapes, and because at the same time the ingot gets some angles which are sharp enough for the degree of fusibility of the hot metal to be observed by the aspect of the edges of the ingot. The mold is composed of two parts, both of cast iron. The bottom plate, A, is planed at the middle part of its surface. Two wrought-iron bolts are cast in it and stand out about an inch and a half over the top of two massive flanges about one inch high. The pyramid, B, planed at its smaller end, has two ears, about two inches high, with circular holes an inch and a half deep in the lower surface. These ears and holes are made so as to fit the position of the flanges and bolts on the bottom plate. These two parts of the mold are fixed together simply by passing the bolts of the plate into the holes or the ears of the pyramid, to prevent the mold from falling over during the casting operation. The mold has to be made very strong in all its parts and dimensions, so as not to break when the ingot is knocked out of it afterward. The weight of the ingot for testing may be between eight and twenty, and in single cases fifty or sixty pounds. In places where a proper rolling mill or good-sized hammer can be used, it will be well not to have this weight less than fifteen pounds. But where the whole testing operation has to be made by hand, smaller ingots are preferable. The dimensions of the mold depend upon the desired weight of the ingot. If the upper opening of the pyramid is made three inches square, the lower one two and a half inches square, and the hight nine inches, and if the mold is only filled with metal up to a hight of about eight inches, the upper part being filled with sand, ingots of good proportions and of somewhat over fifteen pounds in weight will be obtained.

Such an ingot can, when previously heated to a very light red and nicked, be easily broken, under a steam hammer, to show the fracture of the raw metal, if this is required.

As soon as the small ingot, cast by means of the mold above described, has hardened, the pyramidal part of the mold containing the ingot, is taken away from the bottom plate, set upside down on a frame a little wider than the large opening of the mold, but having the same form of section, and the ingot being still slightly red-hot, is knocked out by blows of a hand hammer on a piece of iron applied to the small end of the ingot in the mold.

After having been examined as to its exterior appearance, the ingot is taken without delay into a heating furnace, heated to a uniform good yellow heat, and hammered or rolled out to a rectangular or quadrangular bar of not over a square inch in section. This bar is cut instantaneously in pieces of one and a half or two feet in length, and the pieces are brought over to a small forge, there to be tested by a blacksmith. If there is no bar mill nor steam hammer at the works, the ingot, being made of a smaller size, is to be treated at the small forge exclusively.

The fuel used in the small forge for the following operations should be charcoal. If mineral coal is used it must be carefully selected so as to be free from pyrites and other minerals or compounds containing sulphur.

TESTING.

Testing has for its object to discover if the metal is of a good or bad quality in general, as well as to investigate its special qualities and aptitude. It is done by forging, hardening and welding: to which three kinds of manipulations there may afterwards be added experiments in relation to the tensile strength and the chemical composition of the metal. The three first-named simple operations will be sufficient, however, for the ordinary and regular testing and classifying of the metal produced by each charge.

FORGING.

Forging is done by heating one or several pieces of the metal in a smith's fire to a good yellow heat, and by hammering, working and distorting it in different ways to show the malleability, the toughness and the equality of structure in the metal. This can be done by all the ordinary kinds of blacksmith operations. A very good way to show the two last-named qualities of the metal, I consider to be the following forging operation: Forge a bar about one-eighth inch thick and one-half inch broad. Cut one end straight off, and split the bar in this place and in the middle of its width to a length of one inch or more; bend the two separated parts around on both sides, and make a large round hole to the middle of the intact part of the bar, very near the end of the split, so as to present the succession of shapes, C, D, E, as shown in Fig. 3. If the metal at *e*, in the top of E, gets very thin by extending the hole, without cracking through to the split, the metal is proved to have a high degree of toughness and a very uniform structure, equal in different directions. An ordinary and well-known testing operation, which should never be omitted, is to bend a bar similar to the one above described in several different places, and to hammer the bent parts close together, to see if the metal is liable to crack by bending. The shape of the bar, produced by this operation, is represented at F, Fig. 3.

Every good kind of metal should withstand these two trials without injury. If not, it is not blown enough, or two much, or it contains chemical impurities. In all these or similar operations, at first to be made, great care has to be taken that the temperature of the metal never exceeds a good yellow and never decreases below a dark yellow heat. For in both these instances the metal, being steel-like and perhaps of an excellent quality for many purposes, may crack, owing to the improper temperature. If the bar cracks more or less easily at the yellow heat, it has to be tried afterwards at a white welding heat, and if it keeps good in this state, it shows that the metal is a kind of inferior wrought iron. In all cases the metal has to be tested by simply hammering it at a red heat to see if it is inclined to be red-short.

HARDENING.

Hardening, considered as a testing operation, is chiefly employed to discover if the metal is of a steely nature, because steel is capable of being hardened and tempered and wrought iron is not, or but very slightly. A bar half an inch square is prepared, heated in the smith's fire to a light red, and dipped in water till it is cold enough to be held in the hand. The bar is then laid across an anvil, and strokes are applied with a hand hammer on its free end till it bends or breaks. If the bar so treated does not bend at all, only giving way for a moment to the blow, instantly returning to its former shape by reason of its elasticity, and breaks at once by a harder blow, exhibiting an even or conchoidal fracture, fine-grained structure and bluish gray color, we have a hard kind of steel before us. If, on the contrary, the bar does not show any degree of hardness or elasticity after having been suddenly cooled in water, but gives way to each stroke applied to its end without returning to its original shape, and is so bent gradually to a right angle or further, showing, when finally broken, an uneven and fibrous structure and pretty dark color, the metal is wrought iron, and the results obtained in forging will show whether it is a good or a poor kind of iron. But most of the products of the Bessemer process are of a quality between the first mentioned and the last kind. Nevertheless these products, when free from chemical and mechanical impurities, prove useful and even very excellent for certain purposes, and therefore a well-determined classification of these different kinds of metal, as proposed hereafter, will doubtless be exceedingly valuable.

WELDING.

Welding, when tried with the metal, will serve to complete the tests of the qualities and the degree of usefulness of our Bessemer products.

A bar about half an inch broad and a quarter of an inch thick, is heated in the smith's fire, bent in the middle and hammered down, so that the two parts come together closely. It is then put back into the fire to be heated to a regular white welding heat, using some pure sand or powdered puddling cinders, hammered, cooled in water and broken. If the metal has the welding property in a high degree, as pure Bessemer metal generally has, the seam should not be at all visible in the surface of the fracture.

The result of this operation, however, very much depends on the skill and good will of the operating workman, and a good and reliable smith has therefore to be chosen for the purpose. If the metal is of the harder kinds, hammering has to be done with care and caution.

Welding of Bessemer metal is, in general, one of the most interesting and yet least understood points in this new branch of industry. Ordinary wrought iron welds better than ordinary steel, and corresponding with this fact it may be said that the softer kinds of Bessemer metal weld better generally than the harder ones. But even the hardest Bessemer product very seldom offers in welding so great difficulties as ordinary cast steel, and all steel-like kinds of it are, when compared with the corresponding kinds of steel made in the ordinary way, good welding materials. It occurs, however, not as a rare but a very strange fact, that metal of some one other Bessemer charge, independent of its other qualities, proves entirely unfit for perfect and reliable welding. I shall, perhaps, on some other occasion, communicate some observations on this subject. Remelting the pig iron used in the process, with the mode of doing it, seems to affect this property of the metal.

The three simple testing operations just explained are generally sufficient to determine very nearly the kind and the aptitude of the material produced by a Bessemer charge. However, the trial of the tensile strength and the chemical analysis of the metal are often of great importance too, and every Bessemer works should have the apparatus necessary for ascertaining them. But they require a longer time and may be done after the tests just described. The modes of conducting them are similar to those employed for other kinds of steel and iron.

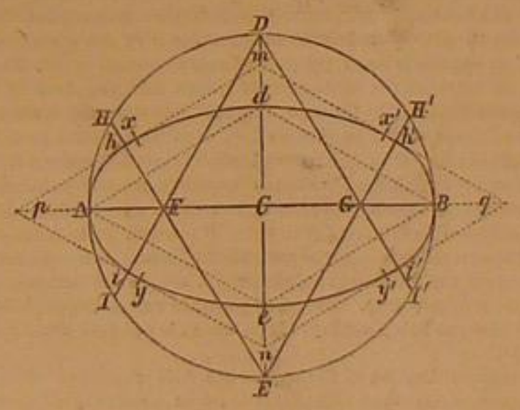
It is also useful to carefully observe the color and qualities of the resulting slags. There will always be found a more or less visible connection between their appearance and the qualities of the metal, if one and the same kind of pig iron is used.

Science Familiarly Illustrated.

How to Draw an Ellipse in Isometric Projections.

J. Konvalinka, of Astoria, L. I., gives the following method for drawing an ellipse such as is required in perspective drawing for the representation of a circle; where the three principal planes are viewed at equal angles and the side horizontals drawn at an inclination of 30°.

First, draw the two diagonals, A B, D E. Then with the radius of the circle, which is to be represented in perspective, describe the circle, A D B E. From the points, D and E, and with the radius of the circle mark on it the sextant and points, H H' I I'. Then draw the lines, D I, D I', E H, E H'. From the crossing points of these lines, F and G, describe the arcs, *i* A *h*, and *h'* B *i'*, which form the ends of the ellipse. These are then united by the arcs, *h d h'* and *i e i'*, from the centers, E and D.



This will more closely and correctly represent an ellipse for the above-mentioned purpose than that shown in Fig. 2 on page 21 of the present volume of your journal. It will coincide in eight points with a true ellipse. Suppose A *d* B *e* A is a square, inscribed within, and *p m q n p* a square, circumscribed around the circle and represented in perspective. A *d* B *e* are four points. *x x' y y'*, are other four points. These are the centers of the sides of the outer square, which at these points touch the ellipse as tangents. This will show how little the curve herewith represented differs from a true ellipse, and it also affords an easy means for correction by hand, if something more exact is required.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Action and Reaction---The Proper Unit of Measure for Force.

MESSRS EDITORS:—The interesting and instructive article in a recent number of your paper, by Prof. Seely, on the "Recoil of Guns," shows a great intimacy with the subject, and is practically valuable. I wish, however, to object to the doctrine therein advocated, that action and reaction are not always equal, and to the concomitant doctrine, which was advocated by the celebrated Leibnitz, that the force of a moving body is proportioned to the mass into the *square* of the velocity instead of the simple velocity.

Since the velocity of the gun is clearly shown to be to that of the ball, inversely in proportion to their respective weights, it undoubtedly follows that if we admit the Leibnitzian measure of force to be correct, i, e, the mass into the square of the velocity, the force of the powder will, under this supposition, be expended *unequally* between the gun and the ball, that acquired by the latter being as many times greater as it is lighter than the former. But the truth of this supposition is the real point at issue, and it was for many years the subject of a violent controversy between Newton and Leibnitz and between their respective followers. It was at last generally admitted that the dispute was one of definitions rather than facts, either party being in the right providing his definition of force, and of its mode of increase or *diminution*, could be admitted as true. Since that time the Newtonian measure, the mass into the velocity, has been generally adopted as the measure of the *quantity* of a force or a motion. Some attempts have been made to revive the Leibnitzian view of the subject, and Prof. Treadwell read an ingenious paper for that purpose before the American Academy at Boston, some years ago. The eminent mathematician, Prof. Peirce of this country, and the distinguished Dr. Mayer of Germany have also, though somewhat less decidedly, expressed themselves in favor of this revival. The difference in the two ways of estimating the quantity of force associated with a given body in motion, depends upon whether the *time* which elapses, or the *space* which is passed over, while the entire force of the moving body is imparted or overcome by a uniformly accelerating or retarding force, is made the coefficient of the unit of measure.

The Newtonian, and it seems to me, the true conception of the subject is this:—a uniformly acting force, like gravity at the earth's surface, for instance, will add equal increments of force to a body upon which it acts freely, in equal periods of time, and its entire force, since its velocity increases uniformly, is simply as its velocity, and not as the square of its velocity, for if unequal increments are added in equal times, then the cause must act variably, which is contrary to the supposition. The passage of a body through space is not an evidence of the *expenditure* of force, since a moving body, if unopposed, will traverse an infinite distance. A certain portion of the space traversed, then, has no relation to the expenditure of force, and it accordingly follows that the entire space is not a proper co-efficient of the force expended.

Suppose a person to walk with a certain uniform speed upon the deck of a steamboat. He will perceive no difference in the amount of effort required, whether the boat be stationary or in motion, or whether the direction in which he walks is the same as, or opposite to that of the boat's motion. But if the Leibnitzian measure of the entire quantity of force be correct, the force expended under the different circumstances must be widely different. If we suppose the boat's velocity to be 12 miles an hour, while the person walks at the rate of four miles in the same direction, the additional velocity thus attained will impart an increased amount of force beyond that attained by walking on a stationary boat in the proportion of 112 to 16, or 7 to 1.* For the square of the walking velocity on a stationary boat is 4×4=16, while the force required to walk forward at the same rate of speed while the boat is in motion would be determined thus: The square of the velocity unincreased by walking would be 12×12=144, increased by walking, 16×16=256, the excess being 112 which is the Leibnitzian value of the different amounts of force in the two conditions. This discrepancy of theory with fact, is greatly increased when we consider the immense velocity of the earth in its motions around its axis and around the sun. The reasoning by which the attempt is made to overthrow the almost self-evident axiom of the equality of action and re-action also leads to the fallacy of applying a measure of one kind to estimate the quantity of something of an entirely different kind. While the product of the mass into the square of the velocity or the equivalent product of the uniform or average intensity of force into the *effective space* is a proper measure of other space products or space effects of the same kind, it does not follow that it is a measure of simple and absolute force.

The proper definition of force seems to me to be,—*that which when associated with water causes it to move.* No mode is known by which we can determine the *absoluteness* of rest or motion and no *practical* error, is found to arise in assuming that the motion of any given body is merely *relative*, or in considering the body as at rest, when referred to another body moving with the same velocity, and in the same direction. The above definition of force thus becomes sufficiently comprehensive to include all that causes *change* of motion whether by acceleration, retardation or change of direction. Since no error ensues from the assumption of the *relativity* of motion it follows that equal increments of force are added or subtracted, in equal units of time, when the velocity of a body is uniformly accelerated or retarded, and consequently that the measure of force in the body is found by multiplying the *mass by the velocity.*

I am, however, quite ready to admit that, while it is not the measure of absolute force, the product of the mass into the *square* of the velocity is the measure of *practical results.* All the operations of mechanics, and even of every-day life, consist in *overcoming resistances*, by which is meant, changing the positions or relative positions of bodies or parts of bodies where *effort* is required. This is called the *performance of work*, and is measured by the product of the resistance into the space through which it acts, or, what amounts to the same thing, the mass into the square of the velocity of the body doing the work. It includes what is called the penetration of bodies, and the overcoming of friction, or, in general, of any kind of resistance. The force acquired by a body falling one hundred feet in vacuum, will lift another body, if thus expended, to a height of one hundred feet or it will lift ten similar bodies to the height of ten feet, or one hundred similar bodies one foot, etc. Since the velocities attained by falling bodies must be squared to make them proportional to the distance fallen, it follows, that these *space effects* are proportional to the squares of the velocities of the gun and ball, are proved to be inversely as the masses, we readily perceive that equal quantities of force are acquired by the two, and that "action

and reaction are equal and opposite," as was propounded and demonstrated by the immortal Newton. We also perceive that the *space effects*, the *penetrative power* or the power of *performing work*, are *unequal* being in inverse proportion to the weights or in direct proportion to the products of the masses into the squares of the velocities.

Henry F. Walling.

New York, Feb., 1867.

Patent Law Amendment.

Messrs. Editors:—I am at a loss to know why Congress repealed section 6th of the patent law of 1842. It was certainly not done in the interest of inventors. The way the law stood, as I understand it, parties unauthorized by patentees or their assignees could not stamp a patented article nor use it unless stamped, without making themselves liable to a penalty of not less than $100 and costs. As it stands now, no one is required to stamp a patented article. For anything I can see in section 5th, persons may use patented articles provided they are not stamped. If patented articles are not stamped there is no very great inducement to stamp unpatented ones.

The two sections together are a protection to inventors to the extent of the penalty attached. As the law is now it amounts to very little. If you take the same view of the matter I do you will use your influence to have section 6th re-enacted, but I am no lawyer.

You may be pleased to know that I am doing very well, for a poor man, with my patent obtained through your Agency. I made a trip this month with my bee hive, and in four days I cleared $150, and I have done better in less time.

Jas. S. Marshall.

Greenville, Pa., Jan. 29, 1867.

[We think the amendment to which our correspondent refers is a very good one. If patentees fail to stamp the date of their patents on the articles offered for sale, or upon the packages so as to give public notice of the existence of the patent, they cannot recover from infringers.—Eds.

Proving Guns by Measurement.

Messrs. Editors:—In the London *Mechanics' Magazine* of Dec. 21, 1866, appears an account illustrated by engravings of an instrument for "proving guns by measurement," by Mr. Joseph Whitworth. This instrument is identical, both in form and principle, with the star gage, which, for at least a quarter of a century, has been used in this country by the Ordnance officers of the Army and Navy for proving guns by measurement, but it is described by Mr. Whitworth as designed by him.

The star gage is believed to be of French origin, though it has been much improved since its introduction into service in this country, but the "Calibre Star," described by Tousard, and referred to in an order of the Duc de Choiseuil, dated March 31, 1766, in relation to the inspection and proof of French cannon, is undoubtedly the original of the present instrument.

As the star gage is fully described both in the Army "Ordnance Manual" and the "Instructions for the Inspection and Proof of Cannon," for the Navy, as well as in various works on Ordnance and Gunnery published in this country, it is not necessary to describe it here; but any person who will take the trouble to compare any one of the above cited descriptions with that of Mr. Whitworth, will see at once that the instruments are the same.

How then can Mr. Whitworth claim this instrument as having been designed by himself? Can it be possible that so distinguished a mechanician and artillerist as he, could be ignorant of the existence of an instrument that has, for so long a time, been considered as almost absolutely essential for the measurement of guns? Or has he really made an invention which is already a hundred years old! U. S. N.

Washington, D. C. Feb. 7, 1867.

A Substitute for Writing Ink.

Messrs. Editors:—Not long since, I read in one of your papers a dissertation relative to the qualities of writing ink. I will simply state to you, that for the last twenty years, I have been doing a large amount of writing, and that during that time, I have used common India ink, simply disolved in water. It being composed of carbon, and little else, it will keep in any climate or place from year to year, perfectly sweet. Even freezing does not injure its good qualities, a simple cover is all that is required to prevent evaporation and keep the dust from falling into it. I have never used any kind of ink that would flow from the pen with that ease and agreable freeness that this *hydrate* of *carbon* does. The stroke of the pen made with it is quite black if desired, and will endure unchanged to all time provided the paper or parchment remain sound, and even papers that have been burned and not fallen to pieces, with this kind of writing upon them, remain quite plain to read. F. S.

[Ordinary writing ink is a modern invention. The ancient ink was such as our correspondent finds best. It is still used by the Chinese and Japanese.—Eds.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,366.—Coating for Paper and other Materials designed to receive Lead Pencil Marks which may be Repeatedly Expunged with Moisture.—Sylvester Schoonmaker, New York city. Dec. 24, 1866.

3.—Bench Planing Machine.—Joseph Jones, Newark, N. J. Jan. 1, 1867.

36.—Water Delivery Nozzle, employed in the Extinction of Fire.—William Barbour, Lawrence, Mass. Jan. 5, 1866.

46.—Auger.—Almaza C. Kasson and Nelson C. Gridley, St. Louis, Mo. Jan 7, 1867.

70.—Elliptic or other Elastic Springs.—Edwin M. Chaffee Providence R. I. Jan. 11, 1867.

[Reported for the Scientific American.]

MANUFACTURE OF BEET SUGAR.

BY JOSEPH RIBSH, PH. DR.

The production of sugar from beets, and the establishment of a branch of industry which has now attained huge proportions, is not, cannot be, traced to a mere accidental discovery, but is the legitimate result of careful and long-continued observation, study and diligence, ever combatted by a cold northerly climate. A detailed account of the advance in the manufacture would show progress made step by step against the greatest prejudices, while ridiculed and pronounced hopeless even by such men of science as Liebig. Yet, in spite of almost insurmountable difficulties, the world did move; and while France in 1829 produced 80,000 pounds of beet sugar, the supply in 1838 was increased to 98,452,182 pounds, or 492,260 tuns, made in 600 manufactories.

Only so late as 1747, the German chemist, Markgraf, published the results of his experiments with different roots, especially the beet and sugar beet, in which he proved the presence of crystallizable sugar, unknown or doubted until then. His discovery remained a scientific curiosity merely, without bearing any practical results; and it is to his talented disciple, Francis C. Achard, that the credit belongs of examining anew all the plants which, in the cold northerly zone of Europe could be raised with profit for the production of sugar, and of being the pioneer in the art, by erecting in the year 1799 the first large establishment for the production of beet sugar, situated in the county of Cuneva, in Silesia. In 1799 and 1812 he published his first complete treatise on beet sugar, which was so precise, distinct and plain, and moreover was treated in such a thorough practical manner, that it aroused the attention of the English sugar merchants, and caused them to make him the generous offer of 50,000 Prussian thalers, on condition that he would discontinue his experiments with beet sugar, and so kill this industry at its birth. Nobly refusing this offer, the sum was subsequently quadrupled, in the hopes of inducing him to publish another work setting forth that his enthusiasm for the beet sugar manufacture had carried him too far, and that experiments on a large scale had not realized his expectations. This offer was also declined. The English merchants had now become thoroughly alarmed at the progress the new manufacture was making on the continent, and made one last effort to crush it, by engaging Sir Humphrey Davy to write a work in which he sought to prove that beet sugar was bitter. But even this very learned treatise was of no avail, for all over Europe beet sugar was consumed, and its bitterness was pronounced to exist only in England. Napoleon's continental blockade, at the beginning of the present century, stimulated the new industry; and though the enterprise was encouraged by all the crowned heads of Europe, yet the main practical and successful aid was given by Napoleon I., to whom belongs the honor of being the second founder of the beet sugar industry.

The discussion of the beet sugar manufacture should be preceded by that of the beet itself, and its cultivation. The sugar beet cultivated in Europe is known under several varieties, the favorite one being the Silesian. A cross section of this beet exhibits a white, dense structure, in a few of its varieties, having concentric rose-colored rings about three eighths of an inch wide. Its juice has a concentration of 8° to 9° B, and contains but a small proportion of impurities. A cond variety of beet is the Burgundy, which grows out of the ground, has a loose porous texture, a great deal of highly diluted juice, and on this account is undesirable for the production of sugar. The properties of a good beet are the following: uniform shape, and if possible without branchings or forks, as these are likely to retain impurities from the field, impart them to the juice, and impede the production of crystallizable sugar. The beets should not weigh less than one pound, nor more than five, smaller ones being washed and ground only with difficulty, while those larger generally have a too diluted juice. The beet should further have a firm, uniform texture, should make a loud cracking noise on breaking, and should sink in water. Those that break readily are easily ground to pulp, a necessary property, while half dried old beets are somewhat elastic, and therefore difficult to be reduced. It is also desirable that the beet should be white, although this is not necessary. The juice should be sweet, concentrated, and contain few impurities, its concentration varying from 4° to 12° B. The beet should not grow above the ground, as that portion has a loose texture, a thick skin, a watery juice, is rich in salt and poor in sugar, and freezes easily during cold winter nights. To obtain these results the ground should be well plowed, manured a year before planting (the best previous crop being wheat, although beets may be grown successively for a number of years without exhausting the ground). Nitrogenous manure is to be avoided, as it increases the nitrogenous protein substances of the beet, consuming its entire vital power while its proportion of sugar remains small. The best time for sowing is between the latter part of March and the first of May. The sowing is made diagonally through the fields, as this uses space more economically than the square way of planting. The seed should be not over one year old, and is to be put in the ground abundantly to insure a full harvest. Rainy seasons are dreaded, as too much moisture produces large beets containing a watery juice, many salts, and but little sugar, while dry seasons commonly produce good beets. The time of harvest lasts from September to October, the latest crop being always the sweetest. When pulled the loose dirt is shaken off, the leaves and side branches are cut off, and remain to act as manure for a future crop. The yield per acre varies from 12,000 to 18,000 pounds, the average being perhaps 15,000, which is equal to about 1,200 pounds of raw sugar.

The thorough cultivation of the beet is the first condition of success, as a poor beet opposes too many difficulties to its economical employment. The best ground for beets is black mold, humus or sandy or limey loose ground; clayey soil, as it retains too much moisture, is less desirable. The beets, after harvesting, must be preserved from frost, by storing in ditches three feet deep and three feet wide, in which the ground is pounded firmly, covered with straw or boards about four inches, then with a layer of earth about six inches high. At distances of six feet bunches of straw are placed in the ditches, to act as escape tubes for the vapors arising from the beets. These ditches are generally made 60-120 feet long, the piles of beets reaching three feet above ground. Occasionally these piles are made entirely above ground and covered with a layer of earth ten to twelve inches high. Thus preserved the beets will keep until March. In Russia, occasionally, wooden sheds are used, under which, upon strips of wood or in baskets, the beets are piled four to six feet high; this mode of keeping is cheapest in the end, although the first cost is considerable.

The production of juice in a pure state necessitates the thorough washing of the beet, for which purpose a drum is employed, made of wooden strips, about ten feet long and four feet in diameter. The drum lies somewhat inclined to one side, in a tank filled with water, into which it reaches to the depth of a foot. The beets fall from a large hopper into the drum at one end, passing out at the other upon an inclined plane, whence they are conveyed by a large archimedean screw, traveling in an upward direction against a continuous current of fresh water, until the cleansing is completed.

After washing, the decayed portions, beet tops and rootlets, parts containing juice poor in sugar and rich in salts, are removed by revolving knives, and what remains is thence conveyed to the crusher or rasping cylinder, revolving six hundred times per minute, and is rapidly reduced by it to pulp, and in this condition is removed to the presses. The rapidity with which this operation is completed corresponds to the the acuteness of the angle between the direction of pressure of the beet, and the tangent of the cylinder at that point; for if that angle is a blunt one, the saws will simply scratch and not cut the beet, hence the pressure must always be directed against the lower side of the cylinder. During the operation of crushing, a continuous current of water cleanses the cylinder, dilutes the juice, and facilitates its removal from the pulp. The latter contains now forty per cent. in volume, or about one per cent. of its weight, of air. The cylinder and pulp box are cleaned every six hours, to prevent oxidation of the juice.

The pulp, as fast as made, is spread on cloths made of raw silk, the whole being supported by perforated plates of sheet iron. These charges, to the number of thirty or more, are placed under a dydraulic press, and a pressure is applied at first of from fifteen to twenty atmospheres to the square inch, gradually increasing to one hundred and twenty to two hundred atmospheres.

The pressing surface is generally twenty-four inches, and each press cloth is charged with sixteen pounds of pulp. The pressure is regularly increased for from eight to fifteen minutes, remains thus for some five minutes, and is then released; the juice expressed during this operation ranges from eighty to eighty-four per cent. of the weight of the beets.

Beside silk, wool, horsehair and hemp, are used for press cloths. Frequent washing of these is necessary, ammonia commonly being added to the water to neutralize acidity, and dissolve slime; soda and lime were formerly used for this purpose, but it was found that these soon weakened the fiber of the cloth. The pressed cakes are used as cattle feed.

Another method of separating the saccharine juice from the pulp, first introduced by Schöttler, is by placing it in a metallic cylinder finely perforated and caused to revolve at the rate of one thousand revolutions per minute. The centrifugal force causes the juice to be expressed, but a great amount of fine pulp is driven out with it through the meshes, causing trouble in the subsequent operation of defecation. By this method, also, an immense amount of froth is produced, which has to be run separately into a vat, and condensed with steam. A charge for a centrifuge is two hundred pounds, and this is exhausted in fifteen minutes, or thirty charges can be made easily in an hour. Among other methods which have been used may be mentioned ordinary rollers, pressure with compressed air or gases, there have been tried, though with but little success. The method of maceration lately come into use, recommends itself for its completeness and simplicity, also in that it does away with expensive pumps and presses. In the cells of beet pulp, in contact with water for some time, an endosmotic process is carried on, the water entering the cells and giving out the saccharine juice, until the liquid within and without possesses an equal density. If, then, one hundred pounds of beets, reduced to pulp containing ninety-six pounds of juice, are mixed with an equal weight of water, endosmosis will produce a juice of half the original strength, but double the quantity. If this be withdrawn, and the same proportion of fresh water be again added, the juice contained in the cell of half the original strength is again reduced, possessing then one quarter of the original strength. If a juice contains eighteen per cent. of sugar, which is a fair average sample, the progress of this reducing process for six consecutive times leaves a juice in the pulp of but one quarter per cent. of sugar, or one almost free of saccharine matter. The juice obtained by all these dilutions is too watery for economical evaporation, and must be concentrated by the same process by which it was diluted.

The juice obtained from the first dilution of the original juice of sixteen per cent., contained eight per cent of sugar. If this now be brought in contact with its weight of fresh juice of sixteen per cent., a mixture will be the result containing twelve per cent. Continuing this process six times as before, the final resulting liquid will contain 15.875 per cent. of sugar, or almost its original concentration. These results, however, are not always to be obtained completely in practice.

The process of maceration now chiefly employed on a large scale is that introduced by Schuetzenback, and consists in placing the beet pulp in vats provided with an agitator, to keep it constantly in motion. The vats have a false perforated bottom, for the complete removal of the liquid, and a corresponding perforated top, the holes of which serve as distributors of the exhausting medium. Twelve tubs form a battery, and the transmission of exhausting liquor between the different exhausters is effected by means of a rotary pump. The motion of the agitator should be about twenty-two turns a minute, neither fast enough to make much froth, nor so slow that the pulp will float. This process furnishes eighty-nine per cent. of beet juice.

Recent American and Foreign Patents.

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

Hydraulic Clothes Boiler.—M. W. Staples, Catskill, N. Y.—This invention relates to the manner in which a circulation of water through a clothes boiler is produced in the process of washing clothes.

Marking Roller.—L. R. Witherell, Galesburgh, Ill.—The object of this invention is to provide a simple and expeditious method by which the trade brand of merchants, dealers and manufacturers may be affixed to their goods and wares and boxes, barrels, and packages may be accurately and expeditiously marked without the use of the marking brush or stencil plate as now used.

Corn Planter.—John N. Arvin, and Joseph M. Whitmore, Valparaiso, Ind.—This invention relates to an improvement on the arrangement of a machine for planting or dropping indian corn automatically in regular checks without furrowing.

Nursery Planter.—J. Warren Clark, Iowa City, Iowa.—This invention relates to the planting of hedges or any small plants in rows, as practised by nursery men or horticulturists. It consists in providing a box wagon made tight to hold water mixed with earthy matters or compost, forming such a puddling compound as is usually applied to young plants and trees when set out to insure their vitality and growth, having connected with it an apparatus for running a narrow furrow or trench in the earth and conducting the fertilizing compound directly into said trench behind the plow or coulter employed for opening it.

Hammer.—J. Yerkes, Fox Chase, Pa.—This invention consists of a cast iron hammer with claws which are produced by splitting or sawing in such a manner that the edges of said claws are rendered sharp and capable of taking a firm hold of nails or other articles.

Cultivator.—W. J. Oxer, Williamsport, Ind.—This invention consists in the combination of peculiarly shaped iron bars to form the frame of the cultivator as herein after more fully described.

Evaporator.—H. C. Gilbert, Cambridge, Vt.—This invention has for its object to furnish an improved means by which the evaporating or drying pan may be removed wholly or partially from over the fire.

Nursing Couch.—James H. Cogshall, Lexington, Mich.—This invention has for its object to assist the mother in nursing her child by compelling her to sit upright, and at the same time giving that support to the muscles of the arm which she required.

Gate Latch.—W. T. Wells, Decatur, Ill.—This invention has for its object to furnish an improved adjustable gate latch constructed without springs and so arranged that the bolt will be thrown quickly into the catch, that it cannot be opened by cows or other cattle, that it may be readily adjusted to accommodate the position of a shrunken or sagged gate or post, that it will not be liable to get out of order, and that it will be easily attached to the gate.

Belt Lap Cutter.—Charles E. Robinson, Concord, N. H.—This invention consists in attaching the knife to a grooved sliding block working in grooves in the top leaf or upper part and provided with a handle of the machine in the combination of a rubber or other elastic seat with the lower leaf or part of the machine, and in hinging the lower and upper leaves or parts to each other.

Hydraulic Punch.—Joshua B. Barnes, Fort Wayne, Ind.—This invention has for its object to furnish an improved punch by means of which more work, with less power; and in a less time can be performed than can be done with the ordinary punch; and which can be used upon a boiler, inside or outside whereever it can be got upon a flange.

Wheat Drill.—Jacob Slander, Osborn, Ohio.—This invention relates to an improved machine for sowing wheat and other small grain or seed in drills, and consists in arranging positive gearing in connection with the driving wheels of a truck and an endless screw for feeding the wheat or other grain with certainty and regularity in just the desired quantity from a hopper.

Machine for Bending Skelp for Tubing.—John Peace, Camden, N. J.—This invention relates to the manufacture of metal pipes or flue tubes, and consists in an arrangement of dies for clamping and bending the skelp or iron plate into shape preparatory to welding the edges or laps so formed for making the tubes or flues.

Horse Power.—Theophilus Harrison, Belleville, Ill.—This invention is designed to obviate the great loss of power caused by friction, in transmitting the power of the horse or horses to the machinery to be driven. In the single pinion horse powers a great deal of friction is produced by the pressure of the master wheel on its pin or axis; and in the double pinion powers, as well as others designed to obviate the friction above specified, the arrangement of the gearing together with its complexity, produces as much friction as is saved by the relieving of the pressure of the master wheel on its pin or axis.

WASHING MACHINE.—J. S. Gochnauer, Goshen, Ind.—This invention relates to a washing machine which is composed of a yielding bed of conical rollers in combination with a corresponding conical roller rubber consisting of two wings which are hinged together and to which a revolving motion can be imparted by a vertical shaft which catches over the rod that unites the hinges of the two wings.

MODE OF TREATING INDIA-RUBBER.—Stephen Bourne, Headstone, Drive Harrow, England.—The object of this invention is to deprive india-rubber and the goods or articles into the composition of which it enters of the odor attaching to india-rubber itself and the various solvents or other substance or substances with which it is combined. And for this purpose, the invention consists in exposing the india-rubber or its various compounds to contact with charcoal and heating them together to such an extent as the different descriptions of goods may bear without injury; charcoal especially animal, having the power of absorbing the offensive smell or odor usually pertaining to this material as well also as its ability to impart flavor to liquids and other substances with which it may come in contact.

WHEELS FOR VEHICLES.—Jacob F. Morris, Lansingburgh, N. Y.—This invention has for its object to furnish an improved means for oiling the axles of vehicles, by the use of which the vehicle may be run for weeks with one application of oil, and kept at all times properly lubricated without the waste of oil.

COVERING OF HOOP SKIRT SPRINGS.—William S. Ryerson, Philadelphia, Pa.—This invention has for its object to protect the covering of the hoops or springs, and preserve them from becoming worn, and thus promote the durability of the skirt.

SMUT MACHINE.—William E. Tickler, Ezra T. Marshall, and Daniel M. Marshall, Pierceton, Ind.—This invention relates to improvements in smut machines, whereby the work of cleaning grain is executed in an efficacious and rapid manner.

DUST AND DIRT RECEPTACLE.—Chesmon Butterfield, West Waterville, Me.—This invention relates to a dirt receptacle to be used in the floor of a room, which receptacle is provided with a cover or slide, in connection with a bottom, so arranged and connected together that when the one is opened the other may be closed.

BOILER FURNACE.—Thomas H. Clark, Indianapolis, Ind.—This invention consists in causing the products of combustion to be equally distributed under the boilers set in a furnace for the purpose of generating steam, and in preventing them, when several boilers are set in an arch, from passing away diagonally from those boilers which are most remote from the chimneys.

CONSTRUCTION OF PAPIER MACHE FOR CASTING STEREOTYPE PLATES.—William Nelson, Boston, Mass.—The invention relates to the construction of papier mache matrices for casting stereotype plates, whereby a superior matrix is obtained for the purpose.

WAGON JACK.—Charles T. Close, Brooklyn, N. Y.—The wagon jack embraced in this invention consists of two legs pivoted together at one end, with a cam lever handle pivoted to the lower end of one leg, so that if the jack, by one leg, be properly placed under the wagon axle, by swinging the handle up the axle will be lifted.

TENT BEDSTEAD.—Rev. A. D. McCoy, New Orleans, La.—This invention consists principally in the combination with a camp bedstead of an upright framing for the reception of a canvas covering, this framing being so put together as to be readily set up and taken down.

FLOATING ANCHOR FOR KEEPING A VESSEL'S HEAD TO THE WIND.—George L. Baker, Astoria, N. Y.—This invention has for its object to furnish an improved apparatus, by means of which a vessel that has lost her rudder or become otherwise disabled or unmanageable in a gale of wind, may be held with her head to the wind, and thus prevented from getting into the trough of the sea and foundering.

BEE HIVE.—C. P. Lloyd, Portsmouth, Ohio.—This invention relates to a bee hive of that class which are provided with removable boxes, and it consists in having the sides of said boxes of glass, and each box provided with a slide and a series of movable comb frames, whereby any one of the boxes may be removed from the hive and the condition of the bees examined without any risk of being stung or without killing or injuring the bees.

BEE HIVE.—Charles McGrew, Bloomington, Ill.—This invention consists of a bee hive, constructed in such a manner and provided with vessels for the reception of water or other liquids, located in such a position that the bee moth will be entrapped and the bees protected from the ravages of that insect.

SHAFT COUPLING.—H. K. Smith, Norwich, Conn.—With this coupling shafts can be readily secured together or detached, and, when coubled or fastened perfectly centered.

CULTIVATOR.—Edwin Children, Lancaster, Wis.—This invention relates to a cultivator of that class which have their plows connected to a frame mounted on wheels and provided with a pivoted draft pole. It consists in a novel means for raising the plow beams and retaining them in an elevated position; and also in an improved arrangement of the draft pole and means of attaching the plows to their standards, whereby advantages are obtained.

PIPE TONGS AND CUTTER.—John Peace, Camden, N. J.—This invention consists principally in combining with one jaw of the tongs a double ended adjustable steel socket having a series of air spring edges; also in combining with the steel socket a bridle of suitable shape to fit about the tongs, to adapt them for the cutting off of pipes.

MANUFACTURE OF CAST STEEL.—V. Gallet.—Dated June 14, 1866.—The inventor of this process takes iron, by preference such as has been submitted to one rolling operation only in which state it is termed "puddle bar," and coats it with a paste made by mixing water with the following ingredients: Limestone, 30 parts; vegetable mold, 3 parts; carbonate of potass, 8 parts; oxide of manganese, 6 parts; resin, 6 parts; soot, 10 parts; charcoal, 34 parts; common salt, 3 parts. The iron coated with this composition is melted in a crucible, and cast steel is in this way obtained from iron in one operation.

METHOD OF TREATING PERMANENT INFLAMMABLE GASES, WHEREBY GREATER HEAT IS OBTAINED THEREFROM.—B. F. Stevens.—Dated June 15, 1866.—This invention consists, essentially, in mixing steam with gas obtained from the distillation of wood, resin, petroleum, peat, and other hydrocarbon substances in the manner hereinafter described, and employing this mixture for the production of heat.

MANUFACTURE OF PIGMENTS.—J. E. T. Woods.—Dated June 18, 1866.—The patentee proposes to utilize the condensed or deposited fumes of lead from lead furnaces, such deposit being known as lead soot or sublimated lead, by converting the same into a chloride of lead. One method of effecting this object is to treat the sublimated lead or lead soot with heated muriatic acid, or to treat the lead soot in combination with a saline chloride, such as the chloride of sodium or common salt, whereby the chlorine having a greater affinity for the metallic than the earthy base, will form a chloride of lead, which, being dissolved in water, and the lead precipitated therefrom, will leave a white pigment suitable for various useful purposes to which pigments are applied.

TREATMENT OF ANIMAL CHARCOAL USED BY SUGAR REFINERS OR OTHERS, IN ORDER TO ITS RE-USE.—W. B. Patrick.—Dated June 18, 1866.—In carrying out the improvements the charcoal, while still in the filter, after it has lost its power by use, is first washed, by causing hot water to flow through it. It is then dried, or partially so, by causing hot air to pass through or among it, aided by force or exhaustion. It is then allowed to remain for fermentation in the filtering vessel, with the taps or valves opened to the atmosphere for twenty-four hours or more. When fermentation has taken place carbonic acid gas is admitted to act on the charcoal for the purpose of rendering soluble or neutralizing the lime or alkaline matters which have combined or mixed with the charcoal in its use. Hot water is again passed through the charcoal, to cleanse it of matters rendered soluble by the action of the gas.

STAIR ROD.—W. B. Gould, New York City.—In this invention the stair rod at each end is held in a socket secured to the stairs at the proper points, and provided with an adjustable yielding bearing surface for the end of the stair rod, whereby the rod, without disturbing or detaching the sockets, can be placed within or removed from them with ease and facility.

SCISSORS SHARPENER.—A. W. Gifford, Worcester, Mass.—With this sharpener the blades of scissors can be sharpened with ease and dispatch and without injury.

PROCESS OF UTILIZING WASTE VULCANIZED INDIA-RUBBER, AND MANUFACTURING HARD RUBBER THEREFROM.—G. T. Bousfield.—Dated June 19, 1866.—The first part of this invention has for its object to avoid the expensive and dangerous modes of treatment usually adopted, and to restore to the rubber those properties of which it has been deprived by the process of vulcanization to which it had been previously subjected. This the patentee accomplishes by adding to the rubber (after it has been suitably comminuted) a portion of some vegetable oil, which having no solvent action on the rubber, simply restores to it those properties and that capability of being vulcanized which it possessed in the crude state.

APPLICATION OF ELECTRIC LIGHT FOR GIVING EVIDENCE OF BUOYS OF EVERY DESCRIPTION.—A. Miroude.—Dated June 20, 1866.—This invention consists in the employment of the electric light for lighting buoys without requiring any communication from the shore, by which they can be increased in number and placed as far from the land as the sea or river navigation requires, the object being to light buoys by means of the light produced by electricity in the apparatus known as Geissler's tube, and is carried out by placing in the buoy to be lighted, whatever may be its dimensions and form, a receiver or battery (of a size and weight in proportion to the size of the buoy), producing an electric current; then a Ruhmkorff induction bobbin; and lastly, at its upper part, the lamp is furnished with several glass tubes or spheres, known as Geissler's tubes.

COTTON BALE TIE.—Joseph Knight, Louisville, Ky.—This invention relates to a new and improved device for fastening iron hoops or straps upon cotton and other similar bales, and consists in a flat loop of plate iron made square at one end and diagonal at the other, through which the ends of the strap are passed, and the outside end is bent in a peculiar way on the diagonal side of the loop and secured by slipping it under the body of the hoop above the loop.

DRESS HOOK.—Andrew Bennett, Brooklyn, N. Y.—This invention relates to such a construction of a dress hook that the same cannot be spontaneously disengaged from the eye, while it does not require much more than the usual force to unhook the same, if required. The invention consists in the use of a spring, which is formed by an extension of the wire of which the hook is made, whereby the aforesaid results may be obtained.

ROCK DRILL.—G. F. Case, New York City.—This invention relates to that class of drills in which diamonds are employed as the medium for cutting the rock, and it consists in arranging the diamonds in the head of the drill in two or more rows, and also in so setting them as to cut the entire surface of the rock embraced by the drill head.

SODA-WATER STAND.—Abraham Van Winkle, Newark, N. J.—This invention relates to a soda-water stand which is composed of two or more tiers of sirup cans placed one above the other, instead of one row on each side of the stand, as heretofore constructed, in such a manner that the appearance of the stand and its convenience are enhanced, all the ornamental sirup drafts being shown at a glance and in convenient reach of the person having charge of the stand. The draft for drawing the soda water is placed at the end of the stand, and thereby the soiling of the plated sirup drafts by the spattering of sirup and water is avoided.

MUCILAGINOUS COMPOUND.—Victor Bloede, Brooklyn, N. Y.—This invention relates to a mucilaginous compound obtained by treating common wheat starch with a mixture of acids applied in such a manner and proportion that a perfectly white gum can be produced, fit for photographers and for other delicate work, or gums of a more or less dark hue, according to the work for which the gum is to be used.

FISH HOOK.—Benj. Lee, Jr., Williamsburgh, N. Y.—This invention consists in combining a spring with the stem of a fish hook, the object being to increase the strength of the hook without materially increasing its weight, as well also as to render it sufficiently flexible to resist sudden strains.

BURGLAR AND FIRE ALARM.—Josiah Holmes and Charles W. Nickerson Pittsburgh, Pa.—This invention relates to the construction of burglar and fire alarms, and consists in the arrangement of devices in connection with inflammable guard cords stretched throughout a building, whereby, when the guard cords are burned by fire or broken by the entrance of a burglar through a door or window, an alarm bell is started which will awaken and notify a person in charge of the building.

STEAM GAGE.—William Stamp, Susquehanna Depot, Pa—This invention relates to the construction of gages for indicating the pressure of steam in boilers, and consists of a novel form and arrangement of a steel diaphragm or partition plate upon which the steam acts by expansion, and also the means of adjusting the moving apparatus of the dial to indicate the degree of pressure with minute accuracy.

WHITENING CURRIERS' SLICKER.—Daniel Peters, Keokuk, Iowa.—This invention has for its object to improve the construction of Daniel Peters and W. D. Wilson's slicker, patented April 19, 1864, and numbered 42,397.

The claims of the following notices were patented Feb. 5, 1867:—

MACHINE FOR HEADING BOLTS.—Philip P. Trayser, Baltimore, Md.—In this machine the heading tool is free to rotate upon its axis so that as the square head of the tool moves forward within the die it is adapted to turn or adjust itself sufficiently to become coincident with the inner surfaces of the die and thereby prevent the abrasion or cutting action by the tool, which occurs in machines of this class as heretofore constructed,

MODE OF FASTENING ROOFING.—J. C. Wands, Nashville, Tenn.—The material consists of a layer of wire cloth covered with any pitchy substance on the outside and with a coat on the inside to prevent its adherence to the sheathing of the roof. The breadths of fabric, felt or prepared paper are laid parallel upon the roof from ridge to eave, their edges lapping each other upon raised strips which are capped with metallic plates which fasten the lapped edges on the strips making a water-tight joint.

COTTON CULTIVATOR.—James C. Bethea, Blakely, Ga.—The sheath or standard is made of the same shape toward the front end to the rear to either of which the share may be attached so as to adapt it to throw the furrow to the right or to the left; the beam itself being shifted end for end to adapt it to the change.

COTTON-BALE TIE.—Henry Fassmann, New Orleans, La.—The buckle of this tie has two loops for securing the ends of the hoop and a ridge or ridges on one or both sides to press the hoop against the cotton and prevent its withdrawal. In use one of the hoops is first lapped aronnd the bar of one loop and the other end of the bar is inserted through the notch in the bar and lapped over the bar of the loop whose notch it spans; the chamfered corners of the bar at the notch permit the oblique insertion of the hoop therein.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Wanted.—Best wool carding and spinning machines and power looms. Manufacturers send circular and price list to C. Picard & Co., Nebraska City, Nebraska Territory.

B. G. Stockton, of Flint, Mich., asks where he can purchase a roadometer and the price.

H. E. Shipman, Towanda, Pa. Where and at what cost can I obtain a machine for making shoe pegs? What power does it require?

Newton Clark, of Baraboo, Wis., asks where machines can be procured for sharpening hop poles.

Forgings of all kinds promptly executed to order at the New York Agricultural Manufactory, corner of Jay and Plymouth streets, Brooklyn.

Chattanooga Water Works Company, Chattanooga, Tenn., want a pump that will supply 500,000 gallons of water per day at an elevation of 150 feet.

Winter & Ball, Honesdale, Pa., wish to communicate with manufacturers of Gates Automatic Turning Lathe or any other wood turning machinery manufacturer. Also of water wheels and saw mills.

Pumps, brass and iron, all sizes. Send for list and prices. Rumsey & Co., Seneca Falls, N. Y.

Parties having for sale second-hand machinery for manufacturing flour barrels will address Wm. Ruddick, Keokuk, Iowa.

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

M. C., of Conn., sends us the details of a supposed spontaneous explosion of a burning oil which he had purchased under the name of "Non-explosive Union Oil." His wife was filling lamps from a can, in the day time standing about six feet away from a coal fire burning in a stove. On removing the stopper which was a piece of potato the oil (vapor) in the can exploded and set fire to the lamp, etc. A previous stopper, a wad of newspaper, had fallen into the oil; except in this aspect the oil was clean and in as good condition as when procured. M. C. is unable to find any cause of the explosion. We are unacquainted with the oil under the name given. If M. C. on re-examination of the case is still satisfied that the explosion did not originate from the fire in the stove or any other fire burning in the room, we recommend him to have examination of the oil and can made by a competent chemist. We have placed his letter on file for future reference if necessary.

D. U. S., of D. C., supposes a very long railway car going East. A track is laid on the top of the long car, and on this track is a short car going West at the same rate as the long car goes East. What is the motion of the short car in relation to a spectator at rest on the side of the railway. What the motion after the short car falls down on to the main track. A very good case for the juveniles.

J. V., of Ala.—The enamel on watch faces is a white glass or glazing which is melted on the metal in a muffle. Photographs may be made on any genuine enamel.

O. H. H., of N. J., sends the following interesting computations. A cubic mile of water in round numbers is equal to 147,000,000,000 cubic feet or 9,000,000,000,000 lbs. or 4,500,000,000 tuns."

J. C. A., of Conn., sinks a pipe perpendicularly into the earth 50 feet, and water is found at 25 feet. He appears to enquire if the water will not rise to the surface of the ground, by reason of the great length of the pipe. The length of pipe beyond the point where its end would constantly be in the water would be of no advantage.

J. C. M., of Me., sends a pencil sketch of a singular freak in the formation of ice. A common wooden pail had been left out of doors till a film of ice had formed about a quarter of an inch in thickness. The surface was ordinarily even except that two or three inches from one side rose a neatly formed flattened tube of ice. The tube was one and three-eighths inches high, one and one quarter inches in outside diameter, about quarter of an inch internal diameter.

W. S., of O.—Benjamin Pike, Optician No. 518 Broadway can supply you with microscopic photographs.

A. H., of N. Y.—The process for purifying black lead consists in mixing it with sulphuric acid to a pasty consistency and exposing to heat till a considerable part of the acid is decomposed. The mass is then washed with water which dissolves the impurities.

J. M., of Pa., thinks it extraordinary that there was a thunder storm in his town (Bareville) on the 2d inst. But we had also here on the same day a thunder storm and another on the 9th. Such storms in winter are rare. They are to be explained in the same way as the summer storms.

H. W. S., of O., suggests that the law of equal pressures in all directions should be extended to solids as well as liquids. He argues that the difference between liquids and solids is only in degree that all liquids have some cohesion, and no solid is perfectly rigid; and concludes that the law of equal pressures is applicable to all bodies due allowance being made for the action of cohesion in individual cases.

R. B., of Ill.—The so-called marine soap, or the soap which can be used with salt water, is made of cocoanut oil and soda. Vegetable oils generally make soaps which are more soluble than those containing only animal fats. Palm oil is used in all parts of the world as a soap fat.

W. R., of N. Y.—We cannot see any greater difficulty in extinguishing a fire in the basements of buildings on the line of the proposed arcade railway, than in the lower stories of other buildings; in fact not so much. The areas leading to the tunnel, and the building, itself, would suffice for the escape of the smoke. It would not be necessary for the engines to be placed on the lower level, but they could be worked from the street, as at present.

J. F. D., of——, has some old brass bearings, faucets, etc., which when melted will not fill the molds well and is too hard to work easily. He desires to know how to remedy it. We think the addition of a little zinc, say 30 per cent, would improve it. Plumbago crucibles are not injured by long exposure to a low fire. It is high heat that weakens them.

B. of R. N., Wis.—You are quite correct. Arsenic is recognized as a medicine and is used by most of the faculty under the form of what is called Fowler's solution. There are perhaps no well known poisons which have not been praised for their medicinal virtues. If you make up your mind to take no doses which contain a poison you may as well at once dismiss all the doctors. The root doctors and the Indian doctors, in respect to the poisons are just as bad as their more enlightened brethren

R. N. T., of Me.—There is as yet no successful electro-magnetic engine, and our knowledge must be much farther advanced to enable us to see how it is possible that electricity can supercede steam as a motive force. The electrical force equivalent to steam force costs about fifty times more, and in utilizing it for mechanical work there is a larger per centage of leakage.

R. B., of Vt.—The steam gun was invented by Jacob Perkins an American, who exhibited it in London where for a time it was the great sensation.

S. C. N., of Del.—Your opinion is just as good as ours, perhaps better on the probable advent of cholera this year. We do not entertain many subjects where mathematics and physical demonstrations are wholly inapplicable.

S. G., of Tenn.—The sources of zinc are very abundant in the United States, but very little of the American metallic zinc gets into market. It is found more profitable to use the ore for zinc paint.

N. L. N., of N. J.—There is no way known of bleaching printing ink. The black matter of the ink is carbon for which there is no solvent. Any corrosive substance which can destroy carbon, acts much more powerfully on paper and other organic matter. Writing ink is of a different nature altogether and its chlorine may be discharged by chlorine and almost any acid; oxalic acid is most commonly used.

R. B., of R. I.—The acid of the lime, lemon and orange is the same substance, citric acid. The acid cannot be manufactured profitably in your state.

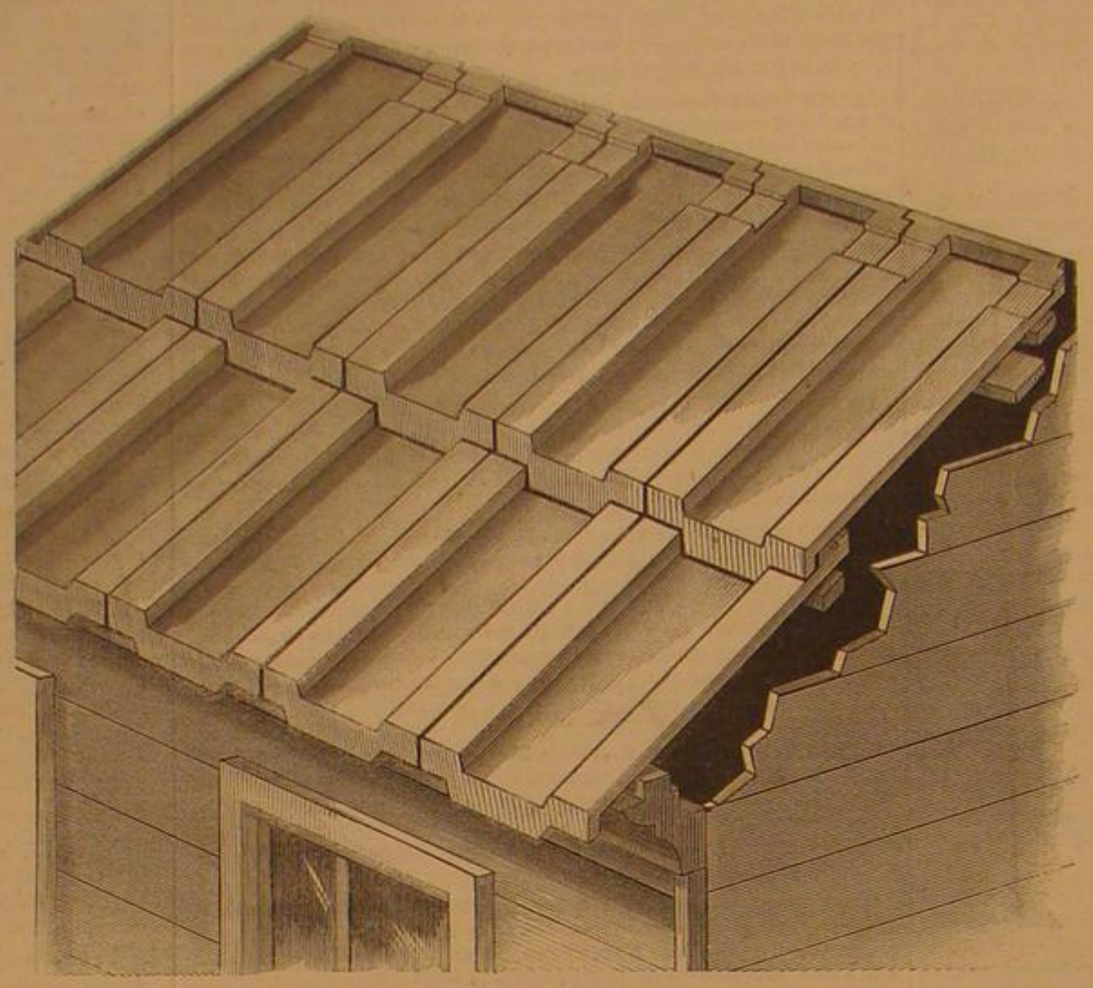
S. N. D., of Ind.—We hear complaints from all quarters about the vinegar. It appears as if half of the manufacturers do not understand their business. A great deal of the vinegar now sold loses all its sourness in a few weeks and becomes offensive to the smell. We are told also that some of the vinegar makers have learned the art of increasing the sourness by putting in sulphuric acid. Those who are anxious on the subject should test the vinegar by a solution of chloride of barium; a white precipitate indicates sulphuric acid.

J. F. S., of Kansas.—To determine the efficiency of a water ram it is necessary to know the diameters of the pipe as well as their lengths. You will perceive therefore that your question cannot be answered.

Improved Tile Roofing.

In some districts of this country, as well as in some other countries, wood is scarce and cannot be obtained readily, even for the purposes of roofing. Shingled roofs may be considered essentially American, not being much in use elsewhere. Slate stone is not universally found, and metal roofing corrodes readily in some climates. In such cases recourse must be had either to tiles or some more primitive material.

The annexed engraving shows a method of forming and laying tiles to make a convenient roofing. It is the invention of gentlemen living in Colorado, where wood, slate and metal for roofing purposes are scarce. The tiles are made in sections, so formed that each successive layer is a support to that next preceding. The tiles are made with projections running across the under sides to rest against the eaves or wall plate and against the cross rafters. The upper edges also have projections at the other ends of the tiles to lock into the downward projecting edges before mentioned. The whole is secured in place by a strip which near the ridge-pole fits into proper depressions, and the longitudinal recesses in the center of the tiles form in combination perfect gutters for rain. The arrangement can be easily understood by the engraving. It would seem to be admirably adapted for certain situations. Address Chas. Bamberg or Jos. Weiber, Box 443 Central City, Colorado, for state and county rights.



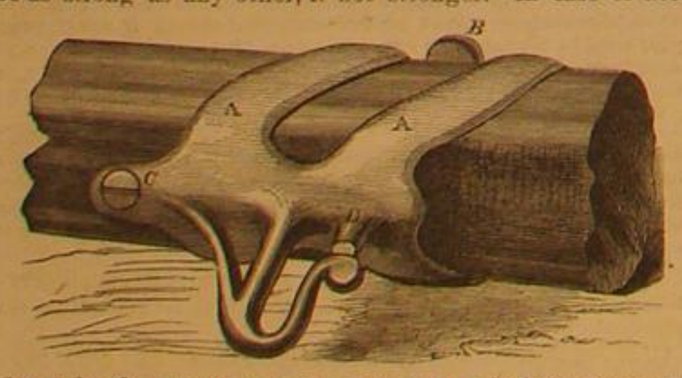
BAMBERG & WEIBER'S TILE ROOFING.

Absorption of Gases by Solids.

Among the interesting observations of Mr. Graham, Master of the British Mint, (to some of which we have lately referred) upon the passage of liquids and gases through solids, is the fact that atmospheric air, by passing through india-rubber, becomes super-oxygenated, and will rekindle smoldering wood like pure oxygen. Any kind of light india-rubber receiver, in which a vacuum may be obtained, the size being sustained by mechanical means, will collect super-oxygenated air; the better if the india-rubber be thin and the temperature high. Mr. Graham makes the suggestion that the solid films pass gases through them by first condensing them to a liquid form within the substance, and then passing them off on the other side by evaporation. Hydrogen passes through redhot platinum, while oxygen and nitrogen do not, or not in appreciable quantities; hence their compounds with hydrogen are readily dialysed by this method. The passage of carbonic acid, chlorine, hydrochloric acid, vapor of water, ammonia, coal gas, and hydro-sulphuric acid, is also inappreciable, while the hydrogen, in compounds containing it, passes. One volume of redhot platinum absorbed 0·207 volume of hydrogen, retained it while cold, and gave it off on reheating. One volume of palladium absorbed 643 volumes of hydrogen, sensibly increasing its weight, and when heated afterward, gave off the most of it in a continuous stream. On the other hand, osmium-iridium does not absorb hydrogen, and copper absorbs it very slightly. Gold absorbs hydrogen and nitrogen slightly. Silver absorbs 0·289 of its volume of hydrogen, and then presents a beautifully frosted appearance. Oxygen is taken up in the proportion of 0·745. Redhot iron and steel pass hydrogen as readily as platinum does.

Wilson's Clasp Hold-back Iron.

In attaching the common hold-back irons to carriage shafts the shaft itself is weakened by the insertion of screws which remove a portion of the wood from that part that requires to be as strong as any other, if not stronger. In case of accidents by the stumble of the horse, the shaft is frequently broken, even if the animal does not fall upon it. The hold-back here represented is not open to these objections, as instead of weakening the thill it really strengthens it. It is made of malleable iron in one piece, embracing the shaft by two bands, A, which unite on the hook-front plate. On the opposite side the hold-fast is divided in a line with the shaft and the two parts are secured together by a single screw, head seen at B, which gripes the halves firmly around the shaft. By loosening this screw and drawing that at C the hold-fast can be removed to any portion of the shaft desired. The projection, D, on the inside of the hook makes it almost impossible for the breeching to slip out.



The contrivance has a very neat appearance and seems to be calculated for giving additional strength to the shaft. It was patented Nov. 6th, 1866. Information required by those interested, as to rights to make and use, can be obtained from Edward Wilson, Northbridge, Mass.

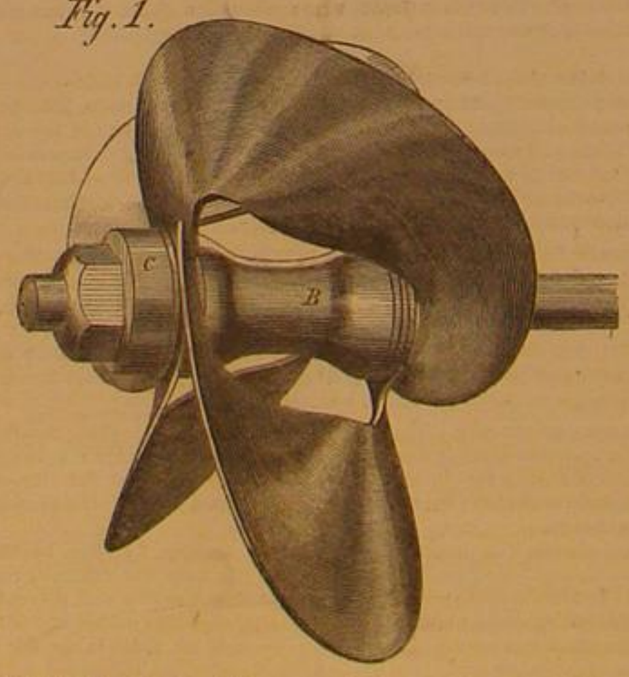
The Model Schoolhouse.—The Legislature of Massachusetts has decided not to pay for the model schoolhouse which certain gentlemen have been getting up for the Paris Exposition. The point is, that Massachusetts and other American States excel not particularly in school *houses* but in school *laws*. Such a humble specimen of mere architecture, in the Exposition, will astonish the natives only as flies in amber do—how in the name of common sense, did they come to be *there*.

Davis's Improved Propeller Screw.

The inventor claims for the screw represented in the accompanying engravings several advantages over that in common use. As may be seen in the engravings, it is a combination screw, formed in parts and put together, instead of being a single casting. The blades are made of boiler plate, or of plate steel, of equal thickness throughout. They are cut from a flat plate, the holes for the reception of the propeller shaft made, and then either by hammer, rolls or formers curved to the proper shape. Each blade is precisely alike, so that if one should be broken a duplicate could be readily fitted.

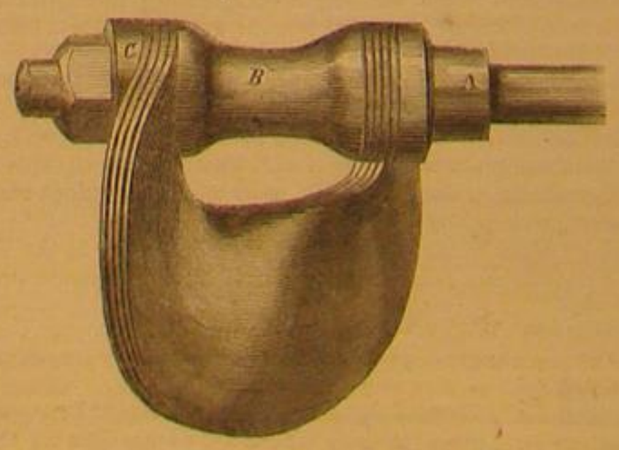
A is a collar secured upon the shaft, and the inner legs of the blades bear firmly against it. The sleeve, B, keeps the legs of the blades at the proper distance apart, and the collar, C, and nut secures all in place. To hold the blades in position

Fig. 1.



against the leverage of the water, bolts may be passed through the collars and blades longitudinally with the shaft, or the blades may be held by a feather on the shaft.

Fig. 2.



Among the advantages claimed for this screw over others is increased strength from the material used, less weight, greater efficiency from the uniform thickness of the blades, facility for repairs and also for transportation as shown in Fig. 2. When a blade is broken from a cast propeller the screw is ruined, and floating ice, timber, or fouling by a rope, are always threatening such an accident. With this screw, however, the breaking of a blade can be at once remedied by removing the remaining portion and replacing it with a duplicate blade. Letters patent for this device were granted through the Scientific American Patent Agency to William E. Davis, Aug. 7th, 1866. Mr. Davis will supply all further information if addressed at Jersey City Locomotive works, Jersey City, N. Y.

Steam Plowing.

A steam missionary has been sent over from England to preach to our Western farmers. The economy of steam plowing, cultivating and harvesting in the Mississippi valley, is extraordinary, of course. The cost of the apparatus is the grand objection. In England, where $5,000 will buy a plowing equipment, it is found that few farmers feel able to furnish themselves, and still fewer, perhaps, could give enough employment to the capital in this form to render it remunerative. Hence association is resorted to, and a neighborhood of farmers sometimes organize a company for steam cultivation. Under our free laws of association this can be done with facility and advantage. Messrs. John Fowler & Co., of England, have taken the right way to extend their business, by sending out the agent above referred to, with their apparatus, (price $10,000) to exhibit its economy and induce the Western farmers to form associations for owning and operating it. An objection to doing this business by itinerant jobbing, is the cost of so much heavy transportation. The work of the steam plowing apparatus is estimated at an acre per hour, twelve inches deep.

Aerial Ferry.

We are rather surprised that our aëronautical friends have not seized the present favorable juncture for proposing an "air line" from New York to Brooklyn. It would seem that the first practical success in aerial navigation should be on short crossings like these, where some kind of guide or aerial suspension way can be established, along which to propel and steady in its course the unfledged flying ship. A sort of guy rope anchored to a pier in the middle of the channel, reaching to the shore, and there connected to the aerial boat, would guide it over in a parabola; yielding gracefully to any lateral deflection the wind might require in either direction. On approaching the shore, a gradual and easy descent would be secured by running out the guy rope off a drum checked by the tension of a strong spring or brake, thus rendering the centripetal pull sufficiently elastic. An experiment might perhaps be cheaply conducted by using one of the islands up the East River.

Payment of a Patentee.—Senator Van Winkle, from the Committee on Post Offices and Post Roads, reported a bill authorizing the Post Master General to pay $100,000 to the owner or owners of the letters patent granted to Marcus P. Norton, of Troy, N. Y., for invention for marking of letters, etc., and for the cancellation of postage stamps thereon, said sum to be compensation for the past and future use of the patent, and for which the transfer of the same is to be made to the United States.

Our readers will find an illustration of this invention on page 104, Vol. XI., Scientific American.

Railway Dry Dock.—Two gentlemen of Portland, Me., have patented apparatus designed for connecting with a dry dock a system of tramways and trucks upon which a ship, after being docked by means of high tide and supplementary water raised by pumps, may be run out into a ship yard adjoining, making room for others to any required extent. Locks and reservoirs are also arranged in such a manner as to store at the required elevation, for further use, the water once raised for the purpose of docking a ship.

George Peabody's Gift.—A million of dollars in cash, and a million and more of unrepudiated Mississippi bonds which can be fully resuscitated through a shrewd application of the terms of the gift, make up a virtual donation of probably two millions of dollars, given in trust to a number of our most patriotic and liberal public men, for the all-important object of the time—the education of the youth of the Southern States, without any other distinction than that of their needs.

Officers of the American Institute.—The election of officers of the American Institute took place on the 14th inst., when the following gentlemen were elected:—President, Horace Greeley; Vice Presidents, Dudley S. Gregory, Orlando B. Potter, William H. Vanderbilt; Recording Secretary, Salem H. Wales; Corresponding Secretary, Samuel D. Tillman; Treasurer, Sylvester R. Comstock.

Patent Extension.—Senator Willey, Chairman of the Committee on Patents, has made an adverse report on the application of Geo. B. Simpson for the extension of a patent of a telegraph-cable insulation by gutta percha. The case was elaborately argued by several prominent lawyers.

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NEW YORK, SATURDAY, FEBRUARY 23, 1867.

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We have a very large number of valuable communications from correspondents who have acted upon our suggestion to write upon practical subjects for our columns. We shall publish them as rapidly as possible. In this connection we wish again to thank our readers for the great interest which they have taken in promoting the circulation of our paper. The subscriptions are still coming in very rapidly and we are now printing 35,000 copies per week.

THE SOUTH AMERICAN MEDITERRANEAN.

Professor Agassiz, in his second lecture (Feb. 11) forgot or deferred the sequel of the interesting geological history of the continent, and devoted the evening to the history of his expedition and the present terraqueous topography of the valley; with both of which our readers are already somewhat acquainted. Certain points, however, struck us with a significance not brought out in former reports, and we shall therefore take occasion to review the ground in a few words.

The valley of the Amazon is no valley to the eye: its bounds are far too distant to be visible at any point in more than one direction if at all, and its slopes are altogether inappreciable by the senses. Even the current of its waters is imperceptible, and sometimes locally reversed; so that it presents to the voyager no other appearance than that of an inland sea with a long, low, distant shore. On either side, the tributaries have a similar appearance: they are themselves so enormous that the eye cannot span their breadth: for example, there are four rivers descending from the Guianas on the north, east of the Rio Negro, hardly noticed on our common maps by name, yet of a wonderful size, one of them being no less than thirty miles wide at the mouth. Not to speak of the "great" affluents, the Xingu presents at its junction with the main river a front of forty miles broad, and the Tocantins, of sixty; and of all of them, it must be remembered that you ascend from the junction from a hundred and fifty to hundreds of miles before any appearance of rising ground, rocks or minerals can be found. The front of the united rivers, with their nearly oceanic depth, at *one* of the final outlets, is 150 miles across, and its yellowish white hue (like coffee and milk) tinges the ocean far out of sight of land.

Nor is the Amazon, when you have imagined its to the eye shoreless breadth, to be conceived as a simple stream or belt of water. It is a water system, prevading the country with unnumbered channels and branches for hundreds of miles in breadth. Independently of the usual obstructions and partings of streams, this system has a structure peculiar to itself, resulting from remarkable causes. The swelling of the waters will amount to from thirty to fifty feet, every rainy season, and the remarkable fact is that this takes place from two opposite quarters, the north and the south, not at the same time, but alternately.

The snows of the Andes melt in August and September, and reach the Amazon by October or November. The rains also begin on the south side in September, and the swelling of the southern tributaries pours into the great bed about the last of November. Both inundations continue with increasing volume until March, when the entire sea rises sometimes at the rate of a foot in twenty-four hours. At the same time, the tributary rivers from the north are at their lowest stage; and bearing in mind the fact that the fall of their channels for a long distance hardly exceeds that of the Amazon, or ten feet in a hundred miles, it is evident that a rise of thirty to fifty feet in the main river must not only send a vast back water up the northern tributaries for hundreds of miles, but must follow the depressions of the ground in every direction, and create a network of innumerable water courses.

At the hight of the southern freshet in March, the rains begin on the north. As the southern rivers subside, the northern rivers swell, and come down in full flood about June, to gorge in turn the channels of their southern rivals, and to press the swollen tide up the southern side of its basin in the summer, as it rose upon the northern side in winter. Thus the water system we are describing resembles an ocean not only in extent and evenness of surface, but also in its (semi-annual) tides.

The result is that all the roads in this wonderful country are ready made. They are water roads, or ship canals, on the grandest scale of nature, through which the united navies of the world might steam or sail in company, for 2,000 miles from east to west and 500 miles on each side, or 1,000 miles from north to south; freely penetrating every portion of the country through the profusion of cross courses by which the rivers, swollen on both sides as we have seen, twice a year, have overflowed and run into each other, and in short have divided up the whole land into islands. Taking this into view with the fact that nearly all the principal countries of South America—Brazil, Peru, Bolivia, Ecuador, New Granada, Venezuela—have their main drainage and the best portion of their domain either in this valley or in navigable connection with it; the importance and the justice of the late decree of the Emperor of Brazil, opening the Mediterranean of South America as a free highway for all nations, are seen at once in a conspicuous light. The Amazon by nature belongs to South America and mankind.

The treasures of commerce to be directly drawn from nature here, have already been brought in a general way to the notice of our readers. We may add to the 300 kinds of choice timber, remarkable for their density and beauty of grain, which cover the entire country with dense forest, an endless variety of strong and light textiles, a variety of fruits of the myrtle family, as numerous and as fine as that of the rose family that embraces all the choice kinds of our northern climate, another family akin to the magnolia, embracing also a great variety of luscious fruits, and still another family of which the character was not defined, quantities of indigenous cotton, probably the greatest on the globe, the material of chocolate, caoutchouc, Brazil nuts, etc., in inexhaustible profusion everywhere, and finally the grand staples, drugs and dyes of the richest character and variety. Settlers would have nothing to do but to gather these stores from gorged nature in a perpetual harvest, and commerce, nothing but to load cargoes of treasure almost directly from the ground on which it grows. The aquatic vegetation is so luxuriant that it is never apparent where the land ends and the water begins, and the latter is often concealed completely by a prairie of rank vegetation and gorgeous flowers.

But there are not now 250,000 people in all this new world; and the bad reputation of the climate, which the learned professor stoutly combats—declaring it, from ten months' trial, most delightful and salubrious—is imputed to the unanimous hue and cry of the officials exiled from time to time to those wild though luxuriant solitudes, whose natural discontent has attributed to them every deadly evil that imagination can conceive. Of the temperature and other interesting matters of this lecture, we need not repeat what we have heretofore republished.

THE GLACIAL THEORY AND THE TROPICAL GLACIERS.

Professor Agassiz' third lecture in New York was a careful elucidation of the Glacial Theory, which he enjoys the honor of having developed and established; proving that a period of a much lower mean temperature than at present must have once existed in the now temperate and torrid portions of the globe, when that peculiar "current" known as the glacial structure crept over the whole surface of the continents, and performed an important part in preparing them for the habitation of man.

The first question is, What is the glacier? We have styled it a current, and such it is, as much as any that exists in the liquid form of the same element, governed in part by the same laws, but performing offices for which water is not adapted. Its law is motion under the influence of heat, in the direction of increasing temperature. Its formation is from snow, at such elevation as under existing thermal conditions permits an average temperature as low as 32°; but the comparative warmth of a lower elevation or of a warmer latitude, usually assists. By this means the snow is alternately softened in part to suspended water, and conglomerated by the freezing of the suspended water, until it forms a granulated ice.

Its law of motion is in substance the simple fact that water expands in freezing. When formed on a mountain side at a proper elevation for the required temperature—and equally when formed on a level, at the right latitude—the glacier is constantly expanding by the expansive congelation of suspended water or rains; and finding little resistance at its lower limit (of altitude or latitude as the case may be) but being more powerfully resisted in the direction of greater cold and rigidity, its horizontal expansion of course pushes in the former direction. In other words, it moves onward, by a simple and constant law, in the direction of warmer temperature; and will continue thus moving as far as that temperature is not warm enough to melt and destroy it entirely.

It is evident that the loose angular rocks constantly crumbled off in the path of the glacier must be carried or rolled along under it, and often embraced and frozen into it, in great numbers. Again, the great transparency of ice to heat, permits the sun's rays to pass through to the rocks beneath and within, and comparatively to warm them. Thus the rocks rolled along under and those carried within the glacier cooperate in thinning by their comparative warmth the ice that separates them, while the grinding movement of the glacier also tends to break it, and thus the rocks practically attract each other, accumulate, and are passed onward until some obstruction arrests them or some cavity receives them. Not to particularize and explain here the very distinct and characteristic arrangement of these accumulations in the Alps, where the active process may be now observed, it will be evident to the reader that some of their peculiarities must be recognizable wherever the glacial drift has passed along, in the disposition of the fragments and in the effect of their tremendous attrition upon themselves and upon the surface of the underlying rock.

The first suggestion of the glacial theory was due to the discovery from the kind of traces above referred to, that the glaciers of the Alps had once pushed out not less than twenty-five miles from their present habitat and extended their flow across the plain of Switzerland until they abutted upon the Jura. The same traces also gave proof that (as might indeed be presumed) they were then some 5,000 feet thicker than now. The inference was imperative, that a glacial temperature then prevailed at the moderate elevation of the plain of Switzerland, and hence must have prevailed in other parts of the world similarly conditioned. This led to examinations everywhere for traces of the glacial drift, and it needs only to be added that they have everywhere been found abundant. In the British Islands, in all parts of North America, and more lately in South America, near the equator,—here commencing on the Andes and moving across the continent eastward, far into the present domain of the ocean—the polished, scratched and furrowed surface of the rock, its grooves always running north and south, (except where the declivity of mountains had changed the direction) and the "drift" of rugged but tamed and abraded fragments, show the unmistakable action of those "mills fo God" once built to grind the face of the earth smooth and pulverize materials for the plastic hand of Nature—now dissolved long since by the breath that built them, having served their end.

LETTER TO MECHANICS AND INVENTORS.

We notice in one of our Michigan exchanges that a stock association is about organizing in Detroit with a capital of $20,000, which is to be employed in defraying expenses of getting up models, obtaining patents, and for establishing agencies for the sale of patents throughout the country. The par value of the stock is fixed at $25, and persons becoming members are required to pay one dollar initiation fee, and a further fee of fifty cents per month, making a total tax of seven dollars which entitles him to a share of stock.

We presume that the parties to this organization are all respectable gentlemen, but it is evident that they are engaged in a business which they do not understand. Efforts have been repeatedly made in this country to organize similar associations and every time the attempt has been made it has failed. Protective or joint stock societies of this kind have also frequently started up in England and though backed by big names, failure has always been the result.

Inventors very naturally and very properly distrust an association that undertakes the double business of procuring and selling patents. The two operations cannot be successfully conducted jointly without causing suspicion. Some inventions will inevitably receive much more attention than others, and it is wholly impracticable to keep a stock of patents on hand for sale like merchandise. The very idea will suggest an absurdity to any practical mind. If the association should chance to get hold of one good invention which promised success they would be quite likely to employ their whole force of salesmen to push it forward in every direction, and thus less important and less easily-managed inventions would have to be suspended.

A member paying seven dollars for his certificate may never have occasion to employ the services of the association. But suppose he does seek their services, what pecuniary advantage does he gain? Nothing more than the facilities possessed by the association and for which of course he must pay extra charges.

We do not object to this scheme as a speculative enterprise, but we do not perceive that it possesses the merit of novelty or is likely to afford any advantage to either mechanic or inventor.

WHEN AND WHERE DOES THE DAY BEGIN?

As we travel eastward the day begins earlier: near the equator starlight appears an hour earlier for each thousand miles going east. When it is sunrise in New York, the people of Europe have had sunlight for many huors, and the Californians are still in their beds dreaming. Evidently the day has a first begining, and at the eastward. But how far and where? What are the people who first see the light of Monday morning?

It is the sun which brings the day; where does he first bring Monday? If we could travel with him we might find out. Let us suppose the case. We will take an early start: at sunrise on Sunday morning, with the sun just at the point of peeping over the horizon behind us, we travel westward. As we go, the people give us a Sunday greeting; we bring Sunday with us to Pittsburgh, St. Louis, Salt Lake, San Francisco. At San Francisco, our faithful chronometer informs us that we have been on the tramp about five hours. But we started on Sunday morning and it is Sunday morning still We go on, still on Sunday morning. Will this Sunday morning ever end? The quiet Pacific knows very little of Sunday or any other day, and our question scarcely receives an echo for reply. When we get to Yokohama in Japan, or Shanghai in China, we search for some Yankee, wide awake in the early morning, and we are told for the first time that Monday

has come. Everywhere now we bring Monday, and in twenty-four hours by the chronometer after starting, we are in New York again, and find the merchants taking down their shutters, and the Monday newspapers telling us what has happened during our absence.

THE RIGHT TO FREE HIGHWAYS.

Why is it that in all the bills and bids we hear of for the construction of railroads or bridges in, above or under our streets and rivers, and among all the proposals or demands of compensation to the public for these lucrative public grants, the one thing we *never* hear of is that excessive profits shall be applied to the cheapening of fares for the million? Why is it that projectors propose to pay license fees into the public treasury, or to divide their profits with the school fund—interests already provided for and sure to be sustained—but shrink from the business-like and beneficent plan of reducing their fares and enlarging their traffic progressively, to any extent which will still yield lucrative returns.

Time is more than money: it is life; and rapid and cheap locomotion is life and money in a double sense, to the industrious and especially the industrious poor. They cannot always afford to pay twenty cents an hour for life; but it might and ought to be afforded them, though the medium of cheap and rapid locomotion, at five or ten cents an hour, with the blessings of pure air and moderate rents beside. The legislature which will provide for a system of rapid conveyance to and from and throughout this city and its suburbs, with a steady compulsory reduction of fares as fast and as far as consistent with a liberal but not inordinate profit and with due regard to safety and comfort, will do an amount of good and earn a grateful remembrance not often open to any body of men in the course of a century. Such a system, we believe, would speedily reduce all city fares to three cents, and all fares from the city to the remoter suburbs to six cents; while the improvements in economy of propulsion yet before us in the future may ultimately make one cent each a profitable fare for the daily moving millions of the city that is to be.

There can be no doubt that, on sound principles of political economy and philosophy, all private property in public highways ought eventually to be extinguished, and the use of them for public or private traffic thrown open on equal terms to all, taxed only with an equitable proportion of the cost of maintenance, in the same manner as common roads. The proper aim of a public work is not profit for a few, nor even wealth and honor to the whole, but to economize the time, strength and means of every individual: for of the gains of individuals all public wealth consists. In the infancy of our country, the resources of all its individuals were organized or incorporated in some sort for making the roads, bridges and other public works esteemed indispensable, and these became at once common property and free to all. A continuance of the same principle of action would have made the railroads, canals, bridges and colleges as free as the common roads and the common schools. In an ideal republic of good men, devoted to public rather than private good, this would be possible and incalculably profitable. But in a republic of men as they are, selfish, and only forced into union of interests and resources by extreme necessity, nearly all progress in public works and institutions is necessarily left dependent on selfishness, and in order to have better roads, bridges, etc., it is necessary to allow certain individuals enormous profit and wealth as an inducement to build them. Nevertheless an eventual return to the primitive ideal of free common wealth in all that is in its nature common to all, should be persistently kept in view. There is a proper and a practicable limit to all these public grants, which will be strictly insisted on by every legislator who is at all qualified by sense and honesty for his trust. The profit of the road company is to be regarded only as a means to the true end, public accommodation and economy, and is to be used only so far as necessary to attain that end; not carried so far as to interfere with it.

The present tendency toward a re-absorption of railroad, telegraph and bridge property by the public and for public benefit, through the agency of Government, is a hint which may yet become an assertion of the principle embodied in the limitations of every charter, that all such grants are but temporary concessions, for the ultimate benefit of the commonwealth, and that when they have served their purpose and repaid their beneficiaries, they must return as public property. We are not prepared to say that the resumption of these grants by Government, especially with its present corrupt and wasteful character, would be an improvement. Nor does it matter what any one may say about it; for these practical issues will work themselves out in their own time and way, little affected by theory and advice. There is one direction, however, in which we think we can discern a practical drift in the nature of things; and it is illustrated in the peculiar principle of the proposal on foot for a railroad from the Missouri river to Texas, to be open to all parties for their own cars and locomotives, by payment of tolls, in the same manner as canals usually are. There are reasons enough why railroads should eventually go the way that most turnpikes have already gone, becoming first toll roads, and eventually, in a distant future of greater common knowledge and wealth, free public roads. Monopolies are at best necessary evils, and that temporarily, and their manifest destiny in every case is to go down before the paramount rights and interests of the whole, sooner or later, after they have served their temporary purpose.

In regard to the internal highways of a metropolis like this, we may assert as an axiom that there is no more reason for making the rails, tunnels and bridges private property than for providing the pavements, sidewalks, street crossings, lamps, sewers, Croton water, public parks, etc. etc., on the same principle. The evils of the private property system as applied to this class of public works (to which may be added the gas service) are such as the community literally groan under, without a hope of remedy. On the other hand, the beneficent success of the system of public works under which the Croton Aqueduct and Central Park were constructed, is a standing refutation of all arguments against the extension of such a system to the construction of a complete and satisfactory network of free public ways beneath or above our present crowded thoroughfares and rivers, and the equitable resumption of the much-abused privileges of all our city railroad and ferry companies. We invoke the attention of the legislature to some statesman-like and far-reaching measure of democratic progress; for which the people can afford to wait a little in preference to riveting tighter the bonds of the present undemocratic monopoly system for the sake of temporary convenience.



ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING FEB. 12, 1867.

Reported Officially for the Scientific American.

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

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

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

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

61,914.—ARM FOR CAR SEATS.—Albert L. Babcock, New Haven, Conn.

I claim the seat-arm herein described as an improved article of manufacture.

61,915.—DEVICE FOR OILING SPINDLES, TOP ROLLS, ETC., OF SPINNING AND OTHER MACHINERY.—Samuel H. Barber, East Greenwich, R. I.

I claim the combination of the tubes, constructed and operating substantially as described, with the various machines used for manufacturing cotton, wool, and other material, for the purpose and substantially as herein set forth.

61,916.—STEAM ENGINE.—John S. Barden, Providence, R. I.

I claim the improved steam engine, constructed not only with the two connected heads, C D, to its piston, and with the exhaust passage, d, extending from the steam chest, laterally, into the space between the said two heads and out the side of the cylinder, but as provided with the lever, G, to extend between the two heads and into the slide valve, H, such lever being for operating with such slide valve, in manner substantially as explained.

I also claim the combination of the mouth piece, L, with the force pump and steam engine, arranged and so as to operate substantially as specified.

61,917.—MODE OF TREATING SACCHARINE MATTERS.—Edward Beanes, London, England.

I claim subjecting saccharine matters to the action of ozone, substantially as and for the purpose described.

61,918.—APPARATUS FOR CARBURETING GAS.—W. W. Bierce, Cleveland, Ohio.

First, I claim the float, D, perforated tin, F, and covering, F', as arranged, in combination with the sleeve, G, tube, B, and slot, C, for the purpose and in the manner substantially as described.

Second, The shield, K, pipe, B, and sleeve, G, in combination with the case, A, for the purpose and in the manner as herein set forth.

61,919.—BLOWER.—George W. Bigelow, New Haven, Conn.

I claim the combination of the revolving valve, E, with the vibrating piston, D, substantially as and for the purpose herein set forth.

61,920.—DIE FOR FORMING SPIKE HEADS.—Reuel Blackwood, Philadelphia, Pa.

I claim a die consisting of the parts, A and B-D B-D, constructed substantially as described, and operated by any suitable machinery, substantially as and for the purpose set forth and described.

61,921.—CAP FOR PRESERVING JARS.—Joseph Borden, Bridgeton, N. J., assignor to F. & J. Bodine, Philadelphia, Pa.

I claim a cap consisting of a disk, B, and arms, b b, the whole being constructed and adapted for attachment to a jar, substantially as described.

61,922.—COAL STOVE.—Albert Brown, Troy, N. Y.

I claim, in combination with a fire-box and combustion chamber of stoves, a fuel magazine or reservoir, A, as provided with lateral vents or apertures, a a a, substantially in the manner as herein described and for the purpose set forth.

61,923.—SASH-SPRING HOLDER.—Reuben F. Brown, Lewisburg, Pa.

I claim as a new article of manufacture, the arrangement and combination of the casing, A, its solid base, H, and notches, a a', latch, B, spring, D, covering plate, C, all constructed and operating in the manner and for the purpose specified.

61,924.—CLOTHES-LINE REEL AND HOUSE.—M. H. Card and A. Sallee, Fulton, Ill.

We claim, in a clothes-line reel, the combination and arrangement of the flanged drum, G, the spring, C, house, J, and stop, L, all operating as and for the purpose specified.

61,925.—CHURN.—William L. Card, Gardiner, Ill.

I claim, the combination of the revolving churn and stationary dashers, the hollow shaft, a, and removable spindles, F, arranged and operating substantially as and for the purposes specified.

61,926.—SCREW GAGE.—J. S. Copeland, Bridgeport, Conn.

I claim a screw gage constructed substantially as described.

61,927.—HYMN AND TUNE BOOK.—Ebenezer Curtice, Yonkers, N. Y.

I claim, First, In singing books having their leaves cut, as herein described, the use of whole leaves, intervening the cut leaves, for the purpose mentioned herein.

Second, The application of a holder, in the manner and for the purpose herein specified.

61,928.—CARPET STRETCHER.—George O. Dunlap, Chicopee, Mass.

I claim, First, The spring, D, arranged upon the plate, A, in combination with the projections, b b', substantially as herein shown.

Second, The claws, E E, in combination with the carpet stretcher, substantially as shown.

61,929.—WRENCH.—Timothy Earle, Valley Falls, Smithfield, R. I.

I claim the invention in wrenches, described, consisting of a movable jaw, C, provided with a serrated or equivalent, roughened surface, a a', in combination with a spring clamp, F, or its equivalent, substantially as set forth.

61,930.—MACHINERY FOR DRYING PAPER IN PAPER-MAKING MACHINE.—Oliver Ellsworth (assignor to himself and Richard Smith), Boston, Mass.

I claim graduating the supply of steam to the cylinders which dry the paper by the expansion and contraction or tension of the paper made and dried.

Also, in combination with the drying cylinders, the movable roller over which the paper passes, and the link and lever which connect it to the valve in the steam pipe which supplies the drying cylinders.

I claim making the link which connects the movable roller with the regulating valve detachable and connecting it to a roller held in place by the paper, by the mechanism described, or its equivalent, so that when the paper breaks and releases the roller, the connecting mechanism will detach the link so that it will cease to operate the valve in the steam pipe.

I also claim making the link, x x', adjustable in its length, by means of a slotted slide and screw, or other equivalent device.

61,931.—PREPARING SOLUBLE SILICA, AND IN APPLYING THE SAME TO USEFUL PURPOSES.—Anthony L. Fleury, Philadelphia, Pa. Antedated Dec. 28, 1866.

I claim the process, herein described, for preparing hydrated silica.

I also claim, as a new manufacture, hydrated silica, prepared substantially as described and set forth.

I further claim the improvement, herein described, in the manufacture of artificial stone, marble, paints, cements, and the like, substantially as described.

61,932.—STRAW CUTTER.—Warren Gale, Chicopee Falls, Mass.

First, I claim the pressure cylinder, A, constructed substantially as described, and geared to the cutting cylinder, B, in such a manner that the edge of the knife or knives shall, at the point of contact with the pressure cylinder, move at equal speed therewith, when the said pressure cylinder is constructed of disks of wood, rawhide, leather, or other similar material, not including metals of any kind, and is of full cylindrical form, substantially as set forth.

Second, In combination with the above claim, sliding box, A, screws, E E, spring, D, operating as described and for the purposes set forth.

61,933.—STRAW CUTTER.—W. Gale, Chicopee Falls, Mass. Antedated Aug. 12, 1866.

First, I claim the pressure cylinder, B, constructed as described, and having its entire periphery covered with a surface of soft metal, in combination with a knife-cylinder, provided with oblique of spiral knives, when the said cylinders are constructed and operated so that the edge of a knife, at the point of contact with the soft metal, shall move at the same speed as the pressure cylinder, substantially as and for the purposes specified.

Second, The sliding boxes, c, springs, S, and screws, E, in combination with the devices claimed in the first claim.

Third, The spiral knives, K, when secured in spiral grooves, h, in the cylinder, G, when the said cylinder is geared to the pressure cylinder, B, all constructed and arranged substantially as above described.

61,934.—MACHINE FOR STRAIGHTENING THE WEFT OR FIGURES OF TEXTILE FABRICS.—James Greenwood, Clinton, Mass.

I claim the machine, substantially as and for the purposes described, that is, as composed not only of a straightening roller, made expansible and contractible, as set forth, but of rollers, or their equivalents, for presenting the cloth to the action of such roller and moving such cloth with respect to it, substantially as explained.

I also claim the combination of the adjustable lever, or its equivalent, with the straightening roller, supported as described, and combined with rollers, or their equivalents, for presenting a piece of cloth to the action of such roller, in the manner and for the purpose as set forth.

61,935.—BELT CLASP.—Philander Harlow, Hudson, Mass., assignor to himself and Asa F. Hall.

I claim the belt fastening, composed of the two plates, A and C, constructed and operating together in the manner and for the purpose substantially as described.

61,936.—EDIBLE PREPARATION FROM INDIAN CORN.—J. W. Haskins, Charlestown, Mass.

I claim the improved edible composition, as made of maize and gum acacia, or the same and one or more sweetening or flavoring matters or substances, substantially as set forth.

61,937.—STEERING APPARATUS.—Horatio F. Hicks, Grand View, Ind. Antedated Jan. 28, 1867.

First, I claim the arrangement of the pistons, S S, rods, L, index, M, and pointer, d, substantially as and for the purpose specified.

Second, The arrangement of the levers, H H, with levers, a a, and rods, K, by means of which the boat may be steered from forward or aft, substantially as set forth.

61,938.—MACHINE GEARING.—Alonzo Hitchcock, New York City. Antedated Jan. 30, 1867.

I claim distributing the power around the shaft to be driven so that the tendency to displace the shaft on one side is counteracted by that on the other by the means and in the manner substantially as described.

61,939.—HARNESS CLAMP.—Thomas B. Hodge, Francistown, N. H., assignor to himself and D. McCaine, Groton, Mass.

I claim the above described arrangement and combination of the clamp, D, the looped straps, C C, the bed piece, A, the rod, E, and the ratchet, F, and catch, H.

Also, the combination therewith of one or more of the auxiliary bed pieces, 1, made substantially as described.

61,940.—SORGHUM STRIPPER.—A. D. Huff and L. D. Huff, Clinton, Iowa.

We claim the knife, C, provided with two cutting edges, d e, the first for topping with an endwise thrust, and the other for cutting when drawn back, when combined with the forked guides, b b, of the stock, A, and solid curved stripper, F, arranged and operating substantially in the manner and for the purposes described.

61,941.—ANIMAL TRAP.—Henry Lee, Oberlin, Ohio.

I claim the fall, F, armed with teeth or points, F', standard, G, and yoke, H, in combination with the post, B, baited lever, D, and staple, I, as and for the purpose set forth.

61,942.—FENCE.—J. C. Leonard, Union City, Mich.

I claim the combination of inclined stakes or pickets with a horizontal supporting wire or rod when said stakes are slotted or kerfed to receive the wire, are prevented from spreading apart at their base, all substantially as herein described and illustrated.

61,943.—CULTIVATOR.—Ivory Lord and Sewall Woodman, Saco, Me.

First, We claim the shank, s, as shown in all the figures of the drawings, elongated, and perforated as described, and the brace, b, connected therewith.

Second, The attachment of the teeth by the rods or arms at a distance from the wood, as shown in Figs, 1 and 4, and secured in place by nuts and keys, as described.

Third, The mode of widening or narrowing the machine by sliding the teeth on the arms, r r h h, in Fig. 4, and the combination of all, forming the cultivator as represented and described.

61,944.—HARVESTER.—James S. Marsh, Lewisburgh, Pa.

First, I claim casting the platform, C, in one piece with a tool box on its upper surface to give the required strength to this platform, and with recesses in its outer corner for gears, c2 c3, substantially as described and shown in Fig. 2 of the drawings.

Second, The double-hinged joint platform supported upon inner and outer caster wheels, H H,, in combination with the adjustable transverse bar, D', and drag bar, E, substantially in the manner and for the purpose described.

Third, In combination with the hinged platform, caster wheels, H H', suspending devices, D' and E, I claim the lever, F', and link, d', substantially as and for the purposes described.

Fourth, The combination of the lever, F2, with the hinged cutting apparatus and draft frame, transverse bar, D', link, d,, drag bar, E, and transverse, D2, all arranged and operated substantially in the manner and for the purpose described.

Fifth, The combination and arrangement of the forward adjusting device, F', with the rear adjusting device, F2, each having a separate axis whereby the ordinary adjustment is retained and the adjustment of the pitch of the points of the guard fingers to suit the condition of the grass to be cut, substantially as described.

61,945.—COOKING STOVE.—James Marshall, New Orleans, La.

I claim the combination of the columns, b, and ledges, a, with the oven, A, hollow grate bars, the oven, B, and openings, C, when covered by a cast cross bar, D, when these several parts are constructed and relatively arranged with respect to each other, as described for the purpose set forth.

61,946.—APPARATUS FOR EXTRACTING PARAFFINE, ETC., FROM OIL.—J. B. Meriam, Cleveland Ohio.

First, I claim the stanchions, G, pulleys, d N and O, as arranged in combination with the frames, A, and pan, B, for the purpose and in the manner as set forth.

Second, The cross head, D, friction rollers, c', in combination with the stanchions, G, as arranged and operated by the link, K, and levers, L, for the purpose in the manner specified.

Third, The cylinder, P, as constructed with ribs or corrugations, b, on the inner surface, as and for the purpose specified.

Fourth, The follower, E, with the dependent arms, C, in combination with the cylinder, P, for the purpose and in the manner as substantially as described.

Fifth, The arrangements of the cases, S, bucket, U, pipe, T, in combination with the tank, Q, provided with the perforated bottom, R, as and for the purpose set forth.

Sixth, The cases, S, buckets, V, in combination with the tank, Q, and freezing mixture, for the purpose and in the manner as described.

61,947.—CASTER FRAME.—Frederick J. Miller, Brooklyn, N. Y.

First, I claim the caster frame whose base is provided with receptacles or compartments for salt, sugar, etc., when constructed in the manner described and shown

Second, I claim the combination of the base, a, and the spring or holder, f, when applied to a caster frame, in substantially the manner described and shown.

61,948.—DUMPING WAGON.—George N. Munger, New Orleans, La.

I claim the frame work, D and E, which supports the body, the one part being fixed to the body and the other to the forward axle, and the two parts hinged together and combined with a device for securing the two axles in

their proper relative positions, the whole constructed and arranged so as to operate substantially in the manner and for the purpose specified.

61,949.—HARDENING IRON.—Harvalin Paddock, St. Johnsbury, Vt.

I claim the within-described process of hardening iron with the employment of carbonate of iron and carbon in a finely-divided state, applied in the manner substantially as herein set forth.

I also claim the combination of common salt, carbonate of iron and carbon in a finely-divided state, as a material for hardening iron, when used substantially as herein set forth.

61,950.—COMBINATION OF STAMP HOLDER AND INKSTAND.—Philander Perry, Charlestown, Mass., and Joshua Brooks, Newton, Mass.

First, We claim the stamp holder, O, having openings in the cover with chambers containing each a plunger, o' and c, used with or without springs, substantially as and for the purpose described.

Second, We claim, in combination with a stamp holder, the well, G G, with a rotating cylinder, H, thereon, constructed substantially as and used for the purpose described.

Third, We claim the combination of the mucilage pot, I I, and the sand box, L L, with one inkstand, substantially as described.

Fourth, We claim the grooved steps, C C C, for holding pens and pencils in combination with an inkstand, constructed and used substantially as described.

Fifth, We claim the corrugated pen wiper, substantially as described.

Sixth, We claim the two standards, Q Q, with the ears, R and c, fitted to receive a calendar, when used in combination with an inkstand and constructed substantially as described.

Seventh, We claim the combination of the stamp holder, finger wetter, mucilage pot, sand box, pen rack, and calendar stand, with an inkstand, all constructed substantially as shown and used as described.

61,951.—HOLDBACK IRON FOR CARRIAGE THILLS.—Russel B. Prindle, Norwich, N. Y.

I claim the holdback iron or stop, A, substantially as and for the purpose set forth.

61,952.—HARVESTER.—Amos Rank (assignor to the Ætna Manufacturing Company,) Salem, Ohio.

First, I claim securing the finger beam rigidly to a rocking shoe, J, which is sustained at its front end by means of a transverse brace, H, which has a hinged connection with the draft frame and is coupled to the drag bar or brace G, by means of devices, i and j, or their equivalents, and at its rear end to an angular projection, G' of a longitudinal brace, G, all constructed and operating substantially as described.

Second, In combination with a shoe hinged as at h, the two braces, G and H, coupled together by means of devices, i j, or their equivalents, which will admit of the rising and falling of the front end of the shoe, J, substantially as described.

Third, The construction of the drag bar, G, with the projection, G', on its rear end said projection, G', and the bar being wrought metal and in one piece, substantially as and for the purpose described.

Fourth, The combination with the two-wheeled draft frame and the gearing thereof, of the compound brace, G G' H, coupled together by the loose connection, i j, and the double-hinged shoe, J, substantially as and for the purposes described.

Fifth, The arrangement of the transverse brace, H, angular drag bar or brace, G G', coupled loosely together and a depressed hanger of a two-wheeled draft frame, said wheels being independent drivers, all substantially as and for the purpose described.

61,953.—HARVESTER.—Amos Rank (assignor to the Ætna Manufacturing Company), Salem, Ohio.

I claim providing for keeping the sickle and pitman rod of a combined reaper and mower in a straight line vertically by means of a gage collar, b, applied to the swivel pin, a, substantially as described.

61,954.—MINCING KNIFE.—Helen M. Remington, Springfield, Mass.

I claim the sectional stems or shanks, h, with the knives, c, in combination with the cylindrical clamp or ring, a, and the socket, g, substantially as herein described and for the purpose set forth.

61,955.—MACHINE FOR GRINDING SAWS.—John Richards, Columbus, Ohio.

First, I claim the arrangement substantially as herein described, whereby saw blades are supported, fed up to the position desired, adjusted at different angles with respect to the face of the carriage, D, and bevelled on both sides, all substantially as set forth.

Second, The combination of the two screws, a' d, with the sliding carriage, D, of a saw-bevelling machine, substantially in the manner described.

Third, The combination of the shouldered holder, K h, hinged adjustable support, G, and curved gage, g', substantially in the manner and for the purpose described.

Fourth, The hard metal-shouldered holder, when constructed to operate as described.

61,956.—COOKING STOVE.—J. J. Savage, Troy, N. Y.

First, I claim the location of the fuel door way or feed mouth, B below and forward of the combustion chamber, C, of stove furnaces and in such immediate position to the fire-box, A, as to operate in manner substantially as herein described for the purposes set forth.

Second, When operated in combination with and through said located fuel doorway, B, in manner as and for the purpose described, I claim the lever feeder, constructed substantially as set forth.

Third, In combination with the front plate, D, of stove furnaces, I claim the arrangement of a fire or guard plate, E, in position above the fuel doorway, B, of the fire box, and about opposite the combustion chamber, C, substantially in manner and for the purpose as set forth.

Fourth, In combination with the fuel doorway, B, when located substantially as described, I claim the arrangement of the front plate, D, of stove furnaces, in an inclined or slanting position such as to overhang the fire box and combustion chamber of the furnace, substantially in the manner and for purpose as herein set forth.

61,957.—CHEMICAL COMPOSITION FOR BLASTING ROCKS.—Charles Seidel, New York City.

I claim the above-described composition of matter, substantially as and for the purposes described and set forth.

61,958.—PAVEMENT.—William H. Shurtteff, Providence, R. I.

First, I claim a paving block composed of wood and iron or other suitable metal combined and applied to each other, substantially as shown and set forth.

Second, The combination with a wooden block of suitable form of a skeleton or open-work metal cap or frame applied to the said block in such manner that the fibers of the wood shall be compressed between the sides of, and forced up into the openings in the top of the said cap or frame, substantially as shown and described.

Third, The skeleton or open-work metal cap for paving block herein described the same consisting of a frame of iron or other like material, the sides of which extend a suitable distance below the bars forming the top of the frame, the said bars being wedged shaped or tapering toward their lower ends, and arranged so as to form a grating or lattice work, substantially as and for the purposes shown and set forth.

61,959.—CHEESE VAT.—Alanson Slaughter, Middletown, N. Y.

I claim the arrangement and combination of the hot water trough, A, with its recess, a', the steam and drip pipes, D E, the corrugated disseminator, F, and milk vat, G, with or without the agitator, K, substantially as and for the purpose herein specified.

61,960.—PORTABLE PISTOL GALLERY.—Fisher A. Spofford and Matthew G. Raffington, Columbus, Ohio.

First, We claim a miniature portable pistol gallery, constructed substantially as shown and described.

Second, The gun and turret, Figs. 3 and 8, arranged and operating in the manner and for the purposes herein described.

61,961.—RAILROAD-TIME INDICATOR.—R. C. Taylor, Brockport, N. Y.

First, I claim the employment of a series of adjustable cams, C C, with a graduated cam wheel, B, and an escapement lever, D, or equivalent, operating substantially as described and for the purpose set forth.

Second, Making the wheel, B, in two parts, c d, when combined with the cams, in the manner and for the purpose specified.

61,962.—METALLIC CARRIAGE WHEELS.—Adam P. Ware, Camden county, N. J. Antedated Jan. 28, 1867.

I claim constructing a wheel for carriages, substantially as described, when the felloes, B, are made of malleable iron, and constructed and fitted together with the plates, b, nuts, a, and spokes, C, in the manner described.

61,963.—EXCAVATOR AND POTATO DIGGER.—Benjamin O. Warren, Elkhart, Ind.

First, I claim the central carrier, C', as arranged relatively to the inclined plane of the shovel, b, in combination with the larger carrier, C, substantially in the manner and for the purpose as herein set forth.

Second, The longitudinal frame, B, arranged in combination with the beams, A, axles, a, and carrier, C, substantially in the manner and for the purpose as herein set forth.

Third, The guide lever, G, in combination with the frame, B, and shovel, b, substantially in the manner and for the purpose as herein set forth.

Fourth, The semicircular plate, f, lever, e', hooked spring, e, and windlass, F, as arranged in combination with the beams, A, and frame, B, substantially in the manner and for the purpose as herein set forth.

Fifth, The box, I, provided with a movable bottom, in combination with the double carrier, C' and C, substantially in the manner and for the purpose as herein set forth.

Sixth, The boards, i, of the bottom of the box, I, having eccentrically constructed pivots, j, on their ends, and so arranged as to drop by their own gravity, substantially in the manner and for the purpose as herein set forth.

Seventh, The lever, g, windlass, H, and loop, l, in combination with the chain couplings, k, of the board, i, of the box, I, substantially in the manner and for the purpose as herein set forth.

61,964.—FURNACE AND FIRE-PLACE GRATE.—George Warriner, Little Ilford, England.

I claim, First, The inverted cone or pyramid, or the air-excluding screen or apron, sealed at the bottom by water or other liquid, as herein set forth.

Second, In combination with the above, I also claim a hollow furnace or fire bars, or tubes, in conjunction with solid grate bars, connected with a hollow-bearing bar or bars, whereby steam, air, or gas is introduced to support combustion, the introduction thereof being regulated by any convenient suitable means, substantially as herein specified.

Third, I also claim introducing petroleum or other such like inflammable substance or gases through tubes over, or by the side of, or underneath the fire, as hereinbefore stated.

Fourth, I claim the application or adaptation, in the manner hereinbefore described, of pipes or tubes in furnaces or fire places, in immediate juxtaposition with ovens or other cooking apparatus or heating chambers, which pipes or tubes admit heated air into the oven or other chamber to be heated

61,965.—PEAT MACHINE.—Darius Wellington, (assignor to Cornelius Wellington), Boston, Mass.

I claim the combination of the cylinder, d, and its reducing and pressing mechanism, the mold cell, c, and pit, i, and the follower, l, when the whole are constructed and arranged to operate together, substantially as shown and described.

I also claim so combining the driving shaft, n, by which the follower is directly operated, and the mill shaft, e, that the pressure upon the peat may be increased or diminished relatively to each reciprocation of the follower, substantially as set forth.

Also forming the bed of the mold cell of the stone, as and for the purpose set forth.

Also combining with the cylinder, b, the cutting edge, n, operating as set forth.

61,966.—FIRE BRICK.—Samuel K. Wellman, Nashua, N. Y.

I claim the composition of fire clay and quartz, or fire clay and plumbago or black lead, about in the proportions specified, for the manufacture of fire-brick crucibles and other vessels or articles which are to be subjected to an intense heat.

61,967.—RAILROAD SWITCH.—George Westingham, Jr. Schenectady, N. Y.

First, I claim a portable railroad switch having double branch tracks, D D, which converge as shown, and are insersected by grooves, H H, substantially as set forth.

Second, I also claim the double grooved frog, C, having branch track, D, in combination with the switch bar, E, substantially as set forth.

Third, I also claim the retention of the rests, F, of the branch tracks, D, backward, so as to form a bearing surface for the switch bar behind its joint, substantially as shown.

Fourth, I also claim the combination of the double grooves, the right and left branch tracks, and the track, I, at the forward end of the frog, C, substantially as shown.

61,968.—MANUFACTURE OF PAPER BOXES.—Seth Wheeler and Edgar Jerome, Albany, N. Y.

First, We claim, in the manufacture of hollow paper articles directly from paper pulp by mechanical pressure, means substantially as described, whereby the water is allowed to escape freely, and form is given to the pulp at one operation as set forth.

Second, We claim the combination of vertical and horizontal followers in a machine adapted for making paper boxes and other hollow articles from pulp, substantially as and for the purpose described.

Third, We claim the combination of a perforated die and a follower or followers in a machine adapted for making paper boxes from pulp, substantially as described.

Fourth, In a machine adapted for making paper boxes and other hollow articles, we claim the use of a light, rigid frame upon or within which the article of pulp is formed, said frame being removable from the dies, substantially as and for the purpose set forth.

61,969.—MANUFACTURE OF BOXES FROM PAPER PULP.—Seth Wheeler and Edgar Jerome, Albany, N. Y.

First, We claim a new article of manufacture, to wit, the paper box with its body and the rim of its top pressed into form directly from paper pulp, and the end pieces of the body and top cemented in place, substantially as described.

Second, A box top, as a new article of manufacture, made as described.

Third, The body and bottom of a box, as a new article of manufacture, made as described.

61,970.—HORSE SHOE NAILS.—Albert S. Wilkinson, Pawtucket, R. I.

I claim the horse shoe nail, B C, for securing nails to the feet of animals having a slow tapering head, B, passing quite through the shoe or through the lower plate of a double shoe, substantially in the manner and for the purpose set forth.

61,971.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

First, I claim the placing of a toe clip, B, on one side of the toe of the shoe, so as to be mainly opposite one of the heels of the shoe, when the said opposite heel and toe clip are used to secure the shoe to the foot, while one heel of the foot is free for lateral expansion, substantially in the manner and for the purpose set forth.

Second, I claim a clamping band, K K', running from one heel of the shoe over in front of the hoof, and fastening to the toe of the shoe opposite to the starting point at the heel, in combination with the heel rest, j, substantially in the manner and for the purpose set forth.

Third, I claim the ratchet-headed clamping screw, h i, in combination with the catch or detent, m, Fig. 2, substantially in the manner and for the purpose set forth.

Fourth, I further claim the combination of the heel clip, b', band, K, and the bar clip, J, arranged substantially as herein represented, to firmly clamp one side of the heel of the hoof.

61,972.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

I claim a continuous clip, B B' b g j, in combination with the bar, A, elevated at the toe, B', and heel, b, and having the arms, g j, extending upward and taking hold of the heel of the foot, the heel clips being fastened by the button fastening, h i, substantially in the manner and for the purpose set forth.

71,973.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

First, I claim a rubber sole, B, extending over the whole sole of the foot, in combination with a stiffening metallic shoe, a, substantially in the manner and for the purpose set forth.

Second, And, in combination with the above, I claim the metallic shield, k, substantially in the manner and for the purpose set forth.

Third, I claim the air cushion, P, in combination with the flap, R, substantially in the manner and for the purpose set forth.

61,974.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

I claim a round-bottom shoe, A, Figs. 1 and 2, armed and protected at the heel and toe with steel plates, e e e, substantially in the manner and for the purpose set forth.

61,975.—HORSE SHOE.—Albert S. Wilkinson, Pawtucket, R. I.

I claim a calk formed by parts, d f d, placed alternately on the outer and inner edge of the bar, A, substantially as shown and described.

61,976.—MOLDING SASH WEIGHTS.—Samuel Williamson, Cincinnati, Ohio.

First, I claim the iron cut off or stop, D, when applied and used in casting weights.

Second, The application and use of the horn-shaped conical iron chill or sand cores, E E, in casting weights.

Third, I claim the extension and use of the stops, D D, and the cores or cells, E E', whether used separately or in combination in casting weights, substantially as set forth and described.

61,977.—DIES FOR MAKING KNOBS.—Joseph Wise (assignor to Thomas Kennedy), Branford, Conn.

First, I claim the combination and arrangement of the socket, C, and spindle, D, provided respectively with projections, a and d, and arranged to operate substantially in the manner described.

Second, In combination with the above, I claim the arrangement of the spindle, I, as and for the purpose specified.

61,978.—MANUFACTURE OF VINEGAR.—Harry P. Witbeck, Rochester, N. Y. Antedated August 12, 1866.

I claim the process of producing a liquid for vinegar or acetic acid from the produce of the mixture of grains, as herein described, by passing the same through a filter, for the purpose of purification, substantially as herein specified.

I also claim the rapid process of acidulating the liquid by subjecting it to a charge of pure oxygen, as herein described.

61,979.—BUCKLE.—Henry S. Woodruff, Jamesville, Wis.

First, I claim the application to the cross bar, b, and on the outer surface of a buckle of a fixed or rigid tongue, g, when arranged and used substantially as and for the purpose set forth.

Second, The combination and arrangement of the cross bar, b, and tongue, g, with the cross bar, d, and tongue, r, substantially as and for the purpose set forth.

Third, The fixed and rigid tongue, n, when arranged and used substantially as and for the purpose set forth.

Fourth, The combination and arrangement of the tongue, g, and cross bar, b, tongue, l, and cross bar, d, and tongue, n, with the side bars, a, and end bars, c and e substantially as and for the purpose set forth.

61,980.—COMBINED CULTIVATOR AND PLOW.—Isaac Young (assignor to himself and Isham H. Hayes), Byhalia, Miss.

I claim the attachment, C, to shovel or other plows, when shaped and operating substantially as and for the purpose herein specified.

61,981.—CORN PLANTER.—John N. Arvin and Joseph M. Whitmore, Valparaiso, Ind.

We claim the driving pulley, E, and the friction pulleys, F F, in combination with the chain, c c, the rollers, d d, in the hoppers, g g, and the cam, k, the shaft, b, the pawl, m, on the vibratory rod, n, and the flaps, p p, in the shutes, h h, all arranged and operating as and for the purposes herein described.

61,982.—HORSE SHOE.—John Austin, Rockford, Ill.

First, I claim securing the shoes to the animals foot by means of the bolts, C, constructed and applied as shown and described.

Second, The movable pieces, e, secured in the slot, n, substantially as and for the purpose set forth.

Third, I claim making the calk self-sharpening, by inserting within the body of the calk of a piece of steel, substantially as described.

61,983.—FLOATING ANCHOR.—George V. Baker, Astoria, N. Y.

I claim the combination of the spar, A, detachable planks, B, weight, C, and bolts, D, when constructed and arranged as herein set forth for the purpose specified.

61,984.—CEMENT FOR WALKS, FLOWS, PAVEMENTS, ETC.—J. S. Baldwin, Elmira, N. Y., W. H. Jones, Rochester, N. Y., and E. N. Gibbs, Elmira, N. Y.

We claim a cement formed by the combination of coal tar, coal pitch, sand, coke or coal ashes, furnace cinders or iron scale and rosendale cement, substantially in the proportions herein specified.

61,985.—MODE OF TREATING PEAT.—Hosea Ball, New York City.

The vertical conductor, B, and horizontal conductor, A, arranged at right angles to each other provided with corresponding screws, B E, independent of each other and operating substantially as and for the purpose specified.

61,986.—MUSQUITO BAR FOR WINDOWS, ETC.—V. Barker, Otisfield, Mass.

First, I claim the corners for a frame made from sheet metal as herein shown and described and for the purposes set forth.

Second, I also claim the bars, C, provided with grooves in which is fitted a tongue in combination with the socket corners, substantially for the purposes herein shown and described.

61,987.—HYDRAULIC PUNCHING MACHINE.—J. B. Barnes, Fort Wayne, Ind.

I claim an improved hydraulic punch formed by the combination of the large hollow screw, B, the small interior screw, C, and the plunger, G, with each other and with the yoke, A, substantially as herein shown and described.

61,988.—GAGES FOR SAW MILLS.—Jacob Behel and John Nelson, Rockford, Ill.

First, I claim the adjusting of fence, C, to any desired angle by means of two rotary motions, one around an axis in itself, and the other around an axis in B, or its equivalent.

Second, In combination with the fence, B, of a saw gage, we claim the block, E, slide, F, and setscrew, J, when said slide is grooved to fit the inclined faces of the graduated way bar, L, and the latter is set into and is flush with the face of the saw table, the said parts being constructed and arranged substantially in the manner and for the purposes set forth.

61,989.—HOOKS AND EYES.—Andrew Bennett (assignor to himself and Joseph Oechler), Brooklyn, N. Y.

I claim as an improved article of manufacture, a hook, A, provided with side springs, a a, substantially as and for the purpose herein shown and described.

61,990.—HORSE SHOE.—Thomas B. Bishop, Baltimore, Md.

I claim, First, The combination of the artificial calk, b, and flange, s, formed above the base of said calk, when the calk bears upon the ground and the flange is adapted for being applied between the hoof of the horse, and the shoe, substantially in the manner and described.

Second, The combination of air passages, c, with the elastic sole or frog substantially as and for the purposes described.

Third, Serrating or grooving the bottom surface of the frog, b, substantially as and for the purpose described.

Fourth, The combined cushion and elastic frog or calk, constructed as described the same being a new article of manufacture.

61,991.—MUCILAGINOUS COMPOUND.—Victor G. Bloede, Brooklyn, N. Y.

I claim the gum produced by treating starch with a compound of nitric and hydrochloric acids mixed together, substantially as and for the purpose described.

Second, The within described process of producing gum from starch by treating the same with nitric acid in about the proportion herein set forth and drying it on metal sheets of a heat of about 250° Fah. as specified.

Third, The combination of oil of almonds with an aqueous solution of gum prepared by treating starch with acids, substantially as and for the purpose set forth.

61,992.—MODE OF TREATING INDIA RUBBER.—Stephen Bourne, Headstone Drive, Harrow, England, assignor to to himself and Theodore Bourne, New York City.

I claim deodorizing india-rubber or any compound of which it forms a part by means of charcoal, substantially as described.

61,993.—METAL BUNG.—William Boynton, Auburn, N. Y.

I claim, First, The screw, c, in combination with disk, B, the nut, d, and washer, e, the whole constructed and operating as and for the purpose herein set forth.

Second, The case, A, constructed in the manner and for the purpose substantially as herein described.

Third, A combination of a case, A, and disk, B, both constructed and operating substantially as herein set forth.

61,994.—PANEL FOR LAMP SHADES.—George M. Breuker (assignor to Breuker and Kessler), Philadelphia, Pa.

I claim the manufacture of panels for lamp shades by applying to the varnished surface of a sheet of mica or sheet of paper or other material on which two or more layers of oil color have been deposited as herein specified

61,995.—SOAP.—John Brucker, Chicago, Ill.

I claim the soap consisting of the above enumerated ingredients and prepared substantially in the manner herein described and specified.

61,996.—PRINTING PRESS.—William Bullock, Philadelphia Pa.

I claim the endless belts carrying the nippers in combination with the vibrating fly frame for throwing down the sheet, and asserting its motion substantially as described.

61,997.—ALLOY FOR MOLD BOARDS AND OTHER PARTS OF PLOWS.—Oscar F. Burton, Jersey City, N. J.

I claim the manufacture of the mold boards-shares and other parts of plows and cultivators working in and exposed to the soil, of an alloy composed of copper, tin and zinc with or without antimony and lead or either substantially as specified.

61,998.—SKATES.—Charles Bushman, West Chester, Pa.

I claim the curls, c f, formed out of the same piece as the runner and arranged with regard to the heel and toe plate, and the runner as herein described and represented.

I also claim a raised circular socket, m, on the heel plate of the skate, and furnished with an elliptically shaped hole, n, in its top so that a screw head slightly filed away on its opposite sides and set in the heel of a boot or shoe, may enter and turn in said socket to form a fastening between the heel of the boot or shoe and the skate as herein described and represented.

61,999.—DIRT RECEPTACLE.—Chesmon Butterfield, West Waterville, Me.

I claim a dirt or dust receptacle having its cover or top, D, and bottom plate, F, connected together through rods, G and J, and swinging lever or beam, H, so as to operate substantially in the manner and for the purpose described.

62,000.—TRUSS.—Ephraim Capen, Batavia, Ill.

First, I claim the combination and arrangement of the shaft, c, provided with an inclined stationary shouldered, B, the nut, D, movable collar, C, and its pad arm operating substantially as described for the purpose of adjusting and securing the requisite pressure, as herein set forth and specified.

Second, I claim constructing the pad arm in two parts, E F, pivoted together as described for the purpose of affording a lateral adjustment to the pad, as herein set forth.

Third, I claim forming a boss, g, upon the arm, F, whereunto the pad is attached substantially as and for the purposes specified and shown.

62,001.—BUTTON FASTENING.—George J. Capewell, West Cheshire, Conn.

First, I claim a button provided with the cone, f, either as shown in fig. 1, or fig. V, of the drawings, substantially as and for the purpose specified.

Second, The combination of a single eyelet with the cone, e, either with or without the washer, d, substantially as shown and described.

Third, The two eyelets, f and f', in combination with the cloth, C, and the cone, e, either with or without the washer, d, when arranged and combined as and for the purposes set forth.

62,002.—TEA POT.—Alexander Carmichel, Westerly, R. I.

First, I claim the plate, B, arm, b, and slot, a', arranged relatively to the body, A, and the exit holes, a, substantially as specified.

Second, I claim the case, A2, combined and arranged as represented and extending upward from the slot, a' to a level above the top of the tea pot, substantially as and for the purpose herein specified.

Third, I claim in combination with the clearing plate, B, arm, b, and casing, A2, or their respective equivalents, the spring, D, adapted to operate substantially in the manner and for the purpose set forth.

Fourth, I claim the lever, E, arranged to operate in combination with the clearer, B, and the several connections, substantially as and for the purpose herein specified.

62,003.—DRILL.—G. F. Case, New York City.

I claim a diamond drill, having its diamonds arranged in two or more rows, substantially as described.

I also claim, in combination with the above, the diamonds when so set as to cut the entire surface of the rock, substantially as described for the purpose specified.

I also claim the loose collar or ring upon the drill-rod, substantially as and for the purpose described.

62,004.—CULTIVATOR.—E. Children, Lancaster, Wis.

First, I claim the friction roller, j, inserted in the pivoted draft pole, C, in combination with the bar, H, attached to the pivoted arms, b b, all arranged to operate in the manner as and for the purpose herein set forth.

Second, The links, I and T, shaped levers, J, applied to the plow beams and frame, A, to operate in the manner substantially as and for the purpose set forth.

Third, The securing of the plows, K, to the standards, L, by means of the staples, M, bars, r, and the keys, i, all arranged substantially as and for the purpose herein set forth.

62,005.—GRATE.—John S. Clark, Philadelphia, Pa.

I claim a stove or range grate, consisting of the fixed part, A, having the two series of parallel, alternate short and long bars, a1 a2, and the rotary part, B, having the two series of parallel, alternately long and short bars, b1 b2, the said parts being constructed and arranged to operate together substantially as and for the purpose described, and in combination with the subject matter of the preceding claim.

I also claim making the free ends of all the bars, a1 a2, b1 b2, deeper than the frame or shaft from which they project, and giving to the ends of the movable bars, b1 b2, the curved edge form shown, substantially as and for the purposes described.

62,006.—APPARATUS FOR DISTRIBUTING LIQUID MANURE.—J. Warren Clark, Iowa City, Iowa.

I claim the combination of a box wagon for containing water and earth, forming a puddling compound with a plow for cutting a trench connected with a mixer of the compound within the wagon box, and a hose or its equivalent for conducting it into the trench behind the plow, for the purpose of setting young trees or plants in rows, constructed and arranged substantially as herein described.

62,007.—BOILER FURNACE.—Thomas H. Clark, Indianapolis, Ind.

I claim the combination of a boiler furnace, when one or more boilers are arranged in the same longitudinal plane of the flues, E, made concentric in the transverse section with the bottom of the boilers, and which extend beneath the boilers in the direction of their length, and are separated from each other by ridges, S, with the transverse channels, L, and air channels, F and H', and the continuation of the partition between the boilers over the chambers, C', leaving a space under the boilers substantially and for the purposes as herein shown and described.

62,008.—SLEEVE BUTTON AND STUD.—Barnes Clayton, Philadelphia, Pa. Antedated Feb. 2, 1867.

I claim in combination with the shank and head of a shirt bosom stud, or sleeve button, the self-adjusting fastening, consisting of the hollow cylinder, 1, slide or bolt, 2, and spiral spring, 4, the same being constructed, arranged, and combined, and operating together, as and for the purpose described.

62,009.—LIFTING JACK.—Charles T. Close, Brooklyn, N. Y.

I claim a wagon jack, composed of the legs, A and B, and lever, when combined together, as and for the purpose described.

62,010.—NURSING COUCH.—James H. Cogshall, Lexington, Mich.

I claim the nursing couch, consisting of the support, A, screw, B, set screw, E, semi-circular arms, D, table, C, and straps, F, when constructed and arranged as herein set forth.

62,011.—LETTER ENVELOPE.—C. Conkling, Ashland, Ohio.

First, I claim the belt, D, and loops, B C, in combination with the envelope, substantially as described.

Second, The duplicate back, F, and loops, E, and envelope, substantially as and for the purpose set forth.

Third, The duplicate back, F, in combination with the envelope, as and for the purpose set forth.

Fourth, The self-sealing belt, D, in combination with the envelope, as and for the purpose set forth.

62,012.—CLAW BAR FOR RAIL.—Maxwell Cornelius, Cheviot, Ohio.

First, I claim the hinged double headed claw bar, A B B1 D, d, E E', constructed and adapted to operate as set forth.

Second, In combination with the above, I claim the single clawed auxiliary head, F, adapted to be hinged to the bar proper, and to operate in the manner set forth.

Third, The claws proper, B B', E E', adapted for ready removal and replacement, as set forth.

62,013.—LUBRICATOR.—Julien L. Courcier, Paris, France.

I claim the tube, c, in combination with the closed reservoir, a, and tube, g, substantially as herein set forth for the purpose specified.

62,014.—DEVICE FOR FORMING HORSE COLLARS.—Isaac T. Crum, Chicago, Ill.

I claim the combination of the form, A, with the flanges, D, and standard, C, substantially as set forth.

62,015.—SOLE CUTTING MACHINE.—Timothy A. Curtis, Brookfield, Mass.

First, I claim supporting the knife holder, B, on an internal support in connection with the solid bearings of the holder, on the frame, at x' x, when the knife is swung half round between each cut by means of the levers, rack, and catch ring, or their equivalents, substantially as set forth.

Second, I claim raising the block and table in connection with the swinging knife, in the manner and for the purposes substantially as above described.

62,016.—TOE CALK FOR HORSE SHOES.—George Custer (assignor to himself and Charles Toll), Monroe, Mich.

I claim a toe calk provided with a recess, and a projection upon its inner and upper surface, all as set forth, and substantially as described.

62,017.—BOOT HEEL.—George W. Davis, Milford Center, Ohio.

I claim a cast metallic heel, constructed as described, in combination with the devices for uniting the same to boots and shoes, as herein set forth.

62,018.—MACHINE FOR PRESSING HATS.—Joseph De La Mar (assignor to himself and Abraham Emanuel), Brooklyn, N. Y.

First, I claim the combination of steam cylinder, d, d, piston, b, and steam ring, c, for the purposes of affording heated surfaces to press against.

Second, The application of hydraulic pressure into an expansible india-rubber hat, over which the hat to be pressed is placed.

62,019.—RAZOR STRAP.—Friederich Eichner, Chicago, Ill.

I claim the use of the four substances herein enumerated, in three different proportions as herein set forth, for the purpose of making three different kinds of razor straps, in the manner substantially as herein described and specified, for concave razors as the barbers use.

62,020.—SAW.—James E. Emerson, Trenton, N. J.

I claim the method of securing teeth inserted in or attached to a saw plate, by forming the dovetail of one or more rivets, permanently secured either in the saw plate or the tooth, in the manner substantially as shown and described.

62,021.—ICE PITCHER.—George A. Eno, Philadelphia, Pa.

I claim the inner casing of an ice pitcher, or water cooler, contracted at the lower end as described, for the purpose specified.

62,022.—TUBULAR GRATE.—B. Garvin and R. J. Pettibone, Oshkosk, Wis.

We claim the combination of the tubes, A, with the caps, B, when constructed and applied substantially as and for the purpose set forth.

65,023.—SCISSORS SHARPENER.—A. W. Gifford (assignor to himself and Henry D. Ward), Worcester, Mass.

I claim the serrated or file bar, B, with the sides, D C, provided with the spring, F, substantially as described, for the purpose specified.

62,024.—VAPORIZING AND BURNING GASOLINE FOR HEATING AND ILLUMINATING.—Henry Gilbert, Philadelphia, Pa.

First, I claim the screw stop, with or without valve at the bottom, intended to fill the reservoir or vessel with the combustible fluid from below.

Second, The stop cock, or its equivalent in the burner, serving to regulate the exit of gasoline vapors, and consequently the size of the flame.

Third, The filling of the lamp or burner, or both, with sawdust, charcoal powdered or otherwise, bone dust, cotton, flax, hemp, wool, rattan, jute, or other similar porous substance.

Fourth, The modification of said lamp, by omitting the metallic burner entirely, and burning it by means of a wick, covered or not covered by a cap of wire gauze, only burning without any wick by means of the metallic burner.

Fifth, The use of a bundle of fine metallic wire in the openings and stop cocks of cans, bottles, tanks, barrels, or other reservoirs, for fluid combustible substances, giving a better ingress and egress to the liquid material, than is the case with wire gauze, and acting as an improved safety arrangement in preventing any flame to communicate to the interior, and cause explosion.

62,025.—EVAPORATOR.—H. C. Gilbert, Cambridge, Vt.

I claim the combination of the shaft, D, cog wheels, G, racks, H, and sliding frame, I, with each other, and with the top, a', of the furnace, A, when said parts are constructed and arranged substantially as herein described, and for the purpose set forth.

62,026.—WASHING MACHINE.—J. S. Gochnauer, Goshen, Ind.

I claim the yielding bed formed of a series of radiating conical rollers in combination with the rubber, F, composed of a series of conical radiating rollers, and made in two parts, which are hinged together by a rod, e, passing through the vertical shaft, D, substantially as and for the purposes described.

62,027.—STAIR ROD.—W. B. Gould, New York City.

I claim the combination of a stair rod, A, and socket or hollow tips, B, when they are constructed or arranged together so as to hold the rod, at either one or both of its ends, with an elastic or yielding pressure, substantially as and for the purpose described.

62,028.—CAR COUPLING.—Ransom W. Green, Bradford, Pa. Antedated Feb. 19, 1867.

I claim the arrangement of the flanged draw head, B, the link, I, the shouldered pin, E D, guide frame, C, and the shouldered spring arm, H, G, operating substantially as described.

62,029.—CARPET BEATER AND CLEANER.—W. H. Hankinson, New York City.

First, I claim the two pairs of feeding rollers, B and C, and the cylindrical brush, F, made self-adjusting as described and arranged in relation with each other, and with the supporting cords, E, and flexible beaters, a*, substantially as herein set forth, for the purpose specified.

Second, The stiff brushes, e, arranged upon a rotating frame in combination with the feeding rollers, B C, and cylindrical brushes, F, substantially as herein set forth for the purpose specified.

62,030.—HORSE POWER.—Theopilus Harrison (assignor to himself and William C. Buchanan), Belleville, Ill.

I claim the arrangement of the pinion, D, and the pinion, D', shaft, F, and pinion, H, diagonally with the pinion, H', and the shaft, E, in combination with the master wheel, A, constructed in the manner and for the purpose specified.

I also claim the elliptical or oval pin or axle, B, of the master wheel, A, in connection with the two pinions, D D', and separate shaft, E F, substantially as and for the purpose set forth.

62,031.—HEATING STOVE.—Thomas Henney, Dubuque, Iowa.

First, I claim the combination of the branch pipes, I, inlet pipe, H, pipes, G G', damper, J, central fire cylinder, A, hollow base, B, cap section, C, and the pipes, D D', all arranged and operating substantially as and for the purpose described.

Second, The combination of pipes, H I, with the pipes, G' and D', applied to a stove composed of sections, A B C, and pillars or pipes, substantially as described.

Third, Providing for securing the several movable sections of the stove together by means of rods, nuts and flanges applied to the air pipes, G, substantially as described.

Fourth, I claim the arrangement of the air pipe, G', opening at the top and bottom of the stove, and passing through the exit pipe, D', and damper, E, substantially as described.

62,032.—PRINTING PRESS.—John Henry, Jersey City, N. J.

First, I claim the arrangement in combination with the reciprocating distributing table, C, of disc distributors, D D, for action in concert with distributing rollers, substantially as specified.

Second, The combination with the inking rollers, distributing rollers, table, C, and disc, D D, of separate fountains, E F, essentially as and for the purpose or purposes herein set forth.

62,033.—BURGLAR AND FIRE ALARM.—Josiah Holmes and Charles W. Nickerson, Pittsburg, Pa.

First, We claim the plate lever, n, with the slot, s, in combination with the catch rod, m, and scape wheel, h, when arranged and operated in connection with a clock alarm, substantially as and for the purposes herein described.

Second, The guard cords, v v, with their ends, v v', the spiral springs, r r, and the lever, n, combined, arranged, and operating substantially as and for the purposes set forth.

62,034.—HORSE RAKE.—Edgar Huson, Ithaca, N. Y.

First, I claim the spring B, anterior to the rake head for the purpose of relieving the labor of operating the rake and also for the purpose of a quick upward motion of the teeth, so that the hay or other article raked shall not be bound by the forward motion of the horse, between the teeth, and the stripers or cleaners of the rake.

Second, I claim the combination of the spring B, rod E, and head lever F, as described.

Third, I claim the rake head O, P, teeth I, and staples J, all constructed and arranged substantially as and for the purposes set forth.

62,035.—HARVESTER RAKE.—Robert V. Jones and Henry Fessler (assignors to themselves and James Short), Canton, Ohio.

We claim, First, The circular metallic case A, provided with the wheels I, M, g and f, springs q, m, l, and r, in combination with the pins 1 and 2, treadles n and o, rack bar R, and wheel P, all arranged and used substantially as herein specified.

Second, The Quadranteal shaped platform D, with its slotted shield, hinged as described and the rake bar p, (connected to a stud at the geometrical centre of the platform) rake shaft y, tumbler u, and lugs j and j', for carrying the grain to the rear of the machine, the whole being constructed, arranged and operating as specified,

Third, The circular metallic case, constructed as described with rack bar R, and wheel P, in combination with the platform and rake, the whole being constructed and operating in the manner herein specified.

62,036.—DOOR LOCK.—Francis Just, Buffalo, N. Y.

First, I claim in combination with the tumblers B B, and a key bit, the bolt A, when constructed and operated as shown.

Second, I claim the catches F F, in combination with the key bit, for the purpose specified.

62,037.—MANUFACTURE OF HATS.—Henry Kellogg, New Haven, Conn.

I claim a hat formed and constructed by combining animal fibre with vegetable pulped fibre, substantially as herein set forth and described.

62,038.—WATER CRANES FOR SUPPORTING LOCOMOTIVES.—Lewis Y. Ketcham, Port Jervis, N. Y.

I claim. First, the water shaft c, within the pedestal a, constructed, arranged and operated substantially as described.

Second, The arrangement of means or devices for operating the water valve and the outlet valve, as herein shown and described.

62,039.—OILER.—John Kipp and William Allmendinger, Melrose, N. Y.

We claim, First, An oiler consisting of a reservoir C, and air pipe B, a discharging pipe E, with a removable nozzle F, all constructed and operating substantially as herein described for the purpose of oiling below the level of the operator.

Second, In combination with the elements recited in the forgoing claim, an elastic bulb, operating substantially as and for the purpose as herein described.

Third, In combination with the elements recited, in both of the foregoing claims a suitable device for opening and closing the air hole in the air pipe B, substantially as and for the purpose herein described.

Fourth, The curved removable nozzle and the adjustable discharging pipe in combination with the other parts of an oiler, all being constructed substantially as herein shown and described.

62,040.—COTTON BALE TIE.—J. Knight (assignor to T. C. Coleman), Lousville, Ky.

I claim forming a bale tie loop A, with turned edges, a a, and one diagonal and one square end, arranged and applied for securing the ends of a hoop in the manner herein described.

62,041.—RAILWAY SWITCH.—Ezra B. Lake, Bridgeport, N. J.

First, I claim the rails A, and A', of the main track and the rails B, and B', of the turnout and switch rails C, and C', in combination with the operating lever J, and the devices herein described or their equivalents for communicating motion from the said operating lever to the switch rails.

Second, The operating levers G, H, and D, and their connections in combination with the switch rails.

Third, The combination of the above mentioned operating levers with the movable bars x, situated beneath the cars.

Fourth, The combination of the slotted bar D, eccentric P, its arm t, and rods l, and n.

62,042.—FISH HOOK.—Benjamin Lee, Jr., Williamsburgh, N. Y., assignor to himself and Alfred Woodham, New York City.

I claim a spring B, or its equivalent in combination with a fish hook, substantially as and for the purpose described.

62,043.—BEEHIVES.—C. P. Lloyd, Portsmouth, Ohio.

I claim the combination of the boxes C, with sides as described and openings f, slides g, and suspended attachable frames D, constructed and operating substantially as and for the purpose specified.

62,044.—BRONZING MACHINE.—John Knox Lowe, Cleveland, Ohio.

First, I claim the fur or otherwise lined case described, constructed and operating substantially as and for the purposes set forth.

Second, Wiping cylinder D, and cloth E, in combination for the purposes of operating in a bronzing machine substantially as described.

Third, The combination of the fur roller with the lined box, its cylinder the wiping cylinder and its cloth constructed and operating together, substantially as and for the purposes explained.

Fourth, Feed tapes G G, or their equivalents, in combination with tapes F F, to receive, carry and deliver the sheet substantially as described.

62,045.—MUD BOAT.—Almon D. Monley, Washington, Mich.

First, I claim the combination of one or more mud vats C, with two boats or buoys A, placed parallal with each other and connected with timbers B, substantially as herein described and for the purpose set forth.

Second, The combination of the sectional drop battons c' c2, and the lever catch E, with the mud vats C, when the said drop battons are constructed and arranged substantially as herein described and for the purpose set forth.

62,046.—CHURN.—Geo. W. Manson (assignor to Nicholas W. Manson), Buxton, Mass.

I claim as a means of imparting motion to two dashers in a churn, the arrangement of the geared wheel, B, geared wheel, D, crank shaft, E, connecting rod, h, and working beam, F, swinging on the support, G, the working beam, F, being so connected with the two dashers that it can be separated from the dashers when the cover of the churn is to be removed in the manner and for the purposes set forth.

62,047.—CAR SEAT FOR RAILWAY CARS.—Frank Martin, Aurora, Ind.

First, I claim in combination with a revolving seat, E F F', and hinged back, G, the flexible straps, H H', and retaining hooks, I I', or their mechanical equivalents.

Second, In combination with the frame, A B, and revolving seat, E F F', I claim the hooked bar, K k k', and lugs, L L', employed to secure the seat against rotation, substantially as described.

62,048.—MACHINE FOR SHARPENING CALKS OF HORSESHOES.—J. B. McClanathan, Horicon Wis.

I claim the frame, A, having the burr, D, mounted therein, in combination with the rigid pivoted plate, C, and set screw, F, arranged as described.

Second, Providing the upper front face of the plate, C, with the corrugations to act as rests or supports for the point of the calk as described.

62,049.—TENT BEDSTEAD.—A. D. McCoy, New Orleans, La.

I claim the bedstead, A, having adjustable head rest, B, operated by the frame, C, supporting the upright b, with connecting stretcher rods, c d, bearing the inclined rod, d2, which intersect and form crotches, f, on which rests the beam, g, constructed and operating as described for the purpose specified.

62,050.—SEWING MACHINE.—James S. McCurdy New York City.

First, I claim the hoop, F, constructed with an opening d, a point, b, on one side of the said opening, and a hook, e, on its inner circumference and driven by a tongue or projection, a, on the rotating mandrel of the sewing machine, all substantially as herein specified.

Second, In combination with a rotating hoop constructed and operating substantially as hereinbefore specified, a bobbin so held within but out of contact with the said hoop as to be confined in the direction of its axis but to be capable of free rotation, substantially as herein specified.

Third, The holding device by which the bobbin is held within and in proper relation to, but out of contact with the rotating hoop consisting of the two rings, K and L, one of which has an offset, k, for the partial support of the bobbin, substantially as specified.

Fourth, The arrangement of the adjustable feed cam, P, stop collar, H, spring, t, and nut, T, the whole applied to the rotating mandrel, C, or its equivalent, substantially as herein set forth.

62,051.—BEEHIVE.—Charles McGrew, Bloomington, Ill.

I claim the bottom, c, above the openings, b' leaving the space, d, in combination with the case, A, having water trough, C, on its sides which with the front space below the alighting board is painted white, for the purpose described, and operating in the manner as and for the purpose specified.

62,052.—SAUSAGE STUFFER.—Purches Miles (assignor to Theodore Mace), New York City.

I claim the follower, d, and axle, c, in combination with the vertical hopper, a, having a curved bottom, and the nozzle, f, introduced through the vertical side, a', as specified.

I also claim forming the hopper, a, with the curved bottom and sides cast in one piece, to receive the follower, d, axle, c, and front, a', as and for the purposes specified.

62,053.—FIRE PLACE.—Warren P. Miller, San Francisco, Cal.

First, I claim a lining or partition, g, made of a suitable reflecting metal and located within an air heating chamber behind the fireplace or chamber and separating the latter from the dead air chamber, substantially as and for purpose specified.

Second, In combination with the partition, g, I claim the air-heating chamber, c c c, and dead air or non-conducting chamber, d, all constructed and arranged in the manner and for the purpose specified.

62,054.—DEVICE FOR LUBRICATING THE AXLE OF VEHICLES.—Jacob F. Morris (assignor to himself and Calvin Lockrow), Lansingburgh, N. Y.

I claim the combination of the oil cup or reservoir, F, one or more furnished with short tubes, G and J, strainer, H, sponge, I, and cap, K, or equivalent, with the hub, D, and axle box, E, of the wheel, substantially as herein shown and described for the purpose set forth.

62,055.—PROCESS OF PREPARING INDIA-RUBBER.—William Mullee, Franklin, Pa.

First, I claim the above described process or method of treating or preparing india-rubber for use or manufacture.

Second, I claim as a new article of manufacture the substance produced by subjecting india-rubber either pure or when mixed with other substances, to the process herein described.

Third, I claim the racks, R, or their equivalent for holding the sheets of rubber while in the bat, as set forth.

Fourth, The combination of the feed roller, B, and the roller, C, armed with teeth for removing the crystals from the sheets as described.

Fifth, The hollow drum, E, and roller, D, when combined and used for the purpose set forth.

Sixth, The bath with the fireplace, A, and the heat flue or passage, a, arranged as herein shown and described.

62,056.—MACHINE FOR DRESSING STONE.—William M. Murrey, Tiffin, Ohio.

First, I claim supporting the adjustable frame, A, which carries the vibrating pick and the mechanism for operating it, upon a bed frame, A', and adjustable frame, B, in such manner that frame, A, can be adjusted substantially as described.

Second, The combination of the adjusting screw, a, hook, A4, stay, a' and perforated cross bar, A3, with the bed frame, A', substantially in the manner described.

Third, The construction of the device, m m' n, for the purpose and in the manner substantially as described.

Fourth, Pivoting the pick arm, E, to a vertically adjustable block, d2, substantially as and for the purpose described.

Fifth, The means substantially as described for adjusting the fulcrum block, d3, for raising and depressing the rear end of the hammer arm.

Sixth, The application of the shaft of the wheel, G, to a vibrating frame, H substantially as described.

Seventh, The combination of vibrating frame, H, pinion wheel, h, and spur wheel, d and j, arranged and operating substantially as described.

Eighth, Supporting shaft, c, carrying the parts described, at one end by frame, A, and at the other end of a lever, C, substantially as and for the purposes described.

62,057.—ATTACHING BITS TO BRACES.—John H. Nellis, Richmondville, N. Y.

I claim a bit having a groove with the spring, C, constructed as described and operating in the manner substantially as specified.

62,058.—CONSTRUCTION OF PAPIER MACHE MATRICES FOR STEREOTYPE PLATES.—William Nelson, Boston Mass.

I claim a papier mache matrix for casting stereotype plates, composed of flour paste, paris white and plumbago, and molded in the manner substantially as herein set forth.

65,059.—BUCKLE.—Hermann Neumann, New York City.

I claim the combination of the tongue, B, free at one or both ends with side bars, F, of the buckle frame, the whole constructed and operating substantially as described.

62,060.—CULTIVATOR.—W. J. Oxer, Williamsport, Ind.

I claim an improved iron cultivator frame formed by the combination of the bar, A C and F, with each other, when said bars are constructed and arranged substantially as herein shown and described.

62,061.—DOOR AND GATE LATCH.—J. A. Park, Lansing, Mich.

I claim the arrangement of the plate, A, with the latch, C, and shaft with weight, D, with or without the spring when constructed in the manner substantially as herein set forth.

62,062.—PIPE TONGS AND CUTTER.—John Peace, Camden, N. J.

I claim a pair of pipe tongs having an adjustable screw, E, socket, D, with a series of griping edges at each end, substantially as and for the purpose described.

62,063.—MACHINE FOR BENDING SKELP.—John Peace, Camden, N. J.

I claim the horizontal slide rest, A, or its equivalent, the adjustable bracket, C, the bent lever, E, the adjustable stop, D, and the dies, F F, all constructed combined and arranged substantially as and for the purposes herein described.

62,064.—COURRIER'S "SLICKER."—Daniel Peters and John W. Pauly, Keokuk, Iowa.

First, We claim forming the handle, A, in two parts, a', a2, substantially as herein described and for the purpose set forth

Second, Forming the blade, B, with a slot, b4, substantially as herein described and for the purpose set forth.

Third, The combination of the half round friction wires, b' and b2, and the metallic lined grooves, a3 and a4, with the blade, B, and handle, A, substantially as described and for the purpose set forth.

Fourth, The combination of the friction and strengthening bolt, C, with the slotted blade, B, and with the handle, A, substantially as described and for the purpose set forth.

62,065.—OIL CAN.—Abraham H. Phillippi, Reading, Pa.

I claim the box, L, flat spring, X, rod, R, arm, A, and rod, U, when the whole are arranged as and for the purpose set forth and described.

61,066.—GRAIN DRILL.—Hiram Pulse, St. Paul, Ind.

First, I claim the provision in a grain drill of the separater, I, between the place of supply and delivery, substantially as and for the purpose set forth.

Second, The arrangement of notched rod, W, bell crank, X, draft rod, Y, and slotted clevis, Z, or their mechanical equivalents for the optional rectification of the side draft by a person at the rear of the machine, substantially as set forth.

62,067.—CORN PLANTER.—John M. Reeds, Millford Township, Mo.

I claim the steel spring marked, A, on the drawing and roller and double gearing also above described in combination with the hand corn planter as specified.

62,068.—AXLE BOX FOR VEHICLES.—John Reilly, Racine, Wis., assignor to himself and Thomas Falvey.

I claim casting the box around the rings, as and for the purpose described.

I also claim the arrangement, as described, of the rings within boxes, so that the box shall overlap the rings, to prevent the displacement of the rings from end thrust of the axle on the boxes.

I also claim the combination, substantially as described, with an axle box of hollow longitudinal ribs, which serve both to fasten the box in the hub, and to convey oil to the axle, whether said ribs or chambers be cast with the box, or made separately of cast or wrought metal, and afterwards attached to the box.

I also claim the arrangement of the oil reservoirs, the axle and the lining rings, as and for the purpose set forth.

62,069.—COTTON-BALE TIE.—J. Reinecker, New Orleans, La., assignor to Gustavus Ricker, Covington, Ky.

I claim the plate, B, provided with the semicircular opening, a, and the opening, c, with inclined sides, d, presenting two sharp edges or angles to the strap, substantially as described for the purpose specified.

62,070.—PROCESS OF MANUFACTURING ALCOHOLIC SPIRITS.—John W. Richardson (assignor to himself, Daniel L. Davis, and Jeremiah Kimbrough), Ogden, Ohio.

I claim the process of manufacturing alcohol from the juice or skimming of sorgho or other (so called) northern cane, substantially as described.

62,071.—GAGE FOR CIRCULAR SAWING MACHINES.—John D. Riley, Cincinnati, Ohio. Antedated Feb. 2, 1867.

First, I claim the beveling fence, B, hinged to the arms, A A, and adjustable to cut a bevel at any desired angle, substantially in the manner and for the purpose set forth.

Second, And in combination with the above, I claim the guide bar, G, and piece, H, having curved slots, set screws, I I, and hinged arms, F F, connected with the cross bar, E, substantially in the manner and for the purpose set forth.

Third, I claim the hinged beveling fence, B, provided at its back edge with the hinged slotted cross bar, C, in combination with the hinged uprights, D D, to adjust said fence to any desired angle, substantially in the manner and for the purpose set forth.

62,072.—SMITH'S FORGE.—William H. Risher, Austin, Texas.

First, I claim the construction of the tweer with a central chamber, k, into which the ashes, cinders, and other matters collect, said chambers having a passage between its upper end and the fire bed of the tweer, so that the air

of the bellows or blast nozzle shall circulate in a chamber outside of the chamber, k, and pass up to the grate through the space which is between the fire bed plate and the upper edge of the chamber, k, all substantially as and for the purpose set forth.

Second, The construction of the tweer, substantially in the manner and for the purpose described.

62,073.—BELT LAP CUTTER.—Charles E. Robinson, Concord, N. H.

I claim attaching the knife to a grooved sliding block, E, working in grooves in the top leaf or upper part, B, of the machine, and provided with a handle, G, substantially in the manner and for the purpose herein shown and described.

Second, The combination of a rubber or other elastic seat with the lower leaf or part, A, of the machine, substantially as herein shown and described.

Third, Hinging the lower and upper parts or leaves, A and B, to each other at one end, substantially as herein shown and described.

62,074.—ENAMEL FOR COVERING HOOP-SKIRT SPRINGS.—W. S. Ryerson, Philadelphia, Pa.

I claim enameling the covering of hoops or springs of a hoop skirt or of so many of them as may be necessary, with a composition prepared of the ingredients, and in the manner and proportions herein described and set forth.

62,075.—ICE PLANER OR CUTTER.—James Serrill, Philadelphia, Pa.

I claim an ice cutter or planer, consisting of the adjustable cutting knife, A, supporting block, B, guides, C C, incorrodible surface plates, D D, and the tunnel or spout, E, arranged and combined together as described, as an improved article of manufacture, for the purpose specified.

62,076.—HORSE SHOE.—George Sewell, Poughkeepsie, N. Y.

First, I claim the construction of a horse shoe with a supplementary detachable portion, B, substantially as herein set forth for the purpose specified.

Second, The attachment of the supplementary portion, B, to the part, A, of the shoe, by means of the tapering dovetails, g, tapering dovetail socket, c, spurs, h, and keys, l, arranged in relation with each other substantially as herein set forth.

62,077.—BREECH-LOADING FIRE-ARM.—Christian Sharps, Philadelphia, Pa.

First, I claim the combination of the hooked projection, w, or its equivalent, or the lever, D, with the lip, y, or its equivalent, on the sliding breech, for the purpose specified.

Second, The spring bar, H, arranged to slide in the frame, B, and having a notched projection, J, in combination with the levers, D, and its arm, F, the whole being arranged substantially as described, so that the cartridge may be extracted either by the manipulation of the lever, D, or sliding rod, H.

Third, The combination of the spring plate, G, on the lever, D, the notch, e, on the arm, F, and portion, h, of the frame, by which the said spring plate is released from the notch on moving forward the said lever, D.

62,078.—WINDOW FASTENER.—J. D. Simmons. Quincy, Ill.

I claim the eccentric lever, B, provided with the notch, X, and the lug or wing, Z, for the purpose of stopping the spring and preventing strain upon the same, in combination with the plate, A, formed as described, and the spring, D, provided with bar, b, the whole arranged and used as and for the purpose specified.

62,079.—WHEAT DRILL.—Jacob Slauder (assignor to himself and Levi C. Smith), Osborn, Ohio.

I claim the shaft, d, with the worms or screws, e, over the openings, l, in the bottom of the hopper, C, in combination with the gear wheels, b c, and one of the driving wheels, E, constructed, arranged, and operating substantially as and for the purposes herein described.

62,080.—SEEDING MACHINE.—F. F. Smith and A. Thurston, Four Corners, Ohio.

We claim, First, So combining the lever, E, with the seeding stocks, G, and clutches, e f, that the movements of the said levers will elevate the seeding stocks simultaneously with the operation of the clutches to stop the motion of the seed-dropping mechanism, substantially as herein set forth.

Second, The retention of the plate, c*, in its place, with reference to the cylinder, J, and hopper, I, by means of the groove, c", and removable upper part, a*, of the aforesaid hopper, substantially as herein set forth and for the purpose specified.

62,081.—SHAFT COUPLING.—Henry K. Smith (assignor to himself and Charles Osgood), Norwich, Conn.

I claim the shaft coupling herein described, the same consisting of the sleeve, C, having beveled or inclined ways or grooves, D, pieces or blocks, E, and screw bolts, H, when combined and arranged together, substantially as and for the purpose specified.

62,082.—SINK.—Sidney Smith, Greenfield, Ohio.

I claim, First, The arrangement, in a metallic kitchen sink, of a grating, C, substantially as described and for the purpose set forth.

Second, The arrangement in a metallic kitchen sink of the movable baskets, substantially in the manner described.

62,083.—STEAM GAGE.—William Stamp, Susquehanna Depot, Pa.

First, I claim a concave flat-bottomed or saucer-shaped steel plate diaphragm fitted in a steam gage, and constructed substantially as herein described.

Second, I claim also the eccentric adjusting pin, l, or its equivalent, in combination with the pendent lever, h, and the segment, d, constructed and operated substantially as herein described.

62,084.—WASH BOILER.—M. W. Staples, Catskill, N. Y.

I claim the chambers, B and C, the perforated partition, E, and the circulation tubes, D, with apertures, a, arranged substantially as shown and described, in combination with a boiler for the purposes herein set forth.

62,085.—BASKET MACHINE.—Geo. Storer, New Britain, Conn.

I claim, First, The gudgeon, c, extending from the stock, m, and turning upon the pin, i, in combination with the mold block, d, as specified, so that said gudgeon, c, will be sustained by its stock in a horizontal or vertical position, for the purposes set forth.

Second, I claim the mold block fitted so as to be revolved in combination with the clamping cap, c, and movable center, f, substantially as and for the purposes specified.

62,086.—MACHINERY FOR MAKING OVAL PICTURE FRAMES.—John E. Sweet (assignor to John S. Bon and E. R. Sanford), Syracuse, N. Y.

I claim, First, The combination and arrangement of the shafts, C D E, and their pinions, with their crank and its boxes, substantially as described and for the purposes set forth.

Second, The eccentric sleeve, S, for varying the throw of the crank, substantially as described.

Third, The combination of the scraper, R, arm, O, upright, L, with or without the pedal, P, as described and for the purposes set forth.

62,087.—PICKER CUSHION FOR LOOMS.—Wm. J. Thorn (assignor to himself and F. A. Betts), Westbrook, Me.

I claim a tanned leather picker cushion for weaving looms manufactured and prepared in the manner herein set forth.

62,088.—SMUT MACHINE.—Wm. E. Tickler, Ezra T. Marshall and Daniel M. Marshall, Pierceton, Ind.

We claim, First, The smut machine consisting of the cylinder, B, hollow shaft, C, brushes, E, shaft, D, cones, d, standards, e, riddle, G, fan, T, and pipe, p, operating substantially as described, for the purpose specified.

Second, The spreading device consisting of the pivoted valve, n, elastic fingers, o, arranged in the spout, m, substantially as and for the purpose specified.

62,089.—BRICK BURNER.—Wm. H. Towers, Boston, Mass.

I claim the revolution of unburned bricks within a circular turret or kiln in such a manner that during the first part of a revolution they shall dry and become gradually heated, then be thoroughly baked during their passage over a furnace, and then gradually cool until, at the completion of the revolution, they shall be delivered perfectly burned and serviceable bricks, using for the purpose the apparatus hereinbefore described, or any other substantially the same and which will produce the desired effect.

62,090.—MACHINE FOR PULLING FLAX.—Samuel W. Tyler (assignor to Thos. M. Cleeman, George P. Prescott, Wm. Deyermand, E. H. Jones and Henry Holmes), Troy, N. Y.

First, I claim for pulling flax and such other crops as require such similar harvesting, the use of a series of two or more belts or bands, made flexible so as to ply around pulleys or cylinders and properly arranged to work in conjunction by pairs, so as to eradicate or pull the crop from the earth, and this I claim irrespectively of any pulling or eradicating movement that may be given to the belts, or of any particular form or kind of material employed in the construction of the same, substantially as set forth.

Second, I claim constructing the belts with irregular or corrugated surfaces upon their outer or grasping sides, for the purposes set forth, and substantially as described.

Third, I claim constructing pullers with webbing or other comparatively non-elastic foundation cushioned with india-rubber or other soft material, substantially as described.

Fourth, I claim arranging the belts upon the machine in the position of an inclined plane, in such a manner that their grasping sides shall traverse upward and backward at the same time, for the purposes set forth and substantially as described.

Fifth, I claim so imparting motion to the pullers that each section of each pair thereof shall move in a direction around its axis or axes opposite to that of its fellow, so that the conjunctive sides of the two shall move together in one direction, in combination with impinging elastic surfaces, substantially as described.

Sixth, I claim so arranging the belts as to leave an open space between their grasping sides at the point X', substantially as set forth and described.

Seventh, I claim giving to the belts, Z and Z', when used in pairs, a motion so corresponding to that of the driving wheel that their grasping sides shall traverse backward at the same rate of speed as that at which the machine is advanced, for the purposes set forth and substantially as described.

Eighth, I claim the intermediate pullies, u, or their equivalent, for the purposes as set forth.

Ninth, I claim the revolving fingers, i, or their equivalents, in combination with the traveling elastic pullers, for the purposes set forth.

Tenth, I claim the brace boards, Y, or their equivalent, for the purposes set forth and substantially as described.

Eleventh, I claim so constructing that portion of the frame upon which the pullers are situated as to form an open space through which the crop may pass unimpeded to the platform, substantially as described.

Twelfth, I claim attaching the intermediate pulleys, u, in such a manner that they may be so adjusted as to produce any desired degree of pressure upon the crop between the belts, substantially as described.

Thirteenth, I claim an automatic raking or delivering device when arranged in a manner to support the crop in an upright position while it is being conveyed along from the pullers or cutters to the point at which it is delivered from the rake, substantially as described.

Fourteenth, I claim in combination with the pullers a vibrating separator for separating the swath from the standing portion of the crop, substantially as described.

Fifteenth, I claim the separating swords or blades, X, for the purposes set forth and substantially as described.

Sixteenth, I claim so attaching the pullers to the machine, in connection with springs, as to secure to them an automatic or self-adjusting pressure upon the crop, substantially as described.

Seventeenth, I claim the adjustability of the tongue, E, in combination with the traveling elastic pullers, substantially as described.

Eighteenth, I claim so constructing and attaching the deflecting guards, N, as to allow the crop to approach the pullers at a point upon the opposite side of the line of their axes, for the purposes set forth and substantially as described.

62,091.—NUTRITIVE MEDICINE.—Samuel C. Upham, Philadelphia, Pa.

I claim a nutritive medicine composed of the within-described ingredients, prepared in the manner and in the proportions substantially as set forth.

62,092.—LUBRICATING OIL.—P. H. Vander Weyde, Philadelphia, Pa.

I claim the manufacture of illuminating or burning oil and a superior lubricating oil from common petroleum, combining the filtering, evaporating at a low temperature, and thickening processes above described.

62,093.—PREVENTING INCRUSTATION IN STEAM BOILERS.—P. H. Vander Weyde, Philadelphia, Pa.

I claim the attachment within the upper part of the steam room of a boiler of a number of short rods resembling small inverted straight or curved lightning rods, or their equivalents, intended to carry the positive electricity of the steam to the bottom of the boiler where it discharging in the water repels the electro positive deposits preventing them from settling and thus protects the boiler from incrustation.

62,094.—MAKING AND USING NITROUS OXIDE GAS.—P. H. Vander Weyde, Philadelpha, Pa. Antedated Jan. 30, 1867.

I claim, First, The new economical method of making nitrous oxide gas, as above described.

Second, The apparatus for compressing and liquefying it, as above described.

Third, The use of the liquefied gas after its re-expansion as an anæsthetic for surgical operations (and anti-spasmodic) in cases of typhoid fever, cholera, and other medical operations.

Fourth, Its use as a substitute for oxygen for the Drummond or Calcium light, or hydro-oxygen blow pipe for magic lanterns, light houses, melting of platinum, etc.

Fifth, Its use as a bleaching, oxydizing, deodorizing, and disinfecting agent.

Sixth, The use of the liquefied gas as a store of motive power, for driving railroad cars and other contrivances.

62,095.—GAS GENERATOR.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, A gas generator when the acid is entirely separated from the substance from which the gas is evolved brought in contact only in proportion to the pressure and quantity required and adapted to the instantaneous generation without the application of heat of the following gases: hydrogen, oxygen, carbonic acid, hydro-sulphuric acid, sulphide of ammonia, nitric and nitrous oxide, and hypo-nitric acid.

Second, The long-necked bell jar, A, contracted and expanded below as described above preventing the absorption of the gas by the liquid.

62,096.—TUBULAR STILLS FOR CONTINUOUS DISTILLATION.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, A still consisting of a series of tubes situated in the flue, through which tubes the liquid to be distilled is uninterruptedly passed in a small stream and in its downward course submitted to a continually increased heat.

Second, I claim a number of vapor tubes attached at different hights to this tubular still giving exit to vapors of different density and volatility, each exit tube condensing its own vapor separately in a common worm Liebig's condenser, or any other kind, and thus producing liquids of different density by one single uninterrupted operation; also preventing fusil and other oils from contaminating any other part of the apparatus or of its products with their flavors.

Third, The manner of connecting the tubes by means of traps for the separation of the different vapors, and by screw caps giving access to their interior for cleaning, repair, or other purposes.

62,097.—MANUFACTURE OF WHITE LEAD.—P. H. Vander Weyde, Philadelphia, Pa. Antedated Jan. 30, 1867.

I claim, First, To effect with the same apparatus and one single operation the separation of the products of the distillation of wood, chiefly of the acetic acid the immediate transformation of the remaining charcoal into carbonic acid and the use of those two products to the manufacturing of white lead, in the manner described.

Second, The spiral inverted gutter, h h, intended either to secure a more perfect absorption of the carbonic acid or any other gas by the liquid or to charge air or gas more perfectly with the vapor of the liquid through which it passes.

Third, The treatment of the precipitate with a hot alkaline solution of quicklime, or its equivalent, and the washing out of the filters with lime water.

62,098.—ELEVATOR.—R. M. Van Sickler, New York City.

I claim, First, A portable elevator consisting of a car or truck mounted on two sets of wheels substantially as described with grooved tracks or guide posts mounted thereon and a carriage or platform supported by and moving in connection with said posts, substantially as herein shown and described.

Second, I claim having the tracks or guide posts made adjustable, substantially as and for the purpose herein shown and described.

62,099.—SODA-WATER STAND.—A. Van Winkle, Newark, N. J.

I claim, First, The arrangement of two or more tiers of sirup cans one above the other in a soda-water stand, substantially as and for the purpose described.

Second, Making the cans of the upper tier narrower than those of the next succeeding one below, substantially as and for the purpose set forth.

62,100.—COOKING STOVE.—George W. Walker, Boston, Mass.

I claim the arrangement of the flue, l, with respect to the oven and the main flue, substantially as described.

62,101.—BREWERS' MASH TUN.—James Walker, Cincinnati, Ohio.

First, I claim the provision in a mash tun of the radiating inlets to the drain pipe or pipes, substantially as and for the purposes set forth.

Second, The elevated drain pipe proper within the mash tun, substantially as set forth.

62,102.—LATCH FOR GATES.—W. T. Wells, Decatur, Ill.

I claim the combination with a latch of a slotted plate, or its equivalent, when the two are so constructed and arranged together as to operate substantially in the manner described and for the purpose specified.

62,103.—Suspended.—

62,104.—ELASTIC MARKING ROLLER.—L. B. Witherell, Galesburgh, Ill.

I claim the supplementary bail and handle, G h, in combination with the bail and handle, D F, of an elastic printing cylinder, substantially as and for the purpose specified.

62,105.—MAKING HAMMERS.—J. Yerkes, Fox Chase, Pa.

I claim constructing claw hammers of cast iron, in the manner described.

62,106.—COVERING HARNESS TRIMMINGS WITH VULCANIZED RUBBER.—Andrew Albright, Dryden, N. Y.

I claim providing metallic trimmings for carriages and harnesses with a coating of vulcanized caoutchouc or hard rubber, substantially as and for the purpose herein set forth.

RE-ISSUES.

2,474.—SHEARS.—Barnard, Son & Co., Waterbury, Conn., assignor to Wm. B. Barnard. Patented Dec. 27, 1864. Reissued March 27, 1866.

We claim uniting the blades and handles of shears, lamp trimmers and similar instruments by means of one or more rivets homogeneous with said handles, in combination with a rebate or recess of any suitable form, made in the end of the handle to receive the inner end or tang of the blade when the shoulder or inner edge of the recess does not project above the face of said tang after it has been properly secured therein, all substantially in the manner and for the purpose herein set forth.

2,475.—POCKET BOOK.—J. Frederick Dubber, Brooklyn, N. Y. Patented Jan. 10, 1865.

I claim a pocket book or other similar article provided with one or more strips, d, of steel or other elastic material, in the edge or edges of its closing flap, c, substantially as and for the purpose described.

2,476.—HEATING STOVE.—Samuel B. Sexton, Baltimore, Md. Patented April 19, 1859. Reissued Dec. 3, 1861. Again reissued Feb. 6, 1864. Again reissued Sept. 27, 1864.

First, I claim a stove for warming or heating purposes constructed with a fuel magazine supported free from the grate, and a combustion chamber having a grated fire and air supplying bed of a greater diameter than the fuel magazine, so arranged and constructed that the fuel can spread out laterally and form a conical pile and burn in thin layers out to the wall of the stove, so that the inflamed gases may burn in a free space as they are evolved from the entire outer surface of the incandescent conical pile of coals and so that air shall be supplied in a direct manner through the grate into said free space, substantially as and for the purposes described.

Second, In combination with the subject matter of the first claim, constructing the combustion chamber, A, with projecting window frames or door frames, substantially as and for the purposes described.

Third, A stove for warming or heating purposes embracing the features of construction mentioned in my first claim and the additional feature of the gas or products of combustion, circulating apartment above and around the upper portion of the magazine, substantially as and for the purposes described.

Fourth, A stove for warming and heating purposes wherein the spreading of the coals in a lateral direction from the lower end of the magazine is wholly unobstructed all around and out to the wall of the stove, A, and at the same time the combustion chamber proper is formed by the outer wall of the stove, and the products of combustion circulate underneath and around the magazine, in combination with illuminating door or windows in the said outer wall, said windows or doors being located above the grate and above the upper margin of the lining of the wall, substantially as and for the purposes described.

Fifth, The combination of a fuel supply magazine, H, which has its lower end free from the grated fire bed, G, and an unobstructed space below it where the fuel may spread out laterally and burn in a conical pile and in thin layers to the outer wall of the stove, with a stove, A, which has illumination doors or windows in its wall above the lining, all in such manner that the fire can be kindled through the apertures which are covered by the doors or windows, substantially as set forth.

Sixth, The combination of the unobstructed free space, F, out to the wall of the stove above the lining, the illumination windows or doors in wall, A, and gas circulating space, p, around the circumference of the magazine, substantially as described.

Seventh, In a coal supply magazine stove, I claim the extended grated surface of the fire bed outside of reservoir or magazine, in combination with the free space around the magazine of a base burning stove, substantially as described.

Eighth, Increasing the combustion and the consequent heating effect of the coal and also insuring a more brilliant illumination of the wall of the stove, by constructing, arranging and combining the combustion chamber proper, the magazine and the grated fire bed, all substantially in the manner herein specified.

2,477.—PEN AND PENCIL CASE.—Wm. S. Hicks, New York City. Patented Sept. 12, 1865.

First, I claim the case, A, consisting of a simple tube, provided with the cap, c, and short inner tube, e, arranged as set forth.

Second, In combination with a case consisting of a single tube, I claim the reversible handle, substantially as set forth.

2,478.—BOAT DETACHING TACKLE.—Thomas Huntington, New Rochelle, N. Y. Patented June 5, 1866.

First, I claim the employment or use of a single shaft, C, arranged with hooks, B, in the manner shown, or in an equivalent way so that by the turning of said shaft the hooks, B, may be simultaneously liberated to detach the boat from the davits.

Second, The hooks, B, suspended or fitted in the plates, A, in combination with the arms, e, attached to the shaft, c, all being applied to the boat and arranged to operate substantially in the manner as and for the purpose set forth.

2,479.—CUPOLA FURNACE.—John and Thomas Insull, New Haven, Conn. Patented May 8, 1866.

First, We claim the annular air chamber, C, in combination with one or more blast pipes, D E, and with the furnace, A, constructed and operating substantially as and for the purpose described.

Second, The partition, b, in combination with the annular air chamber, C, blast pipes, D E, and furnace, A, constructed and operating substantially as and for the purpose set forth.

Third, Making the tweers oblong instead of round, as usual, for the purpose described.

Fourth, Two or more rows of tweers placed in a zigzag position, substantially as and for the purpose set forth.

Fifth, The apertures, a', in the outer wall of the air chambers, C, in combination with the tweers, a, constructed and operating substantially as and for the purpose described.

2,480.—MANY-BARRELED FIRE-ARMS.—Christian Sharps, Philadelphia, Pa. Patented Jan. 25, 1859. Division A. Reissued June 18, 1861.

I claim the combination of a discharge with the hammer and the devices herein described, or the equivalents to the same, for changing the position of the discharger on the movement of the hammer.

2,481.—BREECH-LOADING FIRE-ARMS.—Christian Sharps, Philadelphia, Pa. Patented Jan. 25, 1859. Division B. Reissued June 18, 1861.

First, I claim the lever, M, with its projection, V, and the rod, N, in combination with the barrel and its stock, when the whole is arranged as set forth, and when the lever, M, is so formed as to serve the purpose of a trigger guard.

Second, Causing the spent cartriges to be withdrawn from the barrel during the movement out of the same by means of a clip or clips applied and operating substantially as set forth.

2,482.—EAR, CHEEK, AND CHIN MUFFS.—Wm P. Ware, Cincinnati, Ohio. Patented July 6, 1858.

First, I claim a muff or pocket for the ear formed so as to surround the base of the ear and extends of a size and shape to contain the ear and protect the same from cold, substantially as set forth.

Second, I claim a cheek and chin muff suspended from the ears, substantially as specified, instead of being fastened around the neck or over the head.

Third, I claim muffs or pockets formed to set over the ears and held in place by a connection passing down under the chin, substantially as shown.

2,483.—HARVESTER.—Robert T. Campbell, Washington, D. C., assignee of Thos. J. Stealey. Patented Dec. 15, 1857. Reissued Nov. 6, 1866.

First, I claim combining with a hinged platform which is free to conform to the undulations of the ground independently of the motions of the draught frame, or of the axle of the transporting wheels, a toothed rake which will deliver the cut grain upon the ground in gavels, and a reel or gathering device, which will press the standing grain toward the cutters, said rake and reel or gatherer being wholly supported upon said platform, substantially as described.

Second, Combining with a hinged platform a toothed rake and a reel or gatherer, which are wholly supported upon and move in harmony with said platform, an adjustable hinged connection which will allow of the vertical adjustment of the cutting apparatus to adapt the machine to different hights of cut required, substantially as described.

Third, Sustaining a toothed rake and a reel or gatherer wholly upon a platform which is supported at its inner end by a vertically adjustable joint, and at its outer end by a wheel or its equivalent, substantially as described.

Fourth, Suspending the rear inner end of a hinged platform which has a toothed rake mounted wholly upon it, in such manner that this part of the platform can be adjusted vertically without changing the position of the forward adjustable hinge connection, substantially as described.

Fifth, The combination of a hinged finger beam, a platform and an auxiliary adjustable suspending and sustaining jointed or flexible connection, in such manner that the finger beam and platform are suspended at their inner ends and are so supported upon a wheel or its equivalent at their outer ends as to conform at their outer ends to the undulations of the ground, independently of the main frame or of the axles of the supporting wheels, substantially as described.

Sixth, In combination with a vertically adjustable hinge joint and hinged finger beam and cutter bar, and with the crank, d, for communicating motion to the cutters, and the universal joint, m, to connect the pitman, I, with the cutter bar, substantially as described, I claim the adjustable blocks, 1 and 2, for tightening the joint around the crank wrist, substantially as set forth.

Seventh, The combination of crank shaft, Q, with adjustable bearing, a a, the pitman, Q, and the oscillating rake, S, substantially as described.

Eighth, Hanging the reel to the rake frame or platform and adjusting said reel to different hights by means of braces, w w, or their equivalents, substantially as described.

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2,576.—EDGES OF BOOKS.—John H. Crowell, Providence, R. I.

2,577, 2,578.—PRINTERS' TYPE.—Julius Herriet (assignor to David Wolf Bruce), New York City. Two Patents.

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William H. Johnson, of Springfield, Mass., having petitioned for the extension of a patent granted to him the 7th day of March, 1854, and patented in England the 21st day of April 1853, for an improvement in sewing machines, for seven years from the expiration of said patent, which takes place on the 21st day of April, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 15th day of April next.

Lauren Ward, administrator of the estate of Richard Ward, deceased, of Naugatuck, Conn, having petitioned for the extension of a patent granted to the said Lauren Ward as said administrator on the 26th day of June, 1853, for an improvement in machines for turning irregular forms, for seven years from the expiration of said patent, which takes place on the 26th day of June, 1867 it is ordered that the said petition be heard at the Patent Office on Monday the 10th day of June next.

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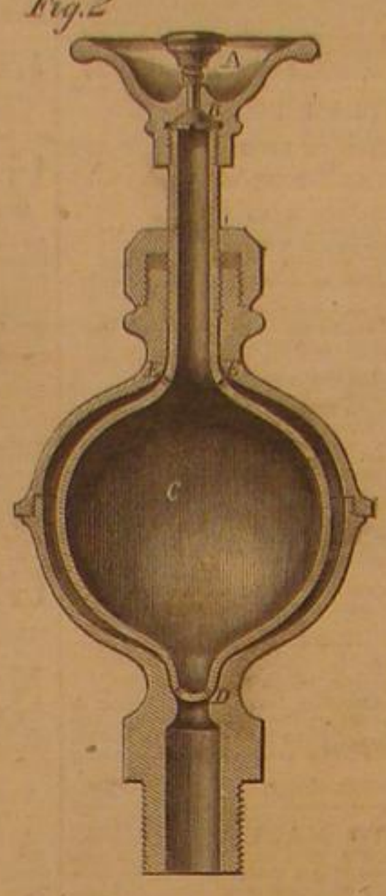
The two accompanying engravings exhibit a new oil cup for the cylinders of engines, whether stationary, marine, locomotive, or portable, which was patented by Nelson J. White, Aug. 21, 1866. From an examination of one of them we are of the opinion it is well adapted to the work for which it is intended, and that the advantages claimed for it are not exaggerated. These are, in the words of the manufacturer: first, simplicity; there being no cocks to be opened or shut: second, durability; nothing to get out of order by use: third, efficiency; by which the cylinder can be oiled under any and all pressures: and, fourth, economy; as the oil or other lubricator may be compelled to trickle slowly into the cylinder, and not, as in some others, be injected with a rush, to be as quickly ejected with the exhaust steam.

Its operation may be easily comprehended. Fig. 1 is a perspective view of the cup, and Fig. 2 a vertical section showing the parts. A is a cup into which the oil is poured or the tallow placed. It is furnished with a downward opening spring valve, B, operated by the thumb. The oil passes from the cup down into the interior hollow globe, C, which is seated at D, forming another valve. When this globe is secured to its seat by the serrated hand-wheel, A, there is no passage between the steam chest or cylinder to the cup. By turning slightly to the left the hand-wheel forming the cup, the inner globe is raised from its seat, and the steam, passing into the annular space between the two globes, and through the two apertures, E, at the top of the inner globe, equalizes the pressure, allowing the oil to descend by its own gravity through the two apertures at the bottom. Only one packing is required for this cup, that at the top under the receiver, and as there are only two valve seats, which have but a slight upward and downward motion, it seems hardly possible to get the device out of order with proper usage. The power of governing the admission of the oil to the cylinder is an advantage which will be recognized by engineers. This cup is already introduced into the navy, on locomotives, and on stationary engines, with the most satisfactory results. It is manufactured by S. C. Woodward, Lawrence, Mass., who should be addressed for any further information.

Fig. 1



Fig. 2



Turning Tapers.

A correspondent from Connecticut writes:—In a former number of the Scientific American I noticed in answer to a correspondent, a statement that a lathe set on a taper will turn a true cone with a tool above the center. Mistakes are seldom found in your valuable paper, but this I think is one; for in this case the tool does not move in a plane with the axis of the article to be turned, and in passing from the small to the larger end, the tool relatively approaches nearer the plane of this axis in consequence of its being further from its center of rotation.

By experiment the above theory is found to be correct.

It may be such a statement has been made in this paper, although we do not recollect it. But it is erroneous. If the cone is 3 inches diameter at one end and only 1 inch at the other and the tool is ¼ inch above the axis of rotation there will be a departure from the desired taper, because while the difference between the diameter and the altitude of the tool at one end is as 1 to 12, at the other it will be as 1 to 4.

Sounding and Sensitive Flames.

Prof. Tyndall has recently unfolded in a lecture at the Royal Institution, the result of his investigations of the effect of sounds upon flames. Every one has observed the musical sounds emitted by flames, and many will remember observing a curious susceptibility of flames to shocks of sound. The jumping of a naked fish-tail flame in response to musical sounds was first noticed by Professor Lecomte at a musical party in America. Prof. Tyndall exhibited a most wonderful set of experiments on flames or gas jets thrown through glass tubes. These tubes were of all varieties of length and size, and by singing to them, reciting lines of poetry to them, and sounding tuning-forks at them, the lecturer exhibited from each flame a distinct note or song, and the room was at times filled with harmonies as of many Æolian harps. One flame was so sensitive that although 20 inches long, the slightest tap on a distant anvil knocked it down to 8 inches, and the dropping of a sixpence threw it into a violent commotion. Another flame could not tolerate the uterance of a letter S, and a hiss from some one, which the Professor invited, made it flare and shiver in the most odd and ludicrous way. Another danced in response to measured sounds.

Illustrations for Patent Reports.

We are happy to state that the contract for engraving the illustrations accompanying the report of the Commissioner of Patents has been awarded, by the joint committee of the two Houses of Congress, to E. R. Jewett & Co., of Buffalo, to be executed in their new style of relief line engraving. The award was made on the ground of the superior character of their work over all competing specimens offered. The number of patents to be engraved is something over 8,000, larger than during any previous year. The Patent Office is the only self-sustaining branch of the Government. The fund now on hand, after paying the entire expense of the Office, is $280,000, all paid by inventors.

It was the determination of the Committee that the standard of the engravings should not be lowered. The illustrations furnished by Messrs. Jewett & Co., have been of a very excellent quality.

Weldless Steel Tires are now considered the most profitable article of manufacture in the Bessemer steel trade. They pay a royalty of £3 sterling per tun to Mr. Bessemer, and sell at £28 or not quite $125 per tun. The modes of manufacture are constantly improving, and a reduction of price is considered inevitable. A method formerly employed by Krupp, was to cut a slit or mortice lengthwise through a square bloom of cast steel, and then widen it out into a circular shape under the hammer. At the Bessemer Steel Works in Sheffield, an ingot of steel is shaped into a cylinder, from which rings are cut off and afterwards widened and finished. At Crewe, a solid steel cone of cast steel is formed and punched. The process of steel-casting introduced from Prussia by Naylor, Vickers & Co., enables them to produce tire rings direct from the crucible. The cost of cast steel tires, however, is necessarily so much greater than that of Bessemer steel, that their disappearance from the market is considered inevitable.

Foreign Patents.

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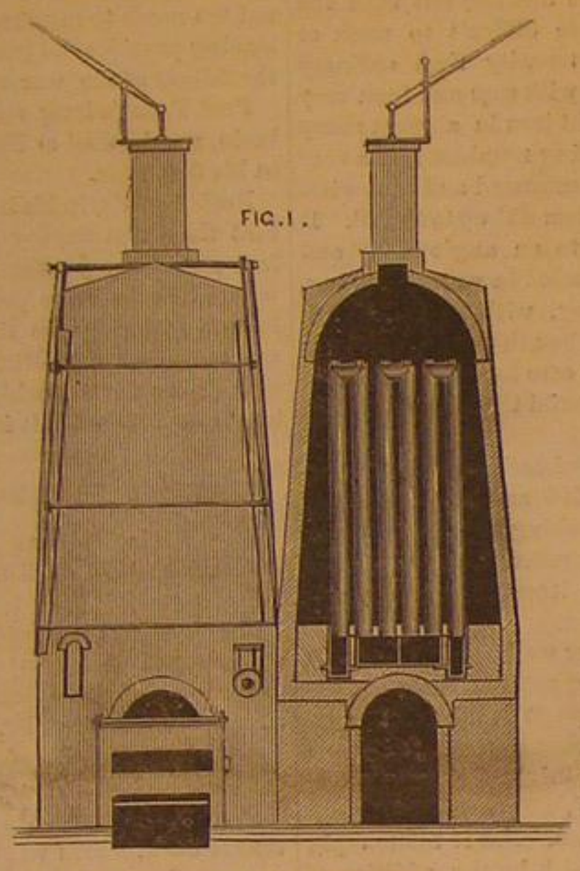
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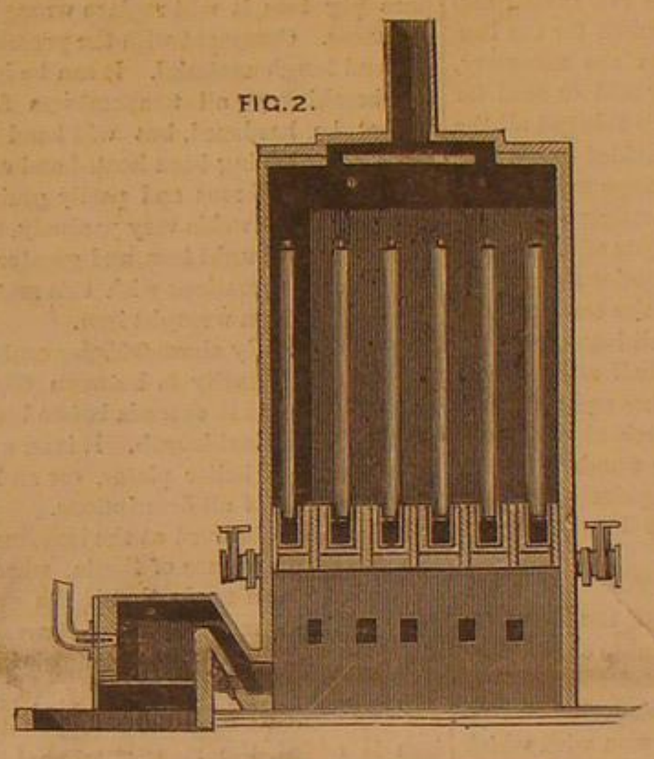
Stove for Heating Furnace Blasts.

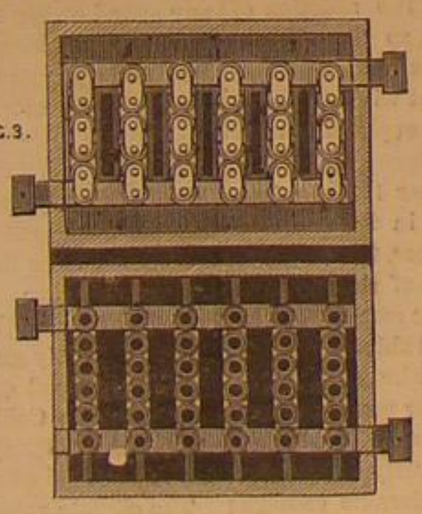
An ingenious mode of utilizing the waste gases from blast furnaces has been invented by Mr. John Player, of Norton, Stockton-on-Tees, England, by which they are drawn into a stove by a steam jet and consumed to heat the blast for furnace with either closed or open tops. It is well known to iron-workers that a highly heated blast is very effective in the fusing of the ores. Where the waste gases are consumed in contact with the pipes they must be kept at a red heat which, in time, disintegrates and destroys their material. Mr. Player's stove consumes the gas in a separate chamber from that containing the pipes to be heated; sufficient air is allowed to enter to cause an intense heat; the heated fumes escape through a series of narrow slots into an air-tight chamber having a damper on the top and containing a series of vertical pipes through which the blast to be heated travels. As the highly heated fumes will not again ignite without a fresh supply of oxygen, the cast-iron blast-pipes remain uninjured under a heat of 1,100° or 1,200°.

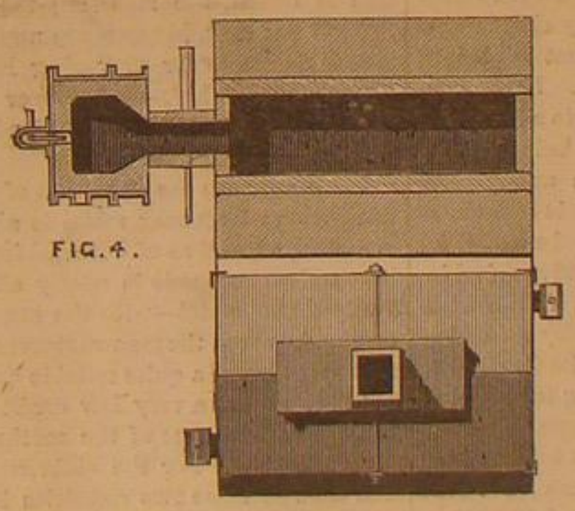
An auxiliary fireplace for burning coal is shown attached to the hot blast stove, which is only used at places where gases are not utilized, as is shown in Figs. 2 and 4. From this fireplace a flue conducts the flame and smoke into the combustion chamber where the combustion is completed. Attached to the end of this fireplace (merely for convenience of illustration) is shown a branch gas pipe with a small steam jet placed near its orifice to create a partial vacuum and this branch gas pipe is connected with flues at the furnace top. This draws the gases down from the furnace top and forces them into the stoves where they are burnt. Where this branch gas pipe and steam jet are used there no necessity for using the fireplace. They may be placed at the bottom end of the combustion chamber of the hot-blast stove, where the flue of the fireplace is shown in Fig. 2.

The arrangement of pipes is shown in the engraving: each stove contains 18 pipes, 8 inches in diamether by 14 feet high, giving about 1,000 square feet of heating surface. The pipes are disposed three in a row; the blast thus passing up and down three times, as is shown in Fig. 1. The steam jet in the branch gas pipe enables the furnace manager to control all the gases in the blast furnace to be used in stoves, etc., which by this means will work effectively when placed on the ground.


FIG. 1.


FIG. 2.


FIG. 3.


FIG. 4.

STOVE FOR HEATING FURNACE BLASTS.

Already nearly a hundred of these stoves are in operation in England, giving unqualified satisfaction, in some cases having increased the quantity of ore melted with a given amount of coke from 34 to 40 per cent on account of the higher temperature of the blast. Mr. Barton, manager of the Carnforth Hematite Iron Works, at which sixteen of these stoves are in operation, writes to the inventor: "As regards the stoves, they continue to work very well, getting fair heats. I may say that we use no coal whatever, either for our boilers or stoves, and from the first we have never had the slightest trouble in using gas under your stoves."

James Henderson, 218 Fulton street, this city, is the agent for these stoves in this country, and he will furnish iron manufacturers and others interested any further information desired.

STEAM ON A STAMPEDE.

Translated for the Scientific American.

The late civil war in Germany, which has been remarkable for its rapidity of movements as well as for its immense devastations, has given rise to a new kind of war scenery, which was created by the use of steam and electricity.

The splendid railroad bridge across the Elbe at Pisa, the destruction of which became strategically necessary, was the first victim, and its ascending flames gave the first signal to the numerous locomotives and rail cars of Saxony to begin their inglorious but still remarkable flight toward the Austrian frontier.

The Prussian army, its right wing on the Elbe, invaded Bohemia and did not seem to care much about the railroads in the western part of Saxony. The traffic was therefore continued on these roads and was according to the movements of the Prussians more or less reduced. On June 17th the latter took possession of the town of Waldheim and the passenger train arriving at the same time from Chemnitz was warned to return as speedily as possible. It had now become evident that the danger to these roads was great, the enemy not only tearing up the track and destroying all the bridges and tunnels, but also carrying off all the rolling stock that could possibly be made available. In Chemnitz the approach of the Prussians was announced, and all the rolling stock was thence brought to Zwickau, where, on the night of the 18th of June, forty-two locomotives and several hundred wagons arrived. Long trains, with three or four locomotives at their head were formed and left Chemnitz under the applause of the Saxons. The last two locomotives barely escaped falling into the hands of the Prussians, whose vanguard arrived just as they left.

All these encounters with the Prussian vanguard were merely accidental; the main danger for the rolling stock rapidly accumulating at Zwickau, threatened from a quite different quarter; the blow to be dealt was well considered, and showed, as did all the movements of the Prussians soon after, that they not only knew all the important points in the enemy's country but also the best means of securing them for their own benefit.

By looking at the map it will be seen that the railroad from Chemnitz, passing Zwickau, joins at Werdau with the line which connects Leipsic with Hof, a city in Bavaria. From the latter road, at a small station called Herlasgruen, a single track is laid to Eger, in Bohemia. That point beyond Werdau, where the two main lines which go from Leipsic and Chemnitz to Bohemia and Bavaria meet, is called the Werdauer curve, and if it falls into the hands of the Prussians, the entire rolling stock on both these roads, especially that which has accumulated at Zwickau, is cut off, and must fall into the hands of the enemy. The importance of retreat toward this point, was already shown on the 19th. The same corps of the Prussians which entered Leipsic at daybreak of this day, at once took possession of the depot and all the locomotives and wagons, and prepared a train for following the flying trains to Zwickau. A few precious hours were lost in preparations, and at six o'clock the trains left, and the great railroad race was inaugurated. The danger was felt in Zwickau, although no positive news of the enemy's approach had arrived; it had been too quick in the Leipsic direction, and suspicions were consequently aroused. On the night of the 18th long trains left the Zwickau depot, drawn by the most powerful engines, and went without stopping to Reichenbach, in Bavaria. Long trains of locomotives were among them. At the latter place the news of the arrival of the Prussians at Leipsic was received, and as if the fires in the boilers had received an independent spirit, a sudden mysterious life seemed to be imparted to the iron horses and their long appendages, and away they went in inglorious haste toward Hof. Nineteen locomotives and several hundred wagons raced thither. The bridge across the Goeltzich valley, which is more than a thousand yards long, and which is higher than most spires in Europe, is crossed in haste. In peaceful times the trains are most carefully signaled, and their speed is slackened as they approach this structure; but today they run across with roaring noise, making the mountains resound with their thundering echoes. The people in this valley will forever recollect this night. Aroused from their slumbers by a noise resembling the roar of great water floods, they jump frightened out of their beds. But behold fiery eyes look down upon them from the roaring monsters; shrill whistles intermingle their horrid sound with that of the thundering wheels. Yes, it was a train, and no flood; but what a train! With wondering eyes they could, in the twilight of the summer morning, see the endless line of cars moving across the magnificent bridge. A mighty column of steam and smoke rolls along, over and beyond the train, disappearing behind the far-off mountains. But now, train comes after train, wagon after wagon, all fleeing from Zwickau; the enemy has already left Leipsic on the wings of steam.

The Prussian train arrived at Altenburg from Leipsic as the mail train from Hof, not knowing of the late advances of the Prussians, was about to leave for Leipsic, and this mail train would certainly have fallen into the hands of the Prussians had they not been in too much haste, but, as it was, the mail train was warned and turned off to the right, returning to Goessnitz and thence to Werdau, giving the disagreeable information wherever it arrived. At Werdau everything was ready to start, and in a short time the whole depot was swept of the twenty-five locomotives and numerous wagons that had arrived there, and long lines of trains were again fleeing, as fast as possible, the last engine leaving just as the Prussians became visible on the opposite side. The race now began, of the dimensions of which nobody can form an idea. The trains from Werdau united at the Werdauer curve with those from Zwickau. The fugitives went with the swiftness of the wind on both tracks at the same time. For a distance of eighteen miles, between Werdau and Herlasgruen the whole track was covered with the fleeing trains and engines. All order had ceased, confusion reigned supreme; first and second-class cars, coal cars, wood and mail cars, locomotives of different classes, all mixed together, each trying to evade the victorious enemy. Even the most prudent man must have felt uneasy, for what would have been the consequence if but one of the thousands of wheels had run off the track?

A fleeing army thundered along and announced war and misery. Peace and happiness seemed to leave the country with the empty wagons. In Reichenbach the flood came to a stop, on account of want of water. The depot there, which is over a thousand yards long and very wide, was completely filled with trains, and the power which should set all these masses in motion, slumbered in the reservoir, which was considerably distant from the town. Great embarrassment was thereby occasioned. Should all these rolling treasures, after having so far successfully evaded the enemy, still fall into his hands? No! Parties are sent up the road to tear up the track as soon as the train with the Prussians should appear. The water which is used to supply the town of Reichenbach is all conducted to the depot from the reservoir, and when it began to flow courage and hope returned again; the trains began to move on both tracks and arrived safely at Herlasgruen, thence to leave for Eger. At Herlasgruen the same want of water detained many trains which were not sufficiently provided with the precious liquid to enable them to pass that town; but they were supplied by the friendly inhabitants,

who brought it in pails, pots, cans, and barrels; thus the whole army of wagons arrived safely at Eger, where on the 20th of June more than 140 Saxon locomotives and thousands of wagons were stationed.

The Prussian expedition, which left Zwickau a day later, soon found that the trains had successfully escaped. The men who imperiled their lives by taking care of the railroad property deserve our admiration as much as the bravest soldiers on the field of battle.

The fleeing masses have since returned and have brought the much-desired peace with them. All the dams thrown across the track have again been levelled. May the dams thrown across the road of civilization be also removed and levelled, and, if possible, by the agency of the locomotive which unites all nations more completely and better than all the cannon, orations, and banquets of the world.—*Gartenlaube, Leipsic.*

A METHOD OF CONTROLLING THE PRODUCTS OF THE BESSEMER PROCESS.

PREPARED FOR THE SCIENTIFIC AMERICAN BY DR. ADOLPH SCHMIDT.

(Concluded from Page 136.)

The regular practice of the three trials above described, after each Bessemer charge, will enable the manager of the process to compare the phenomena observed during its course with the results obtained, and thereby to acquire very soon a far more exact practical and theoretical knowledge of the process, and much greater certainty in conducting it than would be possible without the testing. But to extend this certainty to the subsequent working or selling of the raw metal, and to give to this experience a high practical worth for the Bessemer trade, well-determined exterior signs are necessary, which may prevent the ingots from being sold or used for other purposes than they are adapted for. To this end all the metal resulting from the process must be divided into a certain number of classes, the metal of each charge must be adjudged according to the results of the three testing operations described, to one of these classes, and the ingots of the charge must be marked with numbers or other exterior signs, indicating the class to which they belong. As the testing operations are made after the casting of the small ingot, without delay, and can be done in little more than half an hour, the large ingots of the same charge will still be hot and soft after the trial has been made, and the number decided upon, can easily be stamped upon each of them. The numbers should also be marked in a charge journal, kept regularly, and giving an account of the raw material, the more important phenomena, and the results of the charge.

According to experience in the Austrian Bessemer works I believe that the most convenient division of the Bessemer products will be in five classes or numbers whose characteristics I will endeavor to give in the following statement:

Number I. is the hardest kind of Bessemer metal, and resembles the harder kinds of cast steel in common with which it requires to be forged at a certain and carefully chosen temperature. This temperature is indicated by a not too bright yellow color in the heating furnace and metal. If the temperature is raised to a bright yellow or lowered to a light red, this hard kind of Bessemer steel will break in being forged or bent. Having, from its chemical composition and molecular structure, a natural tendency to hardness, it is capable of being hardened to a very high degree, so as to be useful for the manufacture of turning chisels, small files and surgical instruments. It can, when hardened, be bent but a little without breaking, and exhibits a very perfect elasticity returning energetically to its shape after being bent. Its fracture is slightly conchoidal and smooth, the grains being too small to be distinguished by the eye; color, a very light gray. It contains chemically about 1 per cent of carbon. On being tested as to its tensile strength, it extends not more than 5 per cent of its original length, and breaks under a strain of 125,000 to 150,000 lbs. to the square inch of sectional area.

Number II. has similar qualities with No. I., though less sharply pronounced. It is equally a true steel, and can be used for making chisels, larger files, axes and even scythes if the general quality of the metal is very good. It will also do good service as head plates for rails. Entire rails made of this number, though resisting very well, would be too liable to break. It allows greater differences of temperature in being forged, not cracking or breaking in a moderate or in a bright yellow heat. It is generally softer than No. I., but hardens perfectly well, and cannot then be bent durably to any considerable extent. Though its elasticity is nearly as perfect as that of No. I. its elastic force is remarkably less. Its fracture is less smooth, showing the granular structure more distinctly, and presents no conchoidal but an even surface. It contains about $\frac{3}{4}$ per cent of carbon, and has a tensile strength of 100,000 to 150,000 pounds per square inch, with a corresponding extension of 15 to 5 per cent; the extension being the smaller, the greater the strength.

Number III. has still steel-like qualities in a remarkable degree, but cannot be considered as a true steel. It resembles in its properties the ordinary kinds of puddled steel. It is the best material for tires, being hard enough to resist impressions from the rails, soft enough not to injure them, and tough enough not to break. It can also be used and do good service as head plates of rail piles and for rolling entire rails. It is much less sensitive in regard to temperatures than the former, and can, if it is of a good quality in general, be forged and bent without cracking at all temperatures between bright red and welding heat. It can be hardened, though not as easily or perfectly as the former numbers. Its elasticity is much less perfect, and it does not quite resume its original form after bending when hardened. It cannot however be bent considerably in this condition. Its fracture is even but of a darker color and larger grain; the single grains can be seen in the structure with the eye. It contains about $\frac{1}{2}$ per cent of carbon, and has a tensile strength of 80,000 to 100,000 lbs. per square inch, extending at the same time between 20 and 15 per cent of its original length before breaking.

Number IV. has scarcely any qualities of steel, and had better be considered as a hard kind of wrought iron, having a somewhat steel-like, grainy structure and appearance. It can be forged and bent at all temperatures down to a pretty dark red. It does not get much harder by being heated and cooled in water, and can be bent, after cooling, to an angle of about 150°. When broken slowly the surface of its fracture is grainy, uneven and often partially fibrous. It resembles in its appearance and qualities what is called in Germany "Fein korn," i. e., fine grain iron, which is manufactured in puddling furnaces by a process similar to steel puddling and is chiefly used for head plates of rail piles.

The Bessemer metal No. IV. will also suit that purpose, but it will also prove an excellent material for rolling entire rails, and its softer varieties make good boiler-plates. Harder kinds of the metal have been tried for making boiler plates, but did not stand the change of temperature well enough. Number IV., contains about $\frac{1}{4}$ per cent of carbon. It breaks at a charge of 70,000 to 80,000 lbs. per square inch, extending before the rupture between 25 and 20 per cent.

Number V. stands very near real wrought iron, being however generally less fibrous in structure and less soft than the purest kinds of the latter. It is more difficult to work or bend, and has a higher degree of tenacity than ordinary wrought iron. When manufactured with care and from very pure pig iron, it will replace wrought iron in a great many instances. Compared with the preceding numbers it is a very soft and tough material. It can be hammered and bent without breaking at all temperatures from 40° up to 3,600°. It cannot be hardened, but will bend to an angle of 90° and more, after having been heated and cooled in water. Its fracture is partly fibrous and partly grainy, with large dark-colored grains. It welds very perfectly, though not always quite as easily as wrought iron, and greater care has therefore to be taken in the operations with this material than is required in welding common wrought iron.

It contains only about 0·05 per cent of carbon. The tensile strength or tenacity is between 60,000 and 70,000 lbs. per square inch, and it extends before breaking from 30 to 25 per cent of its original length. It is an excellent material for the manufacture of boiler plates, car and locomotive axles, and large forgings of all descriptions.

It has been observed at the Bessemer works of Neuberg, in the Austrian province of Steria, where most of these observations have been made, that if the process is interrupted exactly at the moment which is the easiest to recognize, when the flame begins at last to diminish in brightness and to flicker, before it shortens remarkably, No. V. will be obtained without any addition of Spiegel or pig iron. But if molten pig iron is added, the resulting metal will, by the addition of every 3 per cent, become one number harder, so that 12 per cent is necessary for producing No. I., after a good and regular charge. This may however be different with different materials, and must be determined by special experience with each kind of pig iron.

If we compare the condition of the Bessemer trade in Austria—where Bessemer metal is already used in the place of cast-steel, as well as of wrought iron, and where, for instance, locomotives are made in nearly all their parts of the different kinds of the metal—with the condition of the same trade in England, where the manufacturers are not yet able to furnish rails and tires of a quite reliable quality, and where the metal has till now but a very low credit for all other purposes, the great practical value of the method above described will become apparent. For the difference in the purity of the pig iron used in these two countries is not considerable enough to account for this great difference of public confidence in the products of the process, and the superiority of the German Bessemer industry, in this respect, must chiefly be ascribed to the more careful and scientific manner in which the process is there conducted.

THE LATE ALEXANDER DALLAS BACHE.

Dr. Franklin, justly reverenced as one of the fathers of modern science, has been fortunate likewise in his other posterity. His only daughter, Mrs. Richard Bache, was worthy of her parentage, in intelligence, force of character, and devoted patriotism, and transmitted to posterity the intellectual rank, the personal virtues and even the scientific bent of her illustrious progenitor. Her son, Benj. Franklin Bache, was an able journalist, and her grandson, Alexander Dallas Bache, has just died, ripe in years and honors, leaving a name already long claimed by the scientific world as its own. The names of Franklin and Bache will thus be associated in the records of science and in the regard of mankind. The first Bache from England (Richard) the son-in-law of Franklin, also bore an honorable part in the history of his adopted country, having been president of the republican society of Philadelphia at the beginning of the Revolution, and Postmaster General of the United States during the war. Philadelphia, rich in historic honors, shares in the same happy association, having been the residence of all and the birthplace of the latter two, of this noble line.

Prof. Bache was born in Philadelphia, on the 19th of July, 1806. He graduated at West Point, in 1825, at the age of 19, at the head of his class—never having received a mark of demerit—was commissioned a lieutenant of topographical engineers, and remained for one year at West Point as assistant professor. From twenty-one years of age to thirty-five, he was professor of mathematics in the University of Pennsylvania; next, the first principal of the Central High School of Philadelphia, being transferred to the chair of Natural Philosophy and Chemistry in the University; traveled in Europe in behalf of Girard College, and presided over that institution from 1843 to 1853, when he was appointed to the great work of his life, as Superintendent of the Coast Survey. Of this work nothing could be more fitly spoken than the official tribute from the Secretary of the Treasury, Hon. Hugh McCullough:

Under his direction that great national work has been eminent, no less for its abundant results than for its high scientific character, which has won the approbation of the leading learned bodies of the world, among whom his name has long been held in honor.

That the deceased Superintendent had become illustrious in America and in Europe is due to the steady devotion of his great talents to the service of the people. His genial disposition attracted the love of associates and of subordinates; his wisdom commanded their respect. He leaves us a name of unsullied purity, and a memory that adds lustre to the many public records upon which it is borne.

All remember the many testimonies to the vital importance of the results of the Coast Survey, which are bound up with the exploits of our navy in the late civil war, at Port Royal, New Orleans, Charleston, Savannah, Mobile, Fort Fisher, etc. Every topographical datum required for successful approach and attack in those waters, had been placed by that means in the hands of our naval and military commanders, and it is not too much to say that the Coast Survey was one of those leading providential preparations without any one of which the failure of the war would have been morally inevitable.

Prof. Bache's long and final illness was softening of the brain, and he died at Newport, R. I., on the 17th of February, in his 61st year.

Prof. Agassiz, in his lecture on Thursday evening, remarked that the Coast Survey of the United States is the most perfect coast survey ever made in the world, and that it is the work of Bache in its perfection. He had the talent to apply to practical purposes the most advanced results of science, and to make his practical work contribute to the progress of science, in a manner which has advanced geography in America far beyond what it is anywhere else.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, February 14th, Prof. Tillman presiding.

The President read, as his usual summary of scientific items a condensed statement of the seventeen principal points proved in a course of lectures on chemical and dynamical geology, delivered by Dr. T. Sterwy Hunt, F. R. S., before the Lowell Institute of Boston.

A VOICELESS DUCK.

Dr. Rowell exhibited to the society the throat of an unfortunate duck, which when living was incapable of uttering any sound owing to the enlargement of the bronchial tubes. The case was brought forward as an illustration of his theory, that in the larynx there reside organs of speech, which if once destroyed are never renewed.

BEET SUGAR.

The discussion on this subject was resumed. Mr. Grant believed it clearly proven that beet sugar can be made here cheaper than cane sugar imported from Cuba. Minnesota, he considered to be the state most favorable for its production and manufacture. The soil of New Jersey is also admirably suited but the high value of land is a serious objection to its being profitably grown. More sugar is produced from beets than from equal quantities of cane. The usual product of cane sugar in Cuba is 1700 lbs. to the acre, but in Illinois there is no difficulty in raising beets that will yield 2000 lbs. to the acre.

The climate required for raising beets is the very opposite of that necessary for the successful cultivation of the cane, the colder latitudes being more favorable than hot or tropical ones. After some further discussion the meeting adjourned having selected "Bridge Building" as the subject for the next meeting.

The able article on beet sugar cultivation, read by Dr. Hirsh before this body a few evenings since, we have been permitted to use, and a portion of it appeared in our last issue. The crowded state of our columns necessitates deferring the remainder until next week, when the second and concluding article will be published.

Production of Natural Colors by Photography.

M. Niepce de St. Victor has recently communicated to the French Académie des Sciences the results of his latest researches, having for object to obtain and fix the colors of nature by means of photography. His paper is full of very important, new and interesting facts, proving that the fixation of natural colors on the ptotographic tablet as a practicable and available result, which for a long time has been considered as a dream, is not perhaps so far from being fully realized—not as a mere scientific experiment, but as the completion of the splendid discovery of photography.

The process of M. Niepce de St. Victor may be shortly described as follows:—The silver plate must first be chlorurised, and then dipped into a bath containing fifty centigrammes of an alcoholic solution of soda for every 100 grammes of water, to which a small quantity of chloride of sodium is then added. The temperature of the bath is raised to about sixty degrees centigrade, and the plate is only left in for a few seconds, the liquid being stirred all the time. The plate being taken out, it is rinsed in water and then warmed until it acquires a bluish-violet hue, which is probably produced by the reduction of a small quantity of chloride of silver. The plate is now coated with a varnish composed of dextrine and chlor

ide of lead. In this way all the colors of the original, including white or black of more or less intensity, are reproduced, according as the plate has been prepared, and as the blacks of the copy are either dull or brilliant. The reduction of the chloride should not be too great, because otherwise nothing but pure black or pure white could be obtained; and in order to avoid this inconvenience a little chloride of sodium is added to the soda bath. A few drops of ammonia will produce the same effect. By this process a colored drawing, representing a French guardsman, was reproduced by M. Niepce, with the exception of one of the black gaiters, which he had cut out and replaced with white paper. The black hat and the other gaiter produced a strong impression on the plate, while the white gaiter was perfectly reproduced in white. Much more intense blacks may be obtained by previously reducing the stratum of chloride of silver by the action of light; but then all the other colors lose their brilliancy in proportion.

This production of black and white is a considerable step in heliochomy. It is a most curious and interesting fact, for it would prove that black is not entirely the absence of light, but is a color of itself, producing its own effects, as well as the other colors. This was illustrated by the experiment made at the suggestion of M. Chevreul, the celebrated member of the Acadèmie des Sciences, whose known researches on the contrast and effect of colors are so instructive and interesting. Accordingly, Mr .Niepce tried to represent on his plate the black produced by the absence of light in a hollow tube. But the hole produced no effect, or rather it was negative, which is not the case when the black of natural objects, represented in a colored picture reflects its own tint, or, if we may say so, its own rays—endowed, it would appear, like all the others, with chemical action, for the apparent reason that the hole could not reflect any rays, and its blackness is the result only of the absence of all rays. The same thing may be said of the white, but less extraordinarily; for the white being the result of all the rays of light united, it may be more easily understood that the chemical action of the white would be the compound result of the various rays of which it is composed, and that result is the same as that which gives us the sensation of white. Certainly the reproduction of black and white by M. Niepce de St. Victor is a most extraordinary fact unfolded by his beautiful discovery, and perhaps more surprising than the reproduction of all the colors themselves.

It is not possible at present to foresee all the consequences of the researches of M. Neipce de St. Victor. It may be the seed that in the field of science will, by proper cultivation, grow into a gigantic tree, from which time will probably reap the most nutritious and wonderful fruits.—*British Journal of Photography.*

Editorial Summary.

THE GEYSERS OF NEVADA.—About twenty miles from Carson City, Nevada, are some remarkable mineral springs called Steamboat Springs, from the noise they make, which sounds like several steamers discharging steam. These springs cover an area of about three acres. The water is boiling hot, and the escaping steam can be seen for several miles before sunrise, and the atmosphere in the vicinity is filled with the smell of sulphur. There are crevices in the rocks where the water can be seen boilimg at a depth of thirty feet. There is also a spring which is called Breathing Spring. It is shaped much like a well. The water recedes to the depth of ten or twelve feet, and remains calm for five minutes, and then commences to boil, and rises until it shoots into the air above ten feet, and in five minutes it begins to recede.—*Ex.*

BLEACHING PROCESS OF MOTHAY AND ROUSSEAU.—The article to be bleached is immersed in a solution of permanganate of soda, which has been rendered slightly acid, and is stirred about for a few minutes, with a glass rod. It is then plunged into a solution of sulphurous acid, which removes the violet brown oxide of manganese deposited upon it in the first bath. After the successive immersions in the two fluids have been repeated two or three times it is found to be beautifully white, without its fibers being the least impaired in strength. In this, as in all the processes which have been used for bleaching, oxygen is the agent which destroys the coloring matters; but is here applied in the form of ozone, which is disengaged from the permanganate by the organic matters.

THE LATEST METEORIC THEORY is that of M. Fonvielle who, on the supposition that innumerable meteoric bodies circulate throughout the interplanetary spaces, concludes that each planet in the course of ages, has hollowed for itself a path among those flying meteoric masses, attracting all within the reach of its gravitation; but from periodical inequalities in its orbit, it attracts at times other meteoric masses which had before escaped its attractive power. Le Verrier demonstrated many years ago, by mathematical calculation, the existence of several belts of such meteoric masses moving in orbits like the planets. This shows that the strained hypothesis of a path created and maintained by planetary revolution, is unnecessary. The paths are ready made.

THE NARCOTIC SPRAY ANAESTHETHIC wins great favor among dentists and surgeons, and promises to be a most beneficent substitute for the injurious and dangerous application of chloroform and nitrous oxide. The part to be operated on is subjected to a jet of the spray until cold enough to be insensible, the process involving but slight pain. Numerous practitioners in Europe and America report enthusiastically of the success of the agent and the harmless *sequelae* in all sorts of operations.

TURN-TABLE CASEMATES.—For working heavy guns in casemates, so as to obtain a range of fire in as many directions as possible, a novel system invented by Capt. Robt. F. Scott, R. N., is to be applied on H. M. S. *Hercules*. A turn-table similar in effect to that used for locomotives is made to carry the whole weight of the gun, when required, and is laid with a segment of the curved track or way upon which the gun is swung. A number of these curved ways, each radial to the turn-table, are adjusted so as to carry the gun into the various positions desired, to either side of the casemate, pointing forward, aft, etc. By adjusting the turn-table track to either of these ways, the gun is swung on or off that particular track, and its whole direction changed.

MORE "SOCIAL SCIENCE."—M. Jean Dollfus, a large manufacturer in France, finding upon investigation that the women employed in his factories lost 40 per cent of their children in the first year, whereas the average mortality at that age in France is only 18, determined, with a princely philanthropy, to go to the root of the evil by paying every recent mother six weeks' wages, without work. The result has been the reduction of infant mortality in the district from 40 to 25 per cent in three years. Other manufacturers have introduced a similar plan, by inducing the employees to contribute to a fund. The subject is of importance everywhere, and some provision of the kind is demanded by humanity both for mothers and children.

EARTHQUAKE.—Two shocks were felt at Fort Klamath, Oregon, on the 8th of January, with an interval of half an hour. The first was slight, but the second was violent, lasting two or three minutes and breaking all the glass at the post. The tall pines around the fort, says an eye witness, seemed lashing themselves into fury. The wagons in front of the stable were engaged in a pitch battle; horses and cattle lying crouched upon the ground, uttering most pitiful moans. The sutler's store was thrown about 20 feet from its former position. It is supposed that a volcano had broken loose near the Klamath marsh, as a continuous dark volume of smoke is seen ascending in that direction.

LOWER CALIFORNIA.—The geological and topographical survey of the peninsula by J. Ross Browne, for the Lower California Land Company of New York, will soon be commenced; the party being probably on the ground ere this. Mr. Browne proposes to visit the shores and islands, with a view to determining upon a suitable location for the nucleus of a colony, as well as to make an examination of the products and resources, including gold, silver, copper and other mines, fisheries, pearls, salt beds, fruit, wine, guano, etc. There is little doubt that this great domain will in no long period become a part of the United States.

SPONTANEOUS COMBUSTION.—Some of the penalties which Nature inflicts upon vice of different kinds, are as horrible as anything ever imagined of infernal retributions. A well-authenticated case of spontaneous combustion occurred in Columbus, Ind., on the 15th ult. Andrew Nolte, a German, very intemperate in his habits, was found dead in his shop, his lips entirely burned away, leaving a ghastly hole, his tongue charred to a crisp. His nose was also burned, as if by fire coming out of his nostrils, and his clothes were still burning when found. No other part of his body save the air passages was burned.

IS NITRO-GLYCERIN POISONOUS?—An inquiring German has been trying nitro-glycerin internally, not for blasting, but to ascertain whether it is poisonous. In large doses it caused death in animals, acting chiefly on the brain. The experimenter, getting accidentally more than he meant to, suffered pretty severely from headache, giddiness and partial loss of consciousness, but experienced no very alarming symptoms. Externally, it produced no effect whatever. Hence he concluded that it is a safe article to handle, so long as it does not explode.

FRUIT TREES, says a correspondent, should be allowed to shoot out their branches near the ground, protecting the trunk and the soil from changes of temperature and loss of moisture. He thinks that Providence never meant fruit to grow out of reach. He is right. We have seen the experiment tried, and it has been found that apple trees, especially, bear better when the top branches are cut away, and the limbs permitted to grow lower down on the trunk.

A NEW MODIFICATION OF PHOTOGRAPHY.—It has been suggested that the interior and exterior parts of complex objects, such as an instrument or a bodily organ, may be represented in their actual positions, by first photographing the exterior part, and before the image has been strongly impressed, substituting upon the camera the inner part. The latter will appear in the picture as behind or inclosed in a transparent image of the former.

IF the current of sparks of an induction coil be passed through the luminous flame of gas or of a candle, no alteration is seen in the flame, excepting that in the path of the sparks the flame is intensely luminous. If, however the flame be examined by means of the rotating mirror, it is found that the flame is always extinguished above during the passage of an individual spark. The part below the spark is constant and steady.

DISTILLATION OF PERFUMES.—It has recently been discovered in France that sulphuret of carbon is the best solvent of the essential oils of flowers. The sulphuret penetrates into the substance of the petals, expels the water, and when charged sufficiently with the essential oil, is evaporated.

ELECTRIC "FLUID" OR ELECTRIC FORCE?—The later discussions tend toward the theory that a conductor of electricity is a medium for the transmission of a force or effect, rather than a channel for the locomotion of an agent. In this direction there is a chance for discovering the physical properties which render conducting substances susceptible to electric force, and those which disqualify others.

NOT PATENTABLE.—An ingenious if not practical person lately applied (*not* through the Scientific American Agency) for a patent on an invention designed to render spirits palpable to the senses, by means of some fancied attenuation of light and air in a closed room. The commissioner couldn't see it.

THE GREAT LAKES.—The elevation of the surface of Lake Superior above the sea is six hundred feet, that of the other upper lakes 578 feet, yet their great depth places their beds except that of Lake Erie, below the surface of the ocean. These immense reservoirs, Lake Ontario included, contain nearly one half of the known fresh water on the globe.

THE costliest watch that was ever made is said to have been one which was constructed in 1844 for the Sultan Abdul Medjid, who must have found it rather inconvenient, since it was five inches in diameter, and struck the hours and quarters on wires, with a sound resembling that of a powerful cathedral clock. It cost 1,200 guineas.

THE AIR TREATMENT.—M. Boisson has introduced a method of treating superficial wounds by a jet of air from the common bellows, immediately forming a dried film over the exposed flesh, beneath which healing is greatly facilitated and other obvious advantages secured. Burns which have removed the skin may be treated advantageously in this way.

SHEEP WASHING.—Great pains are taken in cleansing wool before shearing in Germany. In Hungary the sheep are first soaked and rubbed in vats of very warm water with potash. After cooling, they are showered as forcibly as possible with cool water until the wool is white, and are then kept in a clean and warm shelter until dry for shearing.

THE quantity of atmospheric electricity at noon, is much greater in winter than in summer, the relation being about ten to one. This augmentation of electric force proceeds in a manner almost parallel with the number of days of frost or fog, and inversely as the number of days of thunder, elevation of temperature, and actinic power.

M. QUETELET says that careful observations have convinced him that a plant developes much more rapidly during a mean temperature, when this temperature varies, then when it is uniform, provided that it does not fall below freezing point. He is also of opinion that the effect produced is equal to the square of the temperature.

CHARCOAL has been tried in fattening fowls, with marked advantage: the difference in weight produced, amounting to fifteen or twenty per cent, besides a decided advantage in tenderness and flavor. The charcoal was pulverized and mixed with the food, about a gill daily to one turkey, and also left free on the ground.

IMPROVED STEEL MASTS.—This is the latest application of the Bessemer product: substituting much lighter and slenderer tubes of steel, for the wrought iron article which had already been applied to some extent in the British navy in place of "sticks." The new mast is strengthened by transverse longitudinal plates.

M. GANZ, of Ofen, in Hungary, coats the interior of his molds, which should be of iron, with a paste of finely-powdered antimony and alcohol and then dries them at a temperature of 100 deg. cent. The iron castings are thus covered with an extremely hard coating of the alloy of antimony and iron.

SUBMARINE PHOTOGRAPHY.—M. Bazin has obtained clear submarine photograms at a depth of 300 feet, in his diving studio, by means of the electric light thrown through watertight lens windows upon the objects to be photographed. The value of this invention in submarine surveying is obvious.

As a result of the late strike in the iron trade, a scheme has been started at Darlington, which appears to have the sanction of the iron-workers of the district, and is principally under their management, to erect rolling mills on the co-operative principle.

THE *Orontes*, iron troop-ship, which is paid over below the water line with the Admiralty, or Hay's, anti-fouling composition, and has been eight months out of dock, is found to be almost as clean on her bottom as when she left the dock.

ITALY VS. ENGLAND.—An Italian house has carried off an enormous contract for basin, docks, factories and other works connected with the enlargement of the Chatham (Eng.) dock yard, over the heads of the English bidders.

A MISSOURI blacksmith has prepared a horse shoe for the Paris Exhibition, made of raw ore from Iron Mountain. Half the shoe is finished, and the other half shows the ore as it is dug from the mine.

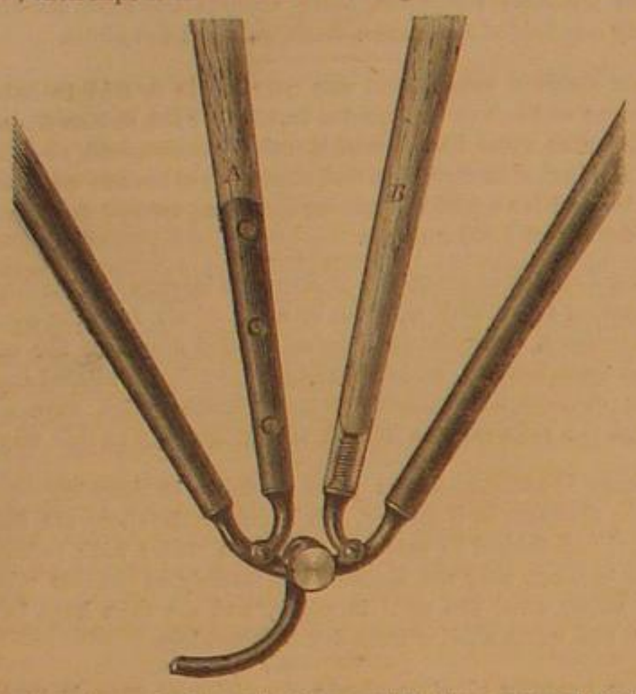
THE FAMINE IN INDIA.—1,000,000 people, or one sixth of the population, have been destroyed by the great famine of 1866 in an area of country not larger than England and Wales.

THE LARGEST ROOF IN THE WORLD is at St. Petersburg. It is a single arch of iron, covering a room 650 by 150 feet, which is used for military purposes, balls, etc.

IMPROVED SLATE IRON FOR CARRIAGE TOPS.

In covering the exposed portion of the bows of a top carriage it is necessary with the slat irons in common use to attach a mitt or cap at the bottom. This is only a manner of concealing an imperfectly finished job, which when the work is done by hand is usually avoided by good workmen. Carriage work, however, is now largely done by machinery, the leather stitching especially, and while straight work done on the machine is neater than the usual hand work it is not relied upon for such jobs as covering bow irons.

The engraving shows an improved bow iron which allows the slat or bow to be removed to receive its cover. In the engraving the two outside slats are covered. A represents one showing the side to which the iron is attached. B is partly in section, showing the screw by which the slat is attached to the pivoted end of the iron. The bows being fitted for the trimmer, he takes them, cuts out the covering, bastes it on the bow, then slips it off and runs it through the sewing machine.



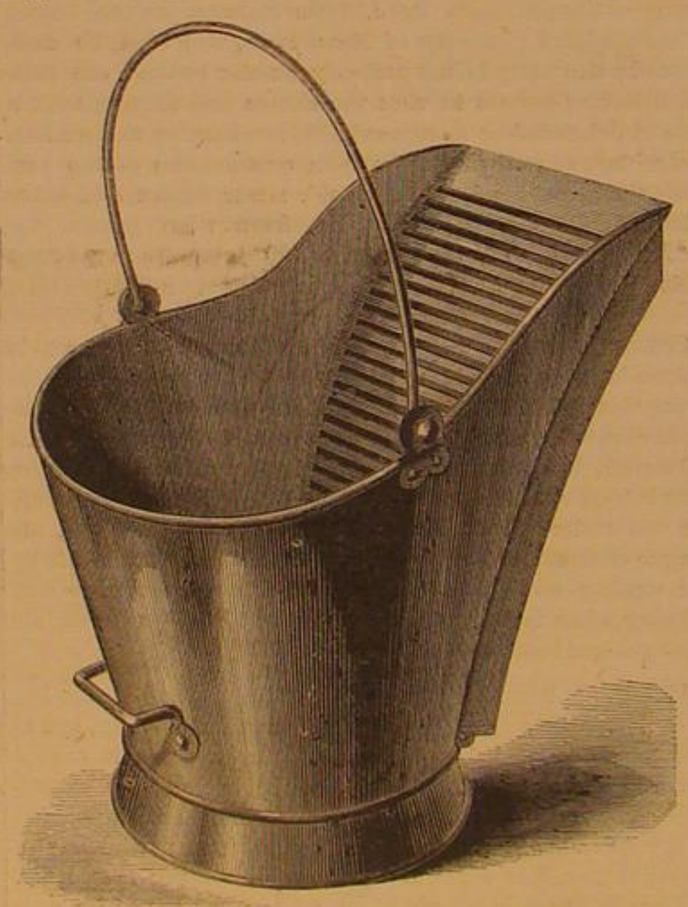
It is then drawn back on the bow and the bow screwed on the jointed part. The job when finished is perfect and has a very neat appearance, considered superior to that of those covered in the ordinary way. Every carriage maker or trimmer will easily understand the advantages of this method of covering. It was patented through the Scientific American Patent Agency, Oct. 30, 1866, and is said to give excellent satisfaction in use. Address for further information A. M. Decker, Glenn's Falls, N. Y.

The Employment of Acid in the Making of Sugar.

During the last three years acids have been largely employed in the manufacture of beet-root sugar in France, and within two years several sugar houses have been specially arranged for the acid process. M. Kessler Desvignes has recently communicated to the Paris Academy of Sciences the results of this new method. The defecating action of sulphuric acid on beet-root juice is well known. When acid of 66° is added to juice of ordinary density, an abundant precipitate is thrown down, and is continued by subsequent additions of acid until it reaches to 2½ millionth parts of the whole weight of the juice. Most of the acids produce the same effect in different doses, but the separation of the deposit is more or less complete in proportion to the energy of the acid. When heat is applied, the precipitate rises to the surface, and is easily got rid of by skimming. Such was the mode originally adopted when sugar was first made in France, but it had to be given up because the defecation was not complete, and also because it injured the crystallization of the sugar. M. Desvignes imagined, however, that it might be advantageously reintroduced with modifications, and having achieved considerable success, he thus explains his process:—1st. Acids employed at the ordinary temperature, even in large doses, do not affect the sugar, and therefore it is only necessary that they should be saturated by a base before heat is applied. 2nd. On the other hand, acids arrest viscous fermentation, and doubtless the effects of other ferments also; they act as powerful antiseptics, and thus prevent the formation of the glareous substance which seems to be one of the gravest causes of bad sugar making, and, on the other hand, they prevent the destruction of the sugar by the ferments with which it is brought into contact when the cells of the beet root have been broken by rasping; and this destruction, M. Desvignes believes, is far more rapid and more considerable than is generally believed. The antiseptic effect may be easily exhibited by taking pure juice and mixing it with other juice which has become glareous to the extent of 5 per cent, then separating it into two parts, and treating one of these with from 2½ to 3 thousandth parts of its weight of sulphuric acid at 66°. On the following day it will be found that the juice which has not been acidified will have become cloudy and viscous, while the other will remain clear, with the deposit caused by defecation at the bottom. M. Desvignes gives the details of his experiments with non-acidified glareous juice, proving the loss in sugar caused by the viscous change, and draws the conclusion that, contrary to generally accepted opinions, acids, instead of having an injurious effect on sugar in cold juice, preserve it, on the contrary, from the destructive effects of fermentation. The same experiments applied to beet-root juice kept for a longer time exhibit the same effects to a still more remarkable extent. 3rd. It is easy to prevent all danger or inconvenience by choice of acids; fluorhydric, hydrofluosilicic, and phosphoric acids, as well as many of their combinations—such as the fluosilicate of magnesia, which is easily obtained in a crystallized form—the fluosilicates of alumina and manganese, the biphosphates of lime, magnesia, or alumina; the phosphate of lime dissolved, or attacked by fluorhydric acid, hydrofluosilicic, hydrochloric, or nitric acid, never produce callosity, and may be used without the slightest ill effect, either as regards the workmen or the pulp. 4th. Defecation by acids is easily completed by the precipitation of certain substances more or less basal, such as magnesia, the silicates and aluminates of lime, the compounds of starchy matter with that base, the insoluble phosphates, the fluoride of magnesium, calcium, and aluminum, etc., and the above named acids easily bring about such deposition. It is only necessary to saturate them with lime, or to dissolve previously in the acidulated juice some of the bases which it is desired to precipitate. Thus a kind of analysis on a large scale is carried on in the manufacture, separating, in the first place, the insoluble organic acids by means of those which are added; and afterwards, the soluble acids with the neutral or basal compounds liable to form with the lime and magnesia compounds difficult of solution. One of the advantages claimed for the system in question is that of effecting very complete defecation with an excess of lime, so that the juice may be immediately evaporated and boiled without the necessity of using charcoal. Thus, we find in acids powerful antiseptics, possessing this advantage over lime—that they may be added to the pulp without danger to cattle, preserving the sugar against fermentation, and yielding in one operation, instead of two, perfectly defecated juice, which, by the addition of a simple solution of lime, yields as much crystallizable sugar as if it had been passed through charcoal.—*The Grocer.*

COMBINED COAL HOD AND ASH SIFTER.

Nothing can be neater or handier than the improved coal hod herewith illustrated. It is at once a receptacle for the fuel and ashes and a sifter of both. Its construction shows an eye to proportions as well as an object of utility. The hod is in the usual form, the discharging surface being perforated either with transverse slits arranged diagonally to retard the escape of the debris as may be desired. In front is a channel formed of a bent sheet of iron and having at the bottom a hinged door to let out the ashes or dust. It shows for itself



that it has great advantages over the ordinary hod and will recommend itself to all housewives. Its cost of construction cannot be much greater than that of the ordinary hod, while its advantages must be obvious.

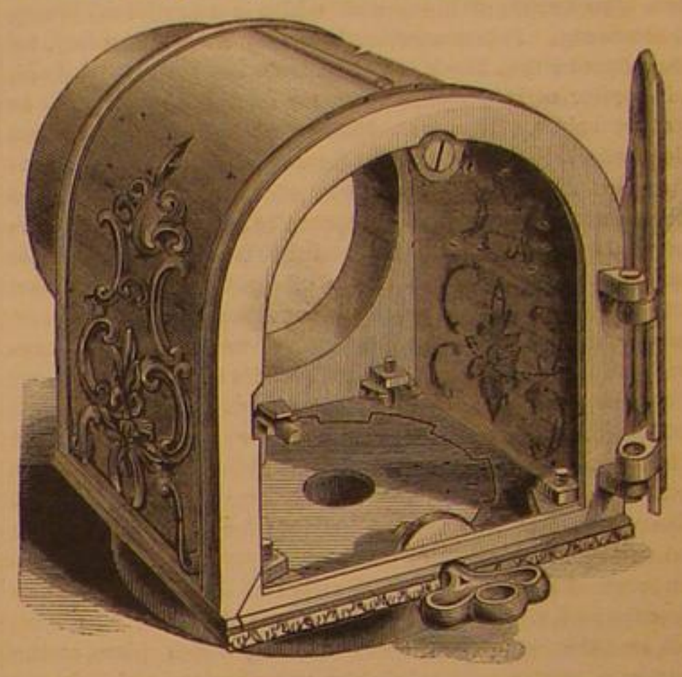
This hod is the subject of a patent issued in favor of Yateman and Mason, Washington, D. C., Jan. 15, 1867. For further particulars address Alexander & Mason, cor. 7th and F streets, Washington, D. C.

Philadelphia Butter.

The editor of the *Practical Farmer* has been investigating the source of the excellence of this celebrated product. He finds that with the model dairyman butter-making is a matter of business, and all the minutiæ receive his personal attention. The quality appears to depend on a number of very important though minute processes. Butter made from sweet cream will not keep well, and until the milk sours all the cream cannot be obtained, while if left longer rancidity ensues. A small quantity of sour milk is therefore put into each pan to hasten this process, unless the weather is such that the souring of the milk takes place within the thirty-six hours which are considered the proper time for the milk to stand before being skimmed. The skimming must be done exactly at the right time. The temperature, 62°, is regulated by a thermometer. The cream vessels are kept in water at a low temperature, and regularly twice a day are stirred thoroughly with a wooden spatula. At churning time these cream pots are plunged into a boiler of hot water, and stirred rapidly with a stick, till the temperature reaches 60°, when they are immediately emptied into the churn. When the butter begins to break a quantity of cold water is poured in, which tends to harden it and cause a more thorough separation of the buttermilk. This is then drawn off and more water thrown in, to wash out any still remaining. After working and seasoning, the butter is laid in water on a clean cloth for a couple of hours, when it is worked over again and finally prepared for market.

WILSON'S COMBINED FUNNEL ELBOW AND DAMPER.

In some parts of the country bituminous coal is largely used for cooking as well as for heating purposes. Much of the volatile constituents of this fuel is unconsumed, and being delayed in its escape to the outer air, is deposited in the funnel of the stove. With the ordinary stove-pipe no other remedy is possible except to take down the pipe at not unfrequent intervals and clean it. The lodgement of these particles of unconsumed carbon is generally in the horizontal portions of the pipe, especially where the upright joins. The device shown in the engraving is an ornamental elbow, easily accessible, by opening which the debris may be drawn or swept out.



The bottom and ends are of cast-iron, and the cover or upper part may be of the same substance or of sheet-iron as preferred. A flange at the bottom receives the vertical pipe, and a similar flange at one end of the contrivance, the horizontal length. Opposite this latter opening is a door, represented open in the engraving, by which the interior may be reached. A damper, either rotating, as shown in the engraving, or a slide, forms the bottom of the elbow. In either case it has an aperture sufficiently large when the damper is closed to allow the escape of deleterious gases into the chimney. The damper, which forms a plate or floor for the reception of the deposit is also useful as a damper, as by it the combustion of the fuel can be easily regulated and controlled.

These elbows are made of all sizes—fitted to all ordinary pipes—and are but slightly more costly than the ordinary funnel elbow. In addition this is ornamental as well as useful, and does away with the annoyance of new elbows where a change of residence becomes necessary. It can be hinged at the turn of the pipe to aid in the adjustment of the funnel, and is made in this style so as to suit all circumstances. Wilson and Wood, Wilmington, Del., are the proprietors of the patent, which was granted through the Scientific American Patent Agency, Dec. 11, 1866, and to them all communications should be addressed.

THE CANNON KING.

[Translated for the Scientific American from the Leipsic *Gartenlaube.*]

Just after the war between the two great German powers was over, the European as well as American journals entertained their readers with descriptions of the inventor of the Prussian needle gun and of the arm itself, and it seems only justice to give our readers a description of the immense manufactory of that man whose genius gave the Prussian artillery an arm of no less importance than that of the infantry. Mr. Alfred Krupp's far-famed establishment is in an exceedingly favorable situation, at the junction of three grand railways of western Germany, about two hours from Cologne, in the direction of Berlin. Here in Essen, Krupp inherited, as a boy of fourteen, a small workshop for manufacturing cutting engines. By ability, energy and good luck he enlarged his workshop gradually, so that in 1865 he manufactured, by the aid of 160 steam engines, 39 steam hammers, and 400 melting, glow and cement furnaces, no less than 1,000,000 cwt. of cast steel, one third for cannon and the rest in large bars for steam engines, axles, wheels, boilers, etc., etc.

Krupp's first steel cannon were cast in 1849 and offered to the chief German governments, but refused by them because they thought the article too novel and costly. The Viceroy of Egypt was the first who ordered them. (Our readers will remember that Mr. Dreyse's offer of his needle gun was also refused at first for a similar reason.) Since that time nearly all the great powers of the civilized world have ordered Krupp's cannon. Russia is going to alter her cannon to steel in her manufactory at Alexandrofsky, expressly erected for this purpose. Prussia buys steel cannon, which are cast at Essen and rifled at the fortress of Spandau: she has, however, her own system of breech loading, which is different from Mr. Krupp's. Belgium and some smaller states have accepted Krupp's system, or still partly use the Prussian arm. The Austrian and Dutch navies are partly supplied with steel cannon. The Italians have bought some six-inch breech-loading guns. Krupp's best customers, however, until lately, were the Turks,

who have bought no less than 200 six-pounders, and the Japanese, who, on their trip through Europe two years ago, ordered at once 60 six-inch cannon, 30 of which were delivered in September last. Mr. Krupp's establishment has delivered 2,500 cannon of steel, mostly rifled breech loaders, 400 of which have a caliber of eight inches and more, the rest having from three to four and a half inches.

The workshops of Krupp cover at present over 500 acres of land, consume daily 15,000 cwt. of coal, work by steam from 120 boilers, are illuminated by 7,000 gas lights, and employ over 8,000 men and boys, whose wages amount to about 2,500,000 dollars, or an average of 312½ dollars each per annum. A fund has been established to which every workman has to contribute an average of one groschen (about three cents) of every dollar he earns, in return for which he receives support in case of sickness, and a good pension in his age. Mr. Krupp himself contributes to this fund half as much as his workmen: so that in fact, if a workman pays for instance $1, the fund gets $1·50. From this source every workman gets, after twenty-five years service, a good pension. In case of accident, he receives full wages during the whole time of inability to work, and if sick he is supplied with medicines, and finally, burial expenses are usually paid out of this fund. Besides this, Mr. Krupp's workmen enjoy a good many other advantages. To supply them constantly with good and cheap bread, he erected bakeries in a grand style, the flour for which he buys in large quantities from Russia. Similar arrangements have been made to supply them with good and cheap potatoes, and we hear that Mr. Krupp intends to do the same with meat. These father-like arrangements prove very beneficent for both employer and workman, and have been imitated in England in many of the large manufactories.

The iron ores for the enormous demand are partly from Krupp's own mines in the late dukedom of Nassau, and near Coblentz, and are partly bought. The former give the well-known Spiegel iron. It contains a large quantity of manganese, of which, however, it is cleaned by a simple process, and contains then over 98 per cent of pure iron, the other two per cent consisting mostly of silicious earth, cobalt, nickel, copper, and a very small quantity of phosphorus. That which is to be used for cannon must be softer than ordinary steel, so as to have a certain elasticity under the force of the discharge. This softness is attained by mixing a quantity of forge iron in the steel mass. Iron and steel are cut into bars of six inches length and put in plumbago crucibles containing from thirty to sixty pounds each. The manufacture of these Krupp crucibles was a secret for a long time. At present, however, those of Ruel in London, and the Patent Crucible Company, Battersea, are deemed to be almost as good. The foundery is an enormous building, containing so many furnaces that the necessary iron and steel masses for castings of the largest dimensions can be melted there in 1,200 crucibles at the same time. About ten crucibles are placed in every furnace, resting on movable bars. The heat in the furnaces is so great that the best Scotch fire-proof stones which surround them, and sometimes even the crucibles, melt, so that the latter can be used but once. The workmen are divided into companies, and obey commands with the greatest precision, so as to be able to found the contents of the different crucibles all at once into a reservoir and thence into the mold beneath. As soon as the casting is solid it is surrounded by hot ashes and kept in a red glow until the forging takes place. As this can only be done in cool weather, the largest pieces sometimes lie two or three months in their hot beds, the necessary temperature being maintained by constant supplies of glowing ashes.

The castings consist first of round or square forms, and are afterwards forged, hammered or turned. By the regular form of the casting, a symmetrical mass is obtained, free of bubbles; the steam hammer gives the mass the necessary compactness, strength and elasticity, and generally compresses it 2 or 3 per cent, and the power of resistance rises from 760 to 1,320 cwt. per square inch. The last mass for the cannon is pretty soft and has a power of resistance from 800 to 900 cwt.

The smaller cannon consist of one solid piece: those over eight inches caliber are compound, and fastened by rings. The largest *steel* cannon yet manufactured is of eleven inches caliber. It was first cast as a cylinder of 750 hundred weight and seven feet diameter, and then forged, after which it was strengthened by rings of cast steel. Two monsters of this kind, weighing 540 cwt. each, and worth about 14,000 thalers, have been manufactured for the Russian government They are breech-loaders, and are able to throw a ball of 540 pounds with a charge of 50 pounds of gunpowder. Their destination is the Russian fortress of Kronstadt. A still larger monster of 15-inch caliber, throwing balls of 900 lbs., for the same government, will be at the grand exhibition.

The steam hammers are of great importance in Krupp's establishment. The largest of this kind has a fall of ten feet and cost about 700,000 dollars, two thirds of which were paid for the tilter or bed of the hammer, which has not sunk in the least, although the hammer has been thundering day and night. We should say that nothing could resist the power of these blows, but the large masses of red glowing steel it has often to forge bear these blows with so much resistance that they become effective only by long repeating. Mr. Krupp has therefore decided to use a three times greater power upon his steel, and to forge a hammer of 2,400 cwt. with a fall of thirteen feet. The cost thereof will be about 1,300,000 dollars.

Steel cannon were until lately the principal manufactures of Krupp, but lately he has also manufactured a good many balls and bombs for the Russian government, to which he has delivered several thousands of oblong eight and nine inch shot and shell, all the finest cast steel, the smaller sort of which contain eight pounds of powder and are able to crush iron plates five and a half inches thick. But every one of these pills costs over 100 dollars, all being hammered and forged. Similar though smaller bombs are destined for the Italians, and partly already delivered.

THE MECHANICAL EQUIVALENT OF HEAT.

Prepared for the Scientific American.

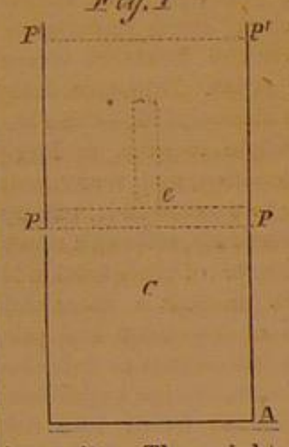
Our present mechanical equivalent of heat is established by proofs of such seeming strength and conclusiveness that it is no light matter to call its truth in question; however, I propose to show that these proofs are not really so conclusive as they appear and that our equivalent, which says a unit of heat will give 772 foot lbs. of force, has no direct proof for its support but the all direct proof which can at the present time be brought to bear on the subject would go to establish quite a different measure for the power of heat. I will first quote from "Heat considered as a mode of motion," by Professor Tyndall, to show how the equivalent has been established and will then present the reasons for making the above statement.

"Using the accurate numbers, the quantity of heat applied when the volume is constant, is to the quantity applied when the pressure is constant, in the proportion of 1 to 1·421.

"This extremely important fact constitutes the basis from which the mechanical equivalent of heat was first calculated. And here we have reached a point which is worthy of, and which will demand, your entire attention. I will endeavor to make this calculation before you.

"Let C, (in Fig. 1.) be a cylindrical vessel with a base one square foot in area. Let P,P, mark the upper surface of a cubic foot of air at a temperature of 32° Fah. The hight A P will then be one foot. Let the air be heated till this volume is doubled; to effect this it must, as before explained be raised 490° Fah. in temperature; and, when expanded, its upper surface will stand at P′ P′, one foot above its initial position. But in rising from P P to P′ P′ it has forced back the atmosphere, which exerts a pressure of 15 lbs. on every square inch of its upper surface, in other words, it has lifted a weight of 144×15=2,160 lbs. to a hight of one foot.

Fig. 1



The "capacity" for heat of the air thus expanding is 0·24 water being unity. The weight of our cubic foot of air is 1·29 ounces, hence the quantity of heat required to raise 1·29 ounces of air 490° Fah., would raise a little less than one-fourth of that weight of water 490°. The exact quantity of water equivalent to our 1·29 oz. of air is 1·29×0·24=0·31 oz.

"But 0·31 oz. of water, heated to 490° is equal to 152 oz., or 9½ lbs. heated 1°. Thus the heat imparted to our cubic foot of air, in order to double its volume and enable it to lift a weight of 2,160 lbs., one foot high, would be competent to raise 9½ lbs. of water 1° in temperature.

"The air has here been heated under a constant pressure, and we have learned, that the quantity of heat necessary to raise the temperature of a gas under constant pressure a certain number of degrees, is to that required to raise the gas to the same temperature when its volume is kept constant, in the proportion of 1·42 : 1 hence we have the statement—

Lbs. Lbs.
1·42 : 1=9·5 ; 6·7

which shows that the quantity of heat necessary to augment the temperature of our cubic foot of air, at constant volume, 490°, would heat 6·7 lbs. of water 1°.

"Deducting 6·7 lbs. from 9·5 lbs., we find that the excess of heat imparted to the air in the case where it is permitted to expand, is competent to raise 2·8 lbs. of water 1° in temperature.

"As explained already, this excess is employed to lift the weight of 2,160 lbs. one foot high. Dividing 2,160 by 2·8, we find that a quantity of heat sufficient to raise one pound of water 1° Fah. in temperature, is competent to raise a weight of 771·4 lbs. a foot high.

"This method of calculating the mechanical equivalent of heat was followed by Dr. Mayer, a physician in Heilbron, Germany, in the spring of 1842.

"In August 21, 1843, Mr. Joule communicated a paper to the British Association, then meeting at Cork and in the third part of this paper he describes a series of experiments on magneto-electricity, executed with a view to determine the "mechanical value of heat." The results of this elaborate investigation gave the following weights raised one foot high, as equivalent to the warming of 1 lb. of water 1° Fah.

1.	896 lbs.	5.	1026 lbs.
2.	1001 lbs.	6.	587 lbs.
3.	1040 lbs.	7.	742 lbs.
4.	910 lbs.	8.	860 lbs.

"In 1844 Mr. Joule deduced from experiments on the condensation of air the following equivalents to 1 lb. of water heated 1° Fah.

823 foot lbs.
795 foot lbs.
820 foot lbs.
814 foot lbs.
760 foot lbs.

"As the experience of the experimenter increased, we find that the coincidence of his results become closer. In 1845, Mr. Joule deduced from experiments with water, agitated by a paddle wheel, an equivalent of

890 foot lbs.

"Running up his results in 1845, and taking the mean, he found the equivalent to be

817 foot lbs.

"In 1847, he found the mean of two experiments to give as an equivalent

781·8 foot lbs.

"Finally, in 1849 applying all the precautions suggested by seven years experience, he obtained the following numbers for the mechanical equivalent of heat:—

772·692, from friction of water, mean of 40 experiments
774·083, from friction of mercury, mean of 50 experiments
774·987, from friction of cast-iron, mean of 20 experiments

For reasons assigned in his paper, Mr. Joule fixes the exact equivalent of heat at 772 foot lbs.

"According to the method pursued by Mayer, in 1842, the mechanical equivalent of heat is

771·4 foot lbs.

"Such a coincidence relieves the mind of every shade of uncertainty, regarding the correctness of our present mechanical equivalent of heat."

This subject will be completed in another article.

CURIOSITIES COMBUSTION.

BY PROFESSOR CHARLES A. SEELY.

"Combustion is the disengagement of heat and light which accompanies chemical combination." This is a very good definition, the best one I remember to have seen. I intend this as a high compliment for I have observed that school-book definitions often need more explanation than the thing defined. It is a very interesting and profitable mental exercise, to discover the heterogeneous things that a definition owing to its inaccuraey of language, is obliged to cover. Any book on the physical sciences will furnish good material. It is a very ancient amusement. Plato once defined man to be a "two-legged animal without feathers," a definition of man about as precise as ever was made. But Diogenes plucked a goose, and throwing it into the Academy, exclaimed, "Plato, behold your man." So I might bring phosphorus and rotten wood which shine in the dark and to a delicate thermometer exhibit heat, as cases of combustion. But Dr. Ure, the author of the definition, might very aptly retort, as did the preacher whose sermon was criticised, "better it if you can." And I should be forced to reply, "I cannot unless you allow me to use a great many more words."

The combustion with which we are most familiar is that where oxygen is one of the elements concerned. A very interesting peculiarity of this ordinary combustion is the fact that its beginning requires a high temperature. We consider coal, wood, oil, sulphur, and gunpowder very combustible, but there is no combustion, although oxygen be present, until they be set on fire or ignited, that is, until some portion be heated up to a high temperature. Oxygen is very different from other supporters of combustion in this respect, for with them combustion begins at ordinary temperatures. If suddenly chlorine were put in the air in place of oxygen, or if the oxygen should assume its active form known as ozone, every thing combustible upon the earth would take fire and be consumed with fervent heat in a few hours. This property of oxygen, to which I allude, is another of the striking evidences of the adorable Wisdom everywhere to be found in the order of nature.

The temperature of ignition varies greatly for the different combustibles. Phosphorus, sulphur, and sodium take fire below a red heat, while the ignition point with others is so high that we rarely have an opportunity to see them burn. The combustible nature of iron, lead, copper, silver, and gold, was not even suspected until a recent period. We know now that they burn even more readily and fiercely than any common fire, when once they are kindled; if I wanted to make the most gorgeous pyrotechnic display I would make a bonfire in which I would burn up a few tuns of iron. The ignition temperatures have been determined for only a few substances. Here is useful work to be commended to the rising generation of chemists. The facts ought to be determined and put into the form of a table.

The philosophy of spontaneous combustion is now well determined and can be made plain to everyone. Heat is always a product of oxidation, or in other words, heat always accompanies the union of oxygen with another substance. The amount of heat produced is, moreover, exactly proportioned to the amount of oxidation. If a day or a year be employed in burning (oxidizing) a pound of coal the amount of heat in the two cases is precisely the same. The rapidity of burning has nothing to do with quantity of heat; it is a question of intensity, quite another thing. The pound of coal burning in a minute gives an intense heat and consequently light, but let that heat be distributed over the space of a year, and it would require an instrument far more delicate than our senses to detect that which would appear in a second or a day. In slow burning or oxidation the heat is simply diluted in time or space. Let a child's supply of candy be divided and administered constantly, and in the homeopathic doses he would never suspect that candy had any taste.

The rust which is produced from a pound of iron indicates or represents an amount of heat sufficient to raise nearly 3,000 pounds of water 1° Fah; that is such a quantity of heat was produced by the rusting or oxidation. As the specific heat of iron is one-ninth (nearly) that of water, this quantity of heat is sufficient to raise the temperature of one pound of iron to the temperature of 27,000°, or nine pounds to 3,000° which last is without doubt above the ignition point of iron. Suppose the heat of rusting be retained in the rust. Would not we have a spontaneous combustion which would be fearful even to think of!

In ordinary oxidation the heat leaks away by radiation and conduction as fast as it is generated. Let us see how we may retain it. As oxidation takes place only at the surface it is plain that its rapidity will be increased just as we increase

the surface. Thus, a pound of iron extended so as to have double the surface will be rusted in half the time, with one-hundredth the surface in one-hundredth the time. Suppose the pound of iron to be originally in the form of a ball and that we divide it successively into balls smaller and smaller. The surfaces of balls are to each other as the squares of their diameters, while their weights are as the cubes of their diameters, and the ratio of the surfaces to the weights is constantly increasing as the division goes on. It is evident that by so dividing and increasing the surface a point might be reached where the heat would be generated by oxidation more rapidly than it could leak away, and that thus the ignition temperature would be reached, when combustion would ensue.

This is no speculation. I can prove the facts by actual experiments, dividing the iron and exhibiting it taking fire, with far less labor than I have put on this article. Prussian blue is a compound of iron, nitrogen, and carbon. If it be heated to a bright red heat in a tube or crucible from which the air is excluded, till fumes cease to be evolved, the iron is left finely divided. When the apparatus is cool the iron may be taken out and on exposure to the air it will immediately take fire. Ordinary lead is not easily set on fire. But get it in fine powder! Fill a small vial with tartrate of lead, fit in a clay stopper, set the vial in a sand crucible, imbedding the vial in sand, and subject the whole to a low red heat for half an hour. The vial now contains lead powder, the particles of which are prevented melting together by other fine particles of carbon. This lead powder takes fire as soon as it is brought into the atmosphere. Dissolve phosphorus in bi-sulphide of carbon, and dip a piece of cloth or paper in the solution and expose it to the air. Instantly as the solvent has evaporated, the phosphorus (now left finely divided) takes fire. I might describe hundreds of similar experimental illustrations, but I hasten to the cases of spontaneous combustion which occur in the ordinary routine of life.

Ninety-nine hundredths of these cases originate from the oxidation of linseed oil. This oil in a paint pot has little surface exposed compared with its whole mass, and the heat generated is diluted over the whole body of the oil, radiates into the air, etc. When the paint is spread on wood, the oil oxidizes rapidly and heat is correspondingly produced but being in contact with the conducting wood it is carried away. But if the wood were a non-conductor and no heat were radiated the oil would speedily take fire. When the oil is mixed with sawdust or spread on cotton wool, paper, or clothing, and the mass is kept away from strong currents of air, spontaneous combustion ensues. A painter rolls up his greasy overalls in a bundle, throws them in a corner or on a shelf and the house is set on fire: dozens of cases like this have occurred in this city. Linseed oil is so remarkable in this way that I think it might sometimes be made available for kindling a fire where matches and other conveniences are not at hand.

The spontaneous combustion of nitro-glycerin, gun cotton and pyrotechnic compounds may be brought within the category of oxidation. But in all these cases the oxygen is not supplied from the air. It is part of the substance itself, and is gradually eliminated to the part which is combustible. A complete explanation of these cases would extend this article beyond reasonable limits.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Menhaden Oil Mania.

Messrs. Editors:—The time was once when those engaged in the manufacture of Menhaden oil were looked upon with disgust by those who considered themselves the "Upper Ten" of society. But now how great the change! Whether the exalted have become abased, or the abased exalted, deponent saith not, but certain it is that it has taken the form of a mania second only to the petroleum excitement. This business, which about fifteen years ago was in its infancy, has now become one of the "institutions" of our land and is not confined to our vicinity but is spreading north and south with astonishing rapidity, and the finny tribes are disturbed in their most secret haunts. While fifteen years ago there was but one factory in this vicinity, today there are perhaps twenty or more, and nearly all of them prospering, as we should think by the extensive preparations being made for the coming season. A novel plan has originated here, to follow the fish with the change of season. Two large steamers have been fitted with necessary apparatus for extracting the oil, and have cruised the past season from Maine to Virginia in search of the "miniature whale." This plan is attended with extra expense and difficulty and we think has hardly been profitable so far, but with proper care and more experience may yet be made remunerative. It certainly has the merit of originality and perseverance, and merits success. About three years since, a company from this place started a factory in the state of Maine. Since that time other companies hearing "fairy tales" of the success of the pioneer works, have located in that vicinity, and now they are nearly as numerous as here. We certainly wish them all success, but fear that the large number engaging in the business will eventually ruin it for all. But in this we may be mistaken. The oil as now made is used largely for outside painting and is considered by many superior to linseed. Forming a smooth glossy coat on the surface of the wood, and being sold at a much lower price than linseed, it is getting into general use. It is also used by rope-makers and curriers of leather, as it is much cheaper than other oils and answers their purpose as well. The refuse of the fish is considered an excellent fertilizer, and is used in large quantities on the Island, and also in Connecticut and Massachusetts. It is also an important component in the manufacture of phosphates, containing a large amount of ammonia, which is necessary to certain crops. But perhaps we have written enough on this subject, our object in writing this article being to enlighten your readers concerning a business of which comparatively little is known. A.

Greenport, L. I., Jan. 29, 1867.

Elongated Shot and Shell.

Messrs. Editors:—Capt. Norton, I observe by your paper of the 2nd inst., has furnished you with evidence relating to his claims of priority. The article states that one Richard Airey, Quarter-master General, had seen Capt. Norton's elongated expanding shot and shell, identical in principle with the present Minie bullet, at Woolwich, England, in 1823. The statement does not furnish us with the information required. If Captain Norton claims to be the first to propose the use of elongated projectiles, I refer him to Joe Hunter's French patent dated 1790, wherein he fully describes his compound shot and sabot for rifle guns. A drawing of Hunter's sabot in my possession represents it as formed on a conical based shot like "Sawyers." Dr. Reed's patent is dated 1756 and consists of the application of expanding sabots to elongated projectiles, but he casts the projectile on the sabot. In practice it is found to be very destructive to guns and projectiles, and it is now abandoned.

Major, now Major General, Dyer, in the spring of 1859, proposed to the Ordnance Department the application of expanding soft metal sabots to the base of projectiles, being the converse of Dr. Reed's patent.

Mr. Thomas Taylor, of Washington Arsenal, claims to be the first to render the Dyer system practical. The advantages of Mr Taylor's improvement are of much importance Shot and shell may now be fired over the heads of troops without danger, as the sabot never strips. Brig.-Gen. John Gibbons says—page 120, Artillerist's Manual, 1863—"the importance of applying the rifle principle to guns of large calibre is too evident to need explanation, and many and various have been the attempts made to succeed in it, but up to the present without any degree of certainty, although much progress has been made. The importance of the question is much enhanced by the fact that the moment a successful plan is discovered, the great problem of concussion and percussion shells is solved. That a way will sooner or later be discovered, there can be but little doubt. Large projectiles, being made of iron, cannot of course be forced into the grooves of the gun like the leaden ball of small arms."

"Attempts have been made to cast on the outside of the cylindrical part of the shot some softer metal such as lead or composition to take the groove and give the necessary rotation, but it has invariably been found that although these metals take the groove at first they are immediately torn to pieces and off the iron part of the shot by the force of the powder. The increase of the force in powder cannot be calculated upon like any other motive power, and because a leaden projection of .01 of an inch will hold in its position a common rifle ball of 2 oz. in weight when acted on by 60 grains of powder, it does not follow that the same effect will be produced when these elements are increased a hundred times—much less when they are increased one thousand times, in a great many inventions of the day."

Mr Taylor's improvement consists in the application of a soft, tough and yielding alloy, and in so constructing the sabot that a portion of the gases is employed to compress the body of the sabot upon the base of the projectile, while another portion is employed to expand the sabot into the grooves of the gun, causing the shot to rotate and ensuring great accuracy of flight. One of the Smith Family.

Washington, D. C.

Artesian Wells.

Messrs. Editors:—In your issue of January 26th, in an article on "Artesian Wells," D. C. says, "Beneath the blue limestone there exists a heavy formation of sandstone, very compact in its structure, and not likely to have any reliable water-bearing strata. It is known in the New York Survey as the Potsdam sandstone. This formation rests on the primary rocks, and artesian wells cannot be expected in rocks of that age and depth."

I am happy to inform D. C. that his theory is not altogether correct, as a glance at the geological survey of our State will show you that we are in Ogdensburgh on the limestone formation and not a little above the Potsdam sandstone, yet we have two artesian wells, one at Arnold & Co.'s Brewery that has been flowing for six or eight years and is nearly one hundred feet deep. The other is at the Ogdensburg gas works. This latter well is about one hundred and one feet deep, and discharges a stream of about one inch in diameter, with a capacity of fifteen to seventeen galls. per minute, of the purest soft water imaginable. Some of our leading citizens will probably sink another this spring to the depth of three hundred or four hundred feet, perhaps more, on an eminence in our village, to supply their houses. S. S. Blodgett.

Ogdensburgh, New York, February 9, 1866.

Bridging the East River.

Dear Scientific:—You are growing more portly and more handsome as you grow older. You are a pearl of great price—a perfect mine of wealth. I hailed you when a "little shaver" many years ago. With increasing admiration I hail you now. Long may you wave for the benefit of the great engineering and industrial interests of our glorious land. Our country abounds in periodicals, but we have only one Scientific American.

Among the very many engineering enterprises discussed in your columns I have been much interested in the Broadway problem, which, it appears to me, is drawing to a practical solution in the grand project illustrated and described in a recent number of the current volume.

I see also that the bridging of the East River is looming up and various suggestions being elicited. In this line we have a most splendid achievement in the bridge thrown across our beautiful river between this city and the city of Covington, on the Kentucky side. It is a magnificent structure and commands the admiration of all that can appreciate the wonders of science.

In regard to bridging the East River it occurs to me that if we keep up with the spirit of the age and make proper use of the achievements of science, the proposition is not as chimerical as many might suppose. We are starting into a new era when steel will displace the great feature of this age and crowd iron out of ten thousand places in which for years we have held it to be supreme. I have not time nor data at hand to do so, but I trust some engineer will think sufficient of the suggestion to make a calculation of the difference in favor of steel over iron; estimating to drive iron completely out of place where strength and lightness of material may be required.

Another suggestion. I would propose a bridge exclusively for foot passengers as a preliminary experiment toward the final solution of the grand project. J. A. C.

Cincinnati, Ohio. Feb. 11, 1867.

Compasses on Board Iron Ships.

Messrs. Editors:—Your correspondent H., who wrote on this subject, page 122, appears not to understand the difficulty in question; he seems to think that the compasses are spoiled in the course of time by the effect of the iron in the ship, and says that fresh needles would always indicate the magnetic meridian. This is not so, but the iron of the ship itself is influenced by the magnetism of the earth is magnetized to a certain weak degree, strong enough however, to reach every compass on board, old or new. The magnetic meridian on board an iron ship, and even on board a wooden vessel by the influence of the iron used in its construction, is not the true magnetic meridian of the earth, and every compass will of course stand in the magnetic meridian as it is on board the vessel. Many years ago (some 40 or 50, if I am not mistaken) an attempt was made by Barlow, in England, to neutralize this magnetism of the ship's iron, by a contrivance called Barlow's correction plate: it consisted of an iron plate or steel magnet, placed in such a position, after repeated trials, in relation to ship and compass, that it counteracted the influence of the ship's iron; this however was only partially successful, as the magnetism of the iron is not the same in all portions of the ship, but shifts, by the induction of the earth's magnetism, when turning the ship around. The last correction is by Ritchie in Boston, lately patented, and appearing successful; he places his needle, floating on a liquid, above the vessel, finding a place where the influence of the different iron parts of the vessel neutralize each other. It has sometimes happened that a wooden ship was struck by lightning, and all the iron on board became so strongly magnetized, that the compass needle pointed always to the same part of the ship, in place of standing in the earth's magnetic meridian. The only disturbance the compass needle itself is subjected to, is either to lose its magnetism altogether, or to have its poles reversed, the north pole pointing south, and vice versa; but any compass needle of elongated form will always stand in the magnetic meridian, as it is at the place where the compass is situated, which meridian will often not correspond with the earth's magnetic meridian, in the same way as the earth's magnetic meridian in very few places corresponds with the astronomical meridian.

P. H. Vanderweyde M. D.

Philadelphia, Feb. 15, 1867.

An Inventor at the North Pole.

Messrs. Editors:—It may not be uninteresting to you, and your many thousand readers, to hear a few facts in regard to one of our countrymen, showing what perseverance and energy can accomplish.

In the winter of 1849-50, the writer of this was a resident of Cincinnati, Ohio. I chanced to make the acquaintance of a young man who was engaged in the business of casting brands for stamp tools, by a peculiar process of his own, using type for patterns. For want of better occupation, I engaged to take orders for him; his wife was making wooden dolls. Time passed, he engaged in the steel press engraving, and built up a good business. Onward, was his motto. Next I find him printing and publishing the "Penny Press" of Cincinnati, using the first (I think) hot-air engine used in the West. In all this time he had been reading all the works on Arctic exploration that were to be had, and he then conceived the gigantic scheme of another trip to the Polar seas, and through the aid of Mr. Grinnell, of your city, he was enabled to carry it out, and to-day is ice-bound amid the regions of an Acrtic winter. And that man is Charles F. Hall. The man who seventeen years ago was molding his little types in Miles Greenwood's foundery is now known throughout the world. Comment is unnecessary. O. V. Flora.

Madison, Ind.

The French Fire Alarm.

Messrs. Editors:—The French fire alarm mentioned in the issue of Feb. 9th as having been invented by Robert Houdin, is not new, as the undersigned while engaged in the manufacture of Telegraphic Instruments in Boston in the year 1858–1859, made a number of these instruments for the Hon. William Whiting, (late Solicitor to the War Department,) for use at his residence in Roxbury, and operated in connection with an Electro-Magnetic Burglar Alarm precisely in the manner

described as the invention of Houdin. The name of the instrument as given by Mr. Whiting was an Electro-Magnetic Thermostat, and was first invented and put into practical use by that gentleman.

JUSTIN HINDS,
Supt. Salem Machine Co.

Salem, Mass., Jan. 31, 1867.

Recent American and Foreign Patents.

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

DITCHING PLOWS.—John T. Miller, Iowa Falls, Iowa.—This invention consists in an arrangement of the cutters and wings of a plow or machine for cutting trenches in wet land, forming by one application of the draft of a powerful team, a ditch about two feet deep, thirty inches wide at top and twelve inches wide at bottom, while the sod and earth removed from the ditch, are laid up in a ridge or embankment on both sides by the wings of the plow. The whole construction is strong, simple and cheap, and especially adapted to the use of the farmers on the Western prairies.

APPLE PARER, CORER, AND CUTTER.—W. A. Coe, Greensboro, N. C.—This invention relates to a machine by which apples may be quickly pared, cored and cut into pieces without removing the apple from the fork.

SUB-SOIL ATTACHMENT FOR PLOWS.—R. J. Wheatly, St. Johns, Ill.—The object of this invention is to obtain a simple and efficient attachment for plows which will pulverize, loosen, or lighten up the soil at the bottom of a furrow made by the plow, and still not increase the draft of the plow to such a degree as to prevent a team from operating or drawing it with facility, when the attachment is set to penetrate into the earth at its greatest depth.

CORN PLANTER.—W. J. Hobson, Savannah, Mo.—This invention relates to a corn planter of that class which is designed for planting the corn or seed in check rows. It consists in a novel and improved seed-dropping mechanism, the arranging and operating of the same, whereby the machine may be used on rough or uneven ground and the seed dropped or planted in check rows, without the previous furrowing of the ground.

COTTON SCRAPER.—Turner Saunders, Memphis, Tenn.—This invention consists in attaching a scraper to a plow in such a manner that the cotton plants may be plowed or bared off, and scraped at one operation. Hitherto the cotton has been plowed or bared off with an ordinary turning plow, and a scraper afterward used, the latter implement being rather difficult to manage and not permitting the earth to be scraped evenly from the plants. This improvement admits of the two operations specified being performed simultaneously and with the greatest facility, thereby effecting a great saving in labor and preparing the work in a more perfect manner than usual.

CONSTRUCTION OF PLOWS.—W. D. Long, Wheatland, Pa.—The object of this invention is to produce a single plate of steel or iron rolled or formed in such a manner that the plow when finished will be thicker at these parts where it is subjected to the most wear, and the plow be capable of being constructed at a very moderate cost.

EXTRACTING STUMPS, RAISING STONES, ETC.—J. M. Gleichman, Evansville, Ind.—This invention relates to a machine for extracting stumps, raising heavy stones, logs, etc., and conveying or transporting the same to any desired place, and consists in the employment of one or more levers arranged in connection with a tackle and windlass, and a frame mounted on wheels, whereby stumps may be extracted with the greatest facility, heavy stones and logs raised and transplanted or conveyed from place to place, with but a very moderate expenditure of time and labor.

BUSHING FOR BARRELS.—David F. Fetter, New York City.—The bushing forms a lining for the bung hole or other holes in casks or vats; it is designed to save the wear and tear of the staves, and is secured by means of barbed creases on the outer periphery of the bush, which catch upon the wood and prevent its removal; the extended plate surrounding the bush may be fastened by rivets or screws to the staves if desired.

GRAIN VENTILATING AND DRYING APPARATUS.—James E. Strode, Litchfield, Ill.—This invention relates to an apparatus for ventilating and drying grain stowed away in bulk, and it consists in having one or more air ducts passing through the bin, box, or granary, in which the grain is placed, said duct or ducts being composed of slats arranged one above the other with spaces between, with openings in the sides of the bin, box, or granary for the admission of air into the duct or ducts, whereby the grain will be thoroughly ventilated and dried.

METALLIC HUBS FOR THE WHEELS OF VEHICLES.—James B. Stuart, Bunker Hill, Ill.—This invention relates to an improvement in metallic hubs for the wheels of vehicles, and it consists in a novel manner of securing the spokes in the hub, whereby the spokes are firmly retained in position and rendered capable of being readily detached and replaced by new ones whenever required.

RAKING AND LOADING HAY.—M. S. Rowson, Winhall, Vt.—This invention relates to a machine for loading hay on wagons, while the latter are drawn over the field. The invention consists of a series of rakes attached to endless chains and used in connection with a guide box, a rake and grating or shield, all so constructed and arranged that the hay may be raked up from windrows and elevated upon the wagon or cart to which the device is attached.

SEWING MACHINE.—E. H. Craige, Brooklyn, N. Y.—This invention consists in making the cloth plate of a Wheeler & Wilson sewing machine in three or more parts, one or more of which are movable, so that by taking off said movable part or parts, free access can be had to the feeder and all the parts to be oiled, which in ordinary Wheeler & Wilson machines can only be reached by uncovering the cloth plate. That part of the cloth plate which is situated under the needle consists of a tapering piece inserted in the direction in which the fabric is fed and held in place by the movable part of the cloth plate in such a manner that said edge shaped piece can be readily removed and replaced by another piece if it should be desirable or necessary.

PRUNING SHEARS.—Daniel Campbell, Elizabeth, N. J.—This invention relates to an improvement in pruning shears by means of which a drawing cut is obtained, instead of that obtained by the ordinary shears, which is a great improvement, as the drawing cut, whereby one blade is gradually drawn obliquely toward the cutting edge of another stationary blade, insures a better operation and a cleaner cut.

BORING MACHINE.—O. O. Crawford, Seneca, Wis.—This invention consists in constructing a machine so that the felloes of carriage wheels may be bored rapidly and in the most perfect and unerring manner.

CHURN.—D. O. Blair, Abingdon, Ill.—This invention relates to a churn of that class in which the dasher is attached to a vertical shaft and receives a reciprocating rotary motion by certain devices arranged above the cover of the churn, and the improvement consists in the construction of those parts by which the dasher shaft is revolved, by which the churn is operated in an easy and efficient manner, and which parts are furthermore so arranged that a slower or faster motion can be imparted to the dasher shaft without changing in the least the motion of the lever by which the whole is operated.

MOP HEAD.—Joseph Messinger and H. H. Mason, Springfield, Vt.—This invention relates to a new and improved mop head of that class in which a screw and a ratchet and pawl are employed for operating the jaws and retaining the same in position to hold a mop cloth.

SOWING RICE AND OTHER SEEDS.—Joseph A. Reynolds, Savannah, Ga.—This invention relates to a machine for sowing rice and other seeds which are grown in small drills. The invention consists in the novel means employed for distributing the seed and in an improved arrangement of furrow openers, whereby a very simple and efficient implement is obtained.

PIPE TONGS AND CUTTER.—John Balmore, New York City.—This invention relates to a tool which can be used with great advantage for screwing up and for unscrewing pipes of any description and also for cutting said pipes. It is provided with a swivel hook that catches over the pipe and is hung on gudgeons projecting from the ends of a nut into which the shank of the tool is tapped. The end of this shank forms a cup-shaped point, the edge of which bears against the pipe to be screwed or unscrewed. A hole bored in the center of the cup-shaped point serves to receive the cutter, the edge of which drops into a groove in the inner surface of the hook so that its cutting edge can be set up against the pipe to be cut without turning the cutter.

PROPELLING VESSELS.—Samuel B. Walt, Mariners' Harbor, N. Y.—The object of this invention is to provide a new manner of propelling vessels employing the oar principle at the stern of a ship, said oars being moved in such a manner by machinery that the full power of each stroke is utilized.

ROTARY ENGINE.—Friedrich Fischer, Garibaldi, Iowa.—This invention relates to a rotary engine which is composed of an annular cylinder fitted with a piston which is secured to a piston wheel. The steam is admitted at one side of an abutment in the cylinder and through cavities or channels in said abutment made of two parts which close up by the action of springs and which are forced apart by a wedge-shaped projection or secured to the piston and traveling with the same in such a manner that immediately as the piston has passed the abutment the two halves thereof close up and the steam acts on the piston until the wedge-shaped toe comes in contact with the abutment and forces the two halves thereof back, steam being shut off at the same time until the piston has passed.

WASHING MACHINE.—Charity Pendleton, Iowa City, Iowa.—This invention has for its object to improve the construction of the washing machine, patented July 12, 1859, and numbered 24,754, to which Letters Patent Schedule of additional improvement No. 281 was annexed May 29, 1860.

BEDSTEAD FASTENING.—James Maguire, Trenton, N. J.—This invention consists in the combination of plates or headed pins or bolts with the side rails and posts of the bedstead.

WASHING MACHINE.—William K. Short, J. W. Allen, and J. Craig, Mount Pleasant, Iowa.—This invention has for its object to furnish a cheap, simple, convenient, and effective washing machine, which shall be capable of self adjustment to any desired thickness of clothes.

LIFTING JACK.—Samuel Gulick, Klines Grove, Pa.—This invention has for its object to furnish an improved lifting jack, so constructed as to be adapted to raising heavy machinery as well as carriages and wagons, and at the same time be capable of raising them to a considerable hight.

TAKE-UP FOR KNITTING MACHINES.—Samuel Ward, Amsterdam, N. Y.—This invention relates to the take-up of knitting machines, whereby the action of the take-up is regulated by the tension upon the fabric knit in the machine.

HORSE HOE.—Moses Chandler and John B. Nickels, Kenduskeag, Me.—This invention consists principally in adjustably attaching wings or blades to the standards, and in the combination of pivoted rake heads with the free or rear ends of the wings or blades.

STOVE-PIPE JOINT.—H. M. Clifford, Philadelphia, Pa.—This invention consists in forming the joint, where lengths or pieces of stove pipe are put together without lapping them, and in such a manner that while the joint is equally tight the facility with which the pipe can be put up and taken down is greatly increased.

SPRING BED BOTTOM.—David Manuel, Boston, Mass.—This invention consists in attaching the slats of the bed bottom, by means of slots, hooks, or notches formed in or attached to the under sides of said slats, to coiled looped springs of a peculiar form, and in the combination of rubber rollers with the loops of said springs.

WINDOW-SHADE FIXTURE.—L. A. Tripp, Middletown, N. Y.—This invention has for its object to furnish an improved fixture by means of which window shades may be raised or held in any desired position.

COMBINED TABLE, CUPBOARD, CLOTHES RACK, ETC.—W. M. Baker, Fortville, Ind.—This invention relates to a table, with which is combined a cupboard, a clothes rack or frame, and a rack or frame for the reception of tinware, together with drawers, trays, and a rolling board, in such a manner as to be most convenient for use when so desired, and when not in use susceptible of being enclosed within the body of the table.

SINKING BORED WELLS.—Peter Ollon, Muncie, Ind.—This invention consists in an improvement in the auger and in the manner of hanging and operating the same for the boring of the well.

BOOT CRIMPING MACHINE.—John Joslyn, Canton, N. Y.—By the machine embraced in this invention the leather which is to be crimped, is drawn between two plates having series of circular depressions or cavities in their opposite faces, by means of a suitable shaped former, so arranged as to move between the said plates; the circular depressions working the leather, and condensing such portions of the same as are necessarily filled, as well as materially aiding in the filling process, and causing such a hold to be had upon the leather as it is drawn between them, as to stretch it out to the utmost extent.

SELF-WINDING CLOCKS, TIMEPIECES, AND OTHER MACHINERY.—F. G. A. Horstmann.—This mechanism consists of a tube constructed with a metallic piston, packed and cupped with one or more layers of leather or other materials, with a spring for keeping the piston pressed close home on the fluid in the cylinder. The piston works up and down within the cylinder, forming a perfect float or floating bucket. The cylinder is in connection with a vessel containing naphtha, spirits of wine, or other expansive fluid—glycerin or other oily matter being used therewith to prevent the evaporation of the naphtha or spirit. The alternation of temperature acting upon this fluid causes the same to expand or contract, thereby causing the piston to rise and fall, thus producing an impulse or motion either in a horizontal or vertical direction. To the said piston the inventor attaches a rod, and by means of a cross bar he causes a drum or wheel to revolve and carry an endless chain, which is passed over the main wheel of the clock, so that it hangs in a loop on either side, and to each of these loops he attaches a weight for giving the necessary working power to the clock and setting in motion the train of wheel work. This principle is also peculiarly adapted for raising greenhouse or hothouse windows, and for other similar purposes.

DOORS OF SAFES, STRONG ROOMS, AND OTHER RECEPTACLES OF PROPERTY.—J. Jessop and W. Warburton.—The object of these improvements is to prevent or render difficult the introduction of wedges, chisels, or other such means for the forcible opening of the doors or covers of safes, strong rooms, and other receptacles of property. For this purpose, in place of the edge or that surface of such door or cover which closes into or upon the frame thereof being formed straight, or of a series of straight lines, simply fitting close into one another, as is the usual manner, the patentees form the edge around the door or cover and the surrounding frame, with a series of short corrugations, serrations, or teeth, those of the door fitting closely into those of the surrounding frame.

ILLUMINATING GAS AND OIL.—G. McKenzie.—This invention relates to the obtainment of illuminating gas and oil from a combination of coal with shale oil or other mineral oil, and in subjecting the mixture to distillation or decomposition at various heats.

PREPARATION OF PEAT FOR RENDERING IT APPLICABLE TO THE MANUFACTURE OF ARTICLES WHICH ARE CAPABLE OF BEING PRODUCED BY STAMPING, MOLDING, EMBOSSING, OR ROLLING.—T. G. Ghislin.—In carrying out the invention the patentee takes any of the common kinds of peat, and having expelled therefrom, either by the application of pressure, heat or otherwise, such of the watery particles as can be easily removed, he mixes with it ground or comminuted seaweed, with the addition, if required, of any suitable gums, such as india-rubber, gutta-percha, or other substances of that class, or in addition thereto may be added resins natural or artificial, bituminous or albuminous substances, pitch, paraffin, stearine, or other oily and fatty matters; to give a body and firmness to the mass, chalk, talc, sulphur, siliceous, and other earthy matters may be added. Waste fibrous and woody substances may be incorporated with the other ingredients when it is desired to form sheets of the material, as for floor-cloths, and if the surface is intended to be painted, metallic oxides, such as white zinc, or ochre, alum, and other analogous ingredients, may be added.

MANUFACTURE OF ICE TO FIT IT FOR MAKING EFFERVESCING DRINKS, ETC.—O. W. Joyce.—The inventor partly fills a vessel with the water, into which he forces carbonic acid gas; he then hermetically seals the vessel, freezes the contents into a solid state, opens the vessel and removes the ice, which may be employed in more or less large blocks in drinks to be made effervescin

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

A. S. J., of N. Y.—The velocity of water issuing from an orifice depends upon the ordinary laws of falling bodies, making proper allowance for change of direction and friction. Thus the velocity due to a fall or head of water of 16 feet is 32 feet per second. If the orifice, in this case, be placed against a current of water of the same velocity, there will be equilibrium at the orifice; if velocity of current be greater, water will rise in the pipe, if less the water will run out. From such data you can calculate the velocity a ship must have to discharge bilge water by means of a pipe which terminates in the outside water, and has its direction turned backward in the path of the ship. In this case the head of water to be considered is the hight of the surface of outside water above the surface of the bilge water.

J. M. S., of Conn.—It was promised by Act of Congress that the diameter of the new five-cent coin should be one-fifth of a decimeter. Our correspondent has measured it and found it to be .81 inch and 5x.81=4.05. But a decimeter is 3 15-16 inches. We have noticed the alleged error before.

C. W. D., of ——.—When an electro-magnet has become saturated no increase of battery power will give it a stronger lifting power. The diameter and length of the wire used for electro magnets should correspond with the intensity of the battery. A current of intensity will move through a fine wire, and low intensity requires a thick and short wire. But the magnetizing power is always proportioned to the total *quantity* of electricity passing through the wire.

J. E. B., of Mass.—The force of a fly wheel, (its power to strike a blow, etc.) is proportioned to the square of its velocity: double the speed implies four times the force. The formula

$$m\ v^2$$

applies to all such cases, m being the weight of the matter in motion and v the velocity. The case of the fly wheel is somewhat complicated from the fact that the weight is not evenly distributed, different parts moving with unequal velocities. Thus, though a rule for calculating the force is simple enough, it is impracticable to obtain the data for its application. It is best in practice to determine the force under a given velocity by means of a friction brake or otherwise, and then to this apply the formula

$$m\ v^2$$

for all other velocities.

R. M. H., of Pa.—The alloy of iron and manganese commonly used in the Bessemer process is produced directly from the ore. In Europe the alloy is known as Spiegeleisen and is produced in Germany. In the United States a similar alloy is found as a residuum in the manufacture of zinc paint from an ore known under the name of Franklinite. This Franklinite "ferro-manganese" can be procured from the N. J. Zinc Co. There is an abundance of ores in America capable of producing "ferro-manganese."

L. G. T., of Conn.—You will find information on the subject of beet sugar in our last issue.

J. W. W., of Ala.—Water is so little condensed by pressure, that even at the depth of five miles in the ocean it would be but a trifle more dense or buoyant than at the surface. The Atlantic Cable is several times heavier than water, and there is no doubt that it rests firmly on the bed of the ocean.

S. R. M., of Pa.—The clarifying of turbid river water by subsidence or spontaneous settling, is cheaper than filtration where a large quantity is needed for manufacturing purposes. We suggest that settling tanks or basins may be more practicable in your case. Perhaps the best filtering medium on the large scale, is simple clean fine sand.

C. C. P., of Ind.—It is a disputed question if genuine diamonds have ever been made artificially. But since we know that diamonds are only a form of carbon we may hope to learn how to produce them. The principal forms or conditions of carbon are: charcoal, plumbago, anthracite, lampblack and diamond. We know how to put carbon into all of these forms except the diamond.

J. L. E., of Pa.—It is said that an excellent way of preserving natural flowers is to dip them for a moment into a solution of paraffine in benzine, or into melted paraffine. By either of these ways the flowers are covered with a thin film of transparent paraffine which excludes the destructive effect of the air. Perhaps some correspondent will give a better process.

R. M. L., of Tenn.—Mica is a natural product, and no solvent for it is known, at least no solvent from which it can be recovered. In its chemical nature and composition it is quite like glass; both are silicates.

W. B. S., of Pa.—A substitute for bricks made of sand and lime is not new. There is a company in this city making such an article which looks very well. . . . . Meerschaum may be mended with glue or shellac.

G. D., of O.—You may find in previous issues several processes for coppering iron. One of the most recent, is to immerse the iron in a solution of tartrate of copper made alkaline by the addition of caustic soda. By practice only can you find the proper method for your purpose.

B. C. S., of Pa.—Civil engineering is taught as a speciality at the scientific schools of Harvard, Yale and some other colleges. In this city there is an excellent school for the special education of engineers under the charge of Prof. J. G. Fox. If you have no embarrassment concerning money you should attend one of these schools; otherwise the best course is to secure a place under some practical engineer.

J. M. P., of O.—The nebulae of Orion have been resolved since the death of Sir Wm. Herschell. The nebular theory of La Place, however still maintains favor with many astronomers. The telescope at Harvard College is without doubt more valuable for all ordinary astronomical purposes than that of Lord Ross.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Wanted.—Best wool carding and spinning machines and power looms. Manufacturers send circular and price list to C. Picard Co., Nebraska City, Nebraska Territory.

Geo. Davis, Martin's Ferry, Belmont county, Ohio, wants a spring, 1½ inches wide, length, 30 coils, to coil up on a 1-inch shaft, and to be twice as strong as an eight-day clock spring. Will some spring maker please write to Mr. Davis?

W. T. S., No. 1,702 Chestnut street, Philadelphia, Pa., desires descriptive circulars of metallurgical furnaces of all kinds.

Improved wood lathes wanted. Send cut with description and price list to Geo. W. Sweet, Flint, Mich.

John G. Clark, Guyton, S. C., desires to correspond with makers of laundry apparatus.

Staveless barrels are wanted by T. D. Ingersoll, Monroe, Mich.

Wm. S. Corning, Fort Edward, N. Y., wishes to communicate with makers of wooden shoes.

Paper-making machinery is inquired for by James Wright, Florence, Ala.

S. S. Perry, Utica, Ill., wishes to know where he can purchase asbestos.

Improved Gang Plow.

The engraving gives a perspective view of a gang plow that appears to have the recommendation of strength, simplicity, and ease of operation. The two shares are attached to beams of unequal length, which are connected in front and supported by the axle, which is either bent to form a crank so that while one wheel travels in the furrow and the other on the firm surface the plow frame shall be kept level, or is two separate journals secured to either sides of the plow at unequal hights. The pole is in line with the shortest beam so that the horses can travel in a convenient position. The tail of the plow is supported on a caster, which, being pivoted, will turn freely in any direction, enabling the driver to turn his team in a space scarcely more than sufficient to turn an ordinary two-wheeled cart. A chain connects the axle with the short beam to facilitate the process of turning. The shares are secured to uprights which move in suitable guides, and they can be elevated or depressed by levers operated by the driver, as shown; one being operated by the foot and the other by the hand. The fulcrum of each lever may be adjusted, as desired, by bolts.

It is claimed by the patentees that the plow while light is very strong: that being short it is easily turned in any direction; that it can be made to plow deep or shallow, as desired, using one or both shares, and that it is easily managed even by a novice. It was patented through the Scientific American Agency, Nov. 20, 1866, by Bequeret & Demoulin, Jamestown, Ill., who will furnish any additional information desired.

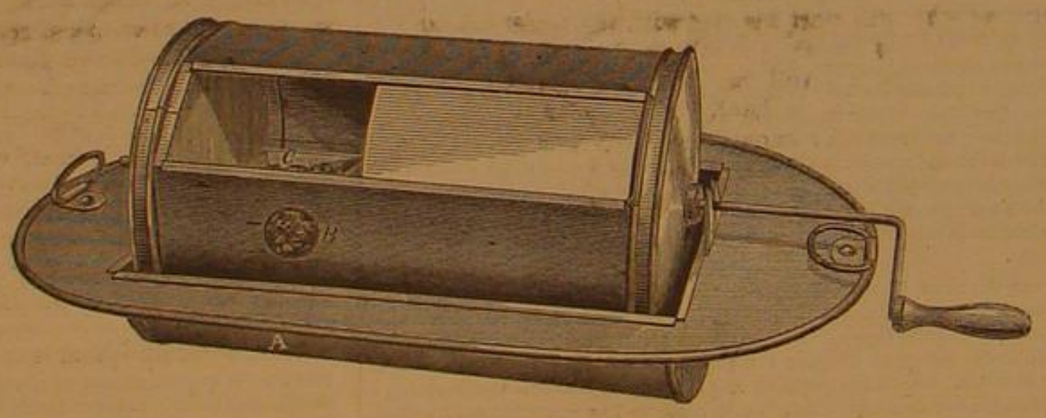


BEQUERET & DEMOULIN'S GANG PLOW.

Improved Coffee Roaster.

Lovers of pure coffee do not much fancy the miserable adulterations which are sold as ground coffee all over the country. It is not alone the low price at which roasted and ground barley, peas, stale bread, and chicory are retailed, that induces people to buy them in place of the coffee berry, but the trouble of roasting and grinding. The roasting process in an open pan, where the berries must be continually stirred to prevent scorching, is always one of anxiety as well as of labor. Several devices for reducing this care and insuring an even roasting are in the market, but they do not always fill all the necessary conditions.

The roaster herewith represented is a form of the rotary utensils so popular, but which, unlike many, permits an inspection of the process during its progress without opening the roaster or removing it from the fire. The cylinder is of brass or any sheet metal in octagonal, cylindrical form, the corners where the cylinder rotates insuring the perfect mixture of the berries. It is swung in a recessed plate with supports for the journals. The protecting sheet, A, prevents the cylinder itself from becoming too hot and exposing the berries to a red hot surface. The journals are not secured to the center of the cylinder but on alternate sides of the head, so that with the rectangular sides the berries are constantly shaken up from end to end of the cylinder as well as from side to side. The circular glass, B, is to enable the operator to see at any stage of the process how the roasting is going on. The glass is so secured as to give room for necessary expansion. C is a receptacle from which a few kernels can be easily withdrawn to test the roasting. This machine, by the substitution of a perforated in place of a close slide is said to be an excellent corn popper. It is made of varying sizes from those capable of roasting two pounds to those of a capacity of one hundred pounds.



WHITNEY'S COFFEE ROASTER.

It was patented through the Scientific American Patent Agency Feb. 5, 1867. For additional facts and rights address Whitney & Van Valkenberg, Effingham, Ill. [See advertisement on another page.]

NEW USE FOR THE SUN.

Reported for the Scientific American.

At the February meeting of the Massachusetts Institute of Technology, Mr. Thomas Boyd gave an account of the "Solar Ventilator" invented by himself, in which the heat of the sun or, in its absence, artificial heat, is employed to produce the ventilating current. However efficacious revolving ventilators may be when the wind is blowing, they do not act in hot sultry days, when no air is stirring, and besides they are noisy and apt to get out of order in this climate. The face principle, by which impure air is forced out and pure air is forced in by mechanical power, is regarded by many with favor but, as this can only be applicable to large buildings, or where mechanical power is at hand, and expense no objection, it can never be of any great public benefit; it also labors under the disadvantage of complicated and expensive machinery. In ventilation as in other circumstances, persuasion is better than force, and the most effective forces in nature are believed to be those which move with the least friction.

It is well known that heat in a flue will cause an upward draft, and in this way produce ventilation. Artificial heat on a large scale has been found expensive, and especially inconvenient in hot weather, and in dwelling houses absolutely out of the question. Mr. Boyd's object was to secure ventilation in hot, still days, when ventilation is most needed, and when other ventilators fail and for this purpose he uses the heat of the sun, or artificial heat, applied very near the place of discharge of the impure air.

Mr. Boyd, in his patent Army tent, had already demonstrated the remarkable effect of a conical cap, closed at the top, in securing ventilation; this was amply proved in the field in 1861, near Washington, D. C.

In the solar ventilator, as constructed by Mr. Boyd, an iron chamber painted black, cone-shaped above and below, receives the sun's rays; these produce a great heat within the chamber and a consequent upward current and ventilation. By using solar heat no expense is incurred, and the highest power of the ventilator is on the calm hot days, when other systems of ventilation fail. In the absence of the sun's rays, any artificial heat, otherwise wasted, may be resorted to. Above the discharge pipe of this ventilator is attached a cone-shaped iron cap, by which a free discharge of impure air is secured without recoil or downward draft.

Though a great heat is obtained by the iron chamber without glass, experiments have proved that the concentration of the sun's rays by lenses upon a hollow metal ball within the heated chamber has important practical advantages. Though the lenses do not create any additional heat, they distribute it in such a manner that its concentration acts, with the mechanical arrangement of the ball and the interior, in the most advantageous manner for the production of a strong upward current.

It is believed to be of great practical importance to have the source of heat so near the place of discharge. The mechanical part is very simple and not liable to get out of order. He believes the principle to be correct, and its application new and it is applicable to buildings of every size and description, to mining shafts, and to all localities where ventilation is of the first importance. It is especially adapted to southern and tropical regions, as the hotter the sun the more efficient its action. He has applied it to his own and to other houses with most gratifying results. K.

Four Eclipses during 1867.—1. Annular eclipse of the sun on March 6th, invisible in America. 2. Partial eclipse of the moon on March 26th, visible in America, and in this latitude from about 2 to 5 A. M. 3. Total eclipse of the sun on August 29th, invisible in the United States. 4. Partial eclipse of the moon on the evening of September 13th, visible in America. The moon will rise eclipsed about 6 P. M., and the eclipse ends between 8 and 9 o'clock.

GUTTA PERCHA CABLE INSULATOR.

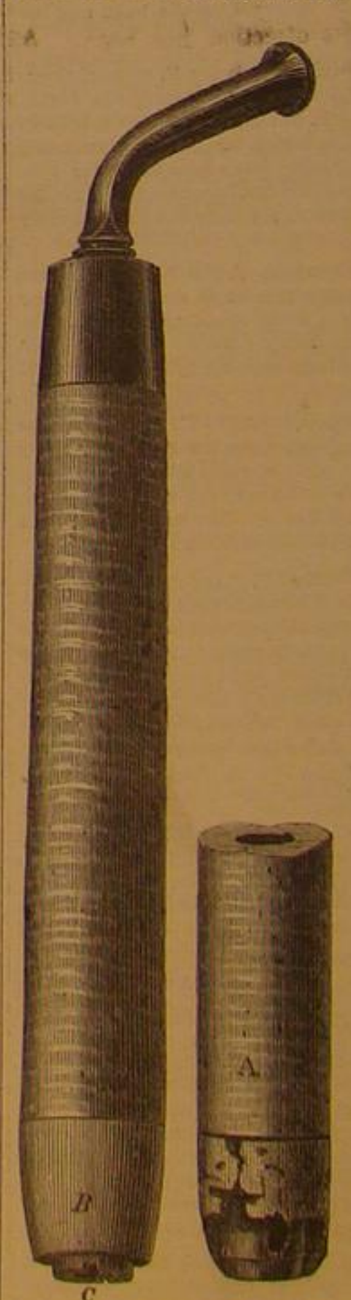
On page 140 we published a notice of an adverse report made by the Chairman of the Senate Patent Committee on the application of Geo. B. Simpson for the extension of a patent for insulating cable wires by gutta percha. We have since received a copy of the bill itself, with accompanying documents, from which it appears that Simpson never had a patent, and therefore could not be an applicant for an extension. It appears also from the records of the Patent Office that Simpson made application for a patent in April, 1849, for insulating telegraph wires by coating them with gutta-percha. The application was rejected in September of the same year, and subsequently withdrawn. About nine years afterwards Simpson made a second application, in which he claimed "the combination of gutta percha and metallic wire, in such form as to incase a wire or wires or other conductors of electricity within the non-conducting substance gutta percha."

This claim was rejected Dec. 29, 1858, for want of novelty. The matters at issue were carefully reviewed by the Examiners-in-Chief, who reported to Commissioner Holt that the application should be finally rejected. The application of Mr. Simpson came before the Senate and House of Representatives in the form of a bill of relief, wherein he prays that Congress will authorize the Commissioner of Patents to hear and determine the application in accordance with rules in other cases.

The prayer of the petitioner was opposed by Samuel C. Bishop, the agent of the Bishop Gutta Percha Company of this city, by their counsel, George Griscom, Esq., of Philadelphia, who presented a strong array of proofs to show that the invention was not new. After a hearing of all the facts, the Senate Committee very justly, in our opinion, reported that the bill ought not to pass.

TRUMAN'S IMPROVED PIPE STEM.

Many smokers prefer the pipe to the cigar—the meerschaum or briar-wood with stem of cherry to the roll of the leaf. But there are some annoyances in using the pipe, one of which is represented at A, in the engraving. The cork sleeve on the stem where it engages with the neck of the bowl is so thin that, after being removed several times for the purpose of cleaning, it almost invariably splits and breaks, as in the illustration. The improvement represented is the substitution of a hollow plug of rubber, B, secured by a hollow screw, C, to the stem. This screw has a flat head or flange, which prevents the plug from separating from the stem and remaining in the pipe. The plug is not merely a sheath covering the wood of the stem, but is secured to the end of the tube thereby removing the wood, which is apt to rot from the effect of the nicotine, further from the bowl. If cork is preferred to rubber it may be secured in the same manner and will last much longer than where it is simply a thin collar. The improvement is one that every smoker will recognize at a glance. A patent was issued for it through the Scientific American Patent Agency, Jan. 15, 1867, to James W. Truman whom address for additional particulars, at Macon, Ga., Lock Box 21.



City Freight Railway.—The railway around Paris, on the left bank of the Seine, is completed, connecting the goods stations of all the great lines out of Paris without any break.

If one four-hundredth part of iodine is added to sulphur heated to about 180 deg. cent. (365 deg. Fah.), and the mixture poured on a slab of porcelain, there results a material which retains for some time a remarkable elasticity. It possesses a metallic luster and takes impressions with great fidelity.

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VOL. XVI., No. 10....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, MARCH 9, 1867.

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SAYING AND MEANING.

We have for some time felt that the attention of educators, at the present day, ought above almost all things to be directed to accurate instruction in language. It is hard to say whether, in a public teacher by type or tongue, the knowledge of things or the knowledge of words to express them is the more important. Wanting either, the failure is complete; but wanting the latter, it is worse than failure, as much as delusion is worse than ignorance. The paramount regard to physical science which has been urged with great plausibility and success upon the present generation, need not be disputed. It is enough to say that by a law of nature that paramount regard is becoming well-nigh exclusive. We are but too material in our tendencies at best, and it is the nature of material objects to assert in us abundantly their own importance. The result of supplied assistance in this direction has been promptly felt in a negligence of language and a confusion of tongues which already seems like Babel come again. In the popular discussion of principles, hardly any one's meaning can be more than conjectured from his language, and friends and foes in opinion are often almost indistinguishable.

Disagreeable misunderstandings often arise out of this state of things. The exact appreciation and application of terms is nearly everything in scientific discussion, and it is but just to say that among those who have any recognized status as men of science, the abuse of language is not frequent. An instance of the kind, however, encountered us the other day from an unlikely quarter, illustrating the infelicity of loose language as forcibly as could be wished.

A paper was read which asserted the eternity of matter, and was referred to in this journal as atheistical nonsense, unworthy of the deliberations of a scientific body. The author sent us a long and irrelevant vindication of the liberty of thought, for which we had no room or need, together with a disavowal of atheism and a re-avowal of the eternity of matter, which we stated, in justice to him, but pointed out their inconsistency. More aggrieved than ever, he called upon us, complaining that we had misrepresented him. By eternity of matter, he did not mean eternity, but only indestructibility: the axiom that matter or force cannot destroy itself. But this gentleman, whom we never had the slightest inclination to injure or to wound, could not be convinced that he had misrepresented himself by abuse of language, and that eternity necessarily meant anything more than future continuance. He appears to be still engaged in "fighting it out on that line," and by the extreme indulgence of the Polytechnic Institute employing its sessions to ventilate his misplaced resentment at the fancied ill will or illiberality of the SCIENTIFIC AMERICAN. Nevertheless, we cheerfully do him the justice he has not done himself, by explaining that his heterodoxy is all in verbiage. He does not hold the eternity of matter any more than we do. He only holds peculiar opinions, to which he is perfectly entitled, on the meaning of words.

Numerous correspondents, laboring more or less under the general confusion of tongues, have since favored us with long communications *pro* and *con*, some of them very good, but which we cannot make room for. Our paper is devoted to science, but not in any measure to scepticism or speculation, as its readers well know, and by an incidental allusion to a metaphysical error, we had no intention of opening a metaphysical controversy, and cannot be drawn into it. The respectable scientific gentleman who prefaces his metaphysics with philology to prove that speculation means substantially the same thing as science, and therefore has a just claim upon our space, wastes argument on us which should be directed against the dictionary. Whether the language or its assailants will ultimately prevail in the struggle now raging, is an interesting question.

ONE CAUSE OF STEAM BOILER ACCIDENTS.

While attention is very properly being directed to the material, construction, and management of boilers with a view to diminishing the danger of explosions, it may not be amiss to recur to what under the latter head is not always a subject of investigation with those who endeavor to ascertain the cause of a catastrophe—the qualifications of the engineer. It is a somewhat singular fact that while the workman at any other business is expected to serve an apprenticeship at his trade before being considered competent to perform the work required, in many cases assurance and an assumption of superior knowledge procures an ignoramus the position of an engineer. On our railroads generally, we believe, a novitiate sufficiently long to insure the requisite knowledge, is demanded, before the fireman can have a machine, and in some cases the service in the inferior capacity is unnecessarily protracted. On some roads service as a fireman is required a number of months, which is unalterable in all cases. On others the superintendent of the rolling stock exercises his discretion as to the length of the term. We think this latter course the best, because while, if the superintendent is competent and impartial, a good judge of a man's capabilities, and unmoved by personal preferences, the interests of the company and the safety of the public are assured, no injustice is done a bright mechanic, and he is not made to suffer for the incompetency of others. One fireman may easily become a competent engineer on his route in a few months while another may run a year and then be unfit to be trusted with a machine. There is a great difference in the aptness of mechanics and in their readiness to compass an object.

Naval engineers also are usually required to pass the ordeal of a sort of apprenticeship; but the runners of stationary engines are not unfrequently selected for their willingness to work for low wages. If they can pack an engine, start and stop it, and keep it looking bright, they are considered by some employers as entirely competent. "Anybody can run an engine" is a common expression. True enough; and it might be added "an engine can run itself." The engineer, however, should be a mechanic who thoroughly understands the machine he manages and has some general knowledge of the powerful agent he attempts to control and direct. Boys who have an ambition to run an engine and men too indolent and ignorant for shop work are frequent candidates for the engineer's position. If they will work cheap the bargain is too often concluded, and when an explosion occurs from the stupidity or want of knowledge of the so-called engineer, the employer gropes about among the debris of the wreck to find some imperfect workmanship or material as the cause of the disaster. Few think to inquire about the engineer's management and such inquiries are often entirely fruitless; for if he, himself, is not buried in the ruin he has caused, he is discreet enough not to betray himself.

An engineer who will start his fires with the water below any gage, and without knowing anything about its level, is not an engineer. One who will open his blow-off and forget it while piling in the coal is hardly a safe man to have around. One who does not know how much pressure the weight on his safety valve denotes, or does not know whether the valve is fast to its seat cannot fairly be considered a competent engineer. Neither can one who places a prop over the end of the safety valve lever to "keep the steam from leaking out." Yet we have known men employed to run engines who have done all these insane and criminal acts. It would seem that here is an opportunity to discover the cause of some of those "mysterious explosions" which so bother some investigators. Others beside boiler makers may be to blame if boilers explode and human lives are sacrificed.

NOTES OF A FLYING TRIP TO NORTHWESTERN PENNSYLVANIA.

In these days of rapid traveling it would be almost useless to inquire of the tourist, who desiring to leave one point and reach another employs the forces of steam to aid him and flies through the air with a velocity rivaling that of the birds, what he had seen on the route. Only by stoppages can he gain any adequate idea of a town, village, or even a way station. To be sure, there are the elements of a flitting panorama as he flies along over some elevated ridge, on this side seeing but the wall of densely wooded steeps, and on the other beholding, far below him, the level valley with clustered dwellings, a winding stream, a country road, a slow moving vehicle, and fields for cultivation. Or, he skims along the margin of a river whose waters some hundred miles away mingle with those of an ocean estuary near some mart of trade. Or, perhaps, he glides rapidly over a level plain dotted with cultivated farms and occasionally enlivened with the white houses and tall spires of a village. But all these are like the images in a kaliedoscope, as evanescent and as changing.

Still, if he spends an hour or two in a place he may so employ his time as to gain a very fair idea of the condition of business and the importance of a locality. On a westward trip a few days ago we tarried at Dunkirk. This is the western terminus of the great New York and Erie Railway, one of the finest roads in the country, whether viewed in its length, its solidity of construction, the noble bridges and viaducts on its line, the comfort of its cars, or its general good management. At Dunkirk is located one of its establishments for building and repairing locomotives and cars. At Susquehanna station is another, very much larger and more important. This we had no time to inspect. The works at Dunkirk are, however, very extensive and appear to be thoroughly well managed. Five new locomotives are now in process of construction at these works and a number of others are receiving repairs. Outside cylinders appear to be the favorite style. Whatever objections may have been urged against such cylinders by those who have used them on other roads on account of the increased oscillation of the engine, are valueless on the Erie road, which is of a wide gage. The driving wheels of the locomotives have hollow rims and hubs, which, we were informed, insures much greater evenness of structure and strength than a solid casting. The crank pins are of cast steel, finely fitted to the hole and forced home by hydraulic pressure without key or pin to secure them. The tires now used are of steel from Krupp's works, Prussia. They are in great favor with the engineers and the managers of the road.

There are some very fine tools in this concern, but we noticed they had only the common trip hammers for heavy forgings. Their work requires a direct-stroke hammer, as it is impossible to do square work of all sizes with equal facility on a trip. The castings, both of iron and composition, which are made at this establishment, appear to be excellent, and the finished locomotives are very fine and good workers, easy to control and powerful.

Erie, Pennsylvania, in the extreme northwestern corner of the state, has some fine manufacturing establishments. To say nothing of the railroad shops, which are of the first class, there is the large concern of the Erie City Iron Works which builds portable and other engines, saw mills, tools, etc. This establishment is building the Bradley engine, a machine having two cylinders of varying diameters but of the same stroke. The large cylinder is at the end of the frame opposite the crank, and the smaller one—one-half the diameter—is between it and the crank, both forming one casting, and both on the same line. Steam is admitted to the small cylinder and works at full pressure the entire stroke, or nearly so, and is then exhausted into the larger one, thus being used expansively. It appears to be an attempt to utilize all the power of of the steam, or rather to get all the advantages of using steam expansively.

The Bay State Iron Works at Erie, build engines and tools turning out some excellent work. The boilers especially which are built here appear to be made of the best materials and well put together. H. Jarecki has in the same city a large establishment for brass and iron work which possesses one peculiarity not shared by any other with which we are acquainted. He uses the gas from an abandoned oil well to furnish fuel for his engines and lights for his shop. The gas is led from the well, something over 1,000 feet distant, through a three-inch iron pipe, and is used to generate steam and warm and light the building. On Sundays and nights, when the works are not in operation, the gas is lighted at an escape pipe and burns so brightly that in the darkest nights the streets in the vicinity of the factory are brilliantly lighted. Chilled wheels for cars are largely manufactured in Erie, which satisfy all who have used them. The city, being the terminus of several important roads, is fast rising into commercial importance. The establishment of a grain elevator at the harbor, and the starting of a line of steamers from the city to Buffalo on the east, and Cleveland on the west, and a communication by water through the Lakes, the Welland Canal, and the St. Lawence, with Europe, will before long make it one of the most important depots in the country. It is the entrance of the oil region, and the products of the oil-producing portions of Pennsylvania, and its importance as an outlet to the coal mines of several counties, will soon bring this locality into prominent notice.

THE DAY FORTY-EIGHT HOURS LONG.

Last week we showed that the first beginning of the day is somewhere between America and Asia. The precise locality of that somewhere has not been determined. If the Pacific ocean were thickly populated with men, the place of the beginning of the day would be a matter of great consequence, and would probably be settled by statute. The day would start from a meridian line extending from pole to pole, and the longitude of this day line would be so accurately fixed that a man might stand astride it and realize the paradox of having one foot in Monday and the other in Tuesday. Many of the readers of this will live long enough to hear this subject discussed in national councils.

We propose now to show that Monday or any other week day is forty-eight hours long; we mean that during the whole of forty-eight hours, Monday is on the earth somewhere to be found. The Monday of this city is of course twenty-four hours long, but before and after our Monday there is Monday in some other quarter. When Monday begins in New York, there have been three hours of Monday in London, and for three hours after our Monday ends there will be Monday in San Francisco. Thus between these places Monday lasts eighteen hours. Now if the day line were at our antipodes, Monday would begin there twelve hours before ours, and end twelve hours after ours. Thus, for the space of forty-eight hours the earth is not rid of Monday. The fact may be illustrated in another way. Suppose we are at the day line. Monday begins, there and in twenty-four hours along comes Tuesday. But just west (half an inch if you please) Monday began only an instant before it ended east of the line. The Monday east of the line is twenty-four hours long, and west of the line is the same length and in all Monday lasts forty-eight hours.

BESSEMER PRODUCTS.—Valuable articles upon the subject which have appeared in one of the last numbers were prepared by Dr. Adolph Schmidt of Troy, N. Y.

GOLD OR SILVER LEAF, as a covering for spectacles, transmits the most delicate and agreeable light for extremely weak eyes. It is a good medium for looking at the sun.

AMERICAN EXHIBITORS ABROAD.

The Paris Exposition will doubtless cause many articles of American ingenuity to be exhibited to the world which are peculiar to our country and consequently novel to artisans abroad. The list of agricultural implements is quite large and these alone will form an interesting display, as the majority of them differ essentially from those of foreign construction and many are entirely unknown in Europe. Some articles, however, which we have sent are common to both hemispheres and one of these, a city railroad car, we recently inspected at the manufactory of John Stephenson & Co., the celebrated car and omnibus builders of this city. This car does not differ materially in size and shape from those now running on our city roads, but it is constructed with a view of accommodating passengers on the roof which has a neat iron railing at each side and ornamented ladders extending up to it from the rear platform. The upholstering is exceedingly rich and the finish of the wood work surpasses anything of the kind we have before seen. The panels have well executed oil paintings on them, and the whole exterior is polished like a mirror. Our first impression was that this car must have been "got up" for the occasion, superior mechanics engaged in its construction and special artists employed to embellish it, in short, that it was something to look at and not to use. On inquiry, however, we found that it was one of a number ordered by the India-street Railway Company of Bombay, India, and is to stop at Paris on its way to the place for which it was ordered. We also learned that all the work was done by the regular employés of the Messrs. Stephenson, even the artist who executed the oil paintings on the panels is "to the manor born" and acquired his profession in their shop. We further learned that this firm built the first street car used in England and that they, a short time since, filled an order of five to run between Liverpool and Birkenhead. They have also furnished cars for Pernambuco, Rio Janeiro, Buenos Ayres, Valparaiso, Carizal and various other foreign places, and during the past year constructed and delivered three hundred and sixty eight cars and quite a number of wagons and omnibuses. It is exceedingly gratifying that the industrial accomplishments of our artisans demand such attention from abroad and that foreign orders are multiplying upon them. We cannot like our English cousins boast with reference to our "dominions' but we can now point with honest pride to our mechanics and say, upon their handiwork "the sun never sets."

State Trial of Breech-Loaders.

We give below the list of guns entered for trial before the State Military Commission at its late session in this city, with a table of the results:—

Spencer rifle, by Arthur Cheney, Boston, Mass. Gray gun, original, alteration and magazine carbine (making three in all) Joshua Gray, Boston, Mass. Milbank gun, alteration, Isaac M. Milbank, Greenfield Hill, Conn. Meigs rifle, alteration Jos. V. Meigs, Lowell, Mass. Needle gun, alteration, S. Weill, No. 421 East Houston street. Cochrane breech-loading musket and carbine, original, and alteration (two) J. W. Cochrane, No. 189 Broadway. Allen gun, alteration, A. H. Allen, Norwich, Conn. Miller's rifle, original, W. H. & G. W. Miller, West Meriden, Conn. Robertson & Simpson gun, original, Robertson & Simpson, Hartford, Conn. Empire breech-loading fire-arm, original, alteration (two), Geo. C. Walter, No. 64 Broadway. Berdan rifle, alteration, H. Berdan. Joslyn breech-loading fire-arm, two original arms, Wm. Herrick, No. West Ninth street. National rifle, National Arms Company, original, A. J. Bergen, corner Kent avenue and Hughes street, Brooklyn, E. D. Hubbell gun, alteration, James H. Crue, Philadelphia, Pa. Fitch gun, an alteration, J. P. Fitch, Fifty-second street, New York City. Aranson gun, alteration, J. N. Aranson, No. 7 Warren street. Poultney musket, original, Poultney & Trimble, Baltimore, Md.

Gun.	*Penetration.*	*Shots.*	*Time.*
Gray	11⅝	99	8:00
Page		20	1:45
Spencer		99	8:20
Miller	9	99	9:27
Berdan	11	99	6:20
Hubbell	11⅛	99	13:32
Meigs	11	99	5:40
Milbank		99	6:55
Empire	11⅛	98	4:40
National	11	91	7:45
Morgenstein	13⅛	28	4:30
Allen	11⅛	99	8:52
Rob rtson & Simpson	10⅛	99	8:20

Osborne's Photo-Lithographic Process.

We have lately examined some very beautiful specimens of photo-lithography, made under the auspices of the American Photo-Lithographic Company, No. 95 Liberty street, New York. They are produced by the processes of J. W. Osborne, patented in 1861, and some time ago noticed in our columns. For many years Mr. Osborne has been engaged in the endeavor to reduce his invention to commercial practice, and his efforts now seem to have been crowned with complete success. By means of these improvements all kinds of line engravings and printed matter can be copied, transferred to stone, and printed by lithography, at a trifling cost, with great ease and rapidity. Some of Mr. Osborne's copies of steel engravings that we have seen are really superb, being apparently equal to the originals. Letter-press pages may be reproduced, so exact in the imitation of the original that it is difficult to determine which was printed from the types and which by the photographic process. One of the striking advantages of this new art is that its copies may be made larger or smaller or of the same size of the orignals, every line of the latter being faithfully reproduced.

The uses of this remarkable improvement will be very extensive, and its effects upon the art taste of the masses will be universally beneficial. All the high priced, and rarest engravings can be duplicated by thousands, and the humblest homes be adorned with the best pictures for less money than is paid for the trashy pictorial stuff now too often seen.

Novel Improvement in Locks.

Mr. Er Lawshe, of Atlanta, Ga., at present at the office of G. W. Platt, 20 Maiden Lane, New York City, has recently patented through this office a lock for cars, mail bags, etc., which combines security and seal, and is very simple in detail It is so constructed that an agent at either terminus of the railroad can lock the cars "through" or "way" according to the destination of the freight; and it so combines both a "way" and a "through" lock as to render as much security as the ordinary lock, while as a "through" lock it affords additional security against picking or breaking. When a car locked "through" arrives at its destination with its tablet indicating "through," the evidence is that there has been no interference with it, thus showing, should the freight check short, that the agent who locked the car is the responsible party, but should the tablet show "through" and the lock be locked "way," or vice versa, it is evidence that the lock has been tampered with.

The construction of the lock is such that if one part should be acted upon another part secures the locking mechanism, whereby picking becomes somewhat impracticable if not impossible. This lock is not only applicable for a car lock but is also peculiarly adapted for mail bags, as with it the bags can be locked "way" or "through," as the case may be, thus enabling the locks to be permanently attached to the bags; and by increasing the number of tablets the lock can be more generally employed.

Button Holes Done Away With.

The use of buttons so made that they can be attached to the clothing without stitching by needles is becoming quite general, and an extensive use thereof has satisfied the public of the real value of the improvement. The man who has no wife may now step into almost any store, buy buttons of any pattern and attach them to his dress in a twinkling. One of the earliest manufacturing companies that engaged in this sort of button making is said to be now in the enjoyment of the princely profit of $250,000 a year.

We have lately examined a very excellent improvement in this class of patented buttons, shown to us by Mr. P. Chariatte, 587 Greenwich street, N. Y., which presents several superior points, of which one of the most striking is. that it does away with the necessity of button holes, thus saving labor, and preventing wear of the garment. The use of rubber is also dispensed with; the parts are all of the simplest form, and easily made by the usual mechanism; the mode of attachment is convenient; the buttons may be quickly applied or removed from the clothing, and the fastening is very secure. Altogether the invention is one of the best of its class that we have seen and is worthy of general introduction.

Science Familiarly Illustrated.

How Much Gas is Required to Lift A Man.

The question is often asked how large must a balloon be in order to lift a man. Many think it a very abstruse question, and not to be answered or reasoned about except by those who are well crammed with mathematics and chemistry. But the fact is, as we shall show, that in reality it is not beyond the comprehension of ordinary school boys; such questions ought to be put in the arithmetics.

We say a balloon goes up because it is lighter than the air. If it be a pound lighter, it lifts a pound, if it be a hundred and fifty pounds lighter it may carry up a man. But what does the lightness depend upon? What is it proportioned to? How shall we measure it?

A balloon is a bag filled with a gas lighter than the air. The lightest gas known is hydrogen. One hundred cubic inches of it weigh only 2·14 grains, while the same bulk of air weighs 31 grains. The ascending force of 100 cubic inches of hydrogen would therefore be the difference of these weights, that is 31·—2·14—28·86 grs. The ascending force of a cubic foot of hydrogen will be 28·86×17·28—498·7 grs. The ascending force of 1,000 cubic feet will be 498·7×1,000—498,700 grs. or 71·25 lbs. And 1,000÷71·25—14 feet in round numbers for the bulk of hydrogen required to lift one pound. Now this bulk multiplied by the weight of a man gives the cubic feet of gas needed to lift him as 14×150—2,100 cubic feet.

So far we have made no account of the weight of the bag. This should be added to the weight to be lifted. What the weight of the bag really is, depends of course upon the material of which it is constructed. Also in practice as the gas is not pure and is liable to leak away, an extra supply of gas must be taken on board. An aeronaut would not feel safe unless he had ascending power sufficient to lift two or three men besides himself.

Hydrogen gas is not often used when common illuminating gas can be had. But the latter weighs five or six times as much as hydrogen, and the balloon must be correspondingly larger.

Books and Men.—It is a very curious fact, if correctly stated by M. Natoli, that in Great Britain there are only six volumes, while in Italy there are 19·5 volumes to every 100 persons. As there can be hardly any practicable mode of estimating the books in private hands, the statement must refer to public libraries. The inference would be, that where fewest books are possessed by individuals, most books are provided publicly, and *vice versa*. It is added that in Bavaria there are 26·4 volumes to 100 persons; in France, 11·7; in Belgium, 10·4; in Prussia 10; in Austria 6·9, and in Russia 1·3. Total: France 4,389,000 volumes; Great Britain 1,771,493; Austria 2,408,000; Prussia 2,040,450; Russia 582,000.



ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING FEB. 19, 1867.

Reported Officially for the Scientific American.

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

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

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

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

62,107.—Horse Rake.—Sylvester E. Ament, Oswego, Ill.

First, I claim the formation of a groove or channel, H, cut within and around the cylindrical part of the bearing, D, when employed substantially as and for the purpose herein set forth.

Second, I claim situating the radial or perpendicular faces, W X Y Z, within the joint rim or parts, E D G, substantially as and for the purpose herein set forth.

Third, I claim putting the stops, I and J, beneath the tangents of the strap, G, or in other words, concealing the same within the handle, E, substantially as and for the purpose herein set forth.

Fourth, I claim the employment of duplicate pawls, I and J, when adapted to operate relatively to one or more pairs of reversed faces, W Y, substantially as and for the purpose herein set forth.

Fifth, I claim the employment of a spring, K, inserted through a hole in the handle, E, and adapted to serve in combination with the duplicate pawls, I and J, substantially as and for the purpose herein set forth.

Sixth, I claim the employment of a cam shaft, n having a cam, n', and a hook, n, upon each end thereof, adapted to operate in combination with the locking devices of a single-handled revolving rake, A a a E, substantially as and for the purpose herein set forth.

Seventh, I claim the employment of a ball or weight, m, adapted to slide or to be dragged upon the earth behind the rake head, A, and to serve in combination with the locking devices of a revolving rake, A a a, substantially as and for the purpose herein set forth.

Eighth, I claim the application of the disk pieces, C C, to the ends of the shaft, A, when constructed and employed substantially as and for the purpose herein set forth.

Ninth, I claim the use of the bearing bolts, F F, when constructed and employed substantially as and for the purpose herein set forth.

Tenth, I claim, in revolving rakes, A a a, the use of one or more chocks or braces, T' T', when employed to brace the runner in rear of the rake head, substantially as and for the purpose herein set forth.

Eleventh, I claim the wooden runners, T T, provided with braces in rear of the rake head, in combination with a revolving rake, A a a, in such manner that the only point of contact of said runners with the ground shall be in rear of the rake head, substantially as and for the purpose herein set forth.

Twelfth, I claim, in combination with a single-handled revolving rake, A a a E, when its locking devices do not depend upon the teeth for resistances, except uniformly upon the whole, through the medium of the shaft, A. The employment of two pairs of reversed faces, W Y and X Z, when arranged relative to each other, and to pawls, I and J, or their equivalents, substantially as and for the purpose herein set forth.

Thirteenth, I claim the use of a check chain or connection, M', when employed substantially as and for the purpose herein set forth.

62,108.—Mucilage and Marking Brushes.—William R. Anderson, New York City.

I claim the combination of the shield tube, d, with the cemented surface of the brush tube, i, for extending moisture and forming a durable shield fastening, substantially in the manner set forth.

I also claim, in combination with the reservoir, the filtering plate, a a, substantially as set forth.

62,109.—Cultivator.—James Armstrong, Jr., Elmira, Ill.

First, I claim providing a shovel-carrying frame, D, which is pivoted to levers, C, so as to operate substantially as described, with an auxiliary adjusting lever, G, or its equivalent, whereby the driver can regulate the depth of the shovels at pleasure, whether the machine be in motion or at rest, substantially as set forth.

Second, I claim pivoting a lever, G, which has an eccentric bearing, g, upon one end, to the draft tongue of frame, D, and providing such lever with a locking device for holding it in any desired position, substantially as described.

Third, Supporting an adjustable shovel-carrying frame, D, upon the axle, A, by means of the levers, C, and an adjusting device, G g f h, substantially as described.

Fourth, I claim the use, in a cultivator, of an eccentric lever, g g, for the purpose described.

62,110.—Grinding or Polishing Implements.—Nicholas A. Buhle, New York City.

First, I claim the composition above described for making grinding or polishing stones, wheels, or other implements, substantially as above set forth.

Second, I also claim, in grinding or polishing implements or artificial stone, making their different surfaces, or portions of their surfaces, of different degrees of fineness, substantially as described.

62,111.—Liniment.—John W. Burnham, Winterport, Me.

I claim the liniment, consisting of the ingredients mentioned, combined substantially as described.

62,112.—Clock.—L. F. Carter and W. W. Carter, Bristol, Conn.

We claim the employment of the attachment, d, in combination with a clock movement, substantially as and for the purpose described.

62,113.—Furnace for Converting Iron into Steel.—Antoine Galy Cazalat (assigns one-half to Jules Despecher), Paris, France.

First, I claim the arrangement of parts, as above specified, applied on either side of the furnace for introducing steam into or through the molten metal.

Second, The upper reservoir of cast iron, as described, for the purpose of restoring to the purified iron the requisite amount of carbon for converting the same into ordinary steel.

Third, The conversion of ordinary steel into homogeneous steel by maintaining the liquid metal in a quiet state of fusion, and at a high temperature, by injecting steam in the chimney, and

Fourth, The means indicated of submitting steel cast in molds to high gaseous pressure, whereby the blisters are expelled and the metal close grained and condensed.

62,114.—Propeller.—R. D. Chatterton, Bath, England.

I claim the arrangement of the longitudinal pipes, B, the direct-action steam pump, placed between the diaphram valves, G G', and the reversing apparatus for the simultaneous operation of the said valves by a single motion, substantially as described and represented.

62,115.—Composition for Roofing.—John P. Cowing, Seneca Falls, N. Y.

I claim the simple compound of ground fire clay, rock, and coal tar, as specified.

62,116.—Mole Plow.—Jacob Creamer, Jeffersonville, Ohio.

First, I claim the combination of the rectangular frame, A, bent axles, B B', and hinged retaining bars, i and k, the said parts being respectively constructed and arranged for use substantially in the manner and for the purpose set forth.

Second, The arrangement of the swinging frame, A, capstan, b''', capstan head, b'', parallel bars, C, chains, e, lever, d, and horse, f, substantially as set forth.

62,117.—Lifting Jack.—A. M. Culver, Bedford, Ohio.

I claim the arrangement of the legs, B B', pivoted to and in combination with the lever A, in the manner and for the purpose described.

62,118.—Extinguishing Fires.—R. Ogden Doremus, New York City. Antedated Feb. 6, 1867.

I claim the within described method of extinguishing fire by means of sulphurous acid, and ammonia or carbonic acid in a liquid or solid state, substantially as set forth.

61,119.—Sleigh.—A. E. Doty, Ilion, N. Y., assignor to J. I. New and C. H. Doty.

First, I claim a metallic runner curved and attached to the beam as seen in fig. 1.

Second, The compound ox-bow brace as is seen in figs. 1 and 2.

62,120.—Prepared Leather.—Smith Dyar, Charlestown, Mass.

I claim, as a new article of manufacture, skins prepared, printed, and polished, substantially as set forth.

62,121.—CHURN.—Belden R. Eaton, Clifton, Wis.

I claim the combination of the two levers, g and l, so constructed and arranged on the shaft, h, that two motions or strokes are produced upon the dash, k and l, at one revolution of the handle, e, all of which will more fully appear and as shown in the drawing aforesaid.

62,122.—WASHING MACHINE.—Nathaniel T. Edson, New Orleans, La.

I claim, First, The combination of the apron with the rubber and with the segments, l, and guides, e e, in the manner and for the purpose substantially as specified.

Second, The combination of the elastic and non-elastic bands, b b and c c, substantially as and for the purposes specified.

Third, The springs, k, in combination with the rubber, B, and apron, A, for the purposes specified.

Fourth, The manner of hinging and fastening the revolving round, h, in combination with the rubber and the apron.

Fifth, The strips or bands, or elastic or non-elastic materials, d d, in combination with the apron and with the segments, l, and guides, e e, for the purposes specified.

62,123.—DRIFT.—John Elgin, Manchester, England, assignor to Thomas Aldridge Weston.

I claim forming the cutting edges of drifts of a series of double-edged diamond cutters by the intersection of two series of spirally inclined grooves in opposite directions, substantially as and for the purposes set forth.

62,124.—CHURN DASHER.—G. R. Forsyth, Pemberton, Ohio.

I claim a revolving churn dasher, constructed, arranged and operating substantially as described.

62,125.—APPARATUS FOR LIGHTING GAS BY ELECTRICITY.—Samuel Gardiner, Jr., New York City.

First, I claim the arrangement upon a bar of a series of keys so placed in reference to the burners s to be consecutively brought into electric connection therewith by a single impulse, substantially as described.

Second, I claim a sliding bar with an insulating support and furnished with keys adapted to a series of gas burners, for the purpose described.

62,126.—AXLE BOX FOR VEHICLES.—Cyrus F. Gillette, Sparta, Wis.

I claim a cylindrical or conical carriage axle box cast in one piece, with flanges, a and a', at each of its ends, and with separated Babbett or other soft metal bearing surfaces, b b, cast between said flanges, all substantially in the manner described.

Second, Holding the cast soft metal in its proper position by the combined agency of the flanges, a and a', and the sprue lugs which fill the sprue holes, e e, substantially in the manner described.

62,127.—RAILWAY CAR.—Abraham Gregg, Forest City, Cal.

I claim, First, The method of attachment of the extreme ends of the trucks to the car by king bolts, g', so that the brakes can be worked in the center of each shaft; also the combination and arrangement of the box coupling, D, to the center of the axle, so as to insure the twofold purpose of a brake wheel and coupling.

Second, The combination and arrangement of the double acting brake, E E, with springs, F, and levers, I H and K, so that it will clasp both sides of the wheel at the same time with equal pressure.

Third, The two bearings, a a, to each section of the axle, to prevent binding in the coupling box, likewise placing the springs, f f, between the trucks and platform and carriage so that each shaft will have bearings near its center.

Fourth, The cross tongue, h, attached to street cars, when operating in parallel slots, i i, so that when the car passes a curve the outer end of the cross will move back in the slot, bringing the draft on the outer ends of said cross or tongue, substantially as described and for the purpose set forth.

62,128.—COMPOSITION CALLED ARTIFICIAL IVORY.—Julius Hackert, New York City.

First, I claim the combination of chloride of zinc and lime with oxide of zinc or other metallic oxide, substantially as above set forth, for producing artificial ivory.

Second, I also claim the combination of chloride of zinc or other metallic oxide, and pulverized glass, or its equivalent, substantially as and for the purpose above set forth.

62,129.—CHURN.—Benjamin Handforth, Chicago, Ill. Antedated Feb. 3, 1867.

First, I claim the combination of the hollow handle, C, provided with an opening or openings, c, and the sliding sleeve, H, arranged and operating substantially as and for the purposes set forth.

Second, I claim the combination and arrangement of the hollow handle, C, provided with openings, c, the sleeve, H, and valve washer, d d, operating substantially as described and for the purposes specified.

62,130.—MANUFACTURE OF CARBONATE OF LEAD.—Henry Hannen (assignor to S. W. Greene and S. A. Hannen), Philadelphia, Pa.

The manufacture of a pure carbonate of lead by subjecting a mass of white lead (containing the oxide or the acetate of lead), mixed with water and heated, by the action of carbonic acid gas.

62,131.—INSTRUMENT FOR DIGGING POST HOLES.—James W. Harpen, Xenia, Ohio.

I claim the spring blades, C C, of rectangular form and construction and entirely separated, on opposite sides, so that they may be sprung apart, or away from each other, substantially as and for the purpose herein specified.

62,132.—APPARATUS FOR UNHITCHING HORSES FROM VEHICLES.—John K. Harris, Madison, Ind.

I claim the provision upon each shaft of a carriage, of a vibrating hook, J, adapted to receive and hold a tongue, E, upon the harness and to be released by the driver, through the instrumentalities of a strap, U, and its described or equivalent accessories, substantially as set forth.

Second, The releasable hitching lock consisting essentially of the vibrating hook, J, sliding bolt, N, and springs, O and P, the same being placed under control of the driver by the strap, U, and its accessories, as set forth.

62,133.—ICE-WATER RECEPTACLE.—Wm. H. Hart, Medfield, Mass.

I claim the above-described ice-water receptacle consisting of the urn, A, and the revolving disk or plate, c, for holding drinking utensils, substantially in the manner and for the purpose as above described.

62,134.—PIANO-FORTE ACTION.—Hiram Herrick, Boston, Mass.

I claim the combination of the arm, D, and its connecting rod, b, or the equivalent or equivalents thereof, with the piano-forte action consisting principally of the key, A, hammer, B, and jack or fly, C, as described.

I also claim the combination as well as the arrangement of the lever, E, and the adjustable stop, c, or the equivalent thereof, with the arm, D, and its connection cord, b, combined with the piano action as described.

62,135.—CAP FOR COFFIN SCREWS.—Geo. H. Howard, South Braintree, Mass.

I claim as my invention an improved arrangement of the latching devices, c d, of the coffin screw, cap cover and base, substantially as described, viz: so that the cover by its inherent diametric elasticity may be caused to operate as a spring to connect or engage the latching devices together and keep one of them in connection or engagement with the other or prevent their accidental engagement, as specified.

62,136.—GATE FASTENING.—S. E. James, Smithfield Station P. O., Ohio.

I claim, First, The combination of the pin or latch, c, the toothed support, C, and retaining device, b, substantially as described and for the purpose set forth.

Second, The block, d, arranged over the toothed wheel, C, substantially as and for the purposes described.

62,137.—PIPE TONGS.—John Johnson, Saco, Me.

I claim the combination and arrangement of the eccentric, a, set into the arms of the gas pipe tongs, pawl, C, spring, d, and the bolt, b, operating as and for the purpose set forth.

62,138.—CARPET STRETCHER.—W. J. Johnson, Newton, Mass., assignor to himself and H. A. Hildreth, Lowell, Mass.

First, I claim a carpet stretcher with a piston or its equivalent magnetically charged, for the purpose substantially as described.

Second, I claim a carpet stretching device in combination with a magnetic tack driving arrangement, for the purpose substantially as described.

62,139.—APPARATUS FOR EXTRACTING WOOL FROM MIXED ARTICLES AND FABRICS.—Arthur Knowles, James Knowles and Joshua Barraclough, Bristol, Great Britain.

We claim the means or apparatus shown and described, for the purpose of extracting wool from cotton and other vegetable substances contained in mixed fabrics.

62,140.—SPRING HINGE.—Chas. W. Lawrence, Milton, Ind.

First, I claim the combination with the leaves of a hinge of otherwise ordinary or suitable construction, of one or more compression springs, placed at right angles and transversely to such leaves and connected by a flexible and elastic steel or brass band, under the arrangement and for operation as herein shown and described.

Second, The combination of the tubular sheath or sheaths and the spiral spring with the elastic and flexible rod or band, substantially as shown and set forth.

62,141.—TELEGRAPHING APPARATUS.—J. J. E. Lenoir, Paris, France.

First, I claim the revolving rollers, H and H', in combination with the revolving screws, F F', traversing frames, I I', their magnets, K K', levers, J J', and armatures, e e', the whole being constructed, arranged and operating as described.

Second, The shafts, G G', and the rollers, H H', screws, F F', frames, I I', magnets, K K', and levers, J J', in combination with the trains of wheels, E E, or the equivalent to the same, the whole being arranged and operating substantially as and for the purpose set forth.

Third, A sheet of transfer paper and a sheet of plain paper combined with the roller, H, and arranged to be operated on substantially as and for the purpose specified.

Fourth, The combination of a receiving roller or holder, H', having an inked surface, a lever or pencil, J', and a sheet of transparent paper or its equivalent, for the purpose described.

Fifth, The magnets, O O', connected electrically with each other and the arms, l l, in combination with two instruments, A B, when the latter are constructed and operate together as described.

Sixth, The shaft, L, with its disk, N, and the shaft, L', with its arms, q q, in combination with the driving mechanism of two instruments, A and B, and with the arm, j, and the electro-magnet, P, the whole being constructed and operating substantially as and for the purpose set forth.

62,142.—MACHINE FOR SCOURING MARBLE.—Henry C. Lull, Montpelier, Vt.

I claim in the said marble scourer the combination of the handle, the troughed block, and the water vessel, constructed, arranged and applied together substantially in manner and so as to operate as specified.

I also claim the combination as well as the arrangement of the perforated tunnel with the troughed block the handle and the water vessels constructed, arranged and applied together substantially in manner and so as to operate as specified.

62,143.—RAILROAD BOX AND JOURNAL.—George F. Lynch, Milwaukee, Wis. Antedated Feb. 4, 1867.

I claim combining with a box or bearing for an axle or journal, a series or rollers or rings, not positively fastened to each other or to the box or bearing, but so controlled as to be kept in proper working position, and free to move with or independent of each other and with or independent of the journal or shaft, substantially as and for the purpose set forth.

62,144.—LEAKAGE ALARM FOR VESSELS.—G. B. Massey, New York City.

First, I claim the drum, D, having the plate, G, attached thereto by the pins, c, or an equivalent device, in combination with the jointed arm, E, of the hammer, when arranged to operate as and for the purpose set forth.

Second, The combination of the drum, D, having the plate, G, and pinion, u, attached, with the wheel, H, index, h, and dial, I, the drum being operated by the rising and falling of the float, F, as shown and described.

62,145.—FASTENING FOR CARRIAGE CURTAINS.—Theodore McPherson (assignor to John McPherson), Burlington, N. J.

I claim the combination of the screw, revolving barrel and flange, as represented in fig. 3, when the same are arranged and operate substantially as described for the purpose specified.

62,146.—APPARATUS FOR GRANULATING SUGAR.—F. Michael, Gratis, Ohio.

I claim the conduits, f e h L K d, and trough, m, in combination with the sugar house, A, the whole constructed, arranged and operating in the manner and for the purpose herein described.

62,147.—EVAPORATOR.—F. Michael, Gratis, Ohio.

First, I claim the filter, E, with regulating screw, s, in combination with pan, B, the whole constructed and operating in the manner and for the purpose herein set forth.

Second, A combination of pan, B, filter box, K, cooler, H, and conduit, the whole constructed, arranged and operating substantially as herein described.

62,148.—APPARATUS FOR HEATING AND COOKING BY STEAM.—Francis Milliken, Boston, Mass.

I claim the boiler and oven so constructed and connected that the hot air and products of combustion from the fire under the boiler, after being used to heat the oven, shall be returned through the flues of the boiler, substantially as and for the purpose described.

I also claim the pipe, g, for conducting the heat from the steam to the inside of the article to be cooked, substantially as described.

I also claim the hollow sleeve or spit, h, substantially as and for the purpose described.

62,149.—BRICK MACHINE.—Isaac Morley, Pittsburgh, Pa.

I claim the arrangement of the gear for operating the various parts of the machine, as herein shown and described.

Second, the tilting bars, e, for supporting and loosening the mold, when arranged and operated substantially as set forth.

Third, The combination and arrangement of the shafts, y and t, with the hopper, B, screw, S, and screw, W, substantially as herein described.

62,150.—LOW WATER ALARM FOR STEAM GENERATORS.—Stewart B. Palmer, Syracuse, N. Y.

First, I claim, in combination with a steam generator, the pipes, A C and E, connected and arranged to operate substantially as set forth.

Second, In combination with the bent pipe, C, and elbows, B and D, I claim the rods, M, substantially as and for the purpose set forth.

Third, The combination of the arm, I, attached to the elbow, D, or pipe, E, click, K, and valve stem, N, of the steam whistle, L, substantially as and for the purpose set forth.

62,151.—CORN HUSKER.—O. M. Pond, Independence, Iowa.

I claim the metallic plate, A, constructed and arranged as herein described, in combination with the elastic band, C, as a new article of manufacture.

62,152.—ODOMETER.—Wm. H. Prescott and Whitcomb Judson, Galesburg, Ill.

First, We claim the actuating shaft, C, disk, c, pivot, d, crank, e, and spring pawl, E, when combined with the screw shaft, D, and spur wheel, f, on the end thereof, substantially in the manner and for the purpose as herein described.

Second, The two shafts, C and D, as arranged and when used in combination with the two cog wheels, constructed substantially in the manner described.

62,153.—BUTTON.—Willoughby H. Reed, New York City.

I claim the concavo-convex disk, E, formed in respect to the projection, b, on the button, and having its edge adapted to an annular recess or indentation in the same, all as set forth for the purpose specified.

62,154.—MACHINE FOR SHEARING METAL.—N. B. Reynolds, Auburn, N. Y.

I claim in combination with a shearing machine for shearing stiff metal, the guides and gages, b c, constructed, arranged and operating for cutting off angular sections to adjusted shape, form and size, substantially as herein described and represented.

62,155.—WASHING MACHINE.—George A. Robinson, Mt. Pulaski, Ill.

I claim the arrangement of the geared roller, D, and the concave bed, C, yielding frame, B, connections, G H, and outside springs, K, attached to the bottom of the box, substantially as described and represented.

62,156.—TYPE TO PRINT FOR THE BLIND.—Henry Robyn, St. Louis, Mo.

First, I claim the five several type, as shown in the drawing attached to the specification.

Second, I claim the combination of the five several type, as shown in the drawings attached to my specification, in the manner set forth in the said specification.

62,157.—SOAP.—George Rose, Philadelphia, Pa.

I claim a washing composition consisting of the within-described materials combined in the manner and in the proportions herein set forth

62,158.—DEVICE FOR SLAUGHTERING HOGS.—W. M. and R. Savage, Chicago, Ill.

First, We claim the combination of the clutch, A B, and chains, C, or their equivalent, with a swiveled hook, E, substantially as and for the purpose specified.

Second, In combination with the above we claim the anti-friction roller, G, arranged as and for the purposes described and set forth.

Third, We claim the combination of the said clutch and its appendages with a curved inclined supporting track, L, arranged as and for the purposes shown and specified.

62,159.—ADJUSTABLE RACK OR SHELF.—Gerard Sickels, Boston, Mass.

I claim the swinging frame, C C, in combination with the standard, A A, and supporting bars, B B, when constructed and operating as and for the purpose set forth.

62,160.—ROCK CHAMBER DRILL.—Henry M. Stow, San Francisco, Cal.

I claim the chisels, B, connected with handle, C, in the manner described and for the purpose specified.

62,161.—METALLIC HUBS FOR THE WHEELS OF VEHICLES.—James B. Stuart, Bunker Hill, Ill.

I claim a metallic hub for the wheels of vehicles cast with a collar, B, having lateral flanges or projections, a, of the form shown and described, so that the spaces between the flanges which receive the spokes will be of wedge or taper form longitudinally, or in a direction parallel with the hub and of double taper form in a radial direction in combination with a loose collar, C, fitted on the hub and secured to the fixed collar, B, by bolts, substantially as and for the purpose herein set forth.

62,162.—STEAM GENERATOR.—J. W. Summers, Sandy Hill, N. Y.

First, I claim the generator, H, when constructed as and for the purpose herein described.

Second, The air chamber, D, for the purpose of governing and controlling the pressure of steam in the generator, as and for the purpose set forth.

Third, The valve, I, for the purpose of dispersing the water, in the manner and for the purpose specified.

Fourth, The combination of the valves, L K and O, the air chamber, D, and generator, H, the whole constructed, arranged, and operating as and for the purpose herein set forth.

62,163.—SAFETY VALVE.—John Russell Swann, Edinburgh, Scotland.

I claim the combination and arrangement of the spring, h, and stud, k, with the lever, d, fulcrum, g, and its stem, g', substantially as described.

62,164.—MANUFACTURE OF ELASTIC ROLLS.—William A. Torry, Mont Clair, N. J.

I claim securing the rollers constructed of india-rubber and other vulcanized elastic gums to shafts or spindles by the use and application of the compounds and cement, substantially as and for the purpose set forth.

62,165.—COMPOSITION FOR ARTIFICIAL STONE.—George E. VanDerburgh, New York City. Antedated Feb. 14, 1867.

I claim an artificial stone or composition for various useful and ornamental purposes formed of silex in combination with silicate of lime with or without other ingredients when produced before the composition has been molded or allowed to dry and harden, substantially in the manner herein set forth.

I also claim the production of silicate of lime in combination with silex by excluding atmospheric air from a formed or molded mass or device composed of caustic lime and sand with or without other ingredients, and subjecting the same to moisture with or without heat, substantially in the manner and for the purpose herein set forth.

I claim also the application of steam to a composition containing silex or siliceous materials and lime in any form or in any proportions for the purpose of producing an artificial stone, substantially as herein set forth.

62,166.—ARTIFICIAL STONE FOR BUILDING.—Geo. E. VanDerburgh, New York City. Antedated Feb. 14, 1867.

I claim a finished block or stone of any desired form for building or ornamental purposes, produced substantially in the manner herein set forth.

62,167.—FOOT REST.—Isaac Van Hagan, Chicago, Ill.

I claim a foot rest, constructed substantially as and for the purpose described and set forth.

62,168.—LET-OFF MOTION FOR LOOMS.—Richard Walker, Milford, Mass.

First, I claim a let-off motion in looms effected by means of a horizontal sliding bar, R, provided with pawls, as described, in connection with a ratchet wheel, P, the said sliding bar being operated by the hammer, u, on the lay, which in its backward movement strikes the horizontal intermediate bar, M.

Second, I claim the combination of the pivoted pressure bar, C, located as described, with a series of adjustable levers and rods in such a manner that the tension of the warp upon the pressure bar will cause a bar, M, to be brought in a position to be operated by the backward movement of the lay and thus operate the escapement slide, R, substantially as described.

Third, I claim regulating the degree of tension which will determine the position of the bar, M, by means of the series of adjustable bars, levers and rods, operated by the pressure bar, C, located below the warp, substantially as described.

62,169.—COOKING RANGE.—Thomas C. Walter, San Francisco, Cal.

First, I claim the furnace, A, and the ovens, D and E, with the flues, K F f and h, with their regulating dampers, constructed as described for the purpose set forth.

Second, The compartment, C, in combination with the furnace, A, arranged as described.

Third, The register, N, with the damper, m, and the damper, B, combined with the furnace, A, as described.

Fourth, The arrangement of the furnace, A, with the damper, B, and the register, N, the ovens, D and E, with their flues and compartment, C, all operating together, substantially as and for the purpose set forth.

62,170.—HORSESHOE.—Benjamin R. Watson, New Bedford, Mass.

I claim securing calks in metallic shoes by fitting them with tapering dovetail tenons to tapering dovetail mortises cut through the shoes and tightening them by screws, or their equivalents, as set forth and described

62,171.—DITCHING AND GRADING MACHINE.—William J. Wauchope, Brookfield, Ill.

First, I claim supporting one end of the transversely-arranged endless conveyor, G, upon a roller, arranged in the main frame of the machine and the other end upon a roller having a vertically-adjustable supporting frame independent of the main frame, arranged and operating as and for the purposes specified.

Second, I claim the arrangement of the longitudinally-adjustable beveled bars, J, within the endless apron, G, and with the roller, I, operating as and for the purposes set forth.

Third, I claim the combination and arrangement of the plow, S, the transverse conveyer, G, stationary roller, H, adjustable roller, I, lever, J, and rollers, K, operating as and for the purposes described.

62,172.—SAD-IRON HEATING APPARATUS.—Joseph Davis Westgate, San Francisco, Cal.

I claim an ironing apparatus consisting of the sad-iron, B, and stove, A, constructed as herein described, lined with non-conducting material, substantially as and for the purpose set forth.

62,173.—SPINNING FLYERS.—Thomas Westley and Thomas Richard Beaumont, Preston, England.

We claim as our invention attaching split tubes to the legs and presser arms of solid leg flyers, substantially in the manner and for the purposes hereinbefore set forth.

62,174.—DIE.—Lorin Wetherell, Boston, Mass., assignor to himself and John H. Wells.

I claim the use in the trip hammer of dies constructed as described for the purpose of forging articles of the description specified.

62,175.—LIFTING JACK.—Eli Zimmerman, Pamelia Four Corners, N. Y.

First, In a jack for raising fences and for other purposes, I claim the swinging lifting hook arranged so as to be adjusted to different hights on and relatively to the sliding bar by which it is actuated, substantially as set forth.

Second, The combination of the sliding ratchet bar, the actuating lever, and the spring latch and pawl, of a slotted lifting hook suspended from said bar and adjustable thereon, substantially as shown and described.

62,176.—TABLE, CUPBOARD AND CLOTHES RACK.—W. M. Baker, Fortville, Ind.

First, I claim a combined table, cupboard, and clothes rack or frame, substantially as and for the purpose described.

Second, In combination with the above the rack or frame, N, for tins, rolling board, P, and tray, O, when arranged together and within the body of the table, substantially as described.

62,177.—PIPE CUTTER.—John Balmore, New York City.

I claim the cutter, D, and groove, d, in combination with the shank, C, nut, B, and hook, A, constructed, arranged, and operating substantially as described and for the purposes set forth.

62,178.—METHOD OF FORMING THE PARTS, LINKS, ETC., OF CHAINS, BRACELETS, ETC.—P. M. C. Beziel, Paris, France.

I claim the method, substantially as herein set forth, of forming links, leaves, or other similar articles of gold or silver for ornamental or useful purposes.

62,179.—CHURN.—D. O. Blair, Abington, Ill.

First, I claim the combination of the lever, E, cord, c, pulleys, d, socket drum, C, and dasher shaft, B, with each other and with the frame, D, constructed as shown and operating substantially in the manner herein set forth.

Second, In combination with the above the vertical dashers, F, beveled toward their outer ends, for the purpose described, substantially as specified.

62,180.—PRUNING SHEARS.—Daniel Campbell, Elizabeth, N. J., assignor to Henry Seymour, New York City.

First, I claim the combination of the curved shank, c, of the movable blade, C, with the grooved plate, f, and stationary blade, A, substantially as and for the purpose herein shown and described.

Second, I claim the application to pruning shears of the double set of toggle levers, E, and arms, d, made and operating substantially as herein shown and described.

62,181.—HORSE HOE.—Moses Chandler, Corinth, Me., and John B. Nickels, Kenduskeag, Me., assignors to V. R. Palmer and J. B. Nickels.

First, We claim adjustably attaching the wings or blades, H, when formed as described, to the uprights, G, substantially as and for the purpose set forth.

Second, The combination of teeth or cogs with the blades, H, and uprights, G, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the pivoted rake heads, K, with the blades or wings, H, substantially as herein shown and described and for the purpose set forth.

Fourth, Securing the uprights, G, to the caps, C, and to the slotted cross bar, B, by means of angular bolts, E, and steady pins, I, substantially as herein shown and described.

Fifth, The combination of the stay braces, J, with the uprights, G, and adjustable caps, C, substantially as herein shown and described.

Sixth, The combination of the adjustable slotted caps, C, and slotted cross bars, B, having band, D, around their slotted ends with each other and with the draft beam, A, substantially as herein shown and described.

62,182.—WHEELWRIGHT MACHINE.—O. O. Chapman, Seneca, Wis.

I claim the head block, G, bearing the wheel, H, pinion, I, movable table, C, lever, T, treadle, Q, rod, P, and lever, F, when constructed, arranged and operating substantially as herein set forth.

62,183.—STOVE-PIPE JOINT.—H. M. Clifford, Philadelphia, Pa.

I claim the band b, constructed and applied substantially as described for the purposes herein set forth.

I claim the lip or flange a, on the end of the pipe in combination with the band b, as and for the purposes specified.

62,184.—APPLE PARER CORER AND CUTTER.—Wesley A. Coe, Greensboro, N. C.

First, I claim the tubular bar C, having its opening continuous throughout for cutting out the core and discharging it beyond the working parts of the device in combination with the shaft M, cross bar N, and bar D, in the manner represented and described.

Second, I claim the sliding bar D, provided with the bar L, in which is the ring i, substantially as shown and described

Third, The shaft M, and cross bar N, in combination with the bars C and D, for the purposes as shown and described.

62,185.—CULTIVATOR.—J. W. Connely, Charleston, Ill.

First, I claim the machine in combination with a cultivator of the several parts as arranged and described.

Second, The arms O, O, made either of wood or iron, and manner and place of attachment to bar or double-tree on forward end of hounds of frame as described and shown.

Third, The flexible connecting beams F F, with arms O O, either by bolts, pins or clevis, as shown and described.

Fourth, The bar B, arms O O, beams F F, and stocks T T, as constructed and shown and described.

62,186.—Work-supporting Plate of Sewing Machine.—E. H. Craige, Brooklyn, N. Y.

I claim a cloth plate of the Wheeler & Wilson sewing machine, constructed in three or more parts, the parts to be removed being tounged and grooved substantially as and for the purpose set forth.

Second, The throat piece f, constructed as described so as to be inserted in the cloth plate in the direction in which the fabric is fed, substantially as and for the purpose described.

Third, Holding the throat piece f, in place by the movable part b, of the cloth plate substantially as and for the purpose set forth.

62,187.—Refrigerator and Water Cooler.—Henry L. Dayton, Maysville, Ky.

First, I claim the combination with a water cooler a, and reservoir or supply chamber F, of the double cock D,' G,' or its equivalent substantially as and for the purpose specified.

Second, I claim the perforated pan E, arranged and employed in combination with the pipes G, and D, in the manner and for the purpose set forth.

62,188.—Cotton Bale Tie.—H. Fassmann, New Orleans, La.

I claim the plate a, having a lot or opening b, provided with serrated or toothed sides to receive the end c, of the hoop and prevent the slipping or withdrawing of c, form b, substantially as shown and described.

62,189.—Bushing for Barrels.—David F. Felter, New York, N. Y.

I claim the bush constructed with the angular ridges presenting an inclined or wedge-shaped surface to the wood, while the bush is being driven into place and a flat surface opposed to the wood when a power is exerted to withdraw the bush substantially as described and represented.

62,190.—Rotary Steam Engine.—Friederick Fisher of Garibaldi, Iowa.

First, I claim the abutment H H, which opens from the middle, in combination with the toe 1, on the advancing end of the piston B, constructed and operating substantially as and for the purpose described.

Second, The inclined planes k, in the piston head in combination with the abutment H H, opening from the middle substantially as and for the purpose set forth.

Third, The hinged or jointed valve stem N, cam M, and starting bar O, in combination with the piston valve I, abutment H H, piston B, and cylinder A, constructed and operating substantially as and for the purpose described.

62,191.—Permutation Lock.—Charles Flesch, Rochester, N. Y.

First, I claim the combination of two jaws G G, connected by the toggle levers r r, or equivalent, operating substantially as and for the purpose herein set forth.

Second, The combination of the dog plate F, with the jaws G G, operating substantially as and for the purpose specified.

Third, The combination of the oscillating fly g, with the dog plate F, or equivalent, operating in such a manner as to allow said plate to fall when centered, but to hold it elevated at all times as specified.

Fourth, The combination of the rollers or cams b b, of the head a, with the oscillating plate E, operating substantially as, and for the purpose set forth.

Fifth, So connecting the head, a, with the dog plate F, or equivalent that in turning from the bolt, said plate will only touch the cam points j j, but in turning toward the bolt, the dog will be allowed to fall, to unlock the device, substantially as set forth.

Sixth, Clamping the centre of the combination wheels in place, by means of a rim y, tightened or loosened by a screw a,' or equivalent as set forth.

Seventh, Connecting the screw a,' with the rim y by means of the shoulders b,' c,' or equivalent, and the slot d,' in such a manner, that the rim is attached to, and raises with the screw, substantially as specified.

62,192.—Stump Extractor.—John M. Gleichman, Evansville, Ind.

I claim the lever G, tackle H, and windlass I, arranged, combined and applied to a mounted frame A, to operate in the manner substantially as and for the purpose set forth.

I also claim the supplemental lever N, in combination with the lever G, tackle H, and windlass I, substantially as and for the purpose specified.

I further claim the windlass J, in combination with the lever G, tackle H, and windlass I, substantially as and for the purpose set forth.

62,193.—Lifting Jacks.—Samuel Gulick, Klines Grove, Pa.

I claim the bars B, C, sliding in opposite directions, pawls D, F, and F, G, lever H, and spring I, constructed and arranged and operating as herein set forth.

62,194.—Wire Rein Snaps.—William B. Hayden, Columbus, Ohio.

I claim the application of a guard or shield B, to a rein snap which is made of wire, substantially in the manner and for the purposes described.

62,195.—Money Drawer.—Charles E. Hayes, Lancaster, Pa.

I claim the tongue and groove pieces with spring attachment to be made of wood or other material and for the purpose set forth in the specification.

62,196.—Gate Hinge.—Charles Hermann, Schuylerville, N. Y.

First, I claim the construction of a gate hinge of a leaf a, and plates b b, the latter having a wheel c, between them and an eye on one side for receiving the pintle on the leaf a, substantially as described.

Second, In gates which are allowed to move in a direction with their lengths and also to swing about on axis, I claim providing for elevating or depressing such gates at pleasure so as to adapt them for the summer or winter use, substantially as herein described.

62,197.—Railway Safety Guard.—Charles L. Heywood, Boston, Mass.

I claim a railway guard arranged and operating as described and for the purpose specified.

62,198.—Car Brake.—Aaron Higley, South Bend, Ind.

I claim in a car brake and starter for railroad cars, the combination of clutch coupling D, pulley F, ratchet g, and pulley E, substantially as and for the purpose set forth.

62,199.—Car Brake.—Aaron Higley, South Bend, Ind.

I claim in a car brake and starter for railroad cars, clutch lever G, Spring H, dog I, swivel J, and chains c, e, and o, in combination with clutch coupling D, ratchet g, pulleys F and E, substantially as and for the purpose set forth.

62,200.—Corn Planter.—W. J. Hobson, Savannah, Missouri.

I claim the wheel, I, provided with a sharp serrated edge, and fitted between bars, H H, attached to a shaft, G, to which the seed boxes, F, are secured, substantially as and for the purpose specified.

Second, The operating of the seed distributing bars, K, from the wheel, I, through the medium of the rollers, b b, attached thereto, the V-shaped lever, N, attached to the rod, M, the spring, O, and right angular levers, L L, all arranged to operate substantially in the manner as shown and described.

Third, The marker, J, attached to the axis of the wheel, I, when used in combination with the seed dropping mechanism, constructed and arranged as set forth.

Fourth, The treader, R, applied to the rear parts of the bars, H H, and arranged in relation with the driver's seat, substantially as and for the purpose specified.

62,201.—Sad Iron Holder.—Lewis Hover, Chicago, Ill.

I claim the combination of the springs, D, semi-cylindrical holders, A, and deflectors, B, when the parts are constructed substantially as and for the purpose set forth.

62,202.—Broom Head.—James S. Hugg, Philadelphia, Pa.

I claim the combination of the broom head, A, with slitted ends, the partition plate, E, and socket, D, secured thereto, and the armed washers, f, substantially as described.

62,203.—Car Coupling.—Ernest V. Jeinsen, New York City.

First, I claim the hinged coupling pins, C C,' provided with shoulders, b b, in combination with lips, a a', and with the shackle bar, B, constructed and operating substantially as and for the purpose described.

Second, The adjustable springs, c c*, in combination with the coupling pin, C, shoulder, b, and lip, a, constructed and operating substantially as and for the purpose set forth.

62,204.—Index Chain for Loom.—Barton H. Jenks, Bridesburgh, Pa.

First, I claim constructing the links of index chains for looms, with hooks and eyes or pins in such manner that the links can be readily separated from each other without removing said pins, substantially as described.

Second, The construction of hooked links of index chains for looms, with teeth upon them for entering spaces between the teeth of a wheel or rack for moving the links, substantially as described.

Third, The construction of hooked links of index chains for looms, with fast or movable studs, a, whether such studs be applied to the outer or upper surfaces, or to the sides of the links, substantially as described.

62,205.—Sawing Machine.—George Johnson (assignor to himself, Francis Brossy, and Adolphus Guadron), Detroit, Mich.

I claim the ratchet bar, a, and sliding or adjustable frame, Y, with the dog, x, and lever, I, attached thereto, and arranged to operate as shown and described for holding the wood.

61,206.—Printing Apparatus for the Blind.—Daniel A. Johnston, Memphis, Tenn.

I claim the wheel, W, provided with the circular series of plungers, a, provided with impressional characters on their faces, and the plungers, b, provided with characters for the touch of the operator.

I also claim the stationary ring, g, provided with the depression, h, in combination with the plungers, b b, as and for the purpose set forth.

62,207.—Brick Machine.—James J. Johnston, Allegheny City, Pa.

First, I claim a brick machine provided with a revolving disk, c, filling and discharging the mold or brick upon a bearing-off table, D, the whole operating substantially as described and for the purpose set forth.

Second, The bearing-off table, D, in combination with mold disk, c, plunger or press, I, lever, J, and cam, m, constructed and operating substantially in the manner herein described and for the purpose set forth.

Third, The locking pin, V, provided with arm, q, and spring, l, when used in combination with the cam, 9, and openings, 6, in the mold disk, C, as herein described and for the purpose set forth.

62,208.—Crimping Machine.—John Joslyn, Canton, N. Y.

I claim crimping boots by passing or drawing the leather down and between two stationary or fixed plates having their surfaces opposite to each other, or with which the leather comes in contact, corrugated or formed with a series of circular or other suitable shaped cavities or depressions, substantially as herein described.

I also claim so arranging the corrugated plates, E E, or their equivalents, that they can be adjusted to any degree of pressure upon the leather being crimped, substantially as and for the purpose described.

62,209.—Fence.—Theodore E. King, Painsville, Ohio.

I claim, First, A base for fence posts composed of the sole figures, 8 and 9, short standard, A, cap figures, 1 and 7, made separate and detachable and formed into a rigid body by means of the adjustable braces figures 1 and 9, used and operating in a pair or pairs, substantially as herein shown.

Second, Attaching the post, K, to the said base by means of the said braces passing through the flange, K', thereof, and secured thereto by the nuts, J J, substantially as and for the purpose specified.

62,210.—Neck Tie.—W. A. Laverty (assignor to Joseph Nicholson, Philadelphia, Pa.

I claim the plate provided with an elastic cord, E, secured to the arms, D, which form crotch, C, retaining the plate against the neck, and allowing the button to protrude through the crotch while resting on the elastic, substantially as described.

62,211.—Making Plows.—W. P. Long, Wheatland, Ind.

I claim forming the land side and mold board from one plate of metal in the manner substantially as described for the purpose specified.

62,212.—Bedstead Fastener.—James Maguire (assignor to John B. Brasher), Trenton, N. J.

I claim the plate, D, provided with the inclined slot, d2, so as to pass over the head of the pin, E, whereby the rails, A, are drawn against the posts, C, and the said plate and screw proportionately relieved from strain as herein set forth.

62,213.—Bed Bottom.—David Manuel (assignor to himself and Willard Manuel), Boston, Mass.

I claim the roller-covered loop of the springs moving in the notches of the slats for the purpose described, as specified and shown.

62,214.—Mop Head.—H. H. Mason and Joseph Messinger, Springfield Vt.

We claim the fixed screw, B, on the handle, A, in combination with the ratchet, D, on the ferrule, C, the pawl, E, the jaw, G, provided with a tube or socket, having an internal screw thread to work on the screw, B, and the jaw, F, connected to the ratchet, D, and fitting in the ends of the jaw, G, substantially as and for the purpose herein set forth.

62,215.—Ditching Plow.—John T. Miller, Iowa Falls, Iowa.

First, I claim a ditching plow, constructed, arranged and operating substantially as herein described.

Second, The sole, B, with the plate, b, supporting the sward coulter, c, cutters, c1 c2, secured to the cross frame, C, the inclines, e, and mold board, D, combined and arranged substantially as described for the purpose specified.

62,216.—Well-boring Auger.Peter Ollom, Muncie, Ind.

I claim the improved auger or well borer, constructed and operated substantially as described.

62,217.—Railroad Switch.—L. S. Packard, West Stockbridge, Mass.

I claim the arrangement of a set of parallel tracks, A, moving on pivots, B, and kept in a parallel position by means of the bars, C, when constructed and operating substantially as herein set forth.

The combination and arrangement of the rails, A, parallel bars, C, slotted lever, D, pusher, N, springs, L, rod, F, lever, E, lever, G, pin, H, and springs, J, as herein shown and described, and for the purpose specified.

62,218.—Revolving Bread Toaster.—Joseph C. Paine, Dubuque, Iowa.

I claim the plate, A, with slots or guides, c c c c, thumb piece, F, sliding bar, B, with flutes or rests, D D D, and holders, E E E, or their equivalents, substantially as and for the purpose herein specified.

62,219.—Hinge.—Julius Parker (assignor to Charles Parker), Meriden, Conn.

I claim the combination of the socket, E, upon the plate, A, with the pivot, C, upon the plate, B, when constructed, arranged, and operating, substantially as herein set forth.

62,220.—Washing Machine.—Charity Pendleton, Iowa City, Iowa.

I claim the water-tight compartments, E and F, formed by the partition, D, provided with the hole, G, and sliding gate, H, when constructed and arranged as herein set forth for the purpose set forth.

62,221.—Axle Box.—P. Philippi, Beardstown, Ill.

I claim the box, B, fitted into the hub, A, and provided with a nut, C, on its outer end, in connection with the thimble, D, provided with the screw, which is crewed into the inner end of the box, and the annular plate or flange, F, secured in the outer side of the flange, a, of the thimble, with the collar, b, of the arm between the shoulder, a', and the annular plate or flange, substantially as and for the purpose herein set forth.

62,222.—Painting and Varnishing Wood and Metals.—Waleriam Piotrouski, New York City.

I claim the new mode of preparing the surface of wood and of metals ready for the reception of finishing colors and varnishes, substantially as herein described, for the purpose of simplifying, shortening, and cheapening the whole process of painting wood and metals for carriages, etc., and to obviate in a great measure the cracking of the coat of paint when exposed to the influences of weather.

62,223.—Cultivator.—Jonas Potts, Bridgeport, West Va.

First, I claim a cultivator provided with movable uprights, D D1 D2, and their arms, d d1 d2, to enable it to be changed to a double or single shovel plow, substantially as and for the purposes described.

Second, The yoke, C, provided with a plate, C', having a hook, f, fastened to it, to hold and support the arms, d1 and d2, substantially as described.

Third, The plow beam, A, provided with the projection, a, and tapering at its end, substantially as and for the purpose set forth.

Fourth, The combination of the plow beam, A, projection, a, yoke, C, plates, C', hooks, f, uprights, D D1 D2, with their arms, d d1 d2, substantially as and for the purposes described.

62,224.—Machine for Raking and Loading Hay.—M. S. Rawson, Winhall, Vt., and C. B. Rawson, South Londonderry.

First, We claim the combination and arrangement of the pinions, b, rack, G, pawl, I, and box, D, in the manner as and for the purpose specified.

Second, The notched pulley, J, fitted in the draught pole, C, in combination with the rope, M, and pawl, L, all arranged and applied substantially as and for the purpose specified.

Third, The rake heads, Q, attached to the endless chains, P P, and provided with the bars, k, having pins, l, passing transversely through their ends, in combination with the guide tube, R, and box, D, in which the teeth, j, of the rake heads, Q, work in the passage of the rakes upward, as shown and described.

Fourth, The spring, m m', at the upper and lower ends of the guide tube, R, in combination with the flap, S, having the spring, n, bearing upon it, substantially as and for the purpose set forth.

Fifth, The combination and arrangement of box, D, shield, N, teeth, h, in the manner as and for the purpose specified.

62,225.—Railroad Car Ventilator.—R. Reniff and Wm. W. Buttolph, Bloomington, Ill.

We claim the use of the vertical screens, J, covering the mouths of the receiving caps, H, in combination with the inner perforated plate, K, and water tank, R, having the partitions, S, constructed substantially as and for the purpose set forth and described.

62,226.—Machine for Sowing Rice.—J. Alston Reynolds, Savannah, Ga.

First, I claim the screws, c, fitted in grooves, b, in the bottom, a, of the seed box, E, and operated from one of the wheels, B, by gearing arranged substantially in the manner as and for the purpose herein set forth.

Second, The sliding or adjustable furrow openers, I, applied to the tubes, H, and arranged substantially as and for the purpose specified.

62,227.—Pencil Holder.—Richard H. Ryne (assignor to William S. Hicks), New York City.

I claim the combined pen and pencil holder having pen and pencil both located at one end, and having the extension handle, B, arranged to operate as shown and described.

62,228.—Cotton Scraper.—Turner Saunders, Memphis, Tenn.

I claim the combination of the scraper and plow, the parts being constructed and arranged to operate in the manner substantially as and for the purpose herein set forth.

63,229.—Washing Machine.—William K. Short, J. W. Allen, and John Craig, Mount Pleasant, Iowa.

We claim the horizontal rubber, D, consisting of the frame, b1, octagonal rollers, b2, projections, b3, and cross bar, C, when constructed and arranged as herein set forth.

62,230.—Low-water Alarms for Steam Generator.—J. H. Springer and W. M. Bartram (assignor to Henry Stellwagen, trustee), Philadelphia, Pa.

First, We claim the arrangement of the balance valve, f, with reference to the monitor and whistle, substantially as and for the purpose set forth.

Second, The combination and arrangement of the pendulum attachment with the stem of the water valve, substantially as and for the purpose set forth.

Third, The arrangement of the test cock of the cylinder, the cup, D, and the valve stem, M, substantially as and for the purpose specified.

62,231.—Sand Box and Carriage Axles.—John S. Steele, Rockingham, Vt.

I claim the sand collar, C, and chamber, E, in combination with the extended pipe box, F, for the purpose set forth.

62,232.—Brace for Bits.—Chas. H. Stockbridge, Whateley, Mass.

I claim the combination of the nut, B secured to the exterior of the socket of a brace or bit stock, with the dogs, C d C d, and cams, b b, all constructed, arranged and operating substantially as and for the purpose herein set forth.

62,233.—Grain Dryer.—James E. Strode, Litchfield, Ill.

I claim the grain ventilator and dryer, consisting of the inclined slats, a, with spaces, b, between them, when constructed and arranged as herein set forth, and for the purposes specified.

62,234.—Ladder.—Daniel B. Taylor, Avon, Mich.

I claim the application to ladders of a movable frame, B, having a step, D, and seat, I, attached together with friction rollers, I, band, M, crank, K, ratchet wheel, F, and pawl, G, constructed and operated substantially as above described.

62,235.—Curtain Fixture.—L. A. Tripp, Middletown (assignor to himself and C. H. Horton), N. Y.

I claim an improved window shade fixture, formed by the combination of the spring catch, F f', one or more radial arms, G, the coiled spring, E, and the journal, c', of the roller, C, with each other, substantially as herein shown and described, and for the purpose set forth.

62,236.—Compound for Coating and Insulating Telegraphic Wires.—R. S. Tucker, Brooklyn, N. Y.

I claim my application of glass finely ground or pulverized, and mixed or incorporated with linseed oil, tar, or other oleaginous and resinous substances, to insulate metallic wires or conductors in telegraph cables.

62,237.—Mop Wringer.—Burk Van Alstine, Channahan Township, Ill.

I claim the hinged jaws, a a, furnished with the prongs, c c, and lever, b, when fastened to the side of a pail, all as and for the purpose herein set forth.

62,238.—Propeller.—Samuel B. Wait, Mariner's Harbor, N. Y.

I claim the arrangement herein shown and described for propelling vessels, consisting of the paddles, h, shafts, E and B, rod, d, pin, f, and sleeve, g, substantially as set forth.

62,239.—Take-up Mechanism for Circular Knitting Machines.—Samuel Ward, Amsterdam, N. Y.

First, I claim the rollers, F, geared together at one end, and hung in a revolving frame, ratchet-wheel, H, pawl, I, lever arm, J X, rocker shaft, M, with crank arms, L and N, and stationary cam disk, Q, when all arranged together so as to operate substantially as and for the purpose described.

Second, In combination with the above, I claim the tension roller, S, so arranged in the frame, A, and with regard to the lever carrying pawl I, as to operate substantially in the manner and for the purpose specified.

62,240.—Clothes Pin.—W. G. Ward, Savona, N. Y.

I claim the arms, A, pivoted to each other at their centers, having notches, a, at both ends, on their inner faces, forming openings, C, when the arms are closed, adapting either end of the pin to be used, substantially as described.

62,241.—Shingle Band.—James W. Wells, St. Joseph, Mo.

I claim an improved binder, made of a single piece of wood, notched and formed at the points where the corners of the bundle will come, substantially as shown and operating as described.

62,242.—Horse Shoe.—Cassius M. Werner, Rockford, Ill.

First, I claim the clip, F, formed with a shoulder at its base, and a hole at its top, substantially as and for the purpose set forth.

Second, securing the shoe to the hoof by two nails clinched over or through side clips, substantially as and for the purpose set forth.

Third, Grooving the top of the clip, or punching the clip, to clinch the nails and protect the hoof, substantially as set forth.

Fourth, The combination of the clip, whether grooved or punched, with the plate by a nail clenched over or through the clip, and tightened by a screw nut under the plate, substantially as and for the purpose set forth.

62,243.—Plow.—R. J. Wheatley, St. John's, Ill.

I claim a subsoil attachment for plows, constructed, arranged, and applied, to admit of being adjusted at a greater or less degree of inclination, and also adjusted higher or lower to penetrate the earth at a greater or less depth as may be required, substantially as herein shown and described.

62,244.—Lamp Burner.—Norman L. Archer and Charles Deavs, (assignors by mesne assignments to Alexander J. Walker), New York City.

We claim a lamp burner, the cone or deflector of which is supported by a skirt or jacket in which are two or more ranges of slots alternating, substantially as and for the purposes specified.

62,245.—Table Leaf Supporter.—Daniel Bull (assignor to J. B. Booker and W. P. Best), Amboy, N. Y.

I claim the bar, c b, in combination with the strip, d, as constructed, and the plate, a, when said plate is constructed so as to protect the end of bar, c, over which it rests, and is provided with an opening through which the pad, y, is operated substantially as and for the purpose specified.

62,246.—Machine for Digging Potatoes.—John W. Bartlett, Harmar, Ohio. Antedated Feb. 9, 1867.

First, I claim, in combination with the shovel, A, the track cleaner, D, when formed and attached substantially as and for the purpose set forth.

Second, I claim the revolving cylinder, v, when used in combination with the endless apron, M, and shovel, A, substantially in the manner and for the purpose set forth.

Third, I claim the adjustable shield, V, when used in combination with the cylinder, v, substantially as and for the purpose set forth.

Fourth, I claim the adjusting levers, H, and caster wheels, G', and arms, G, when used in combination with the shovel, A, substantially as and for the purpose set forth.

Fifth, I claim the combination and arrangement of the crank, W, and system of levers, W' X X', and X2, for giving a vibratory motion to the grates, Q and S, substantially as set forth.

Sixth, In combination with the vibrating grate Q, I claim the receptacle, R, and lever, R', the latter being operated substantially in the manner set forth.

Seventh, In combination with the vibrating grate, S, I claim the box, t, door, T', and rod, T2, said parts being arranged substantially as set forth.

62,247.—Pump.—John Bean, Hudson, Mich.

First, I claim the box, C, constructed as described, and provided with the pipes, E and D, substantially as and for the purpose specified.

Second, The box, C, with its pipes, when used in combination with the valve plates, E and d, substantially as and for the purpose specified.

62,248.—Bed Bottom.—Charles E. Best, Jordan, N. Y.

I claim attaching the ends of the straps, D D, to the lower ends of the pins, H, of a bed bottom when arranged in combination with the diagonal straps, C C, and Slats, B B, in the manner and for the purposes set forth.

62,249.—Brick Machine.—George C. Bovey, Cincinnati, Ohio.

First, I claim the provision in a brick machine of the two feeding rollers, J J, having longitudinal corrugations, J' J', geared together to turn in the same direction as the respective mold wheels, and so as not to mesh into each other, and operating substantially as shown.

Second, I also claim the punctuating points, h h' h'', operating within a hollow plunger, and operated by a grooved stationary cam, in combination with the pressing devices as shown and described.

Third, I claim the solid parts of the mold wheels, pressing the bricks as shown in the drawings, also the mold wheel when arranged with stationary grooved cam, hollow plungers, grooved friction roller, with puncturer operating or sliding through it, with shaft of mold wheel passing through the cam, all arranged and operating in the manner described.

Fourth, I claim the dividing tongue, L, when placed between the mold wheels, B and C, and when used for the purpose described.

Fifth, In combination with the mold wheel, B, I also claim the hexagonal or other square-faced pressure-roller, when made and used in the manner described, and for the purposes set forth, or any other polygonal spring roller, for the purpose of squaring the faces of the brick without scraping or cutting the clay, or the face of the brick.

Sixth, I also claim the combination of the mold wheels, B C, feed rollers, J J', dividing tongue, L, pressure rollers, M M', and aprons, N N', when made and used substantially as shown and described.

62,250.—Pipe Tongs.—Elijah Cash, Brooklyn, N. Y.

I claim the pivoted biting jaw, D, and toothed adjustable slide, B, in combination with each other, and with the serrated shank of the fixed jaw, A, and the locking cam, C, substantially as herein set forth, for the purpose specified.

62,251.—Machine for Burnishing Plated Ware.—Samuel A. Chapman, Waterbury, Conn.

I claim the rollers, A and R, revolving to operate in reverse directions, on opposite sides of the work as described, in combination with a longitudinal reciprocating feed motion to the work, at a less velocity than the periphery of the rolls, substantially as and for the purpose herein set forth.

62,252.—Harvester.—James Collins, Guelph, Canada.

First, I claim the combination of the intermittently moving endless apron moving parallel to the finger beam, to effect a side delivery with the vibrating cut off.

Second, The combination substantially as described of the cut off, and intermittently moving endless apron, with the driving mechanism and shipping lever for the purpose of enabling the driver simultaneously to stop the apron and withdraw the cut off, or to start the apron and interpose the cut off as set forth.

Third, The combination of the suspended endless apron, with tension pulleys driving bands, driving pulleys, and shifting gear as described.

62,253.—Coupling for Carriage.—Hiram Conderman, Haskinville, N. Y.

I claim the bar, C, provided with the sections, F F, and annular box, E, when used in combination with the bed piece, A, as and for the purpose specified.

62,254.—Apparatus for Heating Cars and Other Vehicles.—Charles C. Converse, Brooklyn, N. Y.

First, I claim heating cars and vehicles by heat derived from hot water, substantially as described.

Second, I also claim the boiler, A, constructed substantially as described.

with a well, A', extending downwards from its bottom into an inclosing furnace.

Third, I also claim the combination of boiler, A, furnace, G, steam condensing chamber, B, and pipe, E, arranged substantially as shown, for heating cars and vehicles by means of hot water.

Fourth, I also claim the use of a boiler or water receptacle in heating cars and vehicles whose ends are flattened, substantially as shown.

62,255.—PROPELLER.—Jacob Covert, New York City.

I claim a series of vertical floats or blades, b b, secured to parallel sides, E, and so arranged as to form a series of water compartments in combination with the crank, c c, substantially as described and specified.

62,256.—PROCESS OF COATING SHEETS OF MATERIALS WITH SOLUTIONS.—J. C. Crosman, Boston, Mass.

I claim the described process for coating sheets of material with fluid substances or compounds.

62,257.—HARNESS.—Commodore Daniels, Freemont, Ohio.

I claim the kicking straps, q r, U and V, the strap, P, the rod, T, the neck yoke, a, and the bars, Y, the whole arranged and operating substantially as herein described.

62,258.—BOILER FEEDER.—J. W. Doughty and B. F. Olmsted, Newburgh, N. Y.

First, We claim the combination and arrangement of the float, F, with the leg of the syphon, S, links, l' l', lever, l2 l2, weight, W, links, l4 l4, lever, b6, and valve, v, with the chamber, E, and tube, s2, substantially upon the principle and in the manner as herein set forth.

Second, The arrangementt of the short syphon leg, T, whereby to lower or raise it, substantially in the manner as herein set forth.

62,259.—SEEDING MACHINE.—Andrew R. Eggleston and Charles F. Swain, Ripon, Wis.

First, We claim a scatterer placed below the axle, and arranged and operated substantially in the manner and for the purposes set forth.

Second, The arrangement of a series of seed boxes between the grain box, and scatterer, substantially as and for the purpose set forth.

Third, The axle so constructed as form the frame supporting the seed box and cultivators, and the boxes between the seed box and scatterer.

Fourth, The combination of a gage plate, triangular openings in the bottom of the seed box, and feeding pinions, with the seed trough, substantially as and for the purpose set forth.

Fifth, The drag bars, when formed substantially as described and combined with the axle and cultivators, substantially as and for the purpose set forth.

62,260.—MATCH CASE.—Henry Ellig, Bridgeport, Conn.

I claim the combination of the triangular block, C, with the block, A, and jaws, d, when constructed and arranged substantially in the manner and for the purpose herein set forth.

62,261.—INDIA-RUBBER WHIP SOCKET.—Lewis Elliot, Jr. New Haven, Ct.

I claim the india-rubber whip sockets formed with the metallic ring or band around its mouth or open end enclosed within the india-rubber, in the manner and for the purposes set forth.

62,262.—BEDSTEAD FASTENING.—P. H. Freylinghousen, Jonestown, Pa.

First, I claim the plates, a a', dovetailed and recessed at the ends and adapted to each other and to the post, substantially as specified.

Second, The combination of the post, A, plates, a a', secured permanently to the post and the rail, B, with its recess, h, cross piece, d, and projections, i i, as described.

62,263.—CORN PLANTER AND CULTIVATOR.—Alexander M. Gow, Mount Vernon, Ohio.

First, I claim the frame, A, axle, h, windlass, D, with cultivator frames, B and B', all constructed, arranged and used as herein fully described.

Second, The hook, g, when constructed as described and used for connecting the shovel bars to the beams, by means of the block, b' as herein set forth.

Third, The guard, M, as constructed and used for the purposes set forth.

Fourth, The arrangement of the lever, n, with rod, s, and rod, q, for shifting the cultivators when used in the manner and for the purposes specified.

Fifth the arrangement of the bars, C, with their adjustable braces, J, as constructed in combination with the frames, B B', when used as and for the purposes set forth.

Sixth, The arrangement of the rails, G, with the board, E, rollers, E E, and seed boxes, H H, in the manner and for the purpose set forth.

Seventh, The shaft, P, arms, m m, and rods, e e, for operating the seeders when arranged as specified.

Eighth, The seed boxes, H H, with spouts, u u, all constructed and operating as herein set forth.

Ninth, The arrangement of the furrow openers, R, rollers, F, and arms, t, with the seed boxes, H H, and their spouts, u u, rubber blocks, y, and screws, w, when constructed as herein described and used as specified.

62,264.—LAND CONVEYANCE.—Lewis F. Hake, Salem, Ohio.

First, I claim in combination with the frame of a land conveyance which is mounted upon springs and adapted for sustaining the motive power and driving gear I claim the use of gimbal jointed shafts for transmitting motion to the axles of the transporting wheels, substantially as described.

Second, The use of the gimbal jointed and extensible shaft, G, for communicating motion to the forward axle of the guiding wheels, substantially as described.

Third, Supporting the forward part of the frame, A, upon the guiding axle by means of springs when said axle is sustained in part by a sliding segment, and operated by means, substantially as described.

Fourth, The arrangement of the jointed driving shafts, G h h, beneath the spring frame, A, substantially as described.

Fifth, The application of extensible rods, l l, to the transporting wheels of a land conveyance said rods being so applied that they can be made to protrude beyond the circumference of the wheels or drawn within the same at pleasure, substantially as described.

Sixth, Constructing the inner ends of the hubs of the transporting wheels with recesses which are adapted for receiving the clutch plates, t, substantially as described.

62,265.—GRATE FOR STOVES—Lewis F. Hake, Salem, Ohio.

First, I claim providing for contracting the exit passage for the products of combustion, from an open fire box, by means of a pyramidal or conical cap, substantially in the manner and for the purpose specified.

Second, The application of a door or its equivalent to the cap, G, substantially as described.

Third, perforating the cap, G, when applied to an open fire box, substantially as described.

62,266.—MANUFACTURE OF ORDNANCE.—Gustavus P. Harding, Bohemia House, Cheswick, Eng.

I claim the combined arrangement of the parts, a b c, c' c, c3, the interior parts, c c' c2 co, being formed as explained and expanded by a mandrel, J, substantially as herein described.

62,267.—APPARATUS FOR TAPERING MEASURES.—Anson Hatch. New Haven, Ct.

I claim, First, The combination of the two arms and jaws with the index wheel and screw, when they are constructed, arranged and fitted for measuring tapers, substantially as herein described.

Second, I claim the combination of the two jaws with the index wheel and screw, when they are constructed arranged and fitted for measuring the diameter or sides of prisms or articles whose opposite sides are parallel, substantially as herein described and set forth.

62,268.—LIFTING JACK.—W. G. Hermance, Albany, N. Y.

I claim the lever, K, constructed as described in combination with the standard, B, and sliding piece, E, and their slots, g and h, opening together in the manner and for the purposes set forth in this specification.

62,269.—WINDMILL.—Frederic Hewitt, Newark, N. J.

First, I claim the sliding block, G, collars, R, rod or rods, s, and spider, F, arranged and operating in relation with each other and with the loaded lever, I, and sails, E, substantially as herein set forth for the purpose specified.

Second, The annular sliding block, M, and rod, N, arranged with reference to each other and with the loaded lever, I, and shaft or rod, J, substantially as herein set forth for the purpose specified.

62,270.—COOKING RANGE.—Maurice C. Hull, New York City.

First, I claim the descending flue or flues, l l, in combination with the air heating spaces, c2 and c3, and flues, m, passing to an elevated oven, substantially as specified.

Second, I claim the arrangement of the flues, l l and m, for the products of combustion in combination with the air heating spaces, c2 and c3, and air flues, o o', as and for the purposes specified.

Third, I claim the arrangement of the air flues, r s, and smoke flue, s' 4 and 5, in combination with the elevated oven, g, substantially as specified.

Fourth, I claim the escape damper, t, and pipe, t', for the fumes from cooking in combination with the elevated oven, q, as set forth.

Fifth, I claim the water vessel, q, fitted as specified in combination with the air spaces, n n and o', and elevated oven range as set forth.

Sixth, I claim a recess or groove between the water back and fire pot with openings to supply air to the fire, as and for the purposes specified.

62,271.—POTATO DIGGER.—James W. Innis, Newburg, N. Y.

First, I claim the two series of raking blades, E, arranged opposite each other in rear of the shovel plow, substantially as herein set forth for the purpose specified.

Second, The shovel plough constructed with its rear portion rounded or convex and furnished with breaking cutter cutters, b, substantially as herein set forth for the purpose specified.

Third, The supplementary side shares, E, and curved rearwardly extending rods, G, arranged with reference to each other and to the shovel plow, substantially as herein set forth for the purpose specified.

Fourth, The supporting braces, C, constructed with curved portions, a' and arranged in relation with the runners, B, shovel plow, A, and raking blades, E, substantially as herein set forth for the purpose specified.

62,272.—SHOVEL PLOW.—S. W. Jackson, Baldville, Ohio.

I claim the coaster braces, G, adjustable screw rods or arms, D, provided with nuts, J, in combination with the standards, B C, and adjustable handles E, arranged in the manner and for the purpose set forth.

62,273.—ROAD SCRAPER.—William W. Johnson, Harrison, Me., assignor to N. Fannce, Hollis, and W. Bolster, Harrison, Me.

I claim providing the scraper board for excavating and moving earth whether such board is worked upon straight or crooked axles, with the lever, G, the forked link, B, the pin, D, the slotted pieces, E E, and spring, F, arranged and combined substantially as described and for the purposes set forth.

62,274.—ENVELOPE MACHINE.—John M. D. Keating (assignor to E. Keating), New York City.

First, I claim the elastic creasing rollers, l' l' in combination with the plunger, S, for folding the paper blank at right angles, substantially as described and for the purposes specified.

Second, The slotted feeding plate, O, in combination with the plunger, substantially as described and for the purposes specified.

Third, The elastic flap or presser, s' in combination with the folding mechanism, substantially as described and for the purposes specified.

Fourth, The counting mechanism in combination with the folding apparatus, constructed and operated substantially as described and specified.

62,275.—WASHING MACHINE.—James King, North Vernon, Ind.

I claim the combination and arrangement of the traversing box, H, with movable washboard, Q, and stationary washboards, G G, constructed to operate in the box on vat as described.

62,276.—FLESH FORK.—John C. Klien, Birmingham, Pa.

First, I claim the flesh fork prong piece, A, cast of any suitable metal, in combination with and fastened to the handle, B, made of wrought iron.

Second, The flesh fork made of two pieces united together, the prong piece, A, and handle, B, when said piece, A, is cast and the handle, B, is made of wrought iron.

Third, The pins, F F, cast all of one piece with the prong piece, A, of a flesh fork, substantially as and for the purpose specified.

62,277.—ACID COMPOUND FOR USE IN BAKING AND COOKING.—John E. Laner, New York City.

I claim the acid powder or salt obtained by the treatment of bone black with hydrochloric and sulphuric acid, substantially as herein specified.

62,278.—TRUSS FRAME BRIDGES.—F. C. Lowthorp, Trenton, N. J.

I claim the casting B, constructed and arranged for the reception of the diagonals, and secured to or forming a part of the upper and lower portions A, and A,' of the vertical of a truss frame bridge aqueduct, etc., all substantially as and for the purpose herein set forth.

62,279.—BOAT DETACHING TACKLE.—G. B. Massey, New York, N. Y.

I claim the rod A, provided with the right and left hand grooves to receive, hold and disengage the suspending loops or rings a, by positive movements when arranged for use in connection with a boat substantially as set forth.

62,280.—CORN PLANTER.—Henry Maxell, (assignor to himself and Levi Longabaugh), Canton, Ohio.

I claim the arrangement of the box A, sack c, hooks B B, seed slide D, as constructed and provided with its gage, spring and rod H, when the several parts are combined and used as and for the purpose specified.

62,281.—MANY-BARRELLED GUN.—Enrique A. Mejia, Mexico.

I claim the construction of a rotating axle provided with and having thereon a series of double cams L L L L, of the shape shown and so arranged or disposed around the circumference of said axle, as that their ends all situated at different planes or right lines, relative to each other as in Figs. 1 and 6, each of said cams being situated and working within a vertical slotted and side mortised plunger block or hammer head m m, n, o, together with the internal ratchet wheel w2, w2, the continuous ratchet t, the detents a2, u, the main spring q, r, s, and the ratchet spring b2, v, the whole combined with and operated by a hand trigger or winch handle x, y, z, whereby and through all of which the charges or loads, of a series of gun barrels or detachable magazines may be exploded and discharged in rapid succession d, by the backward and forward movement of said winch handle x, y, z, substantially as set forth and described.

62,282.—MEDICINE.—Abel Messex, Waynesboro, Ga.

I claim the composition mixture or medicine above described for the cure of small-pox which is made by following substantially the directions and descriptions above set forth.

62,283.—PRIMING METALLIC CARTRIDGES.—Isaac M. Milbank, Greenfield Hill, Conn.

I claim the base c, soldered or brazed into the cartridge case a, and covered by the base e, in combination with the fulminate tube i, and head o, setting within a countersink in the base c, as and for the purposes set forth.

62,284.—STILTS.—George Murray, Cambridgeport, Mass.

I claim the movable step as described in combination with the standard for the object specified.

62,285.—TUMBLERS WITH GUARDED CUTTERS.—Lewin A. Peck, Newton Corner, Mass.

I claim the combination as well as the arrangement of the lever knife and its operative spring with the thimble or finger clasp, as set forth.

I also claim the combination as well as the arrangement of the knife and its case or guard with the thimble or clasp as explained.

62,286.—SEED SOWER.—D. R. Prindle, East Bethany, N. Y.

First, I claim the seed bar E, constituted as described and used in the manner and for the purposes set forth.

Second, I claim the hopper D, with rod G, and spring with index H, and rest b, all constructed arranged and operating in the manner substantially as herein set forth.

62,287.—SEWING MACHINE.—T. K. Reed, East Bridgewater, Mass.

I claim, in combination with a sewing-machine shuttle race, an aperture or provision for insertion of an instrument or device through one of the walls or plates thereof so that when the shuttle is brought to rest at a fixed position connection can be made between such instrument or device and the tension mechanism of the shuttle and the stress upon the shuttle thread may be regulated by such connection, substantially as described.

I also claim combining with such provision a device fixed to or forming part of the machine and so located that it may be thrown into and out of connection with the tension mechanism of the shuttle is at rest and be made to operate such tension mechanism, substantially as set forth.

62,288.—TENSION MECHANISM OF SEWING-MACHINE SHUTTLES.—T. K. Reed, East Bridgewater, Mass.

I claim combining with the screw shaft the spur or toothed wheel or nut, or its equivalent, through rotation of which the movement of the shaft is effected, to regulate the stress of the tension spring, substantially as set forth.

I also claim the combination of the hinged pad or plate, c, and the adjusting spring, h, when constructed and arranged to operate substantially as set forth.

62,289.—PEAT MACHINE.—Samuel Root (assignor to himself and W. H. Clark), New Haven, Conn.

I claim the combination of the two grinding cylinders, A and B, with the apron, G, scraper, S, and table, L, constructed and arranged to operate together, substantially as and for the purpose set forth.

62,290.—CORN PLANTER.—Daniel Ruppert, Nimisila, Ohio.

I claim, First, The above-described construction and arrangement of axle, L, provided with feed hole, M, in combination with the lock lever, N, and arm, O, substantially as set forth.

Second, I claim the rakes, H, in combination with the coverers, substantially as described.

62,291.—WRENCH.—Julius B. Savage, Southington, Conn.

I claim the collar, F, and ferrule, I, provided with a tongue, f, with the bar, A, when constructed and combined to secure the collar to the bar, substantially as herein set forth.

62,292.—SUGAR EVAPORATOR.—Shubel M. Shattuck, Cambridge, Ill.

I claim, First, The radiator, B, constructed substantially as described and for the purpose set forth.

Second, The dampers, D and d, substantially as and for the purpose set forth.

Third, The plate, C, in combination with the dampers, D and d, and radiator, B, substantially as described.

62,293.—MACHINE FOR EXTENDING TUBING.—H. A. Shipman and A. B. Hendryx, Ansonia, Conn.

We claim extending metallic tubing and reducing the thickness thereof by first applying external pressure to the tube which shall reduce its diameter, and then internal pressure which will restore or partially so the previous internal diameter of the tube shall alternate and elongate the metal, in the manner and by means substantially as herein set forth.

62,294.—HAIR CRIMPER.—John B. Siccardi, New York City.

I claim the arrangement of two series of round bars or rods, A and B, of different diameters in such a manner that one series of bars shall fit between and into the recess formed by the other series, said bars being hinged or fastened together at their ends, substantially in the manner and for the purpose as set forth and described.

62,295.—APPARATUS FOR SATURATING TIMBER.—W. B. Smith, La Fayette, Ill.

I claim the sack, A, constructed and applied substantially in the manner and for the purpose set forth.

62,296.—ARTIFICIAL TEETH.—S. W. Stockton, Philadelphia, Pa.

I claim the two holes, b and c, in combination with the slot, d, the same being constructed in the body, A, of a porcelain or artificial tooth or block of teeth, substantially as and for the purpose set forth and described.

62,297.—PAIN KILLER.—H. Stonebraker, Baltimore, Md.

I claim the above-described pain killer, when composed and used substantially as and for the purposes set forth.

62,298.—LINIMENT.—H. Stonebraker, Baltimore, Md.

I claim the within-described liniment, when mixed and used, substantially as and for the purposes set forth.

62,299.—MODE OF PHOTOGRAPHING ENGRAVERS' BLOCKS.—Benjamin F. Taylor, Philadelphia, Pa., assignor to himself and George Taylor, Camden, N. J.

I claim the use of a reflector, with a photographic camera for obtaining a reverse photographic impression on blocks of wood, stone, or metal, for the use of engravers, the said blocks or plates being coated with the solution above specified, or its equivalent, to receive the impression from the negative plates, substantially in the manner hereinbefore described.

62,300.—BAGGAGE CHECK.—George C. Thomas, Brooklyn, N. Y.

First, I claim the combination with a railroad or express check, having the number of the check indicated thereon, by a detachable piece, forming an addition to or supplementary part of said check, and attached directly to the check or to the check strap, which shall indicate the destination of the baggage.

Second, The combination with a railroad or express check, having the number of the check indicated thereon, of a detachable piece forming an addition to or supplementary part thereof, and attached directly to the check or the check strap, and so made as to be capable of indicating by its color or shape the direction in which the baggage is to be sent, or the road or branch road over which it is to go.

Third, The combination with a railroad or express check, of a detachable piece forming an addition to or a supplementary part thereof, and indicating the direction or the destination of the baggage when the said detachable piece is secured in position either in part or wholly by the check strap, substantially as herein set forth.

62,301.—HORSE COLLAR.—James Clifford Tredway, Buffalo, N. Y.

First, I claim the staples, M, provided with lugs, n n, draft iron, O, having eyes, p p, and notches, q q, in combination with the tug, q, and collar, A A as constructed and arranged substantially as set forth.

Second, I also claim the manner of attaching a light tug, l, to the collar or hames by means of the projecting standard, J, provided with the head, K, which is secured in the end of the tug, substantially as described.

Third, I also claim the curved bar, B, rigidly attached to the collar frame on one side, and jointed to the other in combination with one padded frame of the collar when the latter is so constructed as to preserve ample space for the wind pipe, substantially as and for the purposes described.

62,302.—CULTIVATOR.—Lewis G. Tuttle, North Haven, Ct.

I claim the combination of the shafts, G H, when made vertically adjustable with the beams, C and D, when made horizontally adjustable, and the whole is constructed and arranged substantially as herein described.

62,303.—RAILROAD CAR STARTER.—A. A. Wilder, Detroit, Mich.

First, I claim in a device for starting cars the eccentric dog, h, wheel, G, arms, f and g, spring, j, links, c and d, in combination with axle, B, when constructed, arranged, and operating in the manner substantially as shown and described, and for the purpose set forth.

Second, In a device for starting cars the combination of the eccentric dog, h, and stop, H, when operating in the manner substantially as shown and described, and for the purpose set forth.

REISSUES.

2,484.—GRAIN SEPARATOR.—Peter Geiser, Greencastle, Pa. Patented Oct. 19, 1852. Extended seven years.

I claim, First, A series of toothed bars, G, attached directly to a crank shaft having cranks at varying angles, said bars having reciprocating motion in parallel vertical planes and coming alternately or successively into action on the straw, substantially as and for the purpose set forth.

Second, I also claim in combination with the reciprocating toothed bars, G, the trough, A, when the bottom of the latter is sub-divided into tight and open portions, substantially as and for the purpose set forth.

Third, So arranging the reciprocating toothed bar, G, on a crank shaft having cranks of varying angles that the whole shall be counterbalanced substantially as set forth.

2,485.—MANUFACTURE OF SKIRT WIRE.—The Silver Skirt and Wire Manufacturing Company, New York City. Assignees of T. S. Sperry. Patented March 7, 1865. Reissued June 5, 1866.

We claim skirt wire protected wholly or partially by metal wire, substantially as and for the purpose described.

2,486.—COTTON BALE TIE.—Charles W. Wailey, New Orleans, La. Patented Oct. 9, 1866.

I claim the wrought or malleable iron self-fastening buckle or tie, A, when provided with curved projecting lips, B B', and openings, C C', and otherwise constructed as described for the purpose set forth.

2,487.—DRILLING AND BOLT TAPPING MACHINE.—Charles W. Coe, Fentonville, Mich.—Patented June 20, 1863.

I claim First, The arrangement of the level gear wheels, D E and H, in such a manner that the shaft, I, may therefore be revolved with more or less speed and power for the different purposes to which the machine may be adapted, substantially as herein shown and described.

Second, The automatic feed arrangement consisting of the ratchet, M, pawl, N, spring, P, and cam, Q, whereby the drill is fed to its work, substantially as set forth, the said feed arrangement being so made that it can be detached and the drill fed by hand, substantially as herein shown and described.

Third, In combination with the machine I also claim the vise for holding bolts for making screws, said vise consisting of the jaws, S S', and screw, V, arranged in the base, R, of the frame, substantially as herein shown and described.

Fourth, I claim the combination of the shaft, I and screw, K, with the pinion, H, and nut, L, whereby the rotary motion is given to the drill and also the necessary feed, substantially as herein shown and described.

2,488.—PISTON FOR STEAM ENGINES.—Orlando Kelsey and Joshua F. Bailey, New York City. Assignees of Benj. H. Hedden. Patented Aug. 4, 1863.

I claim the combination of the following instrumentalities, viz. the piston, the expansible packing ring and removable tubular case with its valves and seats, substantially as set forth.

I also claim the combination of the expansible packing ring for a piston with a cylindrical shell, substantially as set forth.

I also claim the combination of the expansible packing ring, cylindrical shell, piston, and valvular apparatus, substantially as set forth.

2,489.—COAL DUMPING APPARATUS.—Edwin R. Kerr, and James L. Platt, Kewanee, Ill.—Assignees of Edwin R. Kerr. Patented Oct. 2, 1866.

I claim the chutes, B, placed in a shed or building when provided with two doors, C E, the outer ones, F, being so arranged or combined as to serve when lowered or opened as a continuation of chutes, substantially as shown and described.

I also claim counterpoising the outer doors, E, by means of weights, substantially in the manner as and for the purpose specified.

I further claim doors, C, when hung at their upper ends in combination with the bolts, D, at their lower ends, when said doors are applied to chutes, B, for the purpose herein set forth.

I further claim the chains or ropes, G, and weights, F, for adjusting and supporting the outer end of the extension door, E, of a chute, substantially as specified.

2,490.—HARVESTER.—Reuben Hoffhems, Dover, Pa. Patented Nov. 3, 1863. Reissued Nov. 7, 1865.

I claim, First, The combination in a two wheeled hinge joint machine of a drivers seat mounted upon the finger beam, and rotating around a vertical axis, or one nearly so, substantially in the manner described, for the purpose of enabling the driver to ride on the machine while the rake is in operation.

Second, The combination in a two wheeled hinge joint machine of a shoe with a hinge joint in it with a rake and platform having an extension, J 2, and with a draft frame which sustains the weight of the cutting apparatus, and raking apparatus with platform attached, at a point between the two drive wheels.

Third, The combination with the hinged joint machine of the inner shoe, and raking apparatus, substantially as described.

Fourth, The combination of a revolving or turning rake, extensible tumbling shaft and drawing shaft or axle of the main frame, substantially as described.

Fifth, The combination of a two wheeled joint machine, with a revolving raking apparatus and a drivers seat mounted on the main frame, substantially as described and for the purpose set forth.

Sixth, I claim driving a revolving rake, or a combined revolving rake and reel, which move about a vertical or nearly vertical axis by a device arranged on the grain side of the inner drive wheel or inner side of the draft frame.

Seventh, Making a direct driving connection between a revolving rake or a combined rake and reel which move about a vertical or nearly vertical axis, and the inner end of the main axle of the draft frame.

Eighth, Employing a tumbling shaft on the inner side of the draft frame for driving a revolving rake, or a revolving rake and reel which is mounted on a hinged finger beam or upon the platform.

Ninth, The combination of a quadrant platform, hinged finger beam, revolving rake and a drivers seat supported by the main frame.

2,491.—CLASP FOR METALLIC HOOPS.—James R. Speer, Pittsburgh, Pa. Patented Dec. 1, 1857.

I claim a clasp provided with an aperture or apertures and so bent across said aperture or apertures as to present an opening or openings for the easy insertion of the ends of the bands or hoops and form an efficient clasp for securing the ends of the band or hoop, substantially as herein described, and for the purpose set forth.

2,492.—LAMP BURNER.—Alexander J. Walker, New York City. Assignees of Emil Tritten, by mesne assignments. Patented Aug. 19, 1862.

I claim, First, The ranges or series of elongated openings or slots introduced into the burner and so arranged in respect to each other that the several intervening supports of one series come opposite the openings in the next series and thus compel the heat to traverse an indirect or zig-zag route, and thereby lessen the heat conducted to the oil receptacle, substantially as set forth.

Second, Constructing the wick tube in two parts with an open space between the upper which is exposed to the heat of the flame, and the lower part which is directly connected with the reservoir, the two parts being connected substantially as herein described so as to impede the conduction of heat from the upper part of the wick tube to the oil in the reservoir.

DESIGNS.

2,583.—MONOGRAM.—John H. Cummings, Boston, Mass.

2,584.—FRAME FOR A SEWING MACHINE.—Walker B. Bartram, Danbury, Ct.

2,585, and 2,586.—COFFIN HANDLE.—C. L. Leiberg, New Haven, Ct. (assignor to Sargent & Co). Two patents.

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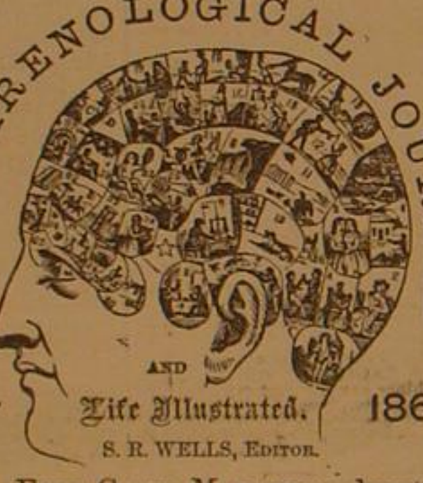
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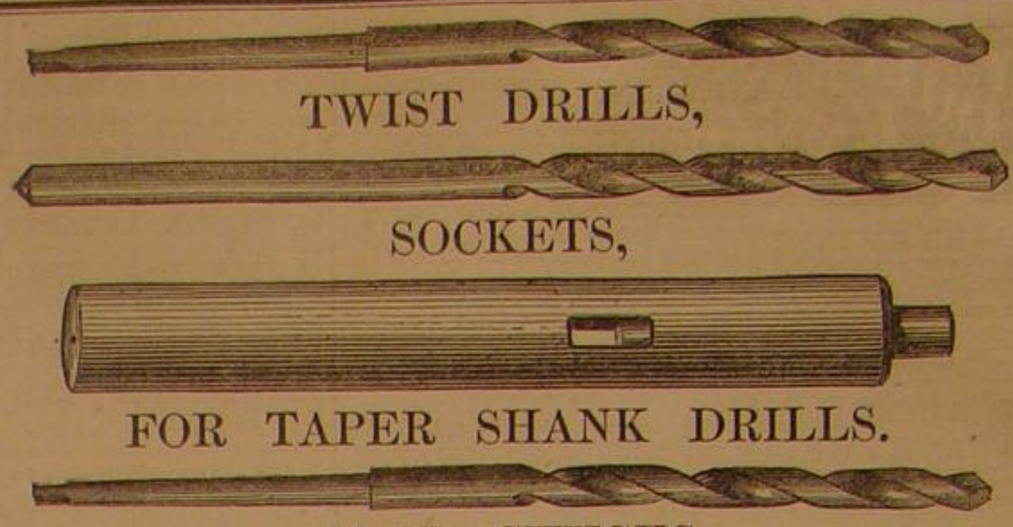
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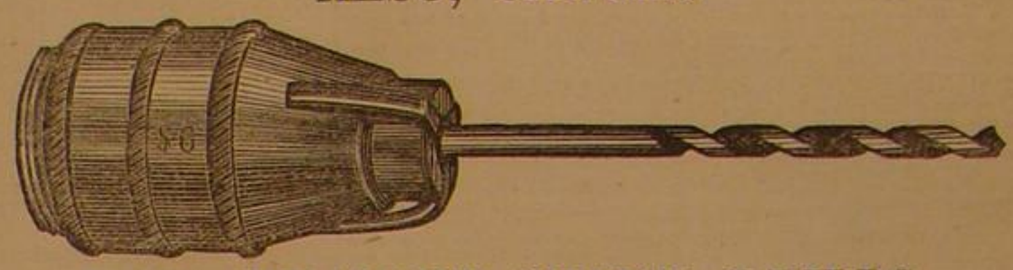
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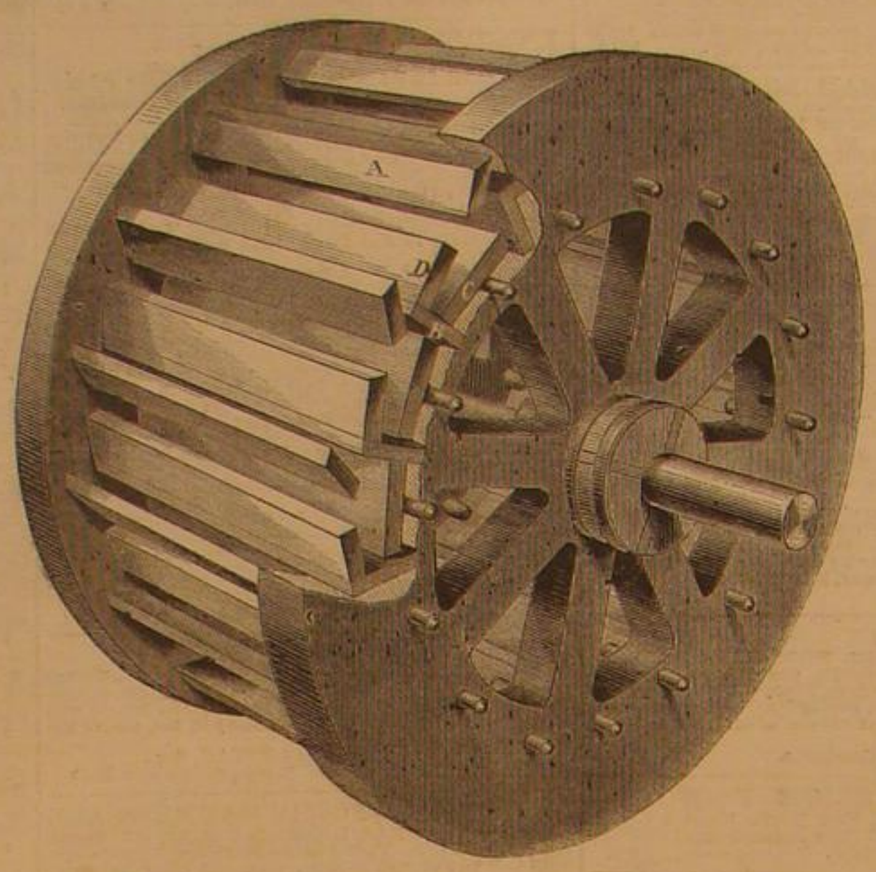
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Improved Overshot Wheel.

The breast wheel is impelled solely by the gravity of the water thrown into its buckets, and the same is true to a large extent of overshot wheels. Some little force is undoubtedly derived from the impact of the stream on the buckets of the ordinary style of overshot wheels, but often a portion of this force is diverted by the form of the buckets. This improved wheel, which was patented through the Scientific American Patent Agency, Aug. 1, 1865, is intended to remove the objections to the ordinary overshot wheel and to increase its efficiency. The inventor says he has found by experiment that this form and arrangement of the buckets will yield one-third more power than the common overshot wheel, other things being equal, and he believes it is superior to any other wheel, not excepting the turbine.

The jet of water first impinges upon the inner edge of the upper bucket, A, the inclination of which directs the stream against the radial bucket, B, which, with the bottom and top, C and D, form a very compact receptacle, which holds the weight of the water securely until the wheel has made half a revolution. The heads of the wheel may be built of wood, or cast of iron with suitable shoulders for receiving the ends of the buckets. The bottom buckets C, are pinned through the heads, making a very strong and stiff wheel.

The whole patent right, or State and manufacturers' rights may be obtained by addressing the patentee, Andrew Jamison, Taylorstown, Pa.



JAMISON'S OVERSHOT WHEEL.

American Beet Sugar.

We have kept our readers thoroughly informed of the history, progress, and improvement of the beet sugar manufacture in Europe, and they will learn with an intelligent interest the circumstances of an experiment in this line begun last year in Illinois by a German company. They planted four hundred acres of land in Livingston county, mostly fresh prairie, from which they have raised a crop of more than four thousand tuns of fine beets, at a cost, according to their own estimate, of less than four dollars per tun. The juice was found to average 12 per cent of sugar, or 5½ per cent of refined "B." The capacity of the manufactory is estimated to be equal to fifty tuns of beets per day. During the few days the works had been in operation at the date of the report, they turned out about eighteen thousand pounds of sugar. The pulp was not watered on the centrifugals, in order to save evaporation. The juice was boiled blank and placed in large tanks to crystallize. This course was taken mainly to economize the use of steam. The first product granulated in twenty-four hours, and the second in three days, so as to go in centrifugal machines.

A Compact Engine.

The Holske Machine Company, at 528 Water street, New York, have running a very novel stationary engine, rated at sixty-five horse power, that is noticeable for its compactness and ease of working. It has two upright cylinders, the connecting rods of which are attached to a double oscillating beam in such a manner that when one is on the quarter stroke the other is at the end of the stroke. The valves are worked from horizontal shafts, having lifting cams which engage with friction rolls, by which the steam is cut off instantly at any required point of the stroke. Some of its movements are very ingenious, and although the whole engine occupies a space not more than four by five feet and four high, the work is in plain view and easily reached for repairs. It is a very smooth-working machine and worthy the attention of mechanics.

Pinchbeck or False Gold---A Curious Advertisement.

Pinchbeck was well known to the last generation as an imitation of gold and largely employed as a substitute for the precious metals in the manufacture of jewelry. It was the discovery of Christopher Pinchbeck who flourished in London in the early part of the last century. The metal was an alloy of five parts copper and one of zinc. Oreide has now usurped its place as an imitation of gold. Mr. Pinchbeck appears to have been quite a genius if his advertisement, published in *Applebee's Weekly Journal* of July 18th, 1721, is reliable:

"Notice is hereby given to Noblemen, Gentlemen and Others, that Chr. Pinchbeck, Inventor and Maker of the famous Astronomico-musical Clocks is removed from St. George's-court, St. Jones's-lane, to the sign of the 'Astronomico-musical Clock,' in Fleet-street, near the 'Leg' Tavern. He maketh and selleth watches of all sorts and Clocks, as well for the exact Indication of Time only, as Astronomical, for showing the various Motions and Phenomena of planets and fixed stars, solving at sight several Astronomical problems, besides all this a variety of Musical performances, and that to the greatest Nicety of Time and Tune with the usual graces: together with a wonderful imitation of Songs and Voices of an Aviary of Birds so natural that any who saw not the Instrument would be persuaded that it were in Reality what it only represents. He makes Musical Automata or Instruments of themselves to play exceedingly well on the Flute, Flaggelet, or Organ, Setts of Country Dances, Minuets, Jiggs and the Opera Tunes, or the most perfect imitation of the Aviary of Birds above-mentioned, fit for the Diversion of those in places where a Musician is not at hand. He makes also organs performing of themselves Psalm Tunes with two, three or More Voluntaries, very convenient for Churches in remote Country Places, where Organists cannot be had, or have sufficient Encouragement. And finally he mends Watches and Clocks in such sort that they will perform to an Exactness which possibly thro' defect in finishing or other Accidents they formerly could not."

A Curious Clock.

Rev. John Wesley in his journal gives the following account of a talking clock:

"On Monday, April 27, 1762, being at Lurgan, in Ireland, I embraced the opportunity which I had desired, of talking to Mr. Miller, the contriver of that statue which was in Lurgan when I was there before. It was the figure of an old man standing in a case, with a curtain drawn before him, over against a clock, which stood on the opposite side of the room. Every time the clock struck he opened the door with one hand, drew back the curtain with the other, turned his head as if looking round on the company, and then said, with a clear, loud, articulate voice, past one, or two, or three, and so on. But so many came to see this (the like of which all allowed was not to be seen in Europe) that Mr. Miller was in danger of being ruined, not having time to attend to his own business. So as none offered to purchase it or reward him for his pains, he took the whole machine to pieces."

Effects of Alcohol.—Experiments made by Drs. Ringer and Rickards on men and animals go to show that the temperature of the body falls nearly as fast after the use of alcohol in doses sufficient to produce intoxication, as after death itself. The facility with which drunkards freeze to death, is explained by this fact.—Dr. Jolly declares that an increasing tendency towards mental disease has been generated by the increasing consumption of spirits. Official reports show that the abuse of alcohol accounts for one fifth of the insanity in France.

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American Inventors should bear in mind that, as a general rule, an invention which is valuable to the patentee n this country is worth equally as much in England and some other foreign countries. In England the law does not protect the right of a foreign inventor as against the first introducer of an invention from abroad. For twenty years past the great majority of patents taken out by Americans in foreign countries have been obtained through Munn & Co's agency. Patents are secured with the utmost dispatch in Great Britain, France, Prussia, Belgium, Russia, Austria, Italy, The Netherlands, Spain, Sweden, Australia, and other foreign countries. Models are not required, but the utmost care and experience are necessary in the preparation of applications. Patentees who intend to take out Foreign Patents should send to us for a Pamphlet of full advice. Address

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If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

We (MUNN & CO.) have been actively engaged in the business of obtaining patents for over twenty years—*nearly a quarter of a century.* Many thousands of inventors have had benefit from our counsels. More than one-third of all patents granted are obtained by us.

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Additions can be made to Caveats at any time. A Caveat runs one year, and can be renewed on payment of $10 a year for as long a period as desired.

In Order to Apply for a Patent, the law requires that a model shall be furnished, not over a foot in any dimensions,—smaller, if possible. Send the model by express, pre-paid, addressed to Munn & Co., 37 Park Row, N. Y., together with a description of its operation and merits; also, remit the first Government and stamp fees, $16. On receipt thereof we will prepare the patent papers and send them to the inventor for examination, signature, and oath. Our charge for preparing the drawings and all the documents, with attendance to the business before the Patent Office, is $25, for the simplest cases, up to $35, and more, according to the labor involved. Our charges are always very moderate. When the patent is allowed, $20 more is paid the Government, making a total of $61 for the simplest case.

The model should be neatly made of any suitable materials, strongly fastened, without glue, varnished or painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

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SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

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The Pneumatic Sub-aqueous Tube.

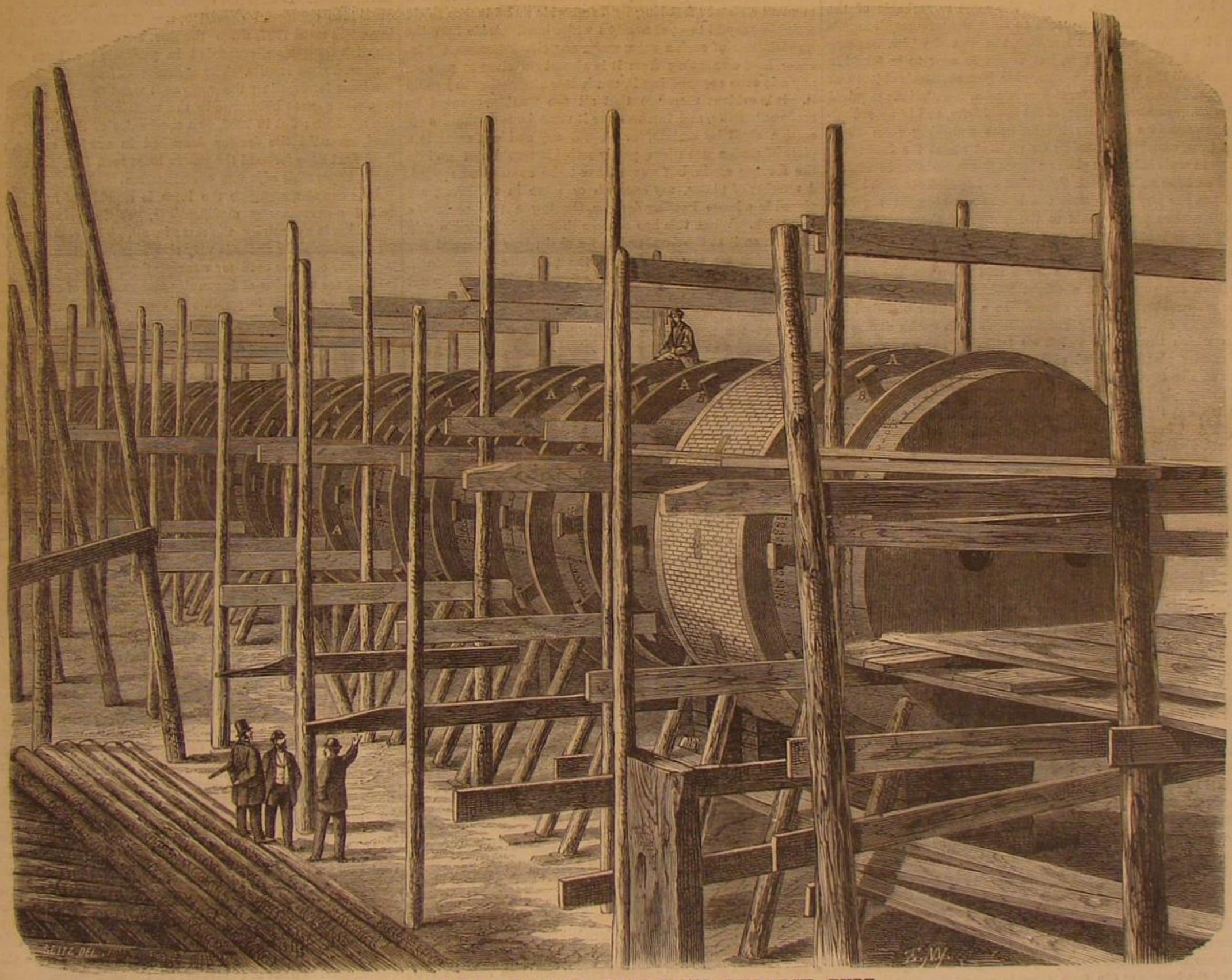
Much interest is manifested by the people generally, as well as by business men particularly, in the subject of additional means of intercommunication between different portions of the metropolis; and several plans are now before a legislative committee at Albany to accomplish this result. The engraving, therefore, which we present will possess special interest to our readers at this time.

It represents a section of a tube now in process of construction in London, for connecting pneumatic lines on either side of the river Thames. It is being laid by the Waterloo and Whitehall Pneumatic Railway Company. The sections are 221 feet in length, made of ¾ inch rolled iron, strengthened by circumferential ribs, A, the spaces between being filled with brick work of three thicknesses, held in place and locked by projecting snugs, B. The iron, therefore, will not be exposed to the action of water, but the tube will be essentially a tunnel of masonry, as it will receive also a lining, interiorly, of brick. When completed the internal diameter will be 12 feet 9 inches. The bottom of the river has been dredged and piers of masonry have been constructed beneath the bed of the river, rising nearly to the surface of the bottom. The tube sections may therefore be considered each a submerged tubular bridge, except that they will be supported not alone by the piers but by the bed scooped in the river bottom.

These sections are built as seen in the engraving, the enveloping courses of brick being laid before the tube is placed in position. After the outside is completed the ends are closed airtight by suitable bulkheads, and the tube launched and floated to place, and sunk by the admission of a sufficient quantity of water, to be afterward pumped out. The ends are to be then brought together and secured by proper packed joints. The sub-aqueous tunnel when completed will be about five-eighths of a mile in length.

Our engraving is from a photograph sent by Sir Charles Fox to M. O. Davidson, C. E., of New York City. A company is already formed for laying similar tubes across both the East and North rivers and encircling the island. The land routes are from Bowling Green, to City Hall Park, under Broadway, under Chatham, Bowery and Third avenue to Harlem River; from the City Hall Park northwesterly to Hudson street and under that and Eighth avenue to Central Park and thence under Broadway to One Hundred and Twenty-fifth street, connecting at various points with the encircling submerged tube and those from Brooklyn, Jersey City, Williamsburg and other points divided from the city proper by water.

This method of tunneling would seem to present marked advantages over that of driving a passage through the earth under a river bed. The tube is to be sunk so that its top surface will not rise above the river bottom, thus presenting no bar for the collection of drift and no obstacle to navigation.



THAMES RIVER, LONDON, PNEUMATIC DISPATCH TUBE.

THE MANUFACTURE OF BESSEMER AND CRUCIBLE STEEL.

[From our Foreign Correspondent.]

SHEFFIELD, Feb. 9, 1867.

ACTIVITY OF THE BESSEMER MANUFACTURE.

The Bessemer process is a marked exception to the general rule of extreme difficulty in the introduction of radical changes in mechanical operations. Perhaps if the same patient study and repeated experiment bestowed upon this had been given to every promising invention, great changes would have been more frequent. When, after several years of persevering industry, the uniform success of the process was established, its vast importance made its rapid adoption a matter of course, and now nearly all the principal iron works have their Bessemer plant, beside a large number of entirely new companies formed expressly for this manufacture. The usual size of the converting vessels is for a charge of five tuns, but at Barrow in Furness they employ 7½-tun vessels, while Messrs. John Brown & Co., at Sheffield, have a pair of a capacity of ten tuns. Of late it must be confessed the reputation of the Bessemer metal has been somewhat injured by the efforts of rival makers to undersell each other and the consequent use of inferior iron in the manufacture, but at the same time the makers know very well that if they will use the proper materials it lies in their power to produce a metal of the highest degree of excellence. Unfortunately the process does not remove the phosphorus or sulphur which may be contained in the pig iron, and hence many kinds of iron are entirely unfit for use in this way, and among them that produced in the Cleveland district where the improvement of blast furnaces has been carried to such an extent.

To a spectator the operation of conversion in the Bessemer apparatus is the most brilliant and grand sight in the whole range of metallurgy. From the mouth of the vessel issues at the commencement of the "blowing" a stream of flame accompanied by brilliant scintillations darting rapidly about. As the process continues the flame increases in brilliancy till it rivals sunlight itself, the sparks become less lively and fall more like fine snow flakes, while occasionally a portion of the boiling mass is thrown out at the mouth and gives evidence of the violence of the commotion in the vessel. When the decarbonization is complete the flame suddenly loses much of its illuminating power, though still voluminous, and the vessel is then turned down, the blast shut off and the charge of melted spiegel eisen, or compound of iron, carbon and manganese—required to secure malleability in the product—is run in. In comparison with the dazzling whiteness of the metal in the vessel it looks dark and turbid. The whole charge is then poured out into a ladle by turning the vessel still farther over on its trunnions, and the metal is then discharged

into iron ingot molds through a nozzle in the bottom of the ladle.

STEEL RAILS AND IRON PLATES.

By far the greatest consumption of the metal at present is in the manufacture of rails, the superiority of which over those of iron was alluded to in one of my earlier letters, and I find at the various works I have visited that no small proportion of these are for our own country, and it is very certain the manufacturers are very jealous of American competition, as they look upon that as their best market. There are many other uses, however, for which the metal is of great value, such as boiler plates, bridge plates, heavy shafts, piston rods, railway tires, and all purposes where strength is required in combination with lightness. Expectation, moreover, fixes upon some modification of this process for the production of armor plates. At present the nature of the metal is not suited for this purpose, as it requires the greatest possible degree of softness to resist the impact of shot without serious cracking. But it is sanguinely hoped that by the use of ferro-manganese instead of the triple compound of iron, carbon and manganese, it will be possible to produce a metal exactly adapted to this purpose.

RAMSBOTTOM'S DUPLEX HAMMER.

Following in the train of this great innovation has been a great change in the tools required for working the material up into desired forms. One of the most remarkable of the tools that have been produced to meet the new requirements is Rambottom's duplex hammer, the first of which was constructed three years ago, but which is now to be found in nearly all the principal works. Mr. Ramsbottom's object was to avoid the necessity for the expensive foundations required with large steam hammers of the usual form, and he accordingly mounts two hammer blocks, each weighing from 10 to 30 tuns, on wheels running on rails at about the floor level, and in a pit below he places a large steam cylinder in a vertical position and connects the piston rod by links to each block. When the piston descends the blocks are brought together with a force proportional to the power of the cylinder, but the shock is entirely between the two blocks and is not transmitted to the ground. The mass to be operated upon rests upon a simple carriage on rails laid between the blocks, which are capable of a slight rocking motion to keep the ingot or bloom in the center. In a hammer of this kind recently erected at Mr Ramsbottom's own works at Crewe, in which the blocks weigh 30 tons each, there is a steam cylinder placed behind each block and connected directly to it, the two being obliged to move at a uniform rate by having placed beneath them a 5-inch screw with 9 inches pitch, cut right handed at one end and left handed at the other. There are nuts on the under side of the blocks which work upon this screw and thus regulate their motion. This beautiful invention, though it may not have been yet perfected in all its details, is certainly destined to be largely employed for heavy forging.

MANUFACTURE OF CRUCIBLE STEEL.

In 1864 the whole amount of pen steel consumed throughout the world was 14 tons per week, and of this 9 tons was produced weekly at the works of Messrs. W. Jessop & Sons. This, however, would form but a small part of their product. The iron used for converting is the best Swedish, in bars about 3 in. wide by ½ in. thick. About 25 tons of this is converted in a single furnace, requiring a fortnight to effect the change. The iron is packed in air-tight cases, with alternate layers of charcoal, and maintained at a perfectly uniform red heat for that time. An opening is provided in the furnace through which a sample bar can be withdrawn to enable the workman to judge of the progress of the operation, and of course on the skill of the man greatly depends the success of the process. The blister steel so produced is broken up into small pieces and carefully assorted so as to insure uniformity in the different kinds of steel which it is desired to produce, and these are then melted in clay crucibles with luted covers in furnaces sunk in the floor, as is usual in brass foundries. This requires about three hours, at the end of which time the "pots" are lifted out of the fire, the covers knocked off, and the contents poured into iron ingot moulds. The heat is so intense that the men are protected around the legs by thick cloths, kept constantly wet. For hammering the ingots into bars, tilt hammers are always employed, working at a very quick speed, and the incessant din from these is one of the peculiar characteristics of a place like Sheffield. Some makers express a preference for small self-acting steam hammers, but very few of these, comparatively, are in use. The tilter sits in a swing suspended from the roof, his feet just touching the ground, and by constantly moving himself back and forth he brings every part of the bar equally under the action of the hammer. When the bar has been brought down to the required size, another man brings a fresh ingot from the furnace and places it under the hammer, so that the tilter does not leave his seat or cease his manipulation. The skill acquired by these men is proved by the beautiful appearance of the steel as it reaches our market. Spring steel is rolled directly from the blister steel, as so great uniformity is not required in this case.

STEEL CASTINGS.

The casting of sound steel ingots of large size is a matter of the greatest difficulty. With the power to produce steel in large quantities by the Bessemer process, it is evident what important results might be obtained were we able to run this directly into castings of irregular shape for machinery purposes where great strength is required. Unfortunately, however, castings so made are full of blow holes, due not at all to the nature of the molds, but to the properties of the steel itself. A few makers, and notably Messrs. Naylor, Vickers & Co., have succeeded in overcoming this difficulty, but the means by which it is effected are kept secret, though it is supposed, with good reason, that allowing the metal to remain in the pots in a state of fusion for a considerable time before pouring has much to do with it. The price of such castings is still too high to render them available except in special cases.

ROLLING ARMOR PLATES.

Of late years the character of the manufactures carried on at Sheffield has undergone a great change. It is no longer merely the manufactory of penknives and scissors, but has taken the first rank in the heaviest kind of iron work, the production of armor plates, and this together with the rolling of steel rails has quite cast the former specialties into the background. The principal establishments for carrying on both these branches of manufacture are the Atlas Works of Messrs. John Brown & Co., Limited, and the Cyclops Works belonging to Messrs. Chas. Cammell & Co., also a limited liability company. In 1858 the Atlas Works employed only 300 men, and their chief product was buffers for railway carriages (a branch of business still largely carried on by this firm and the Cyclops works.) Now they employ over 3,000 hands. The manufacture of armor plates as carried on at these works in one of the most wonderful instances of the manner in which by machinery we are enabled to deal with masses that would appear to be wholly unmanageable. Imagine, for a moment a slab 50 feet long by 5 feet wide and 6 inches thick, weighing say 25 tuns, at nearly a white heat. Aside from the unwieldiness of such a mass under any circumstances, the intense heat emanating from it is almost sufficient to prevent any one even approaching it, much less attempting to handle it. It is evident therefore that all the machinery must be made automatic, and furthermore it must be such that its operation shall be certain, for should any accident occur to a plate of such a size when partly rolled it would not go into the furnace again, but would have to be cut up and repiled. A number of plates, say one inch or more in thickness, are placed in a large heating furnace, forming a pile perhaps a foot thick. When this has become thoroughly heated a grip is taken on it at the front end and a chain passed around the rolls, which for the time serve the part of a large winch. These being set in motion draw the fiery mass majestically out of the furnace upon a truck placed ready to receive it. As soon as this is accomplished the chain is removed from the rolls, and the floor being slightly inclined, the truck runs down the slope and delivers its charge into the jaws of the rolls. As it passes through these it is received upon another truck placed on the opposite side of the rolls and chained fast to the housings so that the plate may not push it away. By means of a suitable arrangement of the gearing the motion of the rolls is now reversed by moving a clutch, and the truck at present bearing the plate also resting on an inclined surface, tends to return the plate to the rolls. As it passes through, it is again received upon the first truck, which in the meantime has been made fast to the housings in the same manner as the other. It is now necessary to prick the blisters which show themselves on the surface, and to do this is a very lively operation. A man runs up to the plate and places a long-handled prick punch on a blister, and with his back turned holds it in position while another man runs up and strikes it with a hammer, when both run away to a safe distance while the same operation is repeated by another pair. Others at the same time brush over the surface with long brooms dipped in water to remove the scale, but no one remains many seconds at a time near the plate. It is then again passed through the rolls and the same operations repeated till it is brought down to the required thickness. At the last pass it is allowed to run off on the floor, and is then straightened by rolling a heavy cylinder back and forth over it while lying there.

The diameter of one of the sets of rolls used for large armor plates is about three feet and the pressure exerted is estimated at two thousand tuns. The train of gearing is perhaps the largest in the world.

The crop ends of the plates are slotted off in heavy machines for the purpose, and the side edges planed, the planing machines carrying two tools so as to act on both edges at once.

PUNCHED STEEL GUNS.

The new mode of manufacturing seamless steel tubes for ordnance or other purposes, (already stated in your paper), promises to be largely adopted. The punching is done with a fine pointed punch, in the first place; the hole being started at both ends of the block, and the punch driven in till the two holes nearly meet in the center. Blunt punches of a larger diameter are then driven in to expand the hole, and the diaphragm separating the two holes is forced out. This operation at once reveals any defect in the metal by the severe strain put upon the grain, and so enables a defective block to be rejected before any further labor has been wasted upon it. The hollow cylinders thus formed are heated and a mandrel inserted in the hole, and they are then drawn out under a hammer into tubes, the presence of the mandrel making the thickness of metal acted upon very small compared with a solid forging of the same size, thereby securing a more thorough working. The tubes are again heated and a mandrel having a long stem of somewhat less diameter is introduced into the bore. The tube is then passed through grooved rolls, the mandrel being held stationary by a collar on its stem secured in a frame in front of the rolls, in such a position that the head of the mandrel shall come directly in the centre between the two rolls so as to sustain the pressure. The motion of the rolls draws the tube off the mandrel. Another slightly smaller mandrel is introduced and the operation repeated till the tube is brought down to the diameter required. It will be seen that it is quite possible also in this way to produce tubes with a solid end which are well adapted for guns. For gun barrels there is a set of rolls with recesses cut in the grooves to produce the enlarged section required for the breech. The rolls are made to stop for two seconds at each revolution, so as to allow the tube to be properly inserted, though it has been found quite possible to do this without this precaution. This process is very valuable for making hollow railway axles, which aside from being light must necessarily be sound from the nature of the process. It is intended also to apply it to the manufacture of boiler tubes. The celebrated firm of Messrs. Peter Gaudet & Co. are also preparing to carry on this manufacture in France.

SLADE.

THE COTTON MANUFACTURE---WEAVING.

The art of weaving is without doubt among the very oldest of the useful arts. Indeed it is cotemporaneous with the earliest written history and is mentioned among the first traditions. The Theban tombs represent looms in variety. In some the web is vertical and in others horizontal. Similar looms have been from time immemorial used in India, and are still employed for the production of the beautiful fabrics brought from thence. Homer speaks of the products of the loom, and the Chinese histories are full of allusions to this useful machine. The power loom is, however, a modern invention. The first intimation of it is contained in "Philosophical Transactions" in 1676 as the invention of a French naval officer. It does not appear, however, that this machine came into successful operation, nor did those of subsequent inventors until 1787, when the Rev. Edmund Cartwright, an English clergyman, succeeded in perfecting a loom which produced good results. The necessity of frequently stopping the loom for dressing the warp as it was taken up by the filling, was a great hindrance to the usefulness and economy of the machine; but in 1802, two mechanics of Stockport, England, invented the dresser described in our last article, and from that time forward the power loom took its place among the indispensible adjuncts of civilization.

Like the steam engine the loom is capable of and has received a great many modifications, yet the principle of its operation is essentially the same in all. The common loom for weaving plain cloths is very simple and easily understood, but some of those used for weaving figured goods, especially carpets, are miracles of ingenuity and marvels of complexity. It would be almost impossible to convey an adequate idea of their construction and operation even by the aid of elaborate drawings.

When the warp has left the dresser it is "drawn in" as the operation of arranging the threads in the "heddles" is termed. These "heddles" or "harnesses" are a most important portion of the loom. For plain cloth there are two. They are made of a very tenacious twine, arranged between parallel bars, and having loops formed in the twine midway between the bars. These harnesses are varnished with a mixture of linseed oil, shellac, and turpentine with some other ingredients yielding body and color, for the purpose of giving smoothness and a degree of rigidity to the twine. The threads of the warp are drawn through the loops of the heddles, every alternate one through one of the two heddles. They are then passed through a "reed" or "comb" which is afterward secured into the "lathe" of the loom.

A brief description of one of the simplest looms will convey some idea of the process of weaving. The beam containing the warp is suspended at the back of the loom frame on its journals in a horizontal position. The warp passes over a roller, through the heddles and the reed, to a roller on the front. The heddles are suspended by straps passing over rollers and held in position by other straps beneath, which connect with levers that alternately press down the heddles, as one goes down the other coming up. The threads being equally divided between the heddles, it will be seen that as they vibrate the warp is divided, forming across its width a triangular opening appropriately termed a "shed," one half the threads being the floor and the other half the roof. Through this opening is passed the "shuttle," a boat shaped implement carrying the filling yarn in the form of a cop. This lays a single thread across in the shed and then the reed secured in the lathe, which swings back and forth, presses the yarn up to a certain point. This process, consisting of three simple movements, combines the essentials of weaving. 1st, the heddles vibrate vertically passing each other and forming the shed; 2d, the shuttle flies across this opening just in front of the lathe; 3d, the lathe moves forward seating the filling in place. These operations in the hand loom are performed by the hands and feet of the workman, but in the power loom wholly by the machine itself. Perhaps the most singular one of these movements is the throw of the shuttle. Even in narrow cloth, less than one yard wide, it would seem to be a difficult matter to throw a shuttle across while the whole machine is in motion; yet in much wider cloths this is successfully done, the shuttle rarely throwing out. At each end of the lathe, beyond the cloth or warp edge, is a box for the reception of the shuttle. A suitably formed block, generally of raw hide, called a "picker," slides on a horizontal bar over the shuttle box and projects a tenon shaped part through a slot in the bottom of the box. To this portion a strap of tough leather is connected, the other end being secured to a lever, which, by a cam, is thrown like an inverted pendulum back and forth, jerking the strap and throwing the shuttle across with great velocity and with force sufficient to land it in the opposite box.

The cloth as it is woven is wound upon a roller in convenient lengths called "cuts." From the loom it is removed to the measuring room where it is accurately measured and folded in a neat bundle marked with the name of the weaver, who usually works by the piece. The measurement and folding constitute a single operation, one of the most simple methods being to hook the cloth on steel pins one yard apart

which lay it in regular folds. Every piece is then carefully examined by an operator, yard by yard, all the knots and loose threads removed, and then pressed in bales by a hydraulic press, when it is ready for the market or the bleachery as it may be intended for sale as brown or as bleached goods.

Editorial Summary.

THE PATENT OFFICE—A PROSPECT OF RELIEF.—At about New Year's we took the liberty of urging strongly upon Congress the duty of relieving the Patent Office at once from some of the obstructions that have been unwarrantably shoved into its premises, and of giving the overworked and underpaid officers of that institution room and force to perform properly the services for which the inventors of the country so liberally pay. In particular we suggested, as the nearest measure of justice and relief, the prompt removal of the Agricultural Bureau. We are happy to find that the justice of this suggestion has been recognized, and that the Senate Committee on Agriculture has recommended the erection of a suitable building for the purpose. We trust the twin suggestion of a building of its own for the Department of the Interior may not be long in bearing fruit. These changes, with the emancipation of the Patent Office from political influences, and a reform of the niggardly pay and number of Examiners, will make this branch of the public service what the interests of the country and the rights of inventors demand.

ANOTHER NOTE OF PROGRESS.—At length, the chief money markets of England and the United States have experienced something like the direct connection which is ultimately to make all the markets of the world one; although it curiously happens that the connection was not reciprocal, as New York received the Liverpool and London rates too late in their day and too early in ours, to make any response. The English quotations of the 23d ult. down to 4 P. M., were received and published in New York at noon of the same day, and in San Francisco probably at a still earlier hour. It will soon be necessary to modify 'change hours in different money markets so as to synchronize, and enable the business of each day in every place to be conducted connectedly and advisedly.

RAPIDITY OF NERVE ACTION.—Haller attempted, in reading the Æneid aloud, to count the number of letters he could pronounce in a minute. Finding that he could pronounce 1,500, among which the R, according to his statement, requires ten successive contractions of the stylo-glossus, he affirms that a muscle can contract and relax itself 15,000 times in a minute; and as the time of relaxation is as long as that of contraction, each contraction requires about 1-30000 of a minute, or 1-500 of a second. From this, Haller concludes that the nervous agent requires the 1-500 of a second to go from the brain to the stylo-glossus muscle.—*Revue des Cours Scient.*

DETECTION OF SULPHURIC ACID IN VINEGAR.—Take about 50 cubic centi-metres (1·7 fluid ounces) and boil it with a small quantity of starch until one-half the liquid has boiled away; after cooling, add a drop of iodine. If sulphuric acid was present, the starch will have been converted into sugar, which will produce no color with iodine; but if no sulphuric acid be present, the starch will retain its properties, and give the characteristic blue color. Very little starch should be used in this test.—*Polytechnisches Notizblatt.*

KRUPP'S LATEST.—We copied lately in a German article, the statement that Krupp is putting up a steam hammer to weigh 240,000 lbs. and to cost $1,300,000. This is more than matched by a pair of rolls he is said to be preparing with a view to the manufacture of one-piece steel boilers. Each of these monstrous solid cylinders is to be five feet in diameter and twenty-seven feet long, and to weigh over 100 tuns. Krupp has orders now on hand for 2,370 steel cannon, received from various Governments within a few months.

SAND BRICKS.—A correspondent says:—In the SCIENTIFIC AMERICAN, Feb. 16th, "A Naval Engineer from Pensacola" asks for a method of making substantial brick of sand. Two parts of potash, soda, or other alkali, to one of sand, fused, will then dissolve in water, making soluble glass. To this add sand, *quantum sufficit*, and press into molds of required shape. This will make a hard vitreous brick or cement.

SODIUM AMALGAM.—Recent reports from Colorado give promise that the long-sought process of extracting gold from the hitherto intractable ores lies in the use of sodium amalgam. No new machinery or manipulation is needed; the magnetic amalgam is simply substituted for the ordinary quicksilver. Sodium amalgam has been extensively used in California for upwards of a year.

IMPROVEMENT IN FRUIT JELLIES.—Mrs. E. A. Ratcliff, Zanesville, Ohio, has sent us some specimens of jellies made by an improved process of her own discovery, which are very fine. The distinguishing excellence of the process seems to be, that it yields a jelly containing more of the fruit substance and flavor than the ordinary method. The improvement also imparts beautiful and clear colors to the jellies.

PROF. BENJAMIN PIERCE has been appointed the successor of Prof. Bache in the Superintendency of the Coast Survey. He is among the first of living mathematicians, and for many years his services at Harvard College have been of inestimable value.

It is easier for the carpenter or wood worker to clean his timber from grit than to file his saw or grind his ax, adze, or plane.

THE AUSTRIAN TRIAL OF BREECH-LOADERS was the most severe and exhaustive of which we have seen any account. The contest was practically between the Remington and Peabody rifles, no other presented being found to have any standing compared to these. The two arms appear to have varied very little in behavior under the severe tests employed, but the Remington was finally adopted for a service trial on a large scale; principally, as we gather, on the ground of simplicity in construction, accuracy, and ability to discharge deteriorated cartridges. It was tried with over 2,000 rounds, divided among the several purposes of rapidity, accuracy, range, penetration, strength, recoil, durability, efficiency under protracted exposure to wet, rust and dirt separate and combined, with wet cartridges, and with cartridges cut or split in a variety of places. No cleaning was done at any of the intervals, and the parts were found at the end of the long and trying campaign, perfectly unworn and with their movement unimpaired. Twenty-three out of thirty-six shots discharged, or 64 per cent, struck the target (outline of a man) at 300 yards: for rapidity, 13 were fired per minute and without aim, and by an expert, 17 per minute: mean recoil, 48 lbs. The Peabody gun was fired 1,883 times under similar conditions. Thirteen out of twenty-four, or 54 per cent, struck the target at 300 yards, 15 per minute were fired from a rest, and 32 in two minutes from the shoulder; mean recoil, 41·6 lbs. The effect of broken cartridges was more unfavorable with the latter than the former gun.

PATENTS.—It appears from the report of the Commissioner of Patents for the year 1866 that the number of applications was 15,269; patents issued, including reissues and designs, 9,550; caveats filed, 2,723; applications for extension of patents, 67; patents extended, 58; patents expired, 1,042. Of the patents granted, there were to citizens of the United States, 9,210; subjects of Great Britain, 127; subjects of the French Empire, 48; subjects of other foreign governments, 65. The receipts were, on applications for patents, reissues, etc., 460,798 dollars; for copies and recording assignments, etc., 34,867 dollars. Total amount, 495,665 dollars. Amount to the credit of the Fund, January, 1866, was $130,184; receipts during the year $495,665; total $625,850; from which deducting amount of expenditures, namely $361,724; and there is left to the credit of the Patent Fund, January 1, 1867, $264,125; surplus of receipts over expenditures during the year is $139,941.

EXPLOSION OF FROZEN NITRO-GLYCERIN.—The attempt to separate frozen nitro-glycerin—which exists at a temperature of about 40 degrees—is extremely dangerous, as it can be easily exploded by friction. In Germany, the last winter, a man who tried this experiment on a lump of some six or eight pounds, was blown to a great hight in the air.

Steel spindles for cotton spinning are heated for hardening at the step end by friction on a revolving wheel without the aid of a fire.

BUSINESS AND MANUFACTURING ITEMS.

IRON.—A new building has recently been completed by the Chicago Rolling Mill Company, which has one of the largest single span roofs in the country. It is semi-elliptic, with an unsupported span one hundred and seventy-six feet by two hundred and forty-four, and seventy feet high.——It is a singular fact, says the Boston *Commercial Bulletin*, that the market for blind fastenings varies almost with county lines: thus the pattern used in Boston finds no favor in Worcester, for which a special style must be had. Woodstock, Vt., claims still another, while the blinds which shield the Southern planter are secured by a fastener which cannot be sold in Northern markets. All these fancies are met by improved machinery in one manufactory in Boston, at the greatest economy of cost.——It is said that from four to six millions of glaziers' points are turned in a day, by the machinery of the last-named establishment——The Fort Pitt Foundery, at Pittsburg, Pa., in the four years of the war, cast guns for the Government amounting to the total weight of 50,735,455 pounds, while the total weight of metal melted for these guns equalled nearly 100,000,000 pounds. The whole number of guns cast by them has been 2,509, of different sizes, both army and navy, among which were 555 10-inch and 198 15-inch guns; also one 20-inch "Rodman" and one 20-inch navy gun. The firm are at present turning out about 13 tuns of projectiles and one 20-inch Rodman gun per day, and also have two 20-inch navy guns under way.

PAPER.—The Chicago Fiber and Paper Company has been organized with a capital of $500,000, which will soon be increased to $1,000,000. Its business, like that of the new Buffalo Company, will be the manufacture of paper by the "Meech process," to reduce slough grass to pulp, without destroying the fiber.——A very smooth strong paper, made entirely from the okra plant, has been patented by Dr. J. B. Read. From one to two tuns per acre of okra stalks, may be grown in Pennsylvania or any of the Middle States. The ordinary machinery for making paper from rags will answer for the new manufacture.—*Practical Farmer.*

WOOL.—The manufacture of knit woolen goods has been greatly stimulated in this country by the high cost of importation since the war, and it is now estimated that 400 sets of machinery and 40,000 hands are employed in this branch of industry in the United States, producing goods to the value of about $20,000,000 per year. The New England and Middle States nearly monopolize this business, New York taking the lead with the extensive mills at Cohoes.——The modern use of shoddy has run up the price of woolen rags in England ten fold. They are now worth £40 per tun. It is disclosed in the report on the London Exhibition of 1862, that sixty-five million pounds of shoddy are annually consumed in England, a greater quantity than the whole wool product of the United States. It is estimated that, in the neighborhood of Leeds, 7,000,000 to 8,000,000 yards of cloth, of the value of $15,000,000, are annually manufactured from this material; and that, if the supply of shoddy were stopped, it would close one third of the woolen mills in the United Kingdom, and bring distress upon the West Riding, in Yorkshire, as great as that lately suffered in Lancashire from the want of cotton.

COTTON.—The Naumkeag Mills paid 22 per cent to the stock holders last year, carried 9 per cent to working capital and reserve fund, and charged 7 per cent to loss in reduced values and for new machinery. The total product of goods for the year was 9,513,200 yards, an increase of 40 per cent over former years. The company have erected houses containing 61 tenements for their operatives, at a cost of $70,000—and have found the outlay very advantageous, being able, according to the Treasurer's statement, to run 250 looms, which they could not do if the houses had not been built.——The voters of Augusta, Maine, have accepted the act recently passed by the legislature, authorizing the city to make a loan of $250,000 in order to comply with the conditions of the Sprague purchase of the water-power on the Kennebec.——A cotton factory is proposed at Shreveport, La., and a large amount of money has been subscribed in aid of the enterprise.——The Eureka Mills, at Houston, Texas, are turning out drills and sheetings of good quality. The machinery for the Houston City Mills, which will be built in the spring, has been bought at a cost of $80,000.——A factory in Augusta, Ga., has turned out, during the past year, six millions four hundred and ten thousand yards of cloth.

SILK.—J. W. C. Seavey & Co., Canton, Mass., manufacture sewing silks, machine and stick twist, employ 60 hands, and produce upwards of 300 pounds per week. The factory has been in operation for fifteen years, and within three years its producing capacity has been doubled.——The California silk manufacturers, Messrs. Neumann and Myers, exhibit in San Francisco cocoons from all the principal silk growers of the State, raw silk, floss silk, silk in hanks and in spools, and some 10 or 12 dress patterns of very heavy 30-inch luster and 38-inch reps. The manufacturers say that when once established in their new factory, at San Jose, they have nothing to fear from foreign competition as they can undersell the best silks imported by at least 50 cents a yard.

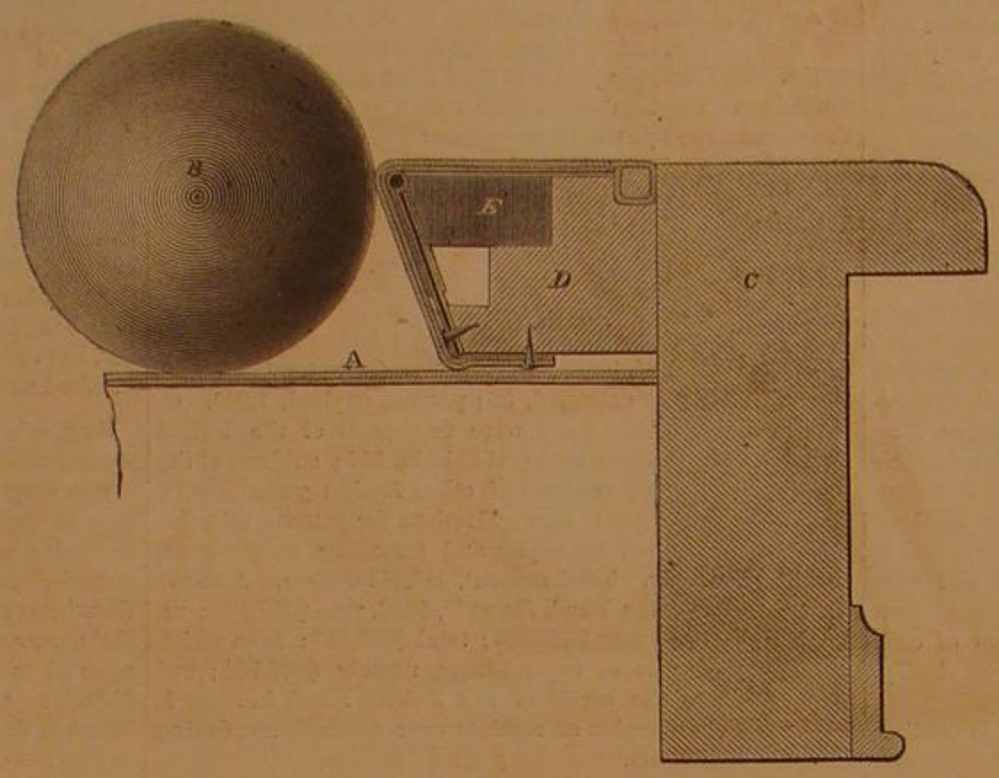
MISCELLANEOUS.—A company, with a capital of $50,000 has been organized at Springfield, for the manufacture of "repeating lights." The igniting composition is placed at regular intervals on a piece of tape, saturated with stearine. The tape is cut into yard lengths, and coiled inside a case; and by simple mechanism one light follows another till the whole is exhausted.——Paper bags are made by the Columbia Paper Company, at Springfield, by machines which cost $1000 each and turn out 40,000 bags per day.——A company has been organized in Boston for the manufacture of American porcelain. The clay used will be procured from Missouri.——The Worcester County Cheese Manufacturing Company, at Southbridge, Mass., during the last year sold $278,670 worth of their products, and on this amount made a net profit of $23,697. In weight their product amounted to 142,767 pounds, representing 170,823 gallons of milk.——Fifty-five cows, belonging to four private dairies, yielded a net income of from $72 to $87 each, in the last season (seven months) at the Verona, N. Y. cheese factory.——The consumption of cheese in England amounts to 321,250,000 lbs. per annum.——At Liberty Village, near Belfast, Me., twelve dams cross the river within the distance of a mile.——Work on the Portage Lake Canal will be commenced in the Spring. Its construction will complete the water connection between the East and West shores of Keweenaw Point (an extensive peninsula projecting into Lake Superior at the Northwestern extremity of Michigan) making with Portage Entry and Portage Lake a ship canal through the center of the Peninsula. The canal will save one hundred and forty miles of perilous navigation. Liberal grants of land have been obtained from Congress, and the success of the project is assured.——Several years ago our Government imported a lot of camels, for trial on the Western Plains. The survivors now carry freight between Virginia City and Austin, Nevada. They have twice the strength and more than twice the endurance of mules, are healthy, and can carry burdens cheaply. Everything seems to show that they can be readily naturalized, yet owing to some prejudice, no pains are taken for their perpetuation, and they are dying out.——The *Public Ledger* mentions having received a box of oranges and lemons grown by two Philadelphians at Pilatka, Florida, which in appearance and flavor are equal to most of the superior samples of the same fruit imported from the West Indies and the Mediterranean. The land upon which they can be grown can be had for $1·25 an acre. A single acre will grow 100 trees, which, after the fifth year, will yield 80,000 oranges annually, said to be worth on the tree three cents each.——It is reported that the amount of shipbuilding for the Lake trade is greater this season than in any previous.—The revenue returns show that fifteen piano makers in the United States turned out last year 1986 instruments, of which the two leading firms, Steinway & Sons, New York, and Chickering & Sons, Boston, made respectively 1,944, valued at $1,001,164, and 1,526 valued at $651,285.—The city railroad system of Philadelphia is the most extensive and best managed in the world, pervading the city in all directions and carrying passengers through by transfer with very slight additional fare at each change of line. There are 18 lines, with 160 miles of track, costing $9,500,500, earning (1866) $2,890,268, and dividing 8 per cent to the shareholders. Their fares numbered in the same year 46,221,490.

Improved Billiard-table Cushion.

The game of billiards has within a few years become immensely popular in this country, a popularity shared also with the Spaniards, French, and especially the Russians. It is one of the most scientific games, demanding a true mechanical eye, good judgment, and long practice to become an adept. Although a recreation common to all classes, few but men of leisure can afford the time to perfect themselves in its practice. It is true that the success of the player depends primarily on his own skill, yet the construction of the table greatly affects this result.

The inventor of the improvement herewith represented says that in the ordinary tables the giving way of the upper or projecting edge of the cushion on the impact of the ball, allowing it to pass over the cushion, is an evil which he endeavors to remedy by his device. In the engraving A is the surface of the table, B the ball, and C a section of the rim of the table with the cleat, D, attached. E is the india-rubber strip forming the body of the cushion, the face being covered with an elastic cloth secured to the lower part of D and designed to support the cushion under the impact of the ball. A cord of catgut or other suitable material is applied to the projecting edge of the cushion at the point where the ball impinges, and is held in place by a strip of cloth which incloses the cord and is glued or cemented to the elastic cloth. The whole is covered with the ordinary green cloth under which is another cloth enveloping all.

The cord is the principal important feature of this inprovement. The inventor says it gives stiffness to the angle of the cushion, preventing its yielding under the blow of the ball, and presents a stiff narrow line to the ball, obviating friction and not interfering with the elastic effect of the cushion. For this improvement letters patent were procured through the Scientific American Patent Agency, Dec. 18, 1866. Address for additional particulars, Kavanagh & Decker, manufacturers, Canal street, corner Center, New York.



DECKER'S BILLIARD-TABLE CUSHION.

Photo-sculpture.

Daguerre in France, and Talbot in England, independently and simultaneously announced the first successful application to a practical use, of the previously observed action of light upon the salts of silver. Sun painting was then in its infancy, and its earliest production, the daguereotype, though popular in its day, was expensive, and owing to the sheen of light from its polished surface, defective, and was justly superseded in public favor on the discovery of the collodion process, by the ambrotype, and later, by the photogram in its most popular forms.

As first introduced, the daguerreotype was only suited for copying artificial views, or for interiors, as the predominant green of nature was found to act too sluggishly upon the silver salts. Its field being thus restricted, its subsequent success was due to the discoveries of Dr. Draper of the New York University, who took the first portraits from life. It is this ability of portraying the human face divine, that has gained for the art its popularity: by its power the absent friend, pictured by the sun's rays and viewed perhaps by the stereoscope, seems ever literally to stand before us. Although in this case a mere optical delusion, in the new process of photo-sculpture this result is actually realized in tangible form by the aid of the sun's rays.

The application of photography to sculpture is the invention of a French artist, M. Willéme, and has been successfully operated for some time past in Paris, where are now a large number of establishments in operation, and more in process of erection, in anticipation of an extensive patronage from visitors to the Exposition. One of these projected concerns, giving employment to some three hundred hands, is provided with electric or magnesium lights, so as to be enabled to work night and day. The first enterprise of this kind in this country, is that of Messrs. Husten & Kurtz at 895 Broadway, where statuettes of some of the leading men of the country have been already successfully executed.

The person desiring to be metaphorically petrified, is placed upon a raised dais or "register" in the center of a circular gallery lighted as usual from the top. From the ceiling hangs a ball directly over the center of the register, and the imaginary line joining these, called the line of departure, is made coincident with the "median line" of the body of the subject. The walls of the rotunda are pierced for twenty-four cameras, placed 15° apart. By a simple connection, the sensitized plates are all exposed simultaneously at the will of the operator, and negatives are obtained from twenty-four different points. It is evident that every pair of opposing pictures will justify each other or show at once if the sitter has not been properly centered.

Each negative, thus obtained, is next enlarged by being thrown upon a screen by a magic lantern, and its outlines and more important details, are faithfully sketched. It now remains to incorporate these twenty-four tracings into one perfect whole, and a fac simile of the person will result. This object is accomplished by the aid of an ordinary pantograph working in a vertical plane.

An iron dais in the modeling room, the counterpart of the register in the rotunda, has from its center a vertical rod or line of departure, around which the clay is massed. By a skilful movement of the operator, one arm of the pantograph is made to pass over the outlines of the first sketch, the other arm tracing correspondingly upon the plaster, clay, or marble. The dais is then moved 15° and sketch number two is in like manner reproduced, the outside mass being each time removed. Successive repetitions carefully executed, by degrees bring out roundness and proportion, and the purely mechanical process is completed.

The invention of M. Willéme by no means dispenses with the sculptor's aid, it but lightens his labors. The pantograph in its rude but efficient way maps out for him with mathematical precision the symmetrical proportions of his subject, the contour of the face and head, the shape of the hands, the exact position of every fold, seam or wrinkle of the dress, the characteristic attitude of the body; in short gives in a few moments, an easy and graceful *pose* that before could only poorly have been acquired, after weeks of patient labor; but all the delicacy and elaboration of details can never be given by any mere machine, but must still be left to the taste and skill of the artist.

One of the beneficial results following the introduction of photo-sculpture will be the cheapening of what have heretofore been regarded as the accessories only of luxury, and bringing them within the reach of persons of moderate means, thereby cultivating among the masses a refined and elevated taste for works of art. In its practical bearings the invention must prove of great service to the architect, allowing him to elaborate his designs at will, adding grace and refinement of detail to the stately edifices which line the streets of our large cities.

THE BOILER EXPLOSION ON BOARD THE LIGHTER "ENTERPRISE."

On the 22d of January last the boiler of the steam lighter *Enterprise* exploded with terrific violence, just as the tug was entering her dock at the foot of 38th street, North River. As the circumstances present some peculiar features we will briefly detail them. The boiler was of the form known as the "Densmore boiler," which is in some respects different from any other with which we are acquainted. It is an upright boiler, the base being considerably larger than any other portion, the form from the grate up to about one-third the hight being that of a truncated cone or a tunnel shape. In these boilers the fire box internally is of unusual hight and contains, opposite the furnace door, an upright cylinder having vertical tubes through which the products of combustion pass from their tops downward to the smoke stack. This tube cylinder is inclined at the same angle as the shell of the boiler, a portion of it projecting below the grate bars. Consequently it will be seen that the area of the grate bars present the form of a cresent, and that the incline of the tube cylinder and the inner shell of the boiler gradually contracts the passage for the smoke and heat until the products of combustion reach the top of the tubes in the cylinder. The heat, therefore, acts continuously in its upward passage against the inclined sides insuring a comparatively perfect utilization of it before it passes off into the smoke stack. The boiler which exploded was not quite one year old and was made of No. 2 iron, said to be of the first quality. It had been tested to 120 lbs. hydrostatic. It was eight feet in diameter at the bottom and six at the top, being fourteen feet six inches high. The gages are placed so as to carry water to several inches above the crown sheet, and water circulates around the tubes and in the water legs. We have examined a number of these boilers and from their appearance and mode of construction, as well as from the testimony of those using them cannot see in what respect they are less safe than the ordinary tubular boilers.

The boiler which exploded had a smoke stack only thirty feet high above the grate, so it could not be expected that it would generate steam too rapidly for safety or convenience. At the time when the explosion occurred the boat was ramning her way through heavy ice, going forward as far as possible and then runuing back for a new start. We have a portion of the boiler in our office which formed a part of the tube cylinder that appears to have given way first. At the angle formed by the point of the crescent section of the fire box the iron appears to have been somewhat corroded probably by the salt water used in the boiler and the deposit of ashes at this point which would be somewhat inconvenient to clean out properly. The worst of this corrosion appears to be at a point below the grate bars. When the explosion occurred the boiler rose bodily from the boat and fell in the rear of a wall forty feet high and at least six hundred feet distant. From these data we can imagine if not estimate the immense power required to project this mass of twelve thousand pounds to such a distance. The boiler could not have attained a hight of less than five hundred or six hundred feet to have reached the locality where found. A pressure instantaneously exerted, or produced, of at least five hundred pounds to the square inch must have been developed to produce this result. That this could not have been by the generation of steam from water in the ordinary way—gradually, however rapidly—seems to be evident. Comparing the results of this explosion with others, the cause of which are apparent, it would seem that the condition of lowness of water was absolutely required to produce the effect. It is well known that explosions occuring when there is an insufficiency of water are the most destructive, while those from an over pressure of steam can hardly be classed as explosions, as the force exerted is a gradual one, and acts as a strain. Evidently in this case the force that produced the explosion was one which was as instantaneously developed as is that of gunpowder when instantly metamorphosed into gases.

In regard to this explosion the opinion has been given that the rapid generation of steam may have lifted the water bodily out of the water legs and left the inclined sheets of the internal wall and the tube cylinder dry. We cannot coincide in this opinion after having thoroughly examined this style of boilers, and it is evident that a circulation of water is necessarily maintained all around the fire box and the water spaces are of full average size.

We have thus detailed the circumstances of this explosion in order that builders of boilers and managers of steam engines may get some data which may assist in determining the cause of explosions and thus aid in their prevention.

We regard it as of the first necessity that boilers, of whatever construction, should at all times be amply supplied with water as one means, at least, of preventing some of the disasters which now attend the use of steam. We cannot believe the peculiarities in this boiler contributed to the catastrophe, but rather incline to the opinion that its construction and principle are correct, at least so far as the proper form and build of boilers is at present understood.

Iron Superstructure vs. Wooden Sleepers.

Elaborate experiments have been tried on a number of German railways to determine the comparative economy of substituting a longitudinal iron permanent way for the wooden tie or sleeper system. A variety of methods have been tried, the more advanced consisting of a steel rail head with a dovetail tongue on the under side, fitted and clasped by flanges at the top of a pair of angle bars which answer, combined, to the stem and base of the ordinary T-rail. The vertical sides of these angle bars are about six inches high and half an inch thick, making together a very strong longitudinal iron sleeper six inches in depth by one inch thick, in addition to the steel head and the base sides of the angle bars. These base sides, turned of course in opposite directions, and slanting a little downward, at more than a right angle with the vertical sides, present together a slightly hollowed base twelve inches broad to rest upon the ground bed. The ground bed is formed in the usual thorough European manner, of deep clean gravel or broken stone. The two longitudinal ways are at once riveted, guaged, connected and braced by frequent crossbars, keyed into them to save needless expense in screws and nuts. The steel head and the supporting angle irons are made to break joints, giving the ends of the former a continuous support. The cost is stated at not over fifty per cent greater than that of equivalent rails laid down on wooden sleepers in Europe; or say $15,000 per mile. Two years of trial on sections of road constructed on this principle, have shown no deflection, displacement or inequality, and the rail ends, as might be expected, have suffered palpably less than those of steel rails on wooden sleepers. The smooth and steady motion of the rolling stock, and the almost imperishable nature of the structure, suggest a very great ultimate economy in the use of some such system, especially if a cheap and elastic bed can be devised which will meet the only serious objection (excessive rigidity) urged by the English engineers.

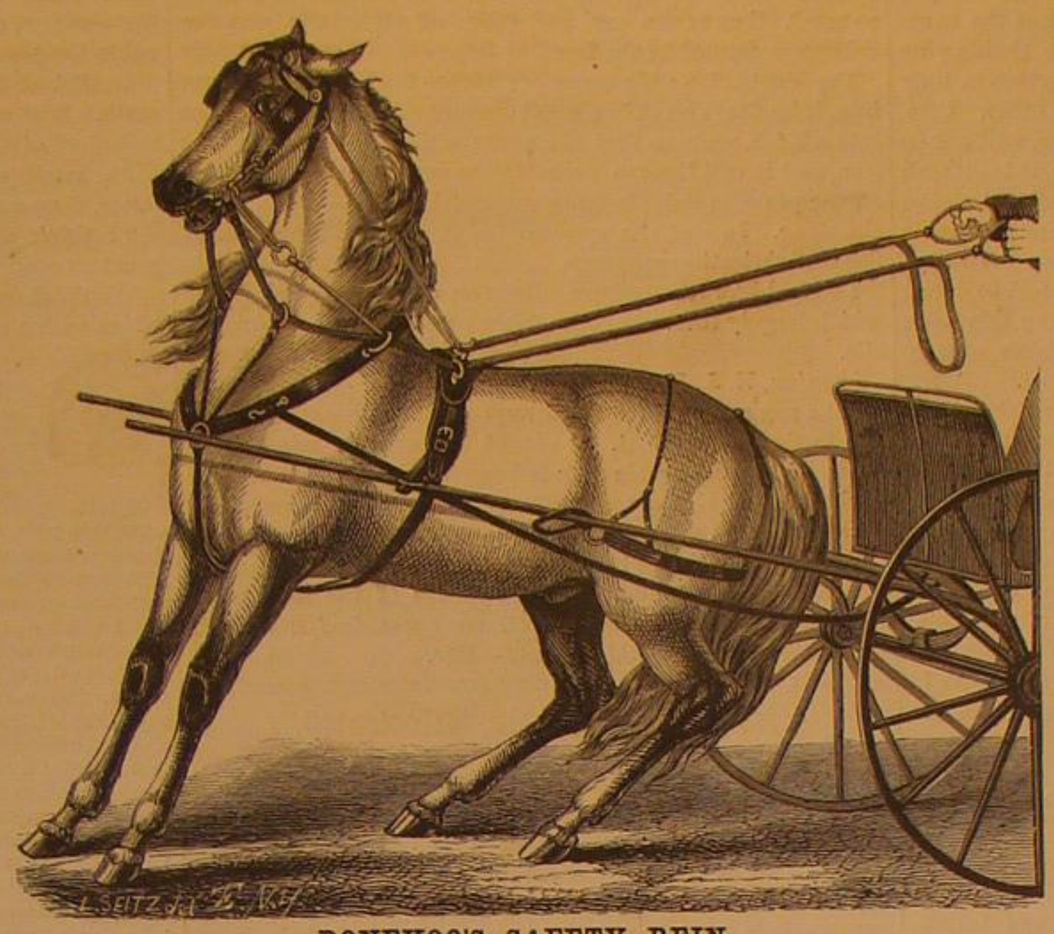
A New Explosive Compound, introduced by Mr. Peter Griess, according to one of our foreign exchanges, explodes with great violence, far surpassing that of fulminating silver, at less than 100° centigrade, and also by friction, pressure or concussion. Iron plates several lines (twelfths of an inch) in thickness, were broken to atoms by exploding 15 grains of the substance upon them. It is named by the author nitrate of diazobenzol, and is prepared by passing nitrous acid through a solution of aniline in four times its volume of alcohol, until the addition of ether precipitates the product in white acicular crystals. After being separated as much as possible from the solution, they are again taken up in cold dilute alcohol, and precipitated by ether, in long white needles.

Improved Safety Rein.

The accompanying illustration shows the arrangement and mode of application of a safety bridle, patented by Daniel M. Donehoo, of Beaver, Pa., through the Scientific American Patent Agency, Jan. 29, 1867. It is adapted for use as a driving or riding rein, the former being represented in the engraving.

Connected to the bit are a driving rein, a safety rein, and a bearing rein; the first is directly attached to the ring of the bit, and, having no peculiar adjustment, needs no further description. At the lower end of the cheek straps are rings from which the bit rings are suspended on each side, by a duplicate strap, which, primarily attached to the bit ring, passes up through the cheek strap ring, then down again and through the bit ring, where it is attached to a ring which prevents it being drawn through the bit ring; the bearing rein proceeds from the gig saddle, through the gag runner, and thence through the bit ring when it is attached to the ring of the duplicated strap, and from this junction proceeds a safety rein which runs through the rounded hollow driving rein.

The gag rim acts as usual when the safety rim is not pulled, as the ring at the junction will not pull through the bit ring, but when the safety rein is pulled, both the bearing rein and duplicated bit strap are shortened up, the former pulling the chin of the horse nearer to his chest, and the latter drawing the bit up into the angle of his mouth. The replication of the bearing rein and bit strap gives a greater power to the safety rein, as the latter moves over double the space in a given time to that traversed by the bit in either direction, giving a great command over the horse. To adapt it to riding, the driving rein is detached, the safety rein retained as a curb, and the bearing rein, without the gag runners, becomes the ordinary snaffle rein, the ring at its junction, with the safety rein, preventing its being drawn through the bit ring, as before explained, while the safety rein, upon emergencies, draws the bit up into the angle of the mouth, as before.



DONEHOO'S SAFETY REIN.

White Gunpowder.

WHITE GUNPOWDER has been prepared by Schultze, a German chemist; the carbon being procured from sawdust without charring. The sawdust is boiled for several days in a solution of soda, then washed, steamed, and washed again for twenty-four hours, and finally bleached with chlorine, boiled in water, washed and dried. Six parts of the sawdust are placed in a mixture of 40 parts nitric acid to 100 parts sulphuric acid (made up at a fuming temperature, and cooled) in an iron vessel surrounded by cold water, and allowed to stand with repeated stirring. The excess of acid is afterward separated in a centrifugal machine, the residuum washed in cold water for several days, immersed in a dilution of soda to neutralize the remaining traces of acid, again washed and dried, and finally treated with a solution of 26 parts nitrate of potassium in 22 parts of water, and dried at a temperature not exceeding 111° Fah. The result, after sifting, is a very strong and quick gunpowder. We should say that the process seems rather tedious and curious than useful. A very good gunpowder is said to be that of Reymond, called pyronine, made with spent tan bark in place of charcoal. Its proportions are by weight, 87½ of dry spent tan bark, to 72½ nitrate of soda and 50 of powdered sulphur. The pulverized bark is mixed in a solution of the nitrate, to the mixture the sulphur is added, and the whole is dried.

THE MECHANICAL EQUIVALENT OF HEAT.

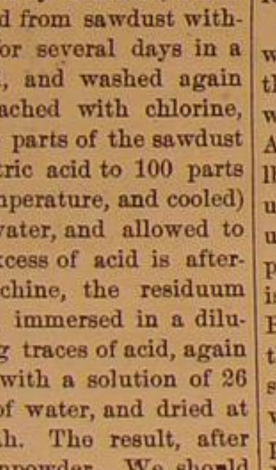
Prepared for the Scientific American.

[The article under the above heading which appeared in our last issue, and the present one, which is a continuation of that, were furnished for our columns by Mr. F. A. Morley.]

Having produced the proofs by which our present mechanical equivalent of heat has been established, I now ask, is this experimental proposition of Dr. Mayer's a correct one; do the 2·8 units of heat really give so much force as 2,160 foot pounds? They do not; there is a deception in so calculating the amount of work performed.

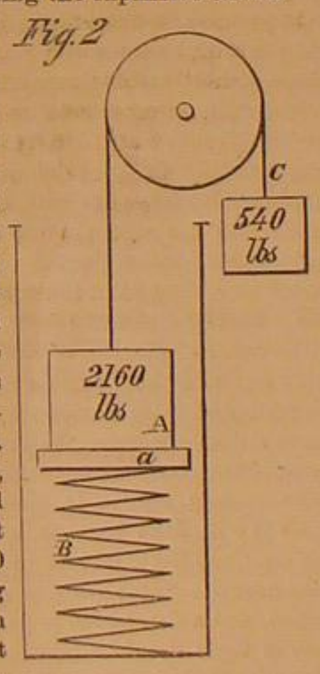
In order to prove this, and find what the amount of work performed really is, suppose the piston, *e*, Fig. 1, is elevated by the application of outside force, and without applying heat; then the force necessary to raise the piston, *e*, one foot, from P to P′, will be 540 foot pounds, and not 2,160 foot pounds. If there was a perfect vacuum below the piston, or if the cubic foot of fluid below the piston were non-elastic like water, then the amount of force necessary to lift the piston from P to P′, would be 2,160 foot pounds, but as it is, there is no such vacuum, and the static repulsiveness of the air below the piston greatly assists to overcome the resistance of the atmosphere on the upper side of the piston. When the piston has been raised one foot by outside force, then the vacuum in C is 7·5 pounds to the square inch, and shows that there has been an average resistance of 3·25 pounds to the square inch, through the space of one foot, which gives 540 foot pounds as the force necessary to elevate the piston one foot from P to P′. This 540 foot pounds being all the work there is to be done in the case, it is clear that the 2·8 units of heat have performed only this amount of work.

Fig. 1



To vary the proposition, suppose after the piston has been raised one foot to P′ by heat, that all the experimental heat were then extracted from the air in the cylinder, we should then have a vacuum of 7·5 pounds, which would give an average vacuum of 3·25 pounds, to force the piston down through the space of one foot; and the amount of work done in such condensation stroke would be 540 foot pounds, and would be an exact return of the force lost in overcoming the resistance of the atmosphere during the expansive stroke.

Fig. 2



I do not wish to multiply words unnecessarily, but think that a mechanical comparison will make this point more clear. A, Fig. 2, is a weight of 2,160 lbs., and represents the pressure of the atmosphere on the upper side of the piston or platform, *a*; below the piston is a very elastic spiral spring, B. The weight, A, is placed on the platform and compresses the spring until the weight, A, is wholly sustained by the compressed tension of the spring, B. Now suppose a second weight, C, of 540 pounds is suspended over a pulley so that its weight may exert a lifting force of 540 pounds on A; then if the spring has a flexibility in keeping with the elasticity of the cubic foot of air, in the previous experiment, the weight, A, will be raised by C, through a space of one foot, the spring, B, which has been compressed by 2,160 pounds of pressure, greatly assisting in the operation of lifting A. The weight, C, in this case, causes the weight, A, to be raised one foot, but still there has been but 540 foot pounds of energy brought to bear, and this is all the work that has been done, and is all that can be recovered by removing C. It is useless to pursue this point farther, it is fatal to the exposition of Dr. Mayer, and all the force of Dr. Mayer's experiment is changed in another direction. It now goes to establish a mechanical equivalent of heat at 193 foot pounds of force for a unit of heat, instead of 772 foot pounds, as before.

Now with relation to Dr. Joule's experiments, it will be observed that all of them are conversions of mechanical power into heat, and not in a single instance has he converted heat into a mechanical equivalent. It will also be observed that Dr. Mayer's method stood alone as the only instance where heat was converted into force, and that instance has now taken a new form, which is in direct conflict with Dr. Joule's conversions of force into heat. Here is a direct issue between the opposite conversions, and who can say what the ultimate result is to be? How are we to know that heat and force are convertible, back and forth in even measure; we have no proof that it is so, while on the other hand we have strong proof that it is not so. Dr. Joule's experiments show that 772 foot pounds of force may be converted into one unit of heat, while on the other hand Dr. Mayer's experiment, when rightly considered, shows that one unit of heat may be converted into 193 foot pounds of force. One is the heat equivalent of mechanics, and the other the mechanical equivalent of heat.

How are we to know that there are not some collateral causes (or diversions) which prevent the consummation of even conversions? We do know that by our best endeavors we have never yet succeeded in making such conversions. There is an important link missing in Dr. Joule's evidence bearing on the establishment of the mechanical equivalent of heat, and as things now stand it falls upon him to show that these conversions can be made in full measure, before his experiments have any direct bearing on the question: as they stand they are nothing more than a side issue.

It is reasonable to suppose that such even conversions should be made, but such supposition has no force without proof to sustain it, and while there are strong proofs to the contrary. The corrected experiment of Dr. Mayer does not now stand alone, to establish the mechanical equivalent of heat at 193 foot pounds of force, for a unit of heat. If air is confined and heated under constant volume, and then allowed to expand and do its work, it gives 193 foot pounds of work for each unit, of all the heat employed. And again, if water is confined so that steam is generated (under the most favorable circumstances possible) at a density of water, or under a pressure of 25·497 pounds to the square inch, then water gives 193 foot pounds of work (190·3 foot pounds by my calculation) as a return for each unit of all the heat employed; and thus gives in its allegiance, and lifts up its voice for a new "equivalent."

It may be, eventually, when further developments have been made, that 772 foot pounds will prove a correct measure of force, which can be developed from a unit of heat; however, it will be time enough to set up a better standard when we find it.

Facts About Metals.

Spectrum analysis has already revealed the existence of four new metals, which but for this mode of examination probably might never have been discovered.

Cæsium was first discovered by Bunsen in the Dürckheim mineral spring, 100 gallons from which yield one grain of the metal. A sample of lepidolite from Maine, yielded 24 per cent, and a rare mineral called pollux has yielded 32 per cent of cæsium. This metal is recognized by giving two bright blue lines in the spectrum.

Rubidium was also discovered first in the above named spring by the same process and the same chemist, but in larger quantity than the cæsium. It gives two violet lines and two red lines to the spectrum.

Thallium was discovered by Crookes in certain sulphur ores, and is most readily obtained from the flues attached to the burners of the sulphuric acid chambers where pyrites are employed. It is very dense, and resembles lead in general appearance. It gives a beautiful bright green band of intense brilliancy.

Indium was first detected by Reich and Richter, but has been more fully investigated by Winkler. It is found in the zincblende of the Freiburg mines. It resembles lead in softness and fusibility, but in color is white, resembling platinum in general appearance. It is not oxidized by the air and burns at a red heat with a violet blue flame. Its spectrum is indigo blue.

Pure iron, according to Stahlschmidt, who was the first to prepare it, is a silver white metal, so soft that it may be readily cut with a knife.

A thin shell of a metal, such as copper, brass, bronze, silver, gold, etc., which from its costliness may not be available for a desired purpose in solid form, may be filled in with molten iron without melting or even tarnishing, if it is immersed in water. The utility of this method is obvious in cheapening ornamental furnishings of almost all kinds. Another method for coating iron with copper, is to plunge it into a boiling solution of a compound of copper with an organic acid (such as the double tartrate of copper and potash) with excess of alkali, and holding it with a brass wire during the immersion, which may be longer or shorter according to the thickness of coating desired.

The effect of phosphorus in copper, in very minute proportions, impairs its value as a conductor of electricity, while it increases very much the tenacity of the metal and its value in manufactures.

Two and a half ounces of magnesium are equal in light-giving power to twenty lbs. of stearine. It burns as readily in carbonic acid gas as in air.

The raw copper ore worked in Swansea contains about 50 per cent of sulphur, and it is calculated that some of the melting furnaces discharge into the atmosphere from their chimneys 1,000 tuns of sulphuric acid per week.

VIBRATION CHRONOMETER.—The uniform rapidity of all sonorous vibrations of a given pitch, affords the most precise standards for measuring the duration of other movements. The energy of the vibration has no effect upon its velocity; so that a tuning fork used as the oscillator in a clock or watch movement may be kept in action with a perfect regularity of effect, by periodical impulses from the moving power. The moving power may be communicated through the same motions of the wheel work which are defined by the vibrations of the tuning fork, or with more absolute precision by an electro-magnetic apparatus. The obvious benefits promised by this regulator, which has been brought into use by M. Niaudet-Breguet are an absolute synchronism between different movements of high velocity, and an absolute standard, equal under all conditions of latitude, altitude, etc.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Crystallization of Glycerin and of Iron.

Messrs. Editors:—Page 132 of your last number, just received, contains an article from the *Chemical News* about glycerin crystallized during its transport from Germany to England. I wonder that it appears to be unknown in England, that at present a common adulteration of glycerin is practiced in Germany, consisting in the addition of sirup of white sugar or of glucose. I believe that this was the cause of the crystallization spoken of, and not the shaking on the railroad. I have succeeded in solidifying glycerin only with a mixture of solidified carbonic acid and ether. Common freezing mixture, or the cold of our winters, will not do it. The adulteration is so much more easy, as it is difficult to separate the two, and the qualities of sweet taste, viscidity, persistent moistness, etc., are unchanged, and are the same as of pure glycerin; only its point of congelation is not quite so low, and this is perhaps the easiest test to detect the presence of sugar or glucose; when applying this test, a mixture of glycerin with white sirup will behave exactly as the glycerin in question is said to have behaved.

I must, however, confess that not having a sample of this glycerin, it is impossible to speak with perfect certainty. Not the least allusion is made to any test of its purity, and this the London chemists should in the first place investigate.

The theory that the crystalline condition of iron is produced by continued vibrations, has lately been exploded by Wedding, machinist in Berlin, who has proved with experiments and specimens, before the Gewerbverein (Polytechnic Association) in Berlin, that when the fracture of an iron bar or axle shows a crystalline structure, it pre-existed as such in the iron, which thus was defective from the beginning, and that good iron of a tenacious structure will remain good and strong, and last without breaking from such a cause. The last opinion was advocated long ago, by some of the first manufacturers in this country also, and Mr. Wedding remarks that the use of iron would be indeed a most dangerous thing, if the common theory were true, that vibration changes its molecular structure, and makes it crystalline and brittle. It is a very convenient pretext for iron manufacturers who produce an inferior article, to save themselves when accidents happen by fractures of their iron, by asserting that the iron was originally good, but became brittle by vibration.

P. H. Vander Weyde, M. D.

Philadelphia, Feb. 15, 1867.

[Our correspondent appears not to have adverted, in giving his experience, to the circumstance of vibration, to which, with the cold, the crystallization of the glycerin was imagined to be possibly due. If he had included this element in his own experiments, without varying the result stated, he would have proved his point: otherwise, the statement is irrelevant. The adulteration, however, is evidently an important point and may prove to include the true solution. We shall probably soon learn the truth, from the English chemists. With regard to the crystallization of iron under vibration, we have as yet seen no reason to revoke the strong doubt cast upon Wedding's assumed demonstration, in our notice on page 71 of this volume. Possibly the account before us was imperfect: it was certainly unsatisfactory: and the occurrence of crystallization in railroad axles fractured in service is so common, even where the utmost care has been used in making them, that the presumption of so extreme a fault in the manufacture becomes too improbable to be of any use by itself in the solution. On the other hand, the assistance, often indispensable, of vibration to crystallization, is the single positive fact we have in the case: too significant, as the subject is too important, to be dismissed by a hasty *dictum*.—Eds.

Is Coal Oil Suitable for Lubricating?

Messrs. Editors;—Much of the time for several years I have been using coal oil in whole, and as a mixture for lubricating purposes, and have noticed that my journals and boxes wore out very fast. Some time since I condemned crude oil of any kind, for that purpose, supposing that it might contain something of a gritty nature, and about one year ago I commenced the use of whale, sperm and lard oils mixed with coal oil of different kinds and in different proportions, but with similar results to journals and boxes. About six months ago I commenced to use lard oil mixed with about one-third burning or clarified coal oil. My object in using the coal oil, was to prevent the lard oil from cooling in the can so that it would not run free, and to keep the journals from gumming. About that time I put up some new lathes, an iron planer, and other new tools for machine work. I noticed in a short time that all of the journals worked, or were loose, notwithstanding none ever run warm or heated, to my knowledge. I took several of the caps off the boxes on the different machinery, and all of them had the appearance of having been run in grit, like fine emery. Neither the journals or boxes had a smooth polished surface. I at once changed the oils, cleaning out all of the cans, and commenced to use clear lard oil, and now, after using it about six weeks I find that the same boxes and journals have an entirely different appearance. On removing the caps, they present a polished surface coated with a thin paste which seems to have resulted from the wear of the two metals of the journals and boxes. On opening the boxes after using the mixture of coal oil, the boxes looked clean, and nothing appeared to cover the surface except the oil. I would add that nothing of a gritty nature had been added or removed from the room during the last six months; a small grindstone only has been used in the room during the whole time.

In my own mind, I am perfectly satisfied that coal oil is injurious to use for lubricating purposes. But the question is what is there about it that is an injury? Can the coal oil have any chemical action on the metal to decompose it, or is it of a gritty nature? My opinion is that neither of these is the true cause. I think that the very substance that the coal oil carries out of the box or journal is the cause of the trouble. I think that the thin paste which the coal oil carries off should remain in the box in order to keep the two metals from coming in direct contact. It is well known to all experienced machinists that a small quantity of oil, or just sufficient to hold a paste in the box, is better than to pour on so much oil as to run out, and carry off all of the paste or substance formed in the box.

For illustration: if a carpenter wishes to sharpen his plane iron, if he drops on only a small amount of oil, it soon forms into a thick paste so that the stone will not cut away the iron, and it will become necessary to use more oil, or wipe off the paste, in order to bring the metal in direct contact with the stone. I am of the opinion that the coal oil is too cleansing for lubricating purposes.

I should like to hear from others on this subject as it is one which largely interests both the user and seller of lubricating oils.

J. E. Emerson.

Trenton, N. J., Feb. 17, 1867.

[The suggestion of our correspondent deserves attention and further experiment. It should be borne in mind, however, that considerable grit is known to be retained in some of the mineral oils (see page 37, this volume), and recent observations have shown (page 135) that some of the agents used in refining attack the bearings chemically. So that the experience detailed would not be evidence of the conclusion, unless it were certain that the oil used was free from both mechanical and chemical irritants.—Eds.

Science Familiarly Illustrated.

Capillary Attraction.

Familiar illustrations of the phenomena attending the contact of liquids with solids, classed by physicists under the general head of capillarity, or capillary attraction, are of every day occurrence. The fact is known to all that if a piece of sugar or salt is placed in contact with water, the whole lump will soon be saturated with the liquid; that the cotton wicking of a lamp will continue to supply the flame until the oil is entirely exhausted; or that a piece of blotting paper applied to an unlucky drop of ink will remove the fluid with dispatch. These are the more common and practical ways in which the phenomenon is observed. To enter a little more into detail, we must premise that the name is derived from the Latin, signifying a hair, because the phenomenon is best seen in tubes whose diameters are compared with the diameter of a hair. If such a tube, open at both ends, is placed vertically in water, the liquid, as if not subject to the laws of gravitation, is seen to mount both in the tube and on the outside, rising higher within as the tubes are smaller. If plunged into mercury the liquid does not wet the glass, and is depressed within and against the sides of the tube. These changes of level are attended by a change in the surface of the liquid, in the former case it having a concave form, in the latter a convex.

The double influence of the attraction of a solid and liquid easily explains these capillary phenomena, for as the relative intensities of these forces vary, the surface of the liquid becomes either concave, plain or convex and the ascent is the direct consequence of the terminal form of the liquid.

If a sewing needle is placed carefully on the surface of water it will float because, being covered with an oily layer this prevents the water from moistening it. Certain insects skim over the water for the same reason, their feet are not wetted, and a depression is produced which keeps them up in spite of their weight.

The force of capillary attraction is one of great importance in the economy of nature. These tubes are found in almost every tissue of the animal body, having a diameter often of but the $\frac{1}{4000}$th part of an inch. The vegetable world is also provided with minute tubes which give the wonderful ascension power to the sap. It is the presence of air in these pores that renders wood buoyant in water. An instance is recorded, where a boat was drawn down into the ocean by a whale to a great depth, and on coming again to the surface, the cells were so saturated with salt water that it would neither float nor burn.

Shrinkage in fabrics is due to the absorption of moisture from the atmosphere, by the little tubes in each strand; these fibers swell and necessarily shorten. Mill stones are split by inserting wedges of dry wood into crevices; on being wetted the water is taken up by the pores of the wood and the stone is rent asunder. One of the most curious applications of this principle is found in the process of currying leather or rendering it soft and pliable, by filling its pores with oil. This cannot be done directly by merely smearing the surface, but a way is prepared for the oil by wetting the skin with water and then rubbing on oil. Exposed to the air the water evaporates at ordinary temperatures; not so the oil, and as a consequence the latter is drawn in by capillary attraction so as to fill the pores vacated by the evaporated water.

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[Reported for the Scientific American.]

MANUFACTURE OF BEET SUGAR.

BY JOSEPH HIRSH, PH. DR.

(Concluded from page 158.)

The beet juice, however procured, contains beside sugar, foreign substances preventing crystallization, and which must be removed. To accomplish this the juice is run into copper defecating pans and is heated by steam until it has acquired a temperature of 175° to 190° Fah.; milk of lime is then added and the liquid is brought slowly to the boiling point when flakes appear which rise to the surface forming a scum. By this defecating process the black color of the juice is changed into yellow, and all turpidity is removed. The lime unites with and removes the organic, as well as the phosphoric and sulphuric acids; it also decomposes the albumen, legumine, and all extractive matters, as is proved by the evolution of ammonia, while the heat coagulates the albumen rendering it insoluble. The amount of lime employed is from one-half to one per cent of the weight of the beets; more than this proportion produces an undue quantity of sediment, while too small a quantity produces a greenish turbid liquor. The scum or sediment constitutes from 18 to 20 per cent of the juice, and as it contains a considerable quantity of the sirup it is placed in bags and pressed.

The juice dissolves about one-quarter per cent of lime employed in the defecating process, forming saccharate of lime from which the sugar is to be removed by means of carbonic acid gas and filtration. The gas is often made by the combustion of coke or charcoal, the products given off being made to pass through lime, thence, after being washed, into a large cooler partly filled with diluted soda lye. From the top of the latter vessel the gas is pumped out and is forced into the beet juice. The suction of the pumps produces the draft in front to hasten the combustion of the furnace. Lime is often employed for furnishing carbonic acid gas made by burning it in continuously-acting kilns; or in some localities the gas is obtained by decomposing chalk in retorts by means of superheated steam; sometimes though rarely, the carbonic acid of distilleries is collected; also the chimney gases, containing from ten to eighteen per cent of pure carbonic acid gas, which, when well washed with alkalies, are forced into long covered pans filled with the juice and having a pipe for carrying off the waste gases. On admitting the gas the liquor froths until the decomposition of the saccharate of lime is completed, when the access of the gas is shut off, and the liquid having been once more heated to the boiling point is drawn off to the settling vats, and when clear is run into the forefilters where it is filtered through bone black. The carbonate of lime remaining at the bottom of the forefilter is placed in bags and its juice is expressed, the lime finally being used as a fertilizer.

Bone black as a filtering medium was first suggested by Figuier, in 1811, and soon after put in practical operation. At first only its clarifying power was noticed, but later the main service rendered was found to be the absorption of alkalies, salts, and other substances impeding crystallization. In this respect filtration is only a second defecation. The bone black was first used in the powdered state, being boiled with the sugar juice. It then could be used but once. In 1828 Dumont introduced the use of coarsely-grained bone black, which he used in small filters. The action of a filter is increased with its hight in proportion to its diameter, for then every particle of liquor passes through a greater amount of black, exhausting it more thoroughly than when the diamater is greater in proportion to the hight, hence the rule that filters should be at least ten times as high as wide. To obviate an inconvenient hight, the filters are placed in connected series or batteries of from three to five members. The amount of bone black used is 20 per cent of the weight of beets or 22 per cent of the weight of the juice. The filters are closed at the top to prevent absorption of air, which might otherwise cause fermentation, and of ammonia which is always present in beet sugar refineries, being produced by the action of lime on the protein substances at the boiling point. Where water is plentifully supplied, it might advantageously be used to cool the filter to preserve the liquor at a low degree of heat.

Beside the shape of the filter the quality of the bone black is of importance. It should always be of a dull black, velvety appearance, should adhere to the tongue when brought in contact with it, both of which are signs of great porosity. When the filter is exhausted, the access of juice is shut off, and steam introduced at the top, which condenses in the pores of the black and washes out whatever sacharine juice may remain in it. This same process is also gone through with a few times before the filter is used, whereby are removed all the black, and it then has an increased absorptive power for the salts of the liquor. On the whole, filtration is carried on in the same way as in our American refineries for the manufacture of cane sugar.

The filtered beet juice is next evaporated in vacuum pans, as is the case in our refineries with but this difference; that while here after a single filtration the liquor is at once boiled down to the crystallizing point, beet juice, which contains more impurities, is boiled down only one-half or to 25°, B., and afterward filtered the second time over bone black. The filters before described are used, thick juice passing first through fresh bone black until exhausted, then thin liquor is passed through the same black which still extracts impurities from the watery liquid. After the exhaustion of the black by this thin liquor, it is steamed and removed for purification. The vacuum pan, one of the neatest pieces of machinery employed in the manufacture, is used in Europe with a view to more economy than in this country. Here single pans are used, the vapors of which are condensed by water. In Europe the heat of these vapors is used to evaporate juice in one or two adjoining pans where the liquid is boiled under a still more reduced pressure. The steam, after heating the second pan of sirup, has lost a great deal of its heat and requires two-thirds less water for condensation than that coming from a simple apparatus. The difference in temperature between the two or three pans during boiling is about 30° Fah., the first boiling at 165° Fah., the second at 136° Fah., the third at 100° Fah., or even below that.

In order to preserve these boiling points in accordance with the density of the liquids, the pans communicate, so that into the third pan fresh liquor is flowing, which after some concentration rises into the second, and thence again after a lapse of time into the first pan where it acquires the density of 25° B. In this state it passes through a montejas upon the black filters, whence it comes, or should come, pure enough for final evaporation to the crystallizing point. This, as well as the after treatment of the sugar, is the same as that employed in our refineries with but this difference, that the yellow sugar or dark-colored sirup gained in claying of the sugar forms, is not brought into market in this inferior state, but is worked over again at the end of the beet season into white loaf sugar, or, though seldom, added as it is

produced to fresh beet juice in the defecating pans. Where these after products are worked separately, they again yield more impure molasses, which is again worked over. In this manner six different products are gained. The sugar crytallizing at first from such an after product is usually of an inferior quality and is generally refined over the following year with fresh juice in which it is dissolved. The molasses remaining behind at the last operation contains 35 to 40 per cent of salts, chiefly potash; it tastes bitter and acrid, and is unfit for sweetening purposes. It is mostly used by distillers, who again sell their exhausted mash for the manufacture of potash. In some places it is used as manure for beet fields with excellent success. The molasses is kept in holes on these fields over the summer but toward fall these holes become covered sometimes by a deposit of brown sugar, which is collected and worked over, while any liquid portion is mixed with the soil, returning the substances taken away with the previous harvest.

The after products, just mentioned, when boiled down to sugar, are boiled to a less concentration than fresh juice, in order to facilitate the separation of the impure molasses in claying. The latter is chiefly done in centrifuges for these inferior qualities of sugar, while ordinary good sugars are clayed in forms, generally in a vacuum.

The manufacture of beet sugar is not by any means perfect yet. When Achard obtained two per cent of sugar from the beet, he considered himself doing well. Now with improved machinery and better-cultivated beets, six to nine per cent is produced, which still leaves three to four per cent to be gained by improved methods of working.

Recent American and Foreign Patents.

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

BEEHIVE.—Howard C. Keith, Ancona, Ill.—This invention relates to certain new and useful improvements in beehives, whereby the hive may be thoroughly ventilated, and spare honey removed from the hive without disturbing the bees or cutting the combs by operating the slides.

SPRING BED BOTTOM.—H. A. Coats, Wellsville, N. Y.—This invention consists in the combination and arrangement of the slots, springs, guide rods, cross bars and elastic blocks with each other and with the foundation frame of the bed bottom.

ICE SLED.—George H. Kirk, Philadelphia, Pa.—This invention has for its object to so improve the construction of boys' sleds, that they may be propelled rapidly and easily over the ice or snow by the boy riding thereon.

COMBUSTION OF FUEL.—George M. Copeland, Brooklyn, N. Y.—This invention has for its object to furnish an improved means for increasing the draft of a boiler furnace or other fire place, making the combustion of the fuel more rapid and perfect and thus increasing the effectiveness of the fire.

AUTOMATIC FAN.—John A. W. Lundboro, San Francisco, Cal.—This invention has for its object to furnish an improved automatic fan to be suspended from the ceiling over beds, dining tables, surgical chairs, and in theaters, public halls, etc.

COMBINED FOOT REST AND KNEELING BOARD.—H. Morrison, Steubenville, Ohio.—This invention consists in a combined reversible foot rest and kneeling board for attachment to church pews, and in the combination therewith of rubber springs and bearings or supports to prevent noise and assist in controlling the said board.

CORN PLANTER.—Joseph E. West, Georgetown, Ky.—This invention has for its object to furnish a machine by means of which three rows of corn may be marked out, and the corn dropped and covered at one operation.

SORGHUM OR CANE STRIPPER.—C. P. Hale, Calhoun, Ky.—This invention has for its object to furnish a neat, light, simple and convenient machine for stripping sorghum, sugar cane, corn, etc., which will do its work well, will not be liable to get out of order, and which can be manufactured at less expense than the cane strippers now in use.

WHEEL FOR VEHICLES.—Charles F. Elliott, Great Falls, N. H.—This invention has for its object to strengthen the wheel at the joints of the fellies and in other places to preserve its roundness and firmness.

TWEER.—Moses Powe, Mount Bethel, Pa.—This invention consists in the combination of a grate having a cross-shaped slot and in its lower part a cone-shaped cavity with the box of the tweer, having a hemispherical cavity below the grate and a tapering pipe or channel for the introduction of the blast.

PRESERVING BUTTER AND LARD.—Wm. B. Guernsey, Norwich, N. Y.—The nature of this invention consists in a mode of preparing paper and wooden packages for preserving butter and lard by an application to their surfaces of paraffine.

BALE-HOOP FASTENING.—Robert Dillon, New York City.—This invention relates to an improvement in a bale tie or fastening to secure the ends of iron hoops on cotton and other bales.

ROAD SCRAPER.—Obadiah Hopkins, Hackensack, N. J.—The object of this invention is to make a cheap road scraper which can also be used for clearing away snow by lengthening one of the dragging chains so as to allow it to be drawn at an angle, it can also be used as a ditcher by weighing it down on one corner, causing that end to dip in the ground.

BORING MACHINE.—Joseph Isenberg, McConnellstown, Va.—This machine is adapted for attachment to a piece of framing timber, and has in adjustable jaws a series of holes which act as guides of distance and vertically for the auger in boring for mortice holes. It is attached to the timber by spiked arms above, and a clamp below, operated and fastened by a locking lever.

HEATING STOVE.—D. J. Happersett, Coatesville, Pa.—The invention consists in the arrangement of a winding flue on the exterior of a central air chamber around which the heated products of combustion are conducted, in passing from the fire chamber, and into which the air is admitted above the fire chamber in order to be heated after the heat has had ample time to radiate below.

FOLDING TABLE.—John H. Bush, Bone Creek, W. Va.—The frame of this folding table consists of two end pieces united by a diagonal girder, two braces and an oblique piece to which the legs are hinged. The usual side pieces of the frame are disused, the legs jointed deeply and securely in the diagonal frame piece and locked when open, by a spring catch.

LOCKING WASHER FOR NUTS.—James H. Gridley, Washington, D. C.—This invention consists of a hinged or pivoted plate which folds down upon one or more edges of the nut to prevent the latter from turning. When the plate is hinged or pivoted to the washer, the latter is prevented from turning by sinking it into the face of the object in whole or in part, by fitting it against a protuberance of the object to which it is attached, or by fitting it to the bolt so as not to rotate thereon.

CLOTHES HORSE.—Charles B. Rogers, Plainfield, N. J.—This invention relates to a clothes horse of that class which are provided with folding arms to admit of the device, when not in use, being folded or adjusted in compact form so that it may be stowed away or placed in an apartment without monopolizing much space.

HARVESTING MACHINE.—John M. Swain, Howard, Ind.—This invention relates to a new and improved harvester, and consists of an improved platform attachment whereby the grain may be discharged from the machine in gavels either with or without the process of raking it off from the platform. The machine is also adapted for cutting either grain or grass as a rigid or jointed sickle may be used.

SEED-PLANTING MACHINE.—Robert B. Wright, Vermillion, Ill.—This invention relates to a seed-planting machine of that class which is invented on wheels and has its seed-distributing mechanism operated from the axle of the wheels on which the machine is mounted. The object of the invention is to obtain a seed-planting machine of the class specified, which will be simple in construction, not liable to get out of repair and be under the complete control of the operator while sitting or riding upon the machine.

OBTAINING SURFACES FOR PRINTING, STEREOTYPING, AND ELECTROTYPING.—James Cheverton.—For this purpose, a plate, consisting of sulphate of lime, in some form, is baked in an oven, until nearly all the water of crystallization is expelled. The intended design is then drawn upon it with a liquid that will sufficiently penetrate the surface, so as to harden and render it tough to a slight depth. The friable material between the lines is next removed by brushing, so as to leave the design in relief. The plate is finally hardened by immersing in hot or cold water for ten or twelve hours, when it is ready for printing.

TREATMENT OF CAST IRON.—James Livesy.—For this purpose, the liquid cast iron is made to flow in a nearly uniform stream on an endless iron belt, carried upon pulleys with a regulated speed; as it passes along it is fanned so as constantly to supply it with fresh air. When it has become solid, a shower of cold water falls upon it, and the steam thus generated assists to eliminate the impurities. As soon as the production of steam ceases, the shower is increased, so that, when the metal reaches the outer pulley, it is quite cold and cracks as it passes off. It may now be used as pig iron, or be subjected to chemical treatment. The air, water, etc., also may be chemically treated.

PLAN FOR CONDENSING STEAM.—Alexander Crichton.—The object of this invention is to simplify the condensation of the steam, so as to reduce the number of working parts and liability to leakage, and economise power. For this purpose, instead of the surface condenser used with marine engines, and the pump employed for producing the necessary circulation of the condensing water through the surface condenser, the inventor carries the exhaust steam from the engine in metallic pipes through the bottom, side, or bilge of the ship, under the light load line of flotation, and returns it through the bottom or side to the engine, the external surface of the pipes being exposed to the cold water through which the ship is being propelled.

ROLLS USED FOR ROLLING METALS.—Caleb Thomas Hill.—These are cast with an axis of steel or case-hardened iron, in sand, or chill molds. The greater strength thus imparted allows the use of an inferior kind of iron. The axis is supported in the middle of the mold, and the iron is cast round it.

MEDICAL COMPOUND.—Jacob Bates, Salineville, Ohio.—This medical compound is especially intended for the cure of coughs, colds, influenza, and other diseases of the lungs.

LEAD PIPE.—William Spellman, Columbus, Miss.—This invention consists in so constructing the apparatus or machine for making lead pipe and solid bars from melted lead, that all loss by oxydation of the lead while thus in a melted state, will be prevented.

TURNING AND SHAVING BOLTS, ETC.—Leander Burns, Port Chester, N. Y.—This invention consists principally in a peculiar construction or arrangement of cutters for shaving or turning bolts.

CLOTHES DRYER.—John T. Elliott, Grand Rapids, Mich.—This invention relates to that class of clothes dryers, having a revolving frame, and it consists principally in so hanging or securing the arms of such frame to its common center head piece, that when desired, said arms can be swung up and into a vertical position, and thus into a compact shape for being carried.

MANUFACTURE OF BRUSHES.—M. P. Wilkins and C. D. Rogers, Jersey City, N. J.—This invention consists in using for each bunch or cluster of bristles of the brush a metallic cap, having a series of elongated prongs, by means of which cap, after the bristles have been properly inserted or placed in it, they can be driven into and secured in the socket of the holder, wherein they are made to assume, or are brought to the proper and desired bunch and open shape.

LINIMENT.—Job Gifford, Smithport, Pa.—This liniment is to be used for the relief and cure of inflammations, swellings, soreness of limbs, flesh wounds of all descriptions, chilblains, and for irritations of the flesh or skin.

APPARATUS FOR THE DRAWING OF WELL TUBES OR PIPES.—T. M. Gile and W. Cochran, Mansfield, Penn.—By the apparatus embraced in this invention tubes or pipes such as are used for oil or petroleum, or artesian wells, can be drawn from the ground with much facility, and in a most satisfactory manner.

TILT HAMMER.—Alfred J. Grainger, Wilmington, Ill.—This invention consists in driving the hammer by a connecting rod which takes hold of the power end of the helve, and connects it with the crank of the driving shaft, and then providing the driving shaft with a counter balance for balancing the weight of the hammer, so as to give a more even strain on the driving devices.

IRON SHEARS.—Silas W. Wright, Ellsworth, N. Y.—This invention relates to a method of cutting and trimming the ends of bolts and rivets in blacksmith and other iron or metallic work.

WATERPROOF GLUE.—George W. Caton, Canandaigua, N. Y.—This improvement consists in combining certain ingredients, and forming thereby a waterproof glue or cement, which for strength and general utility is unsurpassed.

SEWING MACHINE AND QUILTING FRAME.—William R. Idle, Urbana, Ohio.—The object of this invention is to construct a quilting frame, in such a manner as to adapt it to the sewing machine, so that the tedious operation of quilting may be performed as expeditiously as other kinds of sewing.

CULTIVATOR.—John Gilpatric, Biddeford, Me.—This invention relates to an improvement in the construction of cultivators, the object of which is to prevent their clogging with weeds and grass.

SULKY PLOW.—C. H. Littlefield, Turner, Me.—This invention relates to improvements in the construction of sulky plows, and consists in devices for connecting the plow beam with the carriage frame and the draft pole, in such a manner that the plow may be managed while at work, by the plowman on a seat.

BUTTER BOX.—William B. Guernsey, Norwich, N. Y.—The object of this invention is to construct a cheap, neat, and convenient box for containing two small parcels or prints of fresh butter in distinct and separate compartments. The box is made measurably air-tight for the better protection and preservation of the butter in its original purity and freshness, by the peculiar construction of double walls, which are fitted and united very closely together.

STEAM DIGESTER FOR TREATING BONES.—William Perry, North Bridgewater, Mass.—This invention relates to improvements in constructing a retort or digester for the treatment of animal bones with steam, to soften and prepare them for grinding into a fine powder for use as a fertilizer.

MOSQUITO BARS.—V. Barker, Otisfield, Me.—The nature of this invention consists in constructing, in a peculiar and novel manner, the corners of frames for screens to windows to prevent mosquitoes, flies, and other insects from entering the house, and for mosquito bars over beds and other places where it is desired to prevent flies and mosquitoes from entering.

ICE-CREAM FREEZER.—Lewis A. Lipp, Coatesville, Pa.—This invention has for its object to furnish an improved ice-cream freezer, so constructed and arranged that the cream may be frozen quickly, evenly, and thoroughly, and in which the stroke of the dasher may be regulated according to the amount of cream to be frozen.

GATE.—Rodolphus Conway, Volga, Ind.—This invention consists in an improved gate formed in two parts hinged to each other, and hinged at its center to a central post; in the combination and arrangement of the cross wires with the latches of the gate, so that one latch cannot be operated without operating the other; and in the combination of a spring with the parts of the gate to hold the said parts spread or extended when the gate is fully opened.

COMBINED WASHING AND WRINGING MACHINE.—Cassius A. White, Fairfield, Vt.—This invention has for its object to furnish an improved combined washing and wringing machine, so constructed and arranged that the clothes may be washed, conveyed from the washer to the wringer, and wrung by the same operation.

SELF-ADJUSTING RAILROAD SWITCH.—L. S. Packard, West Stockbridge, Mass.—This invention relates to a switch which can be adjusted to, and secured for, a branch track on either side of the main track.

CULTIVATOR.—William J. Andrews, Columbia, Tenn.—This invention relates to a cultivator of that class designed for cultivating crops grown in hills or drills, and it consists of a novel draft attachment for regulating the depth of the penetration of the plows, as may be desired, and in a novel arrangement and application of plows and harrows for pulverizing and rendering the earth light and pliable.

INDICATING ATTACHMENT FOR RAILROAD SWITCHES.—Thomas S. Hall, Stamford, Ct.—This invention consists in having an electro-magnetic alarm or signal applied to the switch, in such a manner that when the switch is not in line with the main track a continuous alarm will be sounded in the station house, and hence, if a switch-tender, after adjusting the switch in line with a branch track to accommodate a train, should fail, after the passing of such train, to adjust the switch in line with the main track, the continuous alarm would arrest the attention of the station master or other employé, who would have the switch properly adjusted at once.

CULTIVATOR.—Omar J. Arnold, Mount Ida, Wis.—This invention relates to a new and improved cultivator for cultivating plants which are grown in hills or drills, and it consists in a novel and improved construction, whereby a strong, durable, and economical device for the purpose specified is obtained, and one which is under the complete control of the operator or driver.

LIFE PRESERVER.—Henry Matthews, Brooklyn, N. Y.—The object of this invention is to construct a life preserver, so that it may be arranged on ferry boats and other vessels, and not be lost or stolen. It is a combined life preserver and stool, which is secured on the floor of a cabin either by screws or in any other suitable manner, so as to be easily detachable when required. The device is used for a seat, and a number may be arranged in rows in cabins of boats similar to the manner in which seats are now arranged. When required the seat is detached from the floor of the cabin, and is used as a life preserver.

ROSSING SAW LOGS.—Walter B. Noyes, Grafton, N. H.—The object of this invention is to facilitate the operation of sawing lumber from saw logs, through a device, by which the ross and sand and gravel on the log is removed from before the saw.

PROCESS FOR PRESERVING EGGS.—Jesse K. Marsh, Terre Haute, Ind.—This invention relates to a process for the preservation of eggs, whereby the pores of the shell are filled, and the air excluded, thereby preserving the egg from decomposition.

REVERSIBLE DUMPING SLED.—J. H. Nonamaker, Middletown, Penn.—This invention has for its object to furnish an improved machine for use in cleaning out the manure from stables, in hauling corn before it has been husked from one part of the field to another, in hauling dirt from excavations too narrow to admit a cart, in hauling cord wood from a clearing, and for other similar uses where it is desirable to unload without its being necessary to handle the load piece by piece.

FIRE ESCAPE LADDER.—Isaac Henderson, Philapelphia, Pa.—This invention has for its object to furnish a simple means for escaping from the upper stories of buildings, when the ordinary stair or passage ways are rendered impassable by fire or other circumstances, which shall be so constructed that it can be packed in a small space, and thus kept always at hand, and which shall be so cheap as to be within the reach of all.

TRUCK.—Asa E. Hovey, West Waterford, Vt.—This invention has for its object simplicity and economy in construction, with suitable springs, and all so arranged that the truck may pass over rough ground with the greatest ease.

INDICATOR.—Chas. Couse, Belleville, N. J.—This invention consists in the manner of operating an index hand or pointer, so that it will move over a graduated scale, and show thereon the number of revolutions made by the machine to which it is annexed. The invention also consists in the manner of arranging the index hand, so that it may with ease be set to any point on the graduated scale.

FOLDING CHAIR.—B. Koechling, New York City.—This invention consists in the manner of hanging the seat to the side frames, which is done in such a manner that, when any number of chairs are to be placed in a convex or concave line, the devices for attaching the seat will always answer as they are.

SAFETY LOCK.—Edward H. Burrows, Willimantic, Conn.—This invention relates to an improvement in that class of locks which are provided with a combination mechanism to be operated by finger pieces in such a manner that the bolt can only be operated by touching said finger pieces in the order corresponding to the set given to the mechanism.

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

F. R., of N. Y.—The bellows is more easily operated by hand and for this reason is used instead of the fan for small furnaces. Whenever power is available and only a moderate pressure of blast is needed, the fan is to be preferred. We agree with you that an article on the construction and use of small furnaces would be useful. You may expect to see such a one in this paper. . . . . The clay you describe is commonly called fat clay and differs in composition from other clay mainly in the fact that it contains a smaller per centage of sand. . . . We expect some day to see the sea weed which is thrown up in vast quantities along our coast to be put to some useful purpose.

U. G. W., of Ohio., supposes a steam tight vessel bounded by plane surfaces, 6 inches square at the opposite and parallel ends. The vessel narrows towards the middle where it has a sectional area of 6 square inches. Suppose steam now let in. We quote his query: "Would the force of steam be in proportion to the 36 square inches on the two ends, or in proportion to the 6 square inches in the middle, or would the force of the steam on the two ends be the same as if the pipe were of the same size the whole length." What does he mean by force? The pressure is the same in every part of the vessel. The size or form of the containing vessel has nothing to do with the rate of pressure, *i. e.* the pressure per square inch. The amount of expansive force at a given pressure is precisely proportioned to the amount of steam, the form of the containing vessel being of no consequence.

M. S., of R. I.—To prepare a ribbon for a stamp canceling machine, smear it over with a mixture of lampblack and butter.

W. K., of Ind.—"Will a certain amount of weight added to a belt wheel produce as much effect as it would in a fly wheel separate from the belt wheel, if the distance from center of shaft is the same?" Yes.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Manufacturers of House-furnishing Goods (Hardware) will please send their address and circulars to S. W. Johnson & Co., Detroit, Mich.

T. H., of Richmond, Va., has invented an article that will pay, but has not the money to get it patented. He will give an interest to any one who will assist him to do so. The article will pay well here and in Europe. Address T. H., Box 446, Richmond, Va.

Parties in want of a good water wheel will please address Valentine & Co., Fort Edward, N. Y.

Where can I obtain machinery to make shoe pegs? William S. Grubb, Baraboo, Sauk county, Wis.

Who manufactures machines for turning broom handles? W. H. Kendig, Middletown, Pa.

Hook and Eye Machine Makers address, with price of machine, J. W. Cunningham, 102 Remsen street Williamsburgh, N. Y.

Where are malleable iron boat pump suckers manufactured? Raymond & Campbell, Middletown, Pa.

Wanted.—The address of parties who manufacture Jackets for Locomotive Cylinders, Steam Chests and Domes. Nagles & Mitchell, Rome, Ga.

C. Browning, Rush Run, Ohio, wishes to correspond with persons in regard to the best manner of tempering iron springs.

Improved Draw Bars for Cars.

When the common draw bars on railway cars give way, railroad men are subjected to much annoyance, and the danger attending such accidents is, not seldom, considerable. The object of the improvement shown in the engravings is to make a perfect connection between the ends of the car. No change is necessary in the general construction of the car, so that the device can be attached to cars already in use. It consists simply of two rods, A, of two inch round iron, passing under the car from end to end and connected at each end by nuts to the coupler. Between the coupler and the car, itself, is a spring of rubber covered by a wrought iron plate and having outside two cylinders or bushes forming part of the coupling and through which the ends of the connecting rods slide as pistons within cylinders. At the center of the car the weight of the rods may be sustained by boxes.

It will be seen that in no case unless the rods are pulled apart by direct tension can the draw bar be disengaged from the car. Any draft applied at one end of the car actuates the other end without any strain upon the framework of the car; the connection is absolute. It is impossible to jam this draw bar or to pull it out. It does not interfere with the use of any style of springs nor any description of "bumpers" but can be applied to cars now run for very little expense. The jar of starting or stopping is received entirely on the bars themselves, independent of the cars, and, therefore, if applied to passenger cars the occupants would not be subject to the vibrations now so annoying. It has the further advantage, as claimed by the inventor of being cheaper than the ordinary style. If two rods are not enough additional ones may be used with the same effect.

It is the invention of Wm. J. Harrop, of Houston, Texas, to whom all communications on the subject should be addressed. Patent pending through the Scientific American Patent Agency.

Chemical Novelties.

At the February meeting of the Massachusetts Institute of Technology Mr. Fleury, of New York, explained the patented process of M. Réne Cupper, of Paris, for extracting iodine from sea water, which consists in the use of a new precipitating liquid composed of sulphate of copper, sulphate of the protoxide of iron, tartaric acid and tartrate of ammonia, of which a mixture of only three pounds and a quarter—and which are afterward nearly all recovered—precipitate one peund of iodine in the state of iodotartrate of protoxide of copper from 25,000 pounds of sea water at a cost of about $1·50 per pound. He stated the present yearly importation (none being manufactured in this country) as 120,000 pounds, at a price varying between $5·50 and $6 per pound.

M. Fleury also gave a description of the properties of sulphide of silicum and its preparation by the action of sulphur and carbon or quartz or flint; he explained the manufacture of a pure hydrate of silica, a neutral solution of flint or opal in water, resulting from the decomposition of the sulphide of silicium. M. Fleury remarked that gold quartz could cheaply be brought from Nova Scotia to Boston, converted into sulphide of silicium, dissolved in water, and all the gold precipitated by specific gravity and forcing of the suspended particles through mercury; that the liquid (the value of which would more than pay for the expense of extracting the gold) mixed with other cheap materials of a proper consistency can, when poured into molds without application of fire or any heat whatever, form excellent snow-white flint marble statuary, tombstones, ornaments and building stones, hard enough to resist all the influences of the weather better than natural marble. M. Fleury remarked further that the cost of this flint-marble statuary, etc., is less than one-third of that of cut or chiseled marble. K.

POLICE INTELLIGENCE!—A PATENT AGENT IN TROUBLE.

A complaint was made on the 26th ult. by George W. Nell, of Philadelphia, and by one of the firm of Munn & Co., to Justice Mansfield, a magistrate sitting at the Essex Market Police Court, that a certain firm styling itself "Neill & Co.," doing business at No. 39 Park Row, as patent agents, had falsely personated the firm of Munn & Co., thereby obtaining money from said Nell, who intended to employ said Munn & Co. to transact his patent business.

Upon presentation of the affidavits the Justice issued his warrant for the arrest of Neill, one of the principals of the firm of Neill & Co., who was arrested and duly arraigned for examination. The affidavits of the aggrieved parties were read and witnesses were examined on both sides. Justice Mansfield ordered the accused to find bail in the sum of $1,500, to answer before him the following week. Ex-Recorder James M. Smith, Esq., appeared for the complainants.

The statute upon which the action was founded reads as follows:—

"Every person who shall falsely represent or personate another, and in such assumed character shall receive any money or valuable property of any description intended to be delivered to the individual so personated, shall, upon conviction, be punished in the same manner and to the same extent as for feloniously stealing the money or property so received."

ALEXANDER'S LEVER SAW SET.

There are a number of devices for setting saws, and various ways of performing the operation. Percussion is a mode most commonly used but is neither safe nor certain in its results. If the saw is stiff—too highly tempered—there is great danger of breaking the tooth; this is also true of one that is properly tempered, when operated upon in very cold weather or when the saw is chilled. Neither can the results be depended upon for uniformity. If there is a resisting back to the instrument used, to present excessive bending by a too heavy blow, the tooth will be spread, and if the blow is too light the set will be insufficient. The teeth of a saw of whatever quality or form should be set by a gradual pressure.

The engravings present two views of a device for insuring regularity in setting saw teeth. Fig. 1 is a side view and Fig. 2 a cross section. A is an iron block, cast and cored to receive the blade B, of the saw and having also an inclined recess for the bend of the tooth. C is a set screw passing through the block to the inclined recess, D, and is intended to graduate the amount of set to be given to the teeth. It is furnished with a check nut, E, to hold it firmly in position. The lever, F, is pivoted at G, and its head is an eccentric cam with inclined face as at H, Fig. 2. The lever handle being raised the saw can be moved to position, and when depressed it engages with the tooth and with great force presses it down against the screw, C, or the inner face of the inclined recess, D.

Fig. 1.

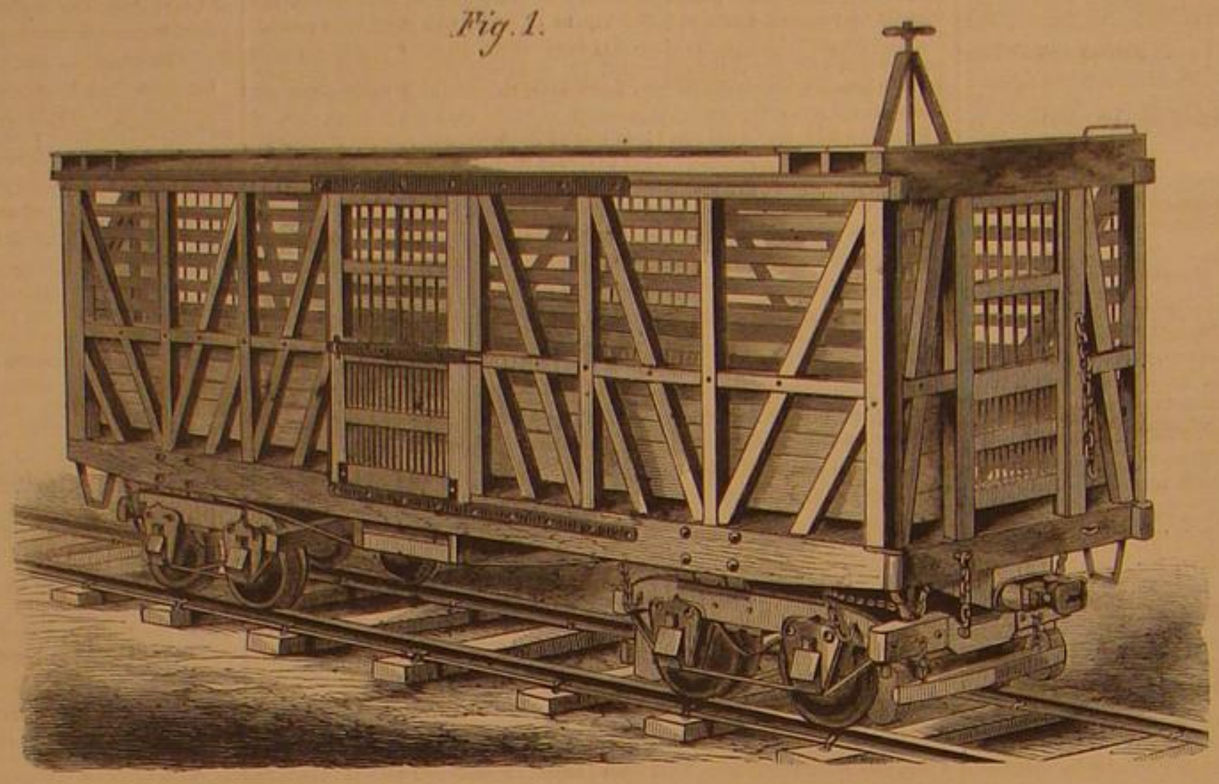
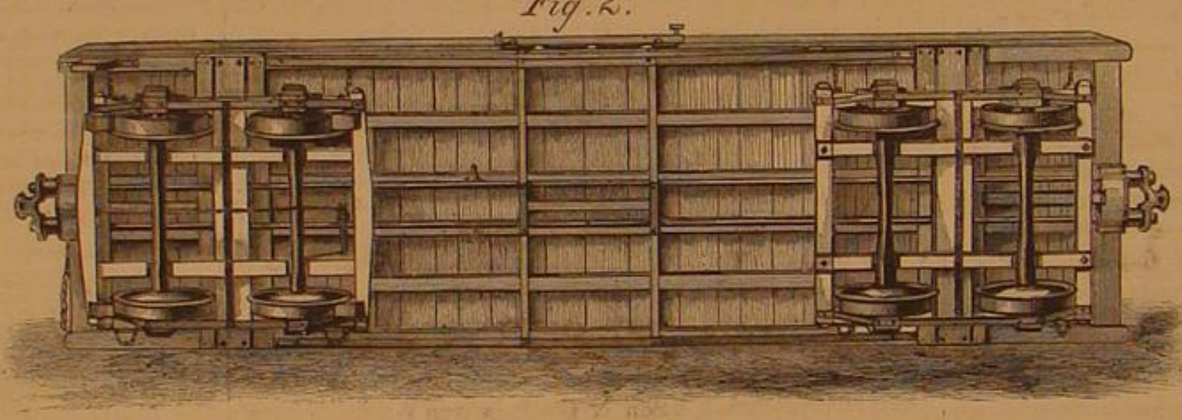


Fig. 2.



HARROP'S DRAW BARS FOR CARS.

Fig. 1

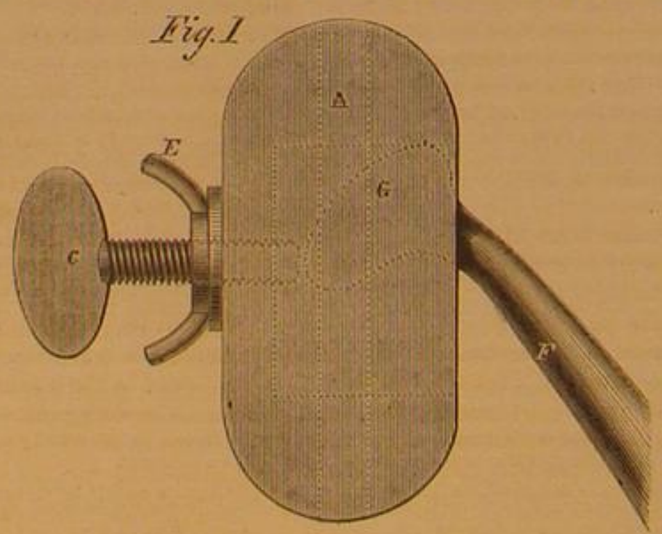
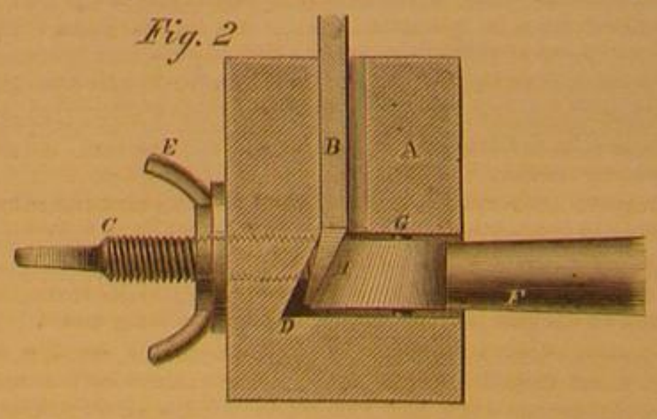


Fig. 2



It will be seen that no great difficulty can accrue in its use even by an inexperienced person. The set-screw determines the exact pitch of the set and no amount of pressure upon the lever can overcome its resistance. The danger of breaking the teeth is obviated and perfect evenness and uniformity in the set is secured. This improvement was patented Jan. 22, 1867, through the Scientific American Patent agency, by W. A. Alexander, of Mobile, Ala., who desires to contract for its manufacture. His address is as above, Box 130.

The Channel Submarine Railway.

An able English engineer (Mr. James Chalmers) who has made this scheme his hobby for some time past, is now before the public in an elaborate *brochure* with drawings and explanations, embracing the full details of his plan for sub-tubing the straits of Dover. Of this plan, the essential principles are all that at present engage our curiosity. The tubes, 15 feet in diameter, 400 feet long, and 260 in number for each of the two parallel lines required, are to be lined with brick, covered with concrete, sheathed with timber, and laid each way from a great ventilator well, built first in the center of the channel. The process for joining the tubes, at a depth of from 100 to 180 feet, is ingenious. Each tube has a strong temporary bulkhead at each end, fixed a few feet inward, and provided with a valve, a manhole, and a window of heavy glass. The first tube having been sunk empty, connected to the ventilator, and loaded down with anchor boxes, a sufficiently powerful wire cable welded to a bolt through the outward end of the sunken tube, is now passed through a projecting ear upon the inward end of the next following tube, and serves to guide that end as sunk, into match with that to which it is to be joined. A ball and socket joint, it has been suggested, may be applied to guide the two ends into exact coincidence, and the fixed end is to be faced with an india-rubber packing. An indefinite amount of ingenious labor will sometimes be exhausted, however, in firmly adjusting a tube in the exact line with its predecessor required for complete contact.

When the two ends are fairly in contact all around, which is ascertained by inspection through the window of the fixed tube, by the aid of an electric light, the valve in the inward end of the tube just lowered is to be opened, and the issue of the water from the chamber formed between the bulkheads, it is claimed, will leave a vacuum and secure the instant compression of the two ends together with immense force. The chamber may then be entered through the man-hole, and the joint perfected and secured permanently. The whole structure, as fast as laid, is to be covered with an embankment. The estimated cost is twelve millions of pounds sterling, and the time required for construction, from two to three years, allowing 120 days in a year to be placid enough for tube-laying. In regard to the joining process, we are unable to conceive the sufficiency of the outward pressure from the water chamber between the tubes—that of a column of water fifteen feet high—to overcome without the assistance of powerful pumps, the inward pressure of 100 to 180 feet of water through the smallest seam or leak between the tube ends, so as to create a vacuum and convert the ocean pressure into an auxiliary.

Petroleum Fuel.—A mode of burning petroleum in an ordinary engine boiler, lately exhibited in England, is to inject a spray of mingled steam, air and petroleum against a slab of fire clay set transversely upon the fire grate, with a thin coal fire burning on the latter. The burning coal serves the purpose of a wick, and produces a perfect combustion of the petroleum without being itself consumed. The cost of steam in this crude form of the experiment is said to have been about the same as when coal is used. Experiments are going on with sanguine expectations, for perfecting the combustion of the cheapest refuse of coal tar and similar substances, in engine boilers. The result, if successful, will be of the highest commercial importance, as the substitution of a much denser fuel for coal will revolutionize traffic between distant ports, and bring steam fully into the ascendant on the ocean.

Sugar as an Article of Diet.—Dutrone calls sugar the "most perfect alimentary substance in nature." Dr. Rush says it affords the greatest quantity of nourishment in a given quantity of matter than any other article in nature. Sir John Pringle tells us that the plague has never been known to visit any country where sugar composes a material part of the diet of the inhabitants. Dr. Cullen is of the opinion that the frequency of malignant fevers of all kinds has been lessened by the use of sugar.

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CAUTION.

It has become necessary for us to state very distinctly that he Scientific American Patent Agency Offices are at No 37 PARK Row, and not at No 39. Our reason for making this announcement will be made to appear by reference to a notice published on page 172, under head of "Police Intelligence."

PERMANENCE OF ANIMAL TYPES.

The last three lectures of Prof. Agassiz' course in New York, were devoted to animated nature. Many curious details might be quoted if we had room for mere details, but we shall confine our notice as heretofore to generalizations. Two remarkable observations were made on the whole system of animal life, in land and water, in the western hemisphere:—the general inferiority of all the types, in comparison with those of the younger world which we call the old; and the wonderful peculiarity of those types, especially in South America and the Amazon. The Amazon has an incomparable variety in fishes, but they are all its own, with few exceptions. Among animals, none of the higher descriptions of any family are found, and numerous inferior species are peculiar to the country. Still, all the variant species, of whatever family, faithfully follow the family type, and resemble their common kind far more than they resemble each other. So that whatever differences local conditions may or may not have induced, such conditions have proved powerless to revolutionize or develope *de novo* family types.

This division of the course sums up in a powerful argument for the well known theory of the author, that all the diversities of species have resulted from distinct interventions of creative power. Prof. Agassiz is not content with the prevailing belief shadowed forth by the combined lights of Geology and Genesis, that at successive periods in the geological development of the world successive acts of creation established the successive ranks of organic life, up to man, and stamped them with inviolable characteristics and limitations, while implanting the germs of a diversified development in detail. To appropriate one of his own fine discriminations, the general plan and purpose of each order was firmly fixed in the outline of its structure, and the filling up, the development, the way of carrying out the design, was left open, or rather subjected to a law of infinite variety. This has seemed particularly manifest in the flexibility of the types of vegetation, and has until lately been taken for granted in respect to man.

But Prof. Agassiz cannot rest in this view. He believes that the development theory, if true within any limits, must be true universally, and that the only escape from falling into a common origin of all varieties, man included, is to resist every derivation or ramification of species that can be proposed. After classifying the varieties of monkeys that exist throughout the world, and comparing their differences with those of the races of men, he ventures the assertion that if these races of men have radiated from a common origin, then not only must the various species of monkeys have a common origin, but these two incommunicable orders of being, the man and the monkey, must by the same reasoning be proved of one parentage! This may not be exactly an argument: but an argument of which both the legitimacy and force must be conceded, was stated in the known history of every animal race from the begining until now. Not a single trace of incipient ramification or transmutation of kinds can be found in all the ages of geology and history; and this fact seems to stand impassable in the way of the admission of such a change within any limitations whatever, and to throw us back upon the only supposition within our reach, that every distinct and permanent feature must have been stamped expressly by the Creator upon those who bear it.

It may not be amiss to add to the statement of Prof. Agassiz' view, a suggestion to quiet the uncomfortable doubts which his argument and the Scriptural record of the origin of the present races of men from Noah, may seem to throw upon each other. Granting that no continued power of ramification inheres in any *species*, there is no inconsistency in supposing a certain limited power of that kind to have been granted to each *order* at its creation, and exhausted in the production of the existing species, or even in supposing the same to have been re-imparted to the second head of the human family at the deluge, or again, in supposing that moral evil, peculiar to man, may have played a part mysteriously potent in our physical nature for the disintegration of the race, developed completely, perhaps, only at the fiat of the Almighty in the dispersion of Babel. In short, our imperfect comprehension of both nature and revelation, will always leave us room enough for the toleration of apparent discrepancies between them.

But after all, what is to forbid the hypothesis that a primal head and embodiment of each order may have been constituted in full generic complexity at the creation? Or, if so, who can say that it transcends the limitations of nature and providence to reproduce at any time a perfect man, embodying and generating all the types of humanity afresh? Certainly, man at least is fruitful in original conceptions, physical as well as ideal, generating at all periods secondary types or "family likenesses" that persist as firmly in proportion to their extent as those of the Caucasian and Negro, yet like them and all others, never transgress the outline of their kind. Does not this endless complexity under strict generic limitations in the minor types, argue strongly a comprehensive complexity under like but larger limitations in the original, in preference to the supposition of numerous independent creations of the same order? Tracing, as we must now do, the ramifications of the tree from the extremities toward the center, and finding that all the individual parts fall into clusters and all the clusters one after another fall into some common stem, while the stems derive themselves from greater branches, should we not expect to find the branches also united in one root? Contradiction, in one word, is the test of heterogeneity: it alone is incompatible with derivation: and there is enough of it between man and the monkey to keep them asunder from eternity to eternity. We are confident that with Darwinism and Agassizism as its extremes, philosophy stands astride of the truth, which will be found between them in the footprints of neither.

TRIAL TRIP OF THE STEAM RAM "DUNDERBERG."

On Friday, Feb. 22d, the iron-clad ram *Dunderberg* left her dock, foot of 6th street, East River, for a trial trip at sea. Besides the engineers, firemen, and crew, there were about forty persons on board, comprising invited guests, representatives of the press, and the builder of the ship, Mr. Wm. H. Webb; Messrs. John Roach & Son of the Etna Iron Works, constructers of the engines; Erastus W. Smith, A. P. D., the designer of the engines and machinery and superintendent of their construction; officers of the navy detailed to superintend the trial; Mr. Thomas Main, engineer at the Etna Works, together with several sea captains of prominence and experience.

As the ship wound her tortuous course through the East River, propelled by her powerful engines and immense screw, her obedience to her helm was remarked by all on board as particularly satisfactory.

Her dimensions are as follows:—Extreme length, 380 feet 4 inches; extreme beam, 72 feet 10 inches; depth of main hold, 32 feet 7 inches; hight of casemate, 7 feet 9 inches; length of ram, 50 feet; draft when ready for sea, 21 feet; displacement, 7,000 tuns; tonnage, old measurement, 5,090 tuns.

The floors and frames of the hull are of oak timber accurately hewed and planed together, so that when in position the sides and floor were one solid mass. This was calked inside and outside; the sides were then stiffened with truss work of heavy bars of iron placed diagonally in opposite directions and riveted at the crossings and bolted to the frames. This was then covered with timber ceiling. The floor, outside, is covered with heavy oak planking. The sides at the bilge are covered with two courses of timber, increasing upward, so that at the water line the sides are six feet thick, and at the angle of casemate seven feet thick. The bow of the hull is constructed with special adaptation for use as a ram. The lines are what nautical men call easy or sharp, and the structure is of solid timber and iron for a distance of fifty feet from the ram, the beak of which is six feet below water line and incased in a heavy shield of iron. The "quarters" of the ship are made of peculiar shape, extending aft far over the propeller and rudder, and curving upward, outward, and downward to a considerable distance below the water line, forming a thorough protection to the rudder and propeller. The entire side to a depth of six feet below the water line from the beak of the ram to the angular point of the main deck aft, is protected with hammered wrought-iron plates, varying in thickness from three and a half to four and a half inches, secured by one and a half inch countersunk wood-screw bolts.

The main deck outside the casemate is composed of a tier of heavy beams transverse the ship, overlaid with a course of timber laid solid longitudinally, and the whole covered with bomb-proof plates. The casemate or fort is built of three courses of timber each one foot thick, the casemate deck being of two courses of timber. The sides and ends of the casemate are inclined inward for the purpose of "shedding" the shot fired against it, and plated with armor plates twenty-eight inches wide, four and a half inches thick, extending in one section the entire hight of the casemate. The deck is also armor-plated, and bomb-proof gratings of wrought iron placed over all the hatchways and openings, including the smoke-pipe hatch. The casement is pierced for twenty guns, but will mount only sixteen guns, four of 15-inch bore and twelve of 11-inch bore.

In external appearance, the ship looks like a fort mounted upon a long, low, sharp vessel. She has a "hermaphrodite brig" rig, and while she has a formidable and invulnerable look as a war craft, the rake of her masts and smoke-stack, together with the angular contour of the casemate and shear of the hull, make up a symmetrical and even pleasing appearance. Lying so low in the water, and a large part of her hull being below the surface, she does not present the appearance of magnitude which would be expected. It is only when one walks her decks and views her in all her parts that her immense proportions present themselves to the understanding.

The engines are two in number, of the back-action, horizontal type, with cylinders 100 inches diameter and a stroke of 45 inches. They are placed side by side on the starboard side of the vessel; the crossheads being on the opposite side, connecting with the piston by two piston rods, one above and one below the shaft, the connecting rod vibrating between. Each cylinder is fitted with separate bed frames, affording a gangway in the center, giving convenient access to the cut-off eccentrics and the center shaft journals. The frames are made in two sections, the upper section admitting of removal, and this in combination with a movable chock behind the bottom section of engine-shaft journal bearing, admits of the removal, repair, or renewal of the journal bearings without disconnecting the engine or moving the shaft. This is the first application of this combination. Each cylinder is fitted on top with slide valves in two sections, the division being made for the double purpose of avoiding the irregularities of expansion, inseparable from a valve of great surface, reducing the size to within that which had been found to work well in practice, and inclining the seats on the cylinder, thereby shortening the ports and proportionally reducing the waste of steam therein. The steam valves are double-ported and fitted with Holmes' improved slide cut-off. The friction of the steam valves upon the cylinder faces is balanced by Waddell's plan, consisting of counter openings communicating both with the steam and vacuum, and packed with brass packing frames.

The steam valve eccentrics are on the outside of either cylinder. The cut-off eccentrics are between them. The engine shaft, cranks and crank pins are of wrought iron made in separate sections fitted and shrunk together. The shaft journals are twenty inches in diameter, the crank pins seventeen inches diameter faced with steel. The large reciprocating connections of the engines are balanced by the cranks, which have a large quadrant-shaped counterbalance opposite the crank pin.

The condenser is tubular, affording 12,000 square feet of condensing surface. The tubes are of solid drawn brass, without seam, and for the protection of the boilers, are tinned inside and outside. The tube heads are packed with seasoned and compressed white pine ferrules, a cheap, simple and efficient method, on the plan of Horatio Allen. The condenser is fitted with two circulating and two air pumps, worked separate and independent of the main engines by means of two steam cylinders having a diameter of thirty-six inches by thirty-six inches stroke. The steam cylinders and the circulating pumps are on the plan of Henry B. Worthington, and, together with the air pumps, were manufactured under the direction of Mr. Smith, by him. They are located at right angles with the main engines and beneath the condenser and main crossheads, the slides of the latter being supported by the bottom of the former, and the whole sustained by the framework of the independent engines connecting with the framework of the main engines.

The arrangement of independent condenser engines is believed to afford great advantages in making it practicable to run the main engines—disencumbered by the circulating and the air pumps—at a greater number of revolutions, as well as admitting of a more convenient and rapid starting, stopping, or reversing of the main engines, as the condenser can remain continually in effective operation. [The condensing engines were not stopped during the entire trip.] This must materially facilitate the maneuvering of the ship when in action. The arrangement for handling the main engines is very simple, convenient and effective. There are two small direct-acting engines with cylinders fourteen inches diameter and twelve inches stroke, connected at right angles and attached by means of screws to the quadrants connecting with the Stevenson link. A simple handle and rod changes the lead of the small engines to run ahead or back. A small hand wheel and rod controls the valve that admits the steam; the small engines are put in motion and the links of the main engines are soon run to a point where the engines will stop or go ahead or back. [The main engines were repeatedly stopped and reversed in from twenty to thirty seconds.]

The line shafting is in sections connected by wrought iron couplings forged on to the shaft, keyed and bolted together. There is near the engines a clutch coupling fitted with fixtures for disconnecting the engines from the propeller or turning the engines by hand. There is in addition, near the stern, a Wilmarth universal coupling of wrought iron with steel faces. This appliance will compensate for any change of line of the shaft bearings arising from changes in the floor of the ship—which takes place to a greater or less extent in every ship—and has in some instances caused serious trouble. This is the first application of this coupling to one of our vessels of war.

The line shaft is fitted with both a collar and a ball thrust bearing, which can be made to take the thrust separately or together. The collar-thrust contains thirteen collars two inches thick.

The propeller is of composition, 21 feet diameter with four

blades and 27 to 30 feet pitch. The weight when cast was 34,800 pounds, and is believed to be the largest composition propeller ever cast in this country.

The boilers are eight in number—six large and two small—of the horizontal return tubular type, with double-tier furnaces, and so connected that either one or all of them can be used upon the engines. The boilers are placed athwart the ship—on either side of the keelson—the fire room between, extending fore and aft the ship for 75 feet. The small boilers are intended for auxiliary use in connection with the pumps and distilling apparatus.

Whole number of furnaces sixty; affording 1250 square feet of grate surface. The total amount of fire surface is 30,000 square feet.

Some idea may be had of the fire room when it is understood that the boilers placed side by side would make a continuous front of 150 feet with two tiers of furnaces, or 300 feet with a single tier. The fire room floor is fitted with a raised trunk of iron upon which the firemen stand when firing the upper tier of furnaces. The sides of this trunk are perforated for the passage of air from the blowers, either to improve the draft or cool the fire room. The fire room is fitted with four large blowers, driven by independent engines. The blowers were not in use during the trial trip.

All the boilers have vent in a single smoke pipe having a diameter of 14 feet, the largest ever made here. The smoke pipe is telescopic and can be raised or lowered at pleasure.

There are, beside the six cylinders embraced in the main engines, six others for driving the blowers, feeding the boilers, working the steam, fire and bilge pumps, supplying the fresh water still, etc.

With these data one can form some idea of the value of this trial trip and of the behavior of the vessel, from the following description of the trip. After leaving the bay the ship was put straight out at sea. There had been, for over forty-eight hours a steady north-east gale with but little intermission, yet at sea the immense ship obeyed her helm as readily as in the smoothest water. Several times her engines were stopped and she thrown into the trough of the sea, to ascertain her bearings. Although there was considerable sea on, she moved as easily as a yacht, not coming back with a jerk, but gently lifting herself as soon as she found her bearings. It was so also in riding across seas, she moved so gently and easily that at no time did any of the landsmen on board experience any great difficulty in walking her upper deck. During this trial of her qualities as a sea boat, the guns were fired under all the circumstances of her pitching and rolling. Although the crew were not picked and were inexperienced in handling them, the guns were served beautifully; one of the eleven-inch pieces which we timed being served and fired with time shells in less than two minutes between the explosions. The fire of the fifteen-inch guns had no more effect on the ship than they would have had on a fixed structure, the concussion inboard being too slight to be felt. Repeatedly we stood on the spar deck directly over these immense guns the muzzles of which were only seven feet below us and felt no tremor worthy of the name. The gun carriages are furnished with Ericsson's patent compressors. Her speed was tried, although the machinery had been but little worked. She made easily twelve and a half knots with only twenty pounds of steam, the throttle partly open, and her average was over ten knots. The highest number of revolutions of the screw was fifty, but it it believed she will reach sixty when her machinery is seated to its bearings. A very satisfactory test of her management was her obedience to the helm in a sea way. She was put around a circuit, the propeller turning ahead all the time, and made one circuit of one-half mile diameter in twelve minutes, and another of about the same radius in ten minutes and forty seconds, using in this latter case the bow as well as the stern rudder. Capt. Comstock, formerly of the Collins line of Atlantic steamers, expressed the opinion that she could be turned as quickly and easily as any of our Sound or river steamers.

During the trip the consumption of coal was but eighty-one tuns, less than three tuns per hour, and during the most of the time she was blowing off. This shows her tremendous powers for generating steam. Although the top of her smoke stack is but a comparatively short distance above her spar deck, it is from the furnaces sixty feet high. It is a telescopic tube, to be lowered, if deemed advisable, in action or in a gale, but under the latter circumstances it will not probably ever be necessary, as the movement of the ship in a sea is less than that of ordinary steamers.

The *Dunderberg* is unlike any other vessel we have any account of. The conception and the construction, is the work of a master mind, only. The same gentleman has built for foreign Governments three of the fastest and most formidable steam frigates ever constructed here. The *General Admiral* for the Russian Government, and the *Re de Italia* and *Re de Portugalo*, both iron clads, for the Italian Government.

On making his contract with the U. S. Government for the *Dunderberg*, Mr. Webb employed Mr. Erastus W. Smith as his constructing engineer, and intrusted to him the important and responsible work of arranging the plans, preparing the specifications and superintending the construction of the machinery of his great work. Mr. Smith, notwithstanding he had at one time the engineership of one of our largest engine establishments and has had more than twenty years of constant practice in the construction and management of marine engines, with an unselfishness not always met with in the profession, incorporated into the machinery of the *Dunderberg*, such improvements and inventions of other engineers as he thought might add to the general perfection of the machinery, and has desired the publication of their names in connection therewith. He also expresses his obligations to chief engineer W. W. W. Wood, of the U. S. N., a gentleman of extensive naval experience and at the time the general inspector of the U. S. iron clads, for aid and co-operation in inducing the adoption of some of the novel features of the machinery, and to Mr. Thomas Main, the engineer of the Etna Works, where the machinery was constructed, for co-operation and assistance in carrying out the details of the work.

The forgings of the engines were made at the Franklin Forge, this city, and the machinery was erected in the ship by Mr. Henry Rodman.

Extracts from the engineer's log show consumption of coal for the 24 hours preceding the termination of the trip to be 143,000 pounds; pressure of steam, 10 to 20 pounds; vacuum, 24 to 26 inches; temperature of the hot well, 70° to 114°; temperature of circulating water, after passing the condenser tubes, 60° to 94°; temperature of sea water, 40° to 43°; temperature on deck, 27° to 38°; mean temperature of engine room, 60°; oil consumed on the machinery for 24 hours, 45 gallons, while on a similar trial trip of two other vessels in the navy—no larger—the consumption for the same period was in one instance 490 gallons and in the other 209 gallons.



ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING FEB. 26, 1867.

Reported Officially for the Scientific American.

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

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

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

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

62,304.—Method of Starting Street Cars.—Augustus S. Armstrong, Parish of St Bernard, La.

I claim the combination of helical spring, D, foot bar, C, lever, B, and catch, b, with draft bar, A, provided with helical spring, c, and slot, a, clutch, E, movable standards, G, and pinion, F, when the several parts are constructed and arranged for conjoint operation, substantially as described for the purpose set forth.

62,305.—Ladder.—Henry O. Baker, New York City.

I claim the combination of the supporting frame, the ladder, the platform, and the braces, the whole to be arranged as and for the purpose set forth.

62,306.—Shoe Clasp.—Isaac Banester, Newark, N. J.

I claim a clasp, when formed substantially in the manner and for the purposes set forth.

62,307.—Steam Generator.—John S. Barden, Providence, R. I., assignor to A. J. Perry & Company, Boston, Mass.

I claim the improved construction, substantially as described, of each of the sections or generators, A A, so as to cause them to form with the internal and casings, G D, the triangular sectional diving flues, F, and ascending flues, E, arranged in manner and so as to open into each other as explained.

I also claim the combination as well as the arrangement of the casings, D D and G G, with the generaters, made as described, the same being so as to form triangular sectional diving and ascending flues, E F, as specified.

I also claim the arrangement as described of the smoke recess, f, in the external side or surface of each generator, the same being as and for the purpose specified.

62,308.—Steam Generator.—John S. Barden, Providence, R. I., assignor to A. J. Perry & Co., Boston, Mass.

I claim the arrangement as well as the combination of the series of flues, a, the series of flues, b, the connections, c, the water-holding spaces, c, the furnace, A, and the water and steam chamber, C.

I also claim the arrangement as well as the combination of the escape pipe, D, and damper, G, the series of flues, a, the series of flues, b, the connections, c, the water-holding spaces, c, the furnace, A, and the water and steam chamber, C.

I also claim the arrangement as well as the combination of the conduits, d, the series of water spaces, c, the series of flues, a, the series of flues, b, the furnace, A, and the water and steam chamber, C, the whole being substantially as specified.

62,309.—Saw-Mill Dog.—Asa M. Beard, Hillsboro, N. H.

I claim the improved saw-mill dog consisting of the shank, c, provided with the spur, a, attached to the hook, b, by a swivel joint, substantially as herein shown and described.

62,310.—Corpse Preserver.—George D. Blocher, Indianapolis, Ind.

I claim the double ventilated case, B, constructed and operating substantially as and for the purpose set forth, in combination with the external case or ice box, A.

62,311.—Car Seat Lock.—Stephen B. Bowles, Brooklyn, N. Y.

I claim the combination of a railroad car seat lock and stop, all constructed substantially as described and for the purpose mentioned.

62,312.—Manufacture of Pearl Ashes.—J. Warren Brown, Washington, D. C., assignor to N. P. Chipman, A. A. Hosmer, C. D. Gilmore, and J. C. Smith

First, I claim the manufacture of pearl ashes from potash or house ashes by means of charcoal coke, coal peat, saw dust, and other substances rich in carbon, excepting black muck, in the manner herein set forth, substantially as described.

Second, Passing carbonic acid over or into the solution of potassa or the lye of house ashes from the fire, by which the same is being evaporated, substantially as herein specified.

62,313.—Calendar.—Clark W. Bryan (assignor to himself, S. Bowles, B. F. Bowles, and J. F. Tapley), Springfield, Mass. Antedated Dec. 11, 1866.

I claim, as a new article of manufacture, a calendar constructed of several sheets, united together in the manner described, and having the piece, B, arranged for the purpose of readily tearing off the sheets, substantially as set forth.

Second, I claim, in combination with the above, the attachment of the counting-house calendar upon the back of the last leaf, substantially as described.

62,314.—Ladder.—Melzer Burt, Boston, Mass.

I claim the ladder addition as composed of the board, B, and furcated and hooked brackets, C C, constructed, arranged, and applied together substantially as set forth.

I also claim the combination of above described ladder addition, made as described, with a ladder.

62,315.—Bed Bottom.—J. B. Campbell, M.D., Cincinnati, Ohio.

I claim the two-sided slat, and the wooden pins running through it, equally on both sides, and the elastic rubber ring ready to be attached to the bedstead, as above described.

62,316.—Grate.—James C. Cochrane, Rochester, N. Y.

First, The coffer, constructed in the center of the grate, and extending below it, substantially as and for the purpose described.

Second, The combination of the coffer with the grate, substantially as described.

Third, The combination of the coffer, grate, and depressed yoke, substantially as described.

62,317.—Garden or Hand Cultivator.—M. D. Cone and A. N. Douglass, Port Gibson, N. Y.

First, We claim suspending the cultivator frame from a wheeled truck or barrow, by which it is drawn, substantially in the manner and for the purposes herein shown and described.

Second, The jointed or hinged draft rods, or their equivalents, and the cultivator frame, either with or without the guide bars, B, in combination with wheeled truck, substantially as and for the purposes set forth.

Third, Providing the pivoted arm of the wheel stock, S, with a slot, a, as shown and for the purposes set forth.

Fourth, The arrangement of the revolving colter wheels and their vertically adjustable hangers upon the pivoted or adjustable stock, S.

62,318.—Covering for Bottles, Steam Pipes, etc.—James B. Crane, Dalton, Mass.

I claim the use of paper pulp for the purpose of obtaining an air-tight, non-conducting, and protective covering, substantially in the manner set forth.

62,319.—Vise.—Peter Crowl, (assignor to himself and H. H. Finley), Brownsville, Pa.

I claim the combination of the stationary jaw C, adjustable jaw D, and stock D,' pawl F, and lever E, and springs F,' and E,' all of said parts being respectively constructed and arranged for use substantially in the manner and for the purpose set forth.

62,320.—Churn.—Henry Decker, Lebanon, Ohio.

I claim the dash consisting of the vanes J, made in a tapering and slightly twisted or spiral form and attached to a central hub, in combination with the gathering board K, located immediately over the dasher and cream box I, when the several parts are constructed and arranged to operate in the manner and for the purpose set forth.

62,321.—Hat Blocking Machine.—Joseph De la Mar, Brooklyn, N. Y., assignor to Griswold & Sheldon, New York.

I claim the combination of the expansible bars c, ring l, and clamp h, constructed substantially as, and for the purpose specified.

62,322.—Machine for Making Horse Shoe Nails.—Lucius H. Dwelley, Dorchester, Mass.

First, I claim the combination of the rolls upon the disk E, with the former F, and hammers G, when so combined and arranged that the blows of the hammers are given between the action of the seperate rolls upon the article being wrought substantially as described.

Second, I also claim cutting off a portion of the blank previous to the nail being finished, by means of the cutters described, and for the purpose set forth.

Third, I also claim the combination of the cams M, hammers G, and cutters k,' l,' when such cams are so formed as to hold the hammers apart and out of action when the cutters sever the nail from the rod.

Fourth, I also claim vibrating the conductor O, by means of the arm a,' with its spring b,' operated by the projections c,' d,' on the wheel L, substantially as described.

62,323.—Apparatus for Rolling and Spreading Dough.—George F. Fessenden, West Cambridge, Mass.

I claim the combination and arrangement of the dredge box and roller or rolling pin.

I also claim the combination as well as the arrangement of the dredge box, the brackets, the handles and the roller or rolling pin as described.

62,324.—Machines for Dressing Leather.—Edward Fitzhenry, Boston, Mass.

I claim the employment of the anti-friction balls or their equivalents, substantially in manner and for the purpose as herein described.

62,325.—Plow.—Charles L. Fleischmann, New York, N. Y. Antedated Feb. 14, 1867.

I claim the use of runners herein described in combination with angular or curved cutters and a mold board, substantially as above described

62,326.—Cultivator.—Charles S. Gwinnup, Milroy, Ind.

I claim, First, The stanchion d, constructed and operating as and for the purpose herein set forth.

Second, The standards E, in combination with plate G, rods f, plates m, and n, and curved plate T, the whole constructed, arranged and operating in the manner and for the purpose herein specified.

62,327.—Machine for Bending Metals.—Samuel Hall, New York, N. Y.

First, I claim the box frame B B, constructed substantially as shown for the purpose set forth.

Second, In combination with the bending roller held and adjusted substantially as described, I claim the rollers X, when the same shall be combined, constructed and operated substantially as shown for the purposes set forth.

Third, In combination with the same, the use of the sliding boxes constructed as shown for the purposes specified.

62,328.—Hair Restorative.—William H. Harris, Corry, Pa.

I claim the compound within described when the same is compounded in the proportions described for the purposes set forth.

62,329.—Cultivator.—Jairus Haskell, Lisbon, Maine.

I claim, First, The combination of the three wheels h, j, k, having their gauges e, pivots m, and clamps n, with the elongated teeth M N P, when the same are arranged in positions relative to each other on a cultivator frame of the described form in the manner and for the purposes set forth.

Second, the combination of the splice beams H, I, with the two rear wheels j, and k, attached and adjustable as set forth, when the two beams H, I, are connected with the two beams B, C, in the manner and for the purposes set forth.

62,330.—Suspending Pendulums of Clocks.—George Heninger, Lena, Ill.

I claim, First, Rendering pendulum clocks capable of keeping accurate time when out of plumb by the method described, suspending a balance lever concentrically with the escapement wheel, to operate the pendulum as set forth.

Second, Balancing the pendulum by a weight substantially as and for the purposes set forth.

Third, The combination of the lever D, with the weight and pendulum substantially as and for the purpose set forth.

62,331.—Washing Fluid.—David Hess, Pittsburg, Pa.

I claim the combination of ingredients in the proportions as herein described and for the purposes set forth.

62,332.—Bag-holder.—A. V. Heyden, Milwaukee, Wis.

I claim a bag-holder when made with platform D, connected to standard C, in combination with arm E, expanding jaws F, and ring H, substantially as and for the purpose described.

62,333.—Bottle Stopper.—Henry Holl, Philadelphia, Pa.

I claim the sieve straining the liquid as it passes through, supplied with or without a handle so that it is easily taken out and the whole stopper cleaned without trouble, the air-tight spherical hinge stop, which opens and closes with its own weight according to the manner in which the vessel is held, the mode of connecting the upper and lower parts by means of a screw and a combination of these several inventions in a compact, secure, neat and convenient stopper.

62,334.—Preserving Wood from Decay.—Arthur Holmes, Cortland, N. Y.

I claim the mode of preparing and preserving wood and timber from decay by the application of a composition, and the composition itself, or any other, substantially the same as herein substantially set forth.

62,335.—Machine for Preparing Rods for Chain Links.—George Homfray, Parish of Halesowen, Eng.

I claim the rotary mandrel, H, in combination with the carriers, M and J, or any construction substantially the same, arranged and operated substantially as described, for the purpose of laying and stripping the coil rod or bar.

62,336.—Machinery for Pointing and Reducing Wire.—O. L. Hopson, Waterbury, Conn., and H. P. Brooks, Wolcottville, Conn. Antedated Feb. 15, 1867.

First, We claim the dies, b b, and die holders, c c, introduced in an undercut groove at the end of the shaft, a, in combination with two or more pairs of tappets or equivalent mechanism for closing said dies two or more times each revolution, substantially as set forth.

Second, We claim the tapering pointed screws, d d, and set nuts, e e, in combination with the dies and the tapering screw sockets in the shaft at the back of the dies, the parts being arranged substantially as and for the purpose forth.

62,337.—Blind Fastening.—Willis Humiston (assignor to himself and L. H. Hall), Meriden, Conn.

I claim the combination of the rod, D, hinged to the blind with the hook, a, upon the blind and the guide, F, and inclined stop, d, on the sill, constructed and arranged so as to operate substantially in the manner described.

62,338.—Burner for Petroleum Stove.—Wm. E. Jervey, New Orleans, La.

I claim the combination of the upper retort or furnace, E, the supporting arms and conductors, D, and the fluid chamber, A, when the parts are constructed and arranged and co-operate in the manner shown and described and for the purpose set forth.

62,339.—Burner for Petroleum Stoves.—W. E. Jervey, New Orleans, La.

First, I claim the lower retort or fluid chamber, A, when constructed substantially as described for the purpose set forth.

Second, The combination of heater caps, B, wire protecting gauze, F, and lower retort, A, constructed and arranged in the manner, substantially as shown and described and for the purpose set forth.

62,340.—Apparatus for Applying Springs to Cushions.—Evan F. Johns, Philadelphia, Pa.

I claim a frame, A, with lever, B, and hooks, c, or their equivalents constructed and adapted for the reception of the frame, X, of a cushion, and for the compression of springs on the same, substantially as described.

62,341.—Damper.—Moses W. Kidder (assignor to himself and H. R. Barker), Lowell, Mass.

I claim the employment of one or more metallic disks or plates, corrugated or plain, in the manner and for the purpose specified.

62,342.—MANUFACTURE OF PAPER BAGS.—Susan M. Kirk, Camden, N. J. and E. J. Howlett, Philadelphia, Pa., assignors to E. J. Howlett, Philadelphia, Pa.

First, We claim the construction of the board or blade, B, and adjustable strip, D, the whole being arranged substantially in the manner described.

Second, The combination of the board, A, the permanent strip, a, and adjustable blade, B.

Third, The combination of the board, A, the guide plate, E, and adjustable strip, D.

62,343.—GOVERNOR.—William A. L. Kirk, Hamilton, Ohio.

I claim the arrangement of two wheels, A A, or their equivalents, on any angle varying from a right angle from the pinion, B, in which they work, the same being provided each with a lug, K K, working in connection with similar lugs, I I I I, on the intermediate driver, E, substantially in the manner and for the purpose specified.

62,344.—CULTIVATOR.—W. B. Lane and W. Coultor, Organ Spring, Ind.

First, We claim combining with a two wheel carriage a shovel carrying frame which is adapted for carrying five shovels, a a b b and d, and which is composed of vertically vibrating beams, H H I I, connected together by transverse braces, J, so as to be laterally adjustable, substantially as described.

Second, Arranging a vertically and laterally adjustable shovel frame, which is constructed as described upon a two wheel carriage, in such manner that the shovels will be located beneath, and in a vertical line, or nearly so with the axle, A, substantially as described.

62,345.—CAR COUPLING.—William Leib and Green B. Hornbeck, Winchester, Ill.

We claim the levers, A and H, and the link or slide, B, when arranged and operated as herein described and for the purpose set forth.

62,346.—STUMP EXTRACTOR.—Hiram Lemm, Leonidas, Mich.

I claim the ratchet wheels, C, separated by a flange, F, of a common windlass shaft, B, pawls, G, hung to a common rocking cross bar operated through lever, J, and chains, M, in combination with each other, substantially as and for the purpose described.

The combination with the above of the chain, N, passing over beam, P, of e frame work, A, substantially as and for the purpose specified.

62,347.—MOP CLOTH.—W. B. Link, Taberg, N. Y. Antedated Feb. 14, 1867.

I claim as a new article of manufacture a mop constructed as herein shown and described.

62,348.—WINDOW BLINDS.—Freeman Little, St. Louis, Mo.

I claim the application of flanged slats with the above described upper slat o Venitian window blinds which will produce the intended effects, substantially as described.

62,349.—REVERSIBLE LOUNGE.—Samuel Lloyd, Washington, D. C.

First, I claim the metal plates, F F, with the angular slots, h h, wrist pins, 11, in combination with the supporting plates, g g, as described and set forth.

Second, I claim the mode of securing the seat frame, B, to the frame, A, by means of the metal ribs, e e, and hooks, f f, so that the seat frame, B, can be moved longitudinally and when in proper position be taken out and reversed so that the back of the sliding frame, B, can be brought to the front as and for the purposes herein set forth.

Third, I claim constructing lounges so that the movable arm may be placed at either end of the frame, in combination with the sliding seat and back shifting to conform to the head so that the appearance is the same whether right or left.

62,350.—SPRING SEAT FOR VEHICLES.—Hiram W. Mapes, Jr. Ripon, Wis.

First, I claim supporting a seat upon two inclined boards, B B', which are jointed together at their inner ends and connected to the seat by means of springs, C C, substantially as described.

Second, Connecting the inner ends of the inclined supports, B B', by means of interlocking tongues and sliding joints, g g', in combination with spring connections, C C, and pivot connections, e e, substantially as described.

62,351.—HAND-SPINNING MACHINE.—Chelton Matheny, Greensburg, Ind.

First, I claim the spindle carriage track arranged obliquely to the plane of the drive wheel, as and for the purposes set forth.

Second, In combination with the elements of the clause immediately preceding, I claim making said track adjustable about a vertical axis, and securable at any desired obliquity, as set forth.

Third, The combination and arrangement of the frame, A B, wheel, E e e', crank, E, treadle, Y, pitman, Z, and spindle, X, to adapt the machine for spinning flax, as explained.

62,352.—CUT-OFF FOR ELECTRO-MAGNETIC ENGINES.—L. H. McCullough, Richmond, Ind.

I claim the compound rods, T T, crosshead, R, and posts, 1 2 3 4, constructed and operated substantially as herein set forth and described.

62,353.—PADLOCK.—Charles H. Miller, Frederick, Pa., assignor to himself and Isaac S. Dengler, Perkiomen, Pa.

I claim, first, the case, A, and arm, B, with its opening, x, in combination with the lever, D, plate, C, its arms, l l', projections, n n1 n2, and recess, S, the whole being constructed and operating substantially as and for the purpose described.

Second, The combination of the above and the plate, E, with its arm, r, for the purpose specified.

Third, The plates, I and H, with their openings, z z', and cover plate, J, in combination with the case, A, and its key holes, q q', substantially as and for the purpose set forth.

62,354.—MACHINE FOR GAGING THE SIZE OF LOAVES OF BREAD.—E. L. Moeschler, Rochester, N. Y.

I claim the employment of one or more gaging or graduating slides, N, either with or without a graduated throat piece or plate, in combination with a revolving belt and reciprocating knife, for the purpose set forth.

62,355.—MACHINE FOR SHARPENING FENCE PICKETS.—J. A. Montgomery, Columbus, Ohio.

First, I claim a machine for producing curved points on the ends of fence pickets, constructed and operating substantially as described.

Second, A machine which will both point and score the end of fence pickets, constructed and operating substantially as described.

62,356.—COTTON PLANTER.—Francis E. Moran, Milburn, Ill.

First, I claim the arrangement and combination of the diagonal shovels, D, marking shovels, C, rods, L L 1, slotted bars, J J K, and pipes, E E', substantially as set forth.

Second, The hoppers, P, with enlargements, X, in combination with the separators, Q, and pipes, E E', substantially as set forth.

62,357.—COVER FOR OIL CANS.—E. A. More, St. Louis, Mo. Antedated Feb. 15, 1867.

I claim the lever, C, when constructed and employed substantially as herein described.

62,358.—REMOVING TOBACCO PLUGS FROM MOLDS.—Gabriel Nendecker, St. Louis, Mo.

First, I claim the cover, A', when armed with the plunger, a', which are so fitted and arranged that they may be employed for the purpose of simultaneously forcing the plugs of tobacco from the molds, B.

Second, I claim the combination and arrangement of the box, A, the mold, B, and the cover, A', substantially as described and set forth.

62,359.—MACHINE FOR MAKING HOOP SKIRTS.—S. H. Perkins and Thomas S. Gilbert, New Haven, Conn.

First, We claim the combination of a feeding cylinder, A, a printer or indicator, F, with a gage and clamp to secure the ends of the wire to the cylinder, substantially as herein set forth.

Second, The combination of the feeding cylinder, A, provided with a clamp for securing the ends of the wire to the cylinder in combination with the cutters, I and P, substantially as herein set forth.

Third, The combination of the feeding cylinder, A, provided with a clamp for securing the ends of the wire to the cylinder, the printer or indicator, F, and the cutters, P and I, substantially as herein set forth.

62,360.—STEAM PUMP.—Joseph B. Pottmeyer (assignor to himself and Nicholas Winter), Pittsburg, Pa.

First, I claim the arrangement of the plug valve, F, with its steam passages, c and c', and its exhaust channel, d, substantially as described and for the purpose as set forth.

Second, The arrangement of the valve, V, and auxiliary valve, F, as described and for the purpose set forth.

Third, The arrangement of the throttle, m, with reference to the steam chest, E, and valve, H, in the manner and for the purpose as set forth.

62,361.—PINS.—Daniel R. Pratt, Worcester, Mass.

I claim a common pin for clothing or wearing apparel, turned from a straight line by corrugations or flexures, as herein shown and described.

62,362.—STILL.—Alonzo C. Rand, Union Mills, Pa.

I claim surrounding or enveloping a still with an adjustable double covering or jacket filled with a non-conducting substance, substantially as described and for the purposes herein set forth.

62,363.—MANUFACTURE OF ILLUMINATING GAS.—Alonzo C. Rand, Union Mills, Pa.

First, I claim so arranging the gas generator or carbureting apparatus with a series of compartments or generators with stop cocks that the air may be driven through the liquid contained in one or more compartments, for the purpose and in the manner herein described.

Second, The combination of the test light, G, and its connection with the series of compartments or generators, a1 a2 a3 a4, substantially as and for the purpose herein described.

Third, The employment of the cock or cocks, I, arranged on the lower part of the generators to connect or disconnect the same, substantially as and for the purpose described herein.

62,364.—APPARATUS FOR CARBURETING AIR.—Alonzo C. Rand, Union Mills, Pa.

I claim placing the tank, B, surrounded by water within the gasometer, A A, in the earth below the frost points, so that the vapors shall be generated at a low temperature thereby preventing their condensation in the pipes leading to the burners, as herein set forth.

62,365.—COTTON-BALE TIE.—Jacob Reese, Pittsburg, Pa.

I claim the combination of the T-head, c, and slots, a a, in a hoop or tie for cotton bales with a movable arm, b, or strap, b', to which the button is attached or constructed and arranged so that when the tie is fastened the head of the button shall lie across the slot, substantially as and for the purposes described.

62,366.—APPARATUS FOR ASCERTAINING TUNNAGE, ETC.—William Oscar Reim, Springfield, Ohio.

First, I claim the use of a duplex system of hydrostatic scales for the admeasurement of the displacement of vessels when said scales are respectively placed in relation to the vessel and one another, substantially as set forth.

Second, The combination of the cylinder, C, pipe, B, and plunger valve actuated by the rod, B, when arranged to operate substantially as and for the purpose set forth.

Third, In combination with the cylinder, C, float, B, and graduated stem, E, I claim the revolving head, E', and balanced indicator, H, substantially as and for the purpose set forth.

62,367.—PLOW.—M. L. Roberts, Smithville, Canada.

I claim the friction wheel, G, having its axis inclined at an angle of ninety degrees or thereabouts, one bearing being attached to the beam, and the other to the heel of the mold board, so that the two faces of said wheel bear against the side and bottom of the furrow, with nearly equal force, in combination with the other parts of a plow arranged and operating substantially as and for the purposes set forth.

Second, I also claim constructing a plow without the land plate or side, when the same is provided with a friction roller or rollers, which track in the furrow angle, which is cut by the share, substantially as set farth.

Third, I also claim the combination of the inclined wheel, G, with the antifriction mold board, composed of the series of rollers, e e, or their equivalent, arranged and operating substantially as set forth.

62,368.—DENTIST TOOL RACK.—Ira A. Salmon, Boston, Mass.

I claim a tool rack or instrument rack, made of steel pins, beveled on one side, in the manner and for the purpose hereinbefore described.

I also claim, as an improvement on United States Patent, No. 54,882, or any such rack, the construction of the teeth beveled wedge, or chisel shaped, substantially as and for the purposes and objects as hereinbefore specified.

62,369.—FRICTION APPARATUS FOR YARN BEAMS OF WARP DRESSERS.—Benjamin Saunders (assignor to himself and Albert H. Saunders), Nashua, N. H.

I claim the combination as well as the arrangement of the friction wheel, a, or its equivalent, the brake, b, the slide rod, c, the prinq, g, and the lever, h, the whole being applied together, and to the yarn beam, A, substantially in the manner and for the purpose set forth.

I also claim the combination of the screw, e, and nut, f, with the slider, c, the brake, b, the friction wheel, a, and the lever, h, the whole being applied together, and to the yarn beam, substantially and for the purposes as described.

62,370.—DEVICE FOR IMPARTING A LATERAL RECIPROCATION TO THE RADDLE OF WARP DRESSING MACHINE.—Benjamin Saunders (assignor to himself and A. H. Saunders), Nashua, N. H.

I claim the combination as well as the arrangement of the grooved cam, H, the arm, c, the two shafts, G G, and the cranks, F' F', the whole being applied to the raddle and the dresser frame and its shaft, substantially in the manner and so as to operate as specified.

62,371.—THERMO-ALARM GAGE.—Richard Sauage, San Jose, Cal.

I claim the above described thermo-alarm gage, in combination with a steam generator.

62,372.—ROOF.—Henry A. Seymour, Bristol, Conn.

I claim the employment of the v-shape metal piece, d, when inserted into grooves formed in the upper side, and near the edge of the board, a, when said grooves are formed about an angle of forty-five degrees, substantially as and for the purpose described.

62,373.—MOP HEAD.—Judson W. Shaw, Concord, N. H.

I claim the rack bar, d, in combination with the mop constructed with the bearer yoke and collar, as and for the purpose described and set forth.

62,374.—PINCH BAR FOR MOVING HEAVY WEIGHTS.—William Siefert, New York City, assignor to George C. Dressel, Tremont, N. Y.

I claim the application of a roller to the end of the short arm of a pinch bar.

62,375.—SCHOOL DESK.—James Smith, Richmond, Ind.

I claim the combination of the connecting bars, D D', with a series of desks and seats, A A', and the receptacle, a a', so constructed that the bars and desk may easily be separated at pleasure.

I claim the combination of the book box, K, and doors, P, when the latter are arranged substantially in the manner described.

62,376.—COMBINED CORN PLANTER AND HOE.—Henry Soggs, Columbus, Pa.

I claim the arrangement of the seeding vices, E J K and M, in the hollow handle of the hoe, with the hopper and seeder at the end of the handle when arranged and combined, as herein described, and for the purposes set forth.

62,377.—PREPARING MICA FOR TABLETS AND OTHER PURPOSES.—John Stevens, New York City, and John Johnson, Saco, Me.

We claim the use of mica for the purposes herein specified, viz.: for tablets, books, and for record.

62,378.—CASE FOR TRANSPORTING EGGS.—J. L. and G. W. Stevens, San Francisco, Cal.

We claim a case for packing and transporting eggs, constructed with compartments substantially as and for the purpose herein described.

62,379.—REVOLVING HARROW.—Henry C. Stoll, Mokena, Ill.

I claim the frame, A, in combination with the teacks, C B, friction rollers, E and D, and the triangular frame, G G G', when constructed substantially as and for the purpose set forth and described.

62,380.—HAND CORN PLANTER.—John P. Van Vleck, Rock County, Wis.

First, I claim curved seed cup bar, H, in combination with the hopper, E, when both are constructed and operated substantially as and for the purposes described.

Second, A general arrangement of the parts, A B E F C D H and G, when the whole are constructed, combined and operated substantially as and for the purposes described.

62,381.—HOOP SKIRT.—E. C. Walker, Newark, N. J.

I claim bracing the front of a skirt by affixing thereto the springs, a and b, when combined with and arranged upon the manner and for the purpose specified.

Also, the use of the sperals, c and d, in combination with the braces, a and b, for the purposes set forth.

62,382.—KNITTING MACHINE NEEDLE.—C. P. S. Wardwell, Lake Village, N. H.

I claim a needle for knitting machines, flattened on the outside of its barb, substantially as and for the purpose herein specified.

62,383.—WEATHER STRIP.—Henry Waterman, Hudson, N. Y.

I claim the arrangement and mode of fastening a strip of india rubber or cloth in a groove in the edge of a door or window sash, by means of a wire forced down into the groove by the side of or within the folds of the rubber strip, so as to hold it firmly in its place, substantially in the manner and for the purpose hereinbefore set forth.

62,384.—MACHINE FOR SHRINKING TIRES.—Albert E. Wing, Battle Creek, Mich.

First, I claim the jaws, H H, biting levers, G G', levers, G G, foot lever, E, constructed and operating as described, and for the purposes set forth.

Second, I claim the stationary block, D, sliding block, D', hand lever, F, constructed and operating as described, and for the purposes set forth.

Third, I claim the frame, C, and blocks, D and D', in combination with the jaws, H H, levers, G' G', foot lever, E, and hand lever, F, the whole constructed and operating as set forth, and the purposes described.

62,385.—CULTIVATOR.—Daniel R. Allen, Cumberland, Me.

First, I claim the relative arrangement and position of the teeth, c and d, viz., upon their respective cross bars, a and b, converging at their lower ends, in the manner and for the purposes described.

Second, The combination and arrangement of the slots and holes in the cross bars, the shoulder, flange, and lip on the teeth, with the bolt and nut, for the purpose of securing the teeth.

Third, In combination with the shoulder, lip, and flange of the teeth, the additional slots and holes in the third cross bar, for the purpose of rendering the teeth, e and f, adjustable as described.

Fourth, The combination of the slots, p and t, bolts, r and u, and nuts, with the slides secured to the mold boards, s s, for the purpose of rendering the mold boards adjustable, as described.

Fifth, In combination with the diverging upper ends of the teeth, c and d, the scooped parts, m m, of the beam, A, in the manner and for the purpose set forth.

Sixth, The combination and arrangement of the scurer, w, constructed as described, with the hooks, v, and pin, x.

Seventh, In combination with the subject of the first and fifth claims, the rounded top, i, of the teeth projecting above the frame of the cultivator, as and for the purposes specified.

Eighth, The concave shape to the upper part of the forward edge of the tooth, d, when the said tooth is attached as described for the purposes specified.

62,386.—CULTIVATOR.—William J. Andrews, Columbia, Tenn.

I claim the combined plows and harrows, G H, applied to the standards, F F, substantially as and for the purpose specified.

62,387.—CULTIVATOR.—Omar J. Arnold, Mount Ida, Wis.

First, I claim the axle, C, inclined downward from its center outward in both directions, in connection with the extended draught pole, A, and brace rods, b b, substantially as and for the purpose set forth.

Second, The beams, D' D', extending in front of the joints, d, and connected by a cross bar, F, substantially as and for the purpose set forth.

Third, The lever, G, provided with the pin or rod, f, in combination with the beams, D' D', and cross bar, F, all arranged substantially as and for the purpose specified.

62,388.—PERMUTATION LOCK.—Edwin A. Barrows, Willimantic, Conn.

First, I claim the sliding bar, B, provided with a series of holes, d d1 d2 d3, and pins, e e1 e2 e3, more or less, in combination with the spring arms, f f1 f2 f3, finger pieces, h h1 h2 h3, latch, C, and bolt, D, constructed and operating substantially as and for the purpose set forth.

Second, The safety dogs, i i1 i2 i3, in combination with the sliding bar, B, pins, e, arms, f, and finger pieces, h, constructed and operating substantially as and for the purpose described.

Third, The rod, s, and lever, t, in combination with the sliding bar, B, and with a suitable key constructed and operating substantially as and for the purpose set forth.

62,389.—MEDICAL COMPOUND.—Jacob Bates, Salineville, Ohio.

I claim the medical compound composed of the ingredients herein described for the purpose specified.

62,390.—TOOL FOR TURNING BOLTS.—Leander Burns, Port Chester, N. Y.

I claim the cutters or dies, B, formed in three parts or sections, C D and E, secured together and constructed substantially as and for the purpose described.

62,391.—FOLDING TABLE.—John H. Bush, Bone Creek, West Virginia.

First, I claim the frame constructed with diagonal girder, E, and oblique piece, F, to which the legs are hinged, substantially as described.

Second, I claim the combination of the spring catch, K, and movable leg, H, arranged and operating substantially as described.

Third, I claim constructing the leg, H, with a notch at its upper end, in combination with notched end piece, D, of the frame, substantially as described.

62,392.—ICE BOX OR COOLER.—John W. Campbell, New York City.

I claim the arrangement of an ice box and cooler for fluids, consisting of an external case, A, internal case, B, pipe, C, for conducting fluids, through the same, and a discharge pipe, E, said parts being respectively constructed combined, and arranged in the manner and for the purpose set forth.

62,393.—WATERPROOF CEMENT.—G. W. Caton, Canandaigua, N. Y.

I claim a waterproof glue or cement, composed of the articles above named and in about the proportions described.

62,394.—MORTISING MACHINE.—John G. Clifton, Middletown, Ohio.

First, I claim the hinged guides, c c, of the chisel bars, b b, rack frames, d d, and adjusting frames, e e, in combination with their actuating mechanism, arranged and operating substantially in the manner and for the purpose herein described.

Second, The arrangement of the forked lever, m, upon the stud, l, on treadle, k, operated in the manner described, for connecting with either or both of the treadle blocks, j, for actuating the chisels, substantially as and for the purpose set forth.

62,395.—BED BOTTOM.—H. A. Coats, Wellsville, N. Y.

I claim the combination of the slats, D, having notched ends fitting on guide rods, C, retained by the cross bars, E, with elastic blocks, F, between them, and resting on springs, B, independent from the rods, in the manner described for the purpose specified.

62,396.—GATE.—Rodolphus Conway, Volga, Ind.

First, I claim an improved gate, B, formed in two parts, b1 and b2, hinged to each other, and which is hinged at its center to a central post, A, substantially as herein shown and described.

Second, The combination and arrangement of the wires, G H, with the latches, E F, substantially as herein shown and described, and for the purpose set forth.

Third, The combination of the springs, J, with the parts, b1 and b2, of the gate, B, substantially as herein shown and described, and for the purpose set forth.

62,397.—COMBINATION OF AIR AND STEAM JETS TO PROMOTE COMBUSTION.—George M. Copeland, Brooklyn, N. Y.

First, I claim the combination of an air and steam jet or jets with each other, and their introduction into a chimney, smoke flue, or other passage way, substantially as herein specified and for the purpose set forth.

Second, The combination of an air pipe, D, single or branched, and the steam pipe or pipes, F, with each other, and with the smoke flue chimney or other passage way in which they are placed, substantially as herein described and for the purpose set forth.

62,398.—INDICATOR FOR ROPE AND OTHER MACHINES.—Chas. Couse, Belleville, N. J.

First, I claim the combination of the screw shaft, E, with the half nut, C, weight, D, and pointer, b, and scale, E, substantially as and for the purpose herein shown and described.

Second, I claim the combination of the half nut, C, with the hand, b, the screw, c, and scale, E, substantially as and for the purpose herein shown and described.

62,399.—DEVICE FOR REGULATING THE REVOLUTION OF PROPELLERS OF STEAM VESSELS.—Henry Dale, Boston, Mass.

I claim the automatic regulation of the motion of the propeller shaft of a steam vessel by means of devices operated by the resistance or varying pressure of the water.

62,400.—BALE HOOP FASTENING.—Robert Dillon, New York City.

I claim the construction of the plate, B, with cross pieces, d, and wings, e e, in combination with the pin, b, substantially as and for the purpose described.

62,401.—APPARATUS FOR RAISING WEIGHTS.—Wm. Eades and William Thomas Eades, Birmingham, England.

We claim the within-described improved apparatus for raising weights, such apparatus consisting of a pulley block, constructed as herein described, or any mere modification of the same construction, whereby a single chain having two loose ends, is carried to work over a pulley driven by self-sustaining gearing, in the manner herein more fully set forth and specified.

62,402.—WHEELS FOR VEHICLES.—Charles F. Elliott, Great Falls, N. H., assignor to himself and O. O. Bennett.

I claim securing the felloes, C, to each other by means of the curved plates, D, inserted and pivoted in channels formed in the face or rim of said felloes, as herein set forth for the purpose specified.

62,403.—LINIMENT.—Job Gifford, Smithport, Pa.

I claim the liniment composed of the ingredients mixed together in or about the proportions described for the purpose specified.

62,404.—APPARATUS FOR DRAWING WELL TUBES FROM WELLS.—T. M. Gile and W. Cochran, Mansfield, Pa.

We claim the stand, B, supported upon jack screws, C, and having dogs, I, rod, E, in combination with the dog, G, on the end, F, of the rod, so as to operate substantially in the manner and for the purpose described.

62,405.—CULTIVATOR.—John Gilpatric, Biddeford, Me.

I claim the iron cross bars, B, provided with tongues, a a, and the cast iron teeth, C, when constructed and arranged as herein set forth and for the purpose specified.

62,406.—COMBINED STEP COVER AND WHEEL FENDER FOR CARRIAGES.—John W. Gosling, Cincinnati, Ohio.

I claim a combined step cover and wheel fender for carriages, consisting of the flexible plate, E, whose upper end is attached to the carriage door, and whose lower end, d h, is connected to the step or other fixed object, the whole being arranged to operate substantially as herein described and for the purpose set forth.

62,407.—FORGING APPARATUS.—Alfred J. Grainger, Wilmington, Ill.

I claim, First, The connecting rod, g, crank shaft, F f, and counter balance, f, in combination with the hammer, A B, substantially in the manner and for the purpose set forth.

Second, The hammer, A, spring-jointed helve, B' B, connecting rod, g, and crank shaft, F f, substantially as and for the purpose described.

62,408.—MACHINE FOR SAWING WAGON FELLIES.—Noble W. Graves, Winnebago, Ill.

I claim, First, So arranging the adjustable saw table, E, and slotted dogs, c and c2, in relation to the concentric saws, a and b, that the piece to be cut shall project beyond the table and be supported by the dogs alone after being separated and fall when the dogs are retracted, substantially as set forth.

Second, The arrangement of the adjustable table, E, vertical guides, h, supporting rods, l l, and slats thereto attached, sliding upon the depending guide, h, and lever, Q, substantially as set forth.

62,409.—COMPOSITION FOR ROOFING.—David Green, Brookfield Township, Ohio.

I claim reducing bituminous coal to flour, and mixing it with coal tar, and using it for roofing and other purposes for which the composition may be useful.

62,410.—BUTTER BOX.—William B. Gurnsey, Norwich, N. Y.

I claim the combination of three cylindrical parts or sections, A B C, made of thin strips of wood or pasteboard united flush at the edges, and fitted together to form a butter box having two compartments, substantially as herein described.

62,411.—PACKING AND PRESERVING BUTTER.—William B. Gurnsey, Norwich, N. Y.

I claim, First, A wooden box or containing vessel saturated with paraffine, substantially as described.

Second, I further claim the use of paraffine to protect the glued or cemented joints of wooden boxes or packages from the effects of moisture from the atmosphere or from contained substances.

62,412.—GATE.—David Hague, Balville Township, Ohio.

I claim, First, A sliding, rotating and raising gate constructed and op-

erated in the manner substantially as shown and described and for the purpose set forth.

Second, The combination of lever cam, j, sliding bar, l, guide pieces or slats, h h, and the gate or its bars, a a, constructed and operating in the manner substantially as shown and described and for the purpose set forth.

62,413.—Cane and Sorghum Stripper.—C. P. Hale, Calhoun, Ky.

First, I claim an improved cane stripper formed by the combination of the hollow or concave knives, B and D, and the jaws, A and C, with each other, when said jaws and knives are constructed and arranged substantially as herein shown and described.

Second, The combination of the spring, G, with the movable jaw, C, substantially as herein shown and described and for the purpose set forth.

Third, The combination of the knife, B, with the stationary jaw, A, substantially as herein shown and described.

62,414.—Railroad Switch Alarm.—Thos. S. Hall, Stamford, Conn.

First, I claim the combination of a railroad switch with an electric signal or alarm apparatus, substantially as described, so that the switch in its movement to either side of the line rail shall close the electric current and sound the alarm, and when in its proper line shall break and leave the circuit broken, using therefor the mechanical devices set forth, or any suitable mechanical equivalent.

Second, I claim in combination with the switch the slotted lever, F, the swivel head, C, the plate, g, and the metallic connections, h h', for operating an electric signal apparatus.

62,415.—Cartridge Pouch.—Henry Hammond, Hartford, Conn.

First, I claim the arrangement of the valve tube with one or more openings, f f', which can be turned to admit the cartridges from one cartridge tube at a time, having also a ratchet or catch fastening capable of being turned through the proper angle, and of being held in the proper position by a spring, substantially as herein described.

Second, I also claim the valve, p, for preventing the cartridges from passing the proper tube and clogging the discharge pipe.

Third, I also claim the peculiar manner of securing the pawls, g g' and h h', in the tube, c, by placing them in properly formed sockets and then slipping over the whole the shell, d, substantially as herein described.

Fourth, I also claim the peculiar mode of attaching the cartridge tubes to the branches of the discharge pipe by means of a screw thread and ferrule, substantially as herein described.

62,416.—Heating Stove.—D. J. Happersett, Coatesville, Pa

I claim the combination with the central air chamber, C, and winding flue, D, of one or more pipes, E, for conducting the air into the air chamber at a point above the fire chamber, substantially as and for the purpose set forth.

62,417.—Window Shade.—Geo. Hasecoster, Richmond, Ind.

I claim a window shade comprised of slats or strips of paper and woven in the manner described.

62,418.—Fire-escape Ladder.—Isaac Henderson, Philadelphia, Pa.

I claim the cords, D, passing through the side holes of the steps, B, and between the stands of the rope, A, above and below the steps securing the steps to the ropes and preventing them from turning beneath the feet, substantially as described.

62,419.—Propelling Car Brake.—Robert Heneage, Buffalo, N. Y.

First, I claim the combination of the friction wheel, D, curved brake bars, E E', Pivoted to the spring rod, F, sliding rollers, c c', with their actuating rods, and foot levers, h r, arranged and operating as and for the purposes set forth.

Second, I also claim the double-acting brake consisting of the two pivoted brake bars, E E', capable of alternate and conjoint application to a friction wheel, D, substantially in the manner and for the purpose set forth.

Third, I also claim the rollers, c c', provided with movable boxes, j, when used in operating the brake bars, E E', for the purpose and in the manner specified.

62,420.—Trucks.—A. E. Hovey, West Waterford, Vt.

I claim the annular plate, B, provided with a pendant flange, g, and connected to the front ends of the crane necks, A, in combination with the annular plate, F, provided with the bars, b b, and the pin, G, the yoke, E, with the axle, D, fitted within it, all constructed and arranged substantially as and for the purpose herein set forth.

I further claim the india-rubber springs, I, when combined and arranged with the parts above specified, substantially as and for the purpose set forth.

62,421.—Road Scraper.—Obadiah Hopkins, Hackensack, N. J.

I claim a road scraper made in manner and for the purpose substantially as described.

62,422.—Quilting Frame.—Wm. R. Idle, Urbana, Ohio.

I claim the cross slides, C, the ratchet and pawl, k l, the gage, D, the thumb screw, M, the rods, A, and the head pieces, B, constructed, arranged and operating substantially as described, for the purposes specified.

62,423.—Water Meter.—Lemuel P. Jenks (assignor to Edwin A. Eaton), Boston, Mass.

I claim, First, The arrangement of a meter or a motor, of two valves, each one being both for induction and eduction, the said valves being connected together and acting alternately, in separate chambers or valve tubes, when the same are used in reciprocal action with a piston, and actuated by percussion, all substantially as and for the purpose described.

Second, Actuating the valves of a meter or of a motor by the alternate percussion of the hammers upon inclined planes connected with the valves, the hammer being operated by the motion of a piston, all substantially as and for the purpose described.

Third, The arrangement in combination with the hammers of the pawls or latches with their respective springs to retain the hammers at their highest elevation, when the same are actuated by the piston discharging said pawls, all substantially as and for the purpose described.

Fourth, With a meter or motor, the device of the horns or protecting inclined planes attached to the piston for the purpose of raising the hammers, when the same operate substantially as and for the purpose described.

Fifth, The arrangement in a meter or in a motor of a piston-containing cylinder, and a valve-containing cylinder, when the valves are operated by percussion, all substantially as and for the purpose described.

Sixth, The general arrangement and construction of the machine represented, all substantially as and for the purpose described.

62,424.—Refrigerator for Milk.—Alva F. Jennings, Shermane, N. Y.

I claim, First, The combination with the sheet-metal pan, E, and its inclosing wooden case, A, of the bar, I I, attached to the bottom of the said pan and movable therewith, constructed and arranged substantially as and for purposes set forth.

Second, In combination with the pan, E, and refrigerating case, A, the cover, O, provided with a transparent center, m, of double thickness, in the manner and for the purposes described.

Third, The combination of the adjustable leg, D, with the milk-pan receptacle, A, and stationary legs, D C, arranged and operating as and for the purpose specified.

Fourth, In combination with the pan, E, and its receptacles, A, the removable slide, k, and plug orifices, j j, of the cover, H, for forming a passage for the circulation of air under and around the pan after the milk is sufficiently cooled with ice or water, substantially as set forth.

62,425.—Beehive.—Howard C. Keith, Ancona, Ill.

I claim the body, A, provided with eccentrics, D, and screws, d, in combination with the bottom, C, and slotted plates, F, for the purpose described, substantially as specified.

62,426.—Farm Gate.—Jared Kelsey and John McLain, St. Marys, Ohio.

We claim the drop guide bar, K, stock divide and hog lock, O P Q, horseman's arrangement, N, gate guide, D, the washers, E and F, and the mode and manner in which the different parts are combined, as herein described for the use set forth.

62,427.—Ice Sled.—Geo. H. Hirk, Philadelphia, Pa.

I claim the combination and arrangement of the toothed arm, L, crank wheels, J, and pulleys, G I, and band, K, or equivalent with each other and with the frame of the sled, substantially as herein shown and described and for the purpose set forth.

62,428.—Folding Chair.—Bernhard Koechling, New York City.

I claim, First, The arrangement of the stop pins, c c, which fit into the mortice, d, as seen, and by which the seat, C, is supported both in rear and in front of the pin, b, on which the seat is hung, substantially as herein shown and described.

Second, The straps, f, fitted in oblong slots in the side pieces, A, in combination with the backs, D, substantially as and for the purpose herein shewn and described.

62,429.—Ice Cream Freezer.—L. A. Lipp, Coatsville, Pa

First, I claim an improved dasher or stirrer formed by the combination of the vertical scraper, S, pivoted scraper, T, and pivoted paddles, V, with the dasher handle, substantially as herein shown and described.

Second, An ice cream freezer in which a vertical motion is imparted to the dasher and a rotary motion to the receiver to be operated either simultaneously or separately, substantially as described.

Third, The combination and arrangement of the gear wheels, D E K, and shafts, F J, with each other and with the receiver, B, crank, L, and frame, G, substantially as herein shown and described for the purpose of enabling the receiver, B, to be revolved, and the dasher operated at the same time or separately as set forth.

62,430.—Sulky Plow.—C. H. Littefield, Turner, Me.

I claim the slotted iron guide, g, made fast to the cross bar, D, and the vibrating iron guide, g', connected with the axle, B, in combination with the rod, h, and plow beam, G, arranged and operating substantially as and for the purposes herein described.

62,431.—Automatic Fan.—John A. W. Lundborg, San Francisco, Cal.

I claim the frame, B, bearing the shaft, R, to which is attached the fan, C, having metallic frame, C2, when constructed and arranged to operate with the clock work, as herein set forth.

62,432.—Process of Preserving Eggs.—Jesse K. Marsh, Terre Haute, Ind.

I claim applying a composition or solution for the preservation of eggs substantially as herein described, and agitating the same as and for the purpose set forth.

62,433.—Life Preserving Seat.—Henry Matthews, Brooklyn, N. Y.

I claim the ring, c, in combination with the hollow chamber, b, having seat, a, and loops, g, substantially as described for the purpose specified.

62,434.—Foot Rest and Kneeling Board.—H. Morrison, Steubenville, Ohio.

I claim the combination of the rubber springs, F, and bearings, e1 e2, with foot rest and kneeling board, D, and with the end boards, C, of the pew, substantially as herein shown and described and for the purpose set forth.

62,435.—Reversible Dumping Sled.—J. H. Nonamaker, Middletown, Pa.

First, I claim the draft hook, D, constructed substantially as herein shown and described and for the purpose set forth.

Second, Making the sled reversible by forming runners, B, upon bosh sides of its bottom or floor, A, substantially as herein shown and described.

Rounding off both ends of the runner so that the sled may be drawn with either end forward, substantially as herein shown and described.

Fourth, The combination and arrangement of the chains, E and C, with the ends of the sled and with the draft hook, D, substantially as herein shown and described.

62,436.—Rossing Sawlogs.—Walter B. Noyes, Dorchester, N. H.

I claim the cutter wheel, f, cutter, g, guide wheel, k, provided with points when constructed and arranged to operate, as and for the purpose specified.

62,437.—Gridiron.—James F. Page, Rochester, N. Y.

I claim as a new article of manufacture, an open bottom sheet metal utensil having its lower edge turned up to form the annular groove or channel, d, provided with the wire grating, a, and cover, b, combined and arranged substantially as and for the purpose set forth.

62,438.—Lamp Burner.—Alexander Parsons, Portland, Me.

First, I claim the helix, C, in combination with the ring, E, loop, F, and shoulders, D, as and for the purpose set forth.

Second, The ring, L, when employed as and for the purposes set forth.

62,439.—Steam Digester for Treating Bones.—William Perry, North Bridgewater, Mass.

First, I claim the combination of the suspended retort or digester, A, and the hinged steam tight caps, d d' on the charging and discharging openings, substantially arranged and employed as as and for the purposes herein described.

Second, I claim also the stopper, m, and the diaphragm, n, in combination with the charging cap, d', and the ejection pipe, p, arranged and operating substantially as and for the purposes specified.

Third, I claim also the steam tight couplings, c and c', on the pipes b and p, respectively in combination with the suspended retort, A, for disconnection therewith, as and for the purposes herein described.

62,440.—Apparatus for the Manufacture of Sugar and Syrup.—Edward Porter, Clinton, Ill.

I claim, First, the adjustable tubes F, E, Filter E, and vats c c, substantially as and for the purpose set forth.

Second, The granulating boxes e e e, and tubes c, when arranged substantially as shown for the purpose set forth.

62,441.—Tweers.—Moses Powe, Mount Bethel, Pa.

I claim the box A, having a spherically formed top, hemispherical chamber, a,' tapering channel a, and grate B, formed with a cross shaped slot b,' and cone shaped cavity b2, constructed and operating as herein shown and described.

62,442.—Lifting Jack.—George Race, Norwich, N. Y.

I claim the eccentric operated by a hand lever in combination with the inclined tapering lever and adjustable levelling block, substantially as and for the purposes herein set forth.

Second, The arrangement of the movable block D, as secured to the taper lever C, for regulating the hight of the jack to operate in the manner herein described.

62,443.—Clothes Dryer.—Charles B. Rogers, Plainfield, N. J.

I claim a clothes horse having its arms D, attached to or connected with the standard A, by means of the notched metal plate C, provided at each corner with an inclined projection a, horizontal pins b, and grooves d, substantially as herein set forth for the purpose specified.

62,444.—Coffer Dam.—Charles H. Sanborn, Roxbury, Mass.

I claim a coffer dam or cylinder or box so constructed that a stream of water may be directed through it, or so arranged that an artificial current of water may be directed under it, as and for the purpose described.

62,445.—Securing Lock Spindles in the Doors of Safes, etc.—James Sargent, Rochester, N. Y.

I claim the spindle B, provided with the enlargement or swell c, and bearings f f, when imbedded directly in the safe without intermediate parts so as to form a fixture of the door substantially as herein set forth.

62,446.—Spindles of Safe Locks.—James Sargent, Rochester, Mo.

I claim the combination of the series of steps or offsets g g, with the conical spindle B, when applied in safes substantially as and for the purpose herein set forth.

62,447.—Cotton Planter.—James P. Selsor, Shelbyville, Mo.

I claim the combination with the frames A, and H, which are hinged together as described of the grooved transporting wheels B B, turning shaft c, spur wheels D, D,' E,' j, removable shaft h2, screw distributing shafts h, h, seed hoppers L, markers J, and coverers e e, all arranged and operating substantially as described.

Second, In combination with the hinged frames A, and H, I claim the arrangement of the spur wheels upon said frames in such manner that the two wheels j, and E' will be disengaged by the upward movement of the front end of frame A, substantially as described.

Third, The application of independently adjustable coverers e e, to a frame H, which is hinged to a frame A, in combination with the grooved pressing wheels B, and the adjustable clearers or scrapers b' b, all arranged and operating substantially as described.

Fourth, The combination of the socketed distributing screw shafts h, h', with the intermediate removable driving shaft h2, and spur wheel j, applied to the hinged frame H, substantially as described and for the purpose specified.

62,448.—Tobacco Pouches.—Winfield S. Sims, Newark, N. J.

I claim a tobacco pouch provided with a rod E, or its equivalent substantially as and for the purpose described.

62,449.—Process and Apparatus for Curing and Packing Meat and for other Purposes.—Daniel E. Somes, Washington, D. C.

First, I claim the process for preserving animal and vegetable substances substantially as herein described.

Second, Construction of buildings, fixtures and apparatus substantially as and for the purpose set forth.

Third, I claim compressing air, gas and liquids substantially as described and for the purposes specified.

Fourth, The combination of the buildings apparatus and devices substantially as set forth.

Fifth, The buildings and apparatus in combination with process substantially as described and for the purposes set forth.

Sixth, I claim as forming part of an establishment for curing and packing meat the following three classes of devices and processes in combination, viz: means and devices for cooling, for drying and for purifying, substantially as described.

Seventh, Means for excluding warm air, dust, insects, etc., in combination with means for cooling the air admitted, substantially as described.

Eighth, Means for excluding warm air, dust and insects, etc., in combination with means for purifying the air admitted.

Ninth, Means for excluding warm air, dust, insects, etc., in combination with the means for drying the air admitted, substantially as described.

Tenth, Salting and packing meat in buildings constructed for the exclusion of warm air substantially as described.

Eleventh, The use of deutoxide of nitrogen sulphurous acid alkaline sulphites or other equivalent deoxodizing substances in salting and curing meat substantially as described.

Twelfth, Curing meat by means of gases under pressure, substantially as described.

Thirteenth, Curing meat by means of materials in fine powder by pressure substantially as described.

Fourteenth, Utilizing the offal and other waste products from slaughter and packing houses by means of cooling, drying and preservative agents substantially as described.

Fifteenth, The use of pressure and agitation in salting meat, substantially as described.

Sixteenth, Apparatus for carrying the cattle to the slaughter house, substantially as described.

Seventeenth, The construction of a sugar house with means herein specified for excluding heat, dust and insects.

Eighteenth, Cooling cane juice by the employment of the means substantially as herein described.

Nineteenth, Lowering the temperature of the air in sugar houses, substantially as set forth.

Twentieth, Purifying the air admitted to sugar houses, substantially as described.

Twenty-first, Constructing sugar houses with walls, roofs, floors, windows, screens and ventilators substantially as described.

Twenty-second, Preventing fermentation by means substantially as herein described.

62,450.—Apparatus for Making Lead Pipe.—Wm. Spillman, Columbus, Miss.

I claim the funnel, D, and stop cock, E, arranged as described, in combination with the cylinder, A, tube, C, and water tank, G, substantially as and for the purposes set forth.

62,451.—Manufacture of Pepper Boxes.—John H. Stone, Philadelphia, Pa.

I claim a short metal pepper or dredging box having its bottom, B, detachably secured to its body, A, by means of the projections, a2 a2, left on the body, and the angular catches, b3 b3, found on the bottom, the same being arranged to operate together substantially as and for the purpose described.

62,452.—Harvester.—J. M. Swain, Howard, Ind.

I claim the grain platform, Q, provided with journals, e e', adapted to be fitted in bearings in bars, f, or plates, f', in combination with the seats, G and H, all constructed and operated substanslially as described.

62,453.—Hasp Trunk Lock.—Leonhardt Uitting (assignor to Conrad Liebrick), Philadelphia, Pa.

I claim a trunk hasp composed of the two portions, A and B, hinged together, substantially as and for the purpose herein set forth.

62,454.—Rosette.—Josiah V. Waldron (assignor to George Oberlander), New York City.

I claim the combination with the rosette frame of the inner cup-shaped plate, H, and screw, J, or its equivalent, substantially as and for the purpose described.

62,455.—Wrestling Toy.—James T. Walker, Palmyra, N. Y.

I claim each pair of arms constructed of one piece which is pivoted at both ends to the bodies of the figure, operating in the manner described and for the purpose specified.

62,456.—Blank for Hoe.—Hervey Walters, Roston, Mass.

I claim a blank, made substantially as described and as shown in Fig. 1.

62,457.—Steam-engine Governor.—J. V. Weitz, Cleveland, Ohio.

First, I claim the tubular shaft, H'', screw or rod, a', in combination with the screw sleeve, F', links, J', cross head, I', arranged in the manner and for the purpose as described.

Second, The steam balance valve, F', ports, J H and K, as arranged in combination with the chamber, A, and auxiliary chamber, A'', for the purpose and in the manner set forth.

Third, The levers, M M', rollers, d e f, and stirrup, E, as arranged in combination with the shaft, G, and valve, E, for the purpose and in the manner as herein described.

Fourth, The shaft, H', screw sleeve, E', levers, M and M', and rollers, d e f, as arranged for the purpose and in the manner specified.

Fifth, The screw sleeve, F', wheel, G, and rod, a', as arranged in combination with the stirrup, E, levers, M M', for the purpose and in the manner as set forth.

62,458.—Corn Planter.—Joseph E. West, Georgetown, Ky.

First, I claim the combination of the sliding valve bar, H, operating levers, K, and handle, M, with each other and with the seed boxes, E, substantially as herein shown and described.

Second, The combination of the blocks, I, and springs, J, with the seed boxes, F, and with the sliding valve bar, H substantially as herein shown and described and for the purposes set forth.

Third, An improved corn planter formed by the combination and arrangement of the roller or wheel, D, draft bars, B, frame, C, seed boxes, E, springs, J, blocks, I, sliding valve bar, H, levers, K, handle, M, beams, G, uprights, O, shovel plows, N, and bull tongues or coverers, P, with each other, substantially as herein shown and described.

Fourth, Forming the bull tongues, B, with long bent iron shanks and adjustably securing them to the beams, G, by the keys, R, substantially as herein shown and described.

62,459.—Washing and Wringing Machine.—Cassius A. White, Fairfield, Vt.

First, I claim the washer formed by the combination of the frames, E and F with each other and with the shafts, G and I, substantially as herein shown and described.

Second, The roller, R, fitted in stationary bearings, and the roller, S, mounted on adjustable bearings on the cross bar, T, operated by the eccentric, u', on the cam shaft, U, in the manner described for the purpose specified.

Third, The combination of the washer, E F, and conveyor, L M N O, with each other and with the wringer, R S, substantially as herein shown and described.

62,460.—Manufacture of Brushes.—M. P. Wilkins and C. D, Rogers, Jersey City, N. J.

We claim, in the manufacture of brushes the pronged cap, D, made of metal or other suitable material, substantially as and for the purpose described.

62,461.—Planting Machine.—Robert B. Wright, Vermillion, Ill.

First, I claim the two shafts, D D', connected by the rod, E, and provided with standards, E G, having plows, b b', respectively attached whereby the plows of both standards may be simultaneously raised by the operator or driver, substantially as set forth.

Second, The rotating of the shaft, Q, from the axle by means of a belt, R, arranged in connection with a friction roller, S, substantially as and for the purpose specified.

Third, The seed slides, M M, in combination with the springs, N N, and the wheels, P P, provided with the pins, f f, all arranged to operate in the manner substantially as and for the purpose set forth.

62,462.—Bolt-cutting Shears.—S. W. Wright (assignor to himself and S. J. Wright), Ellsworth, N. Y.

I claim the cutting levers, A A, and the cross piece, B, constructed, arranged and combined substantially as herein shown and described and for the purpose set forth.

62,463.—Joint Groover for Brick Work.—Albert M. Gabriskie, Bergen Point, N. J.

I claim the said new tool or implement, made substantially as described, viz.: of the tapering and dovetailed blade, C, the plate, A, and the handle, B, arranged substantially as specified, and to be used in manner and for the purpose as hereinbefore explained.

62,464.—Apparatus for the Manufacture of Bromine and Iodine.—David Alter, Freeport, Pa.

I claim the stone box and lid with iodine leaden flue, as above described, to be employed as a retort for the manufacture of bromine and iodine.

62,465.—Breech-Loading Fire-Arm.—Alexander J. Bergen, Brooklyn, N. Y.

I claim the block, l, in combination with the eccentric, k, and hooked block g, substantially as and for the purposes specified.

62,466.—Metallic Cartridge.—Alexander J. Bergen, Brooklyn, N. Y.

First, I claim the cartridge case, a, formed of sheet metal, with a dome-shaped end, b, and a central teat, c, for the fulminate, in combination with the flange, e, surrounding the case, as and for the purposes set forth.

Second, I claim the movable flanged teat, i, in combination with the said flanged, dome-shaped sheet metal cartridge case, as and for the purposes set forth.

62,467.—Priming Metallic Cartridges. — Alexander J. Bergen, Brooklyn, N. Y.

I claim a movable fulminate nipple, projecting from the rear end of, and in combination with a cartridge case, formed with a cavity in the rear end for the reception of said nipple, substantially as set forth.

62,468.—Apparatus for Drying Wool.—Leander W. Boynton, Hartford, Ct.

I claim the combination of the internal cylindrical vessel, A A, etc., fan, C, eduction port, d, when the whole is constructed and arranged and made to operate and produce the result, substantially as herein described and set forth.

62,469.—Apparatus for Preparing Peat for Fuel.—Leander W. Boynton, Hartford, Ct.

First, I claim the combination of the grinding cylinder, c and b, with the spurred rollers, or rollers and spurred apron, and hopper, B, and when they are constructed, arranged, and fitted for use, substantially as herein described and set forth.

Second, I claim the combination of the perforated pipe, j, for the high steam with the apron, D D, and the exhaust fan, C, when they are constructed, arranged, and fitted for carrying and drying the peat, substantially as herein described and set forth.

Third, I claim the molding and pressing cylinder, D, as described in my Patent, issued Dec. 27, 1864, in combination with the apron, F, and zig-zag pipe, p, when they are constructed, arranged, and fitted for molding and drying peat, substantially as herein described and set forth.

62,470.—Churn.—T. I. Burhyte, Fond du lac, Wis.

First, I claim the churn, A, provided with the water chamber, B, at its bottom, and the removable grate, b, and having the tubes, a c and n, arranged as shown and described.

Second, In combination with the platform, L, pivoted to the supports, E, I claim the pendulum rods, C, and the adjustable box, D, or its equivalent, arranged to operate as set forth.

62,471.—Broom Head.—J. T. Carpenter, Harrisburg, Pa.

I claim the jaws, B B, constructed as described, with their loops, a a', when used in combination with the case or head, A, and tapering handle, D, the whole constructed and used as and for the purposes specified.

62,472.—Knife and Scissors Sharpener. — Matthew T. Chapman, Galesburg, Ill.

I claim the sharpener plate, B, having a V-shaped end terminating with parallel edges, and thence angularly and inwardly with parallel edges again, and operating in combination with the angular metallic box, a, constructed in the block, A, substantially in the manner and for the purpose as herein described.

62,473.—Water Wheel.—Rockwell Chapman, Buchanan, Mich.

I claim a water wheel having the radial buckets, c, extending in a straight line across the face of the wheel, with the solid triangular projection d, in rear of said buckets, and the curved passages, b, formed by the overlapping plates, the whole constructed and arranged as herein shown and described.

62,474.—Feed-water Regulator.—George E. Chenowith, Baltimore, Md.

I claim the high and low-water indicator for steam boilers furnished with a hollow ball at one end, which communicates with both the steam and water spaces in the boiler, and the counter or overpoise at the other end, and attached to the stop cock on the supply pipe, so that the rising or falling of the water in the boiler, and the consequent increased or diminished quantity of water in the globe or ball shall close or open the supply cock, substantially as and for the purpose described.

62,475.—Car Coupling.—William Cook, Belvidere, Ill.

First, I claim the combination of the center enlarged link, with the segment catch and bumper, arranged and operating substantially as and for the purpose set forth.

Second, The combination of the segment catch with a coiled spring placed in a recess in the catch, and acting between the bumper and catch with a horizontal pressure to hold the catch in the link, substantially as set forth.

62,476.—LOCK-UP SAFETY VALVE.—Daniel G. Coppin and Gilbert H. Clemens, Cincinnati, Ohio.

First, We claim the body of case, A, and cap, B, to inclose the mechanism of the steam safety valve, in combination with the steam chambers, A' and A'', with openings, a', bottom flange and guard below, with openings, a, in the manner and for the purposes set forth.

Second, The arrangement of levers, c, graduating arms, D, steel points, d, standards, E, weight, F, screw lugs, G, and saddle, I, when constructed to operate with each other in the manner and for the purposes set forth.

Third, The arrangement of the steam chambers, A' and A'', and openings, a' and a'', as shown in the manner and for the purposes set forth.

Fourth, The ring projecting from the bottom face of flange provided with openings, a, as shown in Fig. 5, as set forth.

Fifth, The arrangement of the horizontal eccentric spindle, with reference to the fixed collar, b, on valve stem, as set forth.

62,477.—LOCK-UP SAFETY VALVE.—Daniel G. Coppin and Gilbert H. Clemens, Cincinnati, Ohio.

First, We claim the arrangement of the body, A, and cap, B, of the inclosing case for the mechanism of the safety valve, with the tube, A'', valve, D, parts, a' a', series of V-rings, hook ing, J, lug, guard, M, and escape ports, a'' a'', in the manner and for the purposes set forth.

Second, The arrangement of the notched levers, c c, valve and stem, D D, graduating arms, D' D', with slots, d d, steel points, I, guide, E, weight, F, with T, lugs, f f, saddle, H H, clamps, G G, slotted pin and eye bolt, N, in the manner and for the purposes set forth.

Third, The arrangement of the V-shaped rings, with reference to openings, a, and chamber, A''.

Fourth, The arrangement of the weight, F, with reference to the vertical tubular chamber, A'', and levers, C, as herein set forth.

Fifth, The construction of the arch guide, E, whereby to guide the valve stem, in the manner and for the purposes set forth,

62,478.—DUMPING WAGON.—George R. Cramer, Cincinnati, Ohio.

I claim the combination of the crank shaft, D, roller, E, lever, d, and body, F, or their equivalents, when the same are arranged and operate substantially as above described.

62,479.—MACHINE FOR FINISHING BUTT HINGES.—John J. Crooke, New York City.

First, I claim the files, c c, constructed substantially as described.

Second, The combination with the files, c c, of the sliding bed piece or carriage, D, and stop, L, substantially as and for the purpose set forth.

62,480.—LEATHER SOLE.—C. O. Crosby, New Haven, Conn.

I claim the herein described sole as a new article of manufacture.

62,481.—FISHING NET GEAR.—Charles C. Crosman, Portland, Me.

I claim the flange, D, in combination with and when attached to the net or bag, C, suspended and operated in the manner herein described, as and for the purposes set forth.

62,482.—STEAM ENGINE.—George P. Ganster, New York City. Antedated Feb. 22, 1867.

First, I claim the combination of D D', crank shaft, E, arm, G'', and valve, I.

Second, The combination of D D', guides, G G' box, F F', crank shaft, E, arm, G,'' and valve, T, arranged and operating substantially as described, and for the purpose set forth.

62,483.—LOCKING WASHER FOR NUTS.—James H. Gridley, Washington, D. C.

I claim a hinged or pivoted plate, which folds or falls against one or more edges of a nut, to prevent its rotation.

62,484.—HEAD REST FOR RAILWAY CARS.—Robert Hamilton, Franklin, Ind.

I claim the suspended sack, A, when constructed and used as a support for the arm and head, substantially as set forth.

62,485.—BUCKLE.—Stephen E. Booth, New Haven, Conn., administrator of the estate of Sheldon S. Hartshorn, deceased, West Haven, Conn.

I claim a buckle made with a wire frame, and a sheet metal sliding bar, when the two parts are constructed, locked together, and the whole fitted for use, substantially as herein described and set forth.

62,486.—PAPER TRIMMER.—Jonathan Hatch, South Windham, Conn.

First, I claim the self-sharpening dish-shaped cutters, A A'', with their sides and front edges, a a, constructed as described, and arranged for operation relatively to each, substantially as and for the purpose or purposes herein set forth.

Second, The combination with the dish-shaped cutters, A A', constructed as described, and their recessed stocks, B B', of the wedge-shaped or beveled edged rings, D D', for holding the cutters to their stocks, all arranged substantially as specified.

62,487.—COMBINED HEDGE TRIMMER AND MOWER.—John H. Hepperley, Elmira, Ill.

First, I claim the combination with a carriage having a hinged frame, c c2, and rear adjusting device, H I, of a cutting apparatus and means for sustaining the same in an elevated position for trimming hedges, and also in a position for mowing, substantially as described.

Second, The elevated frame, C1, in combination with the depressed hangers, E E,' adjustable frame, c c2, and means by which the cutting apparatus can be operated, whether in an elevated or depressed position, substantially as described.

Third, The arrangement of the lever, I, support, J, Standards, K, the latter having a wheel, J, attached to it, in combination with the combined hedge trimmer and mower shown, all substantially as and for the purpose set forth.

62,488.—MACHINE FOR CUTTING COILED BARS FOR CHAIN LINKS.—George Homfray, Parish Halesowen, Eng.

I claim guiding, directing, and feeding up the bent coil in a line oblique to the cutting edges of the cutters, so that the links or sections may be cut off with scarfed edges, when said grinding, feeding, and cutting off are accomplished by an arrangement of devices, substantially as described.

I also claim, in combination with the trough and mandrel, a pawl or pawls for feeding the bent rod to the cutters, and holding it in proper position against the action of the cutters, substantially as described.

I also claim the grooving or sloping of the under cutter, and its stock or part to which it is attached, so that the cut off blank link or section will drop, or be free to be removed from the place where it is cut off, substantially as represented and described.

62,489.—CANT HOOK.—Thomas Hopkins, Cincinnati, Ohio.

First, I claim the combination of the rings, A C, chain, B, rod, D, hook, F, and sliding hook, G, when arranged and adapted for use in either of the positions represented in figs. 1 and 2, as and for the purposes described.

Second, In combination with the elements of the preceding clause, I claim the use of the auxiliary chain, I, and its appurtenances, for the purpose stated.

62,490.—MANUFACTURE OF PAINTS.—William C. Hurd, New York City.

I claim the process of manufacturing paint, by mingling with oil, lead, zinc, and other materials ordinarily employed in the manufacture, pulverized quartz, which has first been subjected to the action of an acid, saline or alkaline solution, or all or any of them, substantially as and for the purpose set forth.

62,491.—BORING MACHINE.—Joseph Isenberg, McConnellstown, Pa.

I claim the arrangement of the jaws, c c, two or more, the clamps, E E F, lever, H, catch, I, and adjustable bar, G, constructed and operating substantially as described and represented.

62,492.—FLUTING MACHINE.—G. E. King, New York City.

I claim the guide, E, constructed with one or more curved or arched portions, a', in combination with suitable fluting rollers, substantially as herein set forth, for the purpose specified.

62,493.—WINDOW SHUTTER FASTENING.—Carl Lenhert, Boston, Mass.

I claim the hinge, C, D, constructed as described, and used with the wheels, E and F, with their arms and cam operated by the knob, G, and shaft, m, the whole constructed, arranged, and operating in the manner and for the purposes hereinbefore set forth.

62,494.—STEAM GENERATOR.—Joseph A. Miller, New York City.

I claim the boilers, A A, one or more of them, their fire chambers, D, and the boxes or pipes, I, with their diaphragms forming steam generating spaces, d, and return water passages, e, and pipes or boxes, J K, when arranged in relation to each other and to the fire grate, also to the steam and water spaces of the boiler or boilers, and in communication with the latter, substantially as specified.

62,495.—CROQUETERIES.—G. Livingston Morse, Harrison, N. J.

First, I claim the pins or clips, B, or their equivalents, marked as specified, in combination with the wickets of arches of croquet, substantially as set forth.

Second, I also claim the combination with such pins or clips, marked as specified, of a registering tally for recording the game, substantially as described.

62,496.—ERASER AND PEN HANDLE COMBINED.—W. A. Morse, and J. G. Powell, Philadelphia, Pa.

First, We claim the eraser and burnisher, B, with its parallel face edges, c c, for sharpening its concave surface, s, and convex surface, m, extending its whole length, in combination substantially as described and shown, and for the purpose set forth.

Second, Constructing the eraser, B, of such form that it can be inserted at either the top or the tip of the pen handle, A, substantially as specified, and for the purposes set forth.

62,497.—PLOW.—John Parker, Milroy, Ind.

I claim the clamp, D, with its attachments constructed as described, and used with a plow operating as and for the purposes herein specified.

62,498.—DRAWING AND TWISTING HEADS FOR SPINNING MACHINERY.—Henry T. Potter, Norwich Town, Conn., assignor to himself, Edwin Allen, and Elisha H. Holmes.

I claim the combination with the twisting tube, D, and drawing rollers, c c, of the socketed screw head, c, and revolving screw, E, in gear therewith, for operation together, the whole being constructed and arranged substantially as and for the purpose or purposes herein set forth.

62,499.—SUGAR CANE MILLS.—D. J. Powers, Madison, Wis., assignor to Buffalo Agricultural Machine Works, Buffalo, N. Y.

First, I claim the combination of trap bolts, M M, and india rubber blocks or springs, when applied to the journals of the pressure rollers, substantially as and for the purpose herein specified.

Second, I also claim the latterally widened journal apertures, d d, of the bearings, L L, in combination with strap bolts, M M, and india rubber springs for the purpose of allowing a side play to the top roller, G, substantially as herein specified.

Third, I also claim the adjustments of the turn plate, Q, by the means substantially as specified.

62,500.—SELF-LUBRICATING JOURNAL BOX AND BEARING.—

First, I claim a plain or corrugated journal box fitted with soft metal lining, and provided with a chamber around its sides and ends, as and for the purpose specified.

Second, The employment of wicks or other equivalent for conveying oil from the chamber, beneath the axle, to the journal box, as and for the purpose set forth.

Third, The combination of the cap and lower part of the box, provided with grooves and chambers as set forth with the pipe, D, suspended and connected by lugs, a a, or equivalents, as and for the purpose specified.

62,501.—TIRE SHRINKER.—Joseph Robinson, Johnson's Creek, N. Y.

I claim the clasps, c and c', and the eccentrics, E and E', when made as specified, and used in combination with the other parts as herein set forth.

62,502.—CHURN.—Albert A. Rose, Binghamton, N. Y.

I claim the manner of operating the pendulum or vibrating churn, with the feet, by means of the treadles, G G, and the mode of inserting, securing, and removing the dasher from the churn, substantially as described, and for the purpose set forth.

62,503.—MANUFACTURE OF ARTIFICIAL LEATHER.—Charles Saffray, M.D., New York City.

I claim, in the manufacture of artificial leather, with vegetable or animal fibers, prepared substantially as aforesaid, and united by means of the agglutinating solution herein described; the use of wire cloth protectors to keep immovable the fabric during some of the processes to which it is submitted, and also the mode of saving the solvents used in the preparation of the solution.

62,504.—DENTAL INSTRUMENT.—Ira A. Salmon, Boston, Mass. Antedated Feb. 7, 1867.

I claim a combination composed of the hook or its equivalent the spindle, the hammer and mechanism substantially as described or its equivalent for operating such hammer as and for the purpose aforesaid.

I also claim the combination as well as the arrangement of the direct pressure and back action pluggers with the hammers its case and mechanism for operating such hammer, substantially as and for the purpose specified,

62,505.—VACUUM FILTER.—Thomas Simmons, Chicago, Ill. Antedated Feb. 15, 1867.

First, I claim the combination and arrangement of the filtering vessel, A, receiver B, and and removable generator, E, when connected by tubes, C D, provided with stop cocks, a b c, and operating substantially as herein specified and for the purposes set forth.

Second, I claim the combination of the press, P, vessel, A, receiver, B, generator, E, tubes, C D, provided with stop cocks as shown, arranged and operating as and for the purposes shown and set forth.

62,506.—WHIP SOCKET.—Joseph Steger (assignor to himself and W. Hauff), New York, N. Y.

I claim the arrangement of a spring catch in the interior of a whip socket in combination with a suitable recess in the whip handle, substantially as and for the purpose described.

62,507.—IMITATION OF PEARL ON SOLID SUBSTANCES.—Charles Sticht, Paris, France.

First, I claim the process herein described for producing surfaces in imitation of mother of pearl on paper and other material.

Second, I claim paper or analogous material coated in imitation of mother of pearl, substantially as herein specified.

62,508.—TUBE DRIVING OR BORING WELLS.—Esau D. Taylor and William H. Ballou, Hornellsville, N. Y.

We claim the combination of the head or cap, C, chain, B, wire rope or cord with a series of jointed plugs, a a, and barrel, A, substantially in the manner as herein described for the purposes set forth.

62,509.—WAGON BRAKE.—O. C. Taylor, Rome, Pa.

I claim the arrangement of the blocks and springs upon the outer ends of the separate, levers, E F, when used in combination with the bar, E, rods, d d, and rods, c, substantially in the manner and for the purpose specified.

62,510.—RAILWAY SWITCH.—William Tracy, Chicago, Ill. Antedated Jan. 6, 1867.

First, I claim the construction of the intermediate link, C, in combination the arrangement of the pivot e, on the support, d, and the pivot, c, on the lever, D, whereby a thrust or a pull upon the switch when the lever is adjusted to the positions shown in fig. 1 and 2, of the drawings tends to cause the lever, D, to retain its positions, substantially as described.

Second, The combination of the locking pin, g, with the lever, D, and links, C, all constructed and arranged substantially as described.

62,511.—CULTIVATOR.—J. W. Tyson, Lower Providence, Pa.

In combination with the adjustable cultivator frame, I claim the use of the chains, n and o, when arranged to operate as and for the purpose set forth.

62,512.—NUTRITIVE AND CURATIVE PREPARATION.—Samuel A. Upham, Philadelphia, Pa.

I claim, First, A nutritive and curative preparation consisting of extract of meat, sugar, water and phenol lodique combined in the manner and proportions, substantially as described.

Second, The combination of the above and the hypo phosphates of soda or lime, or either of them.

62,513.—BACK BAND HOOK.—Seth Ward, Princeton, Ind.

I claim the within described hook formed and used with the harness, substantially in the manner herein set forth, whereby the harness acts as a keeper as described.

62,514.—BOARDING MACHINE.—J. E. Wiggin, Stoneham, Mass.

I claim, First, The endless apron, S, actuated by the ratchet, R, and gears, R' R', or their mechanical equivalents made substantially as described and for the purpose set forth.

Second, The endless apron, T, in combination with the device of the pawl lever, Y, the ratchet, V, and the gears, U W, or their mechanical equivalents, for the purpose set forth.

Third, The device of the movable pivot box, H, upon the lever, G, for the purpose of regulating to amount of vibrating motion given to the apron, T.

Fourth, The combination as well as the arrangement of the two endless aprons, S and T, with actuating devices, substantially as described and for the purpose set forth.

Fifth, So arranging the frame, 2, 3, 4, 5, that a vibrating motion as well as a revolving motion may be given to the endless apron, T.

Sixth, The general combination as well as the arrangement of the several parts of my machine made substantially as described and for the purpose set forth.

62,515.—STORE HOUSE.—Charles Wright, New York City.

I claim, First, The flooding means, arranged as herein represented relatively to the several compartments, that is to say, the tank, F, the conducting pipe, I' I, etc., the valve, I, and distributing pipes, J' J2, etc., substantially as specified.

Second, I claim the within described provisions for discharging the water from the compartments that is to say, the gratings, K, gutters, L, leaders, N, and valve, n, substantially as herein specified.

Third, I claim the concrete bed, L, arranged under the gratings, K', and gutters, L, and having its upper surface inclined, all substantially as and for the purpose set forth.

Fourth, I claim the means for indicating the existence of fire in each compartment at the office, M, the same consisting of tubes, O1 O2, etc., arranged as specified withor without the uptake flue, m.

Fifth, I claim the valves, S', or their equivalents, in combination with the flues, H H', etc., for admitting and controlling the circulation of cold air, through each compartment of a fire proof ware house, substantially as and for the purpose herein specified.

62,516.—MEDICAL COMPOUND.—H. Zoeger, New York City.

I claim the within described compound made of the ingredients herein specified and mixed together, substantially as and about in the proportion herein set forth.

RE-ISSUES.

2,493.—LAMP.—Alexander J. Walker, New York City, assignor by mesne assignments to Mills L. Callender. Patented June 6, 1865.

I claim, First, Sustaining the cone or deflector by supports that are bent or folded to allow of their being of increased length, for the purpose and substantially as specified.

Second, The plate, h, extending across the cone or deflector, g, and formed with the flame-spreading projections, 2 2, for the purposes and substantially as set forth.

Third the lips, 1 1, and projections, 2 2, on the plate, h, in combination with the deflector, g, and wick tube, substantially as and for the purposes set forth.

Fourth, The india-rubber ring, s, with an opening through which to fill the amp, in combination with the rods, e, carrying the burner, as set forth.

2,494.—COOKING STOVE.—Daniel E. Paris, Troy, N. Y., assignor by mesne assignments of Samuel B. Spaulding. Patented June 22, 1858. Additional improvements May 17, 1859. Reissued June 19, 1866.

I claim, as the invention of the said Spaulding, arranging the water boiler or reservoir back of the oven and below the top plate of the stove, substantially as described, in combination with the arrangement of flues described, or the equivalent thereof, as and for the purpose described.

Also the arrangement of a boiler or reservoir in front of the stove, in combination with the extension of the bottom flues of the stove under the said boiler, substantially as and for the purpose described.

And also the casing surrounding the bottom of the stove, in combination with the flues in the bottom, substantially as and for the purpose set forth.

2,495.—CLAMP FOR MAKING BROOMS.—Justus Day, Murray, N. Y. Patented November 27, 1866.

I claim, First, In a clamp for forming brooms the combination of the slot, D, with the socket, E, for facilitating the winding of the broom head, as herein set forth.

Second, The combination of the loose rods or wires, G G', with the slot, D, and socket, E, operating in the manner and for the purpose set forth.

Third, A clamp for forming broom heads, combining a round socket or sockets, E, for winding the top of the broom, and an elongated socket or sockets, K, for binding it, as set forth.

Fourth, The arrangement as a whole, consisting of the clamp, A B, sockets, E K, slot, D, and wires, G G', operating in the manner and for the purpose herein set forth.

Fifth, The construction of a broom clamp, the levers, A B, of which are pivoted at their fulcra by means of the link or links, c, so as to be capable by reversing of bringing the sockets, E and F, successively into use, as set forth.

Sixth, In combination with the slot, D, the beveled form of the sockets, E F, whereby the fibers of the material are brought gradually to the greatest degree of compression at the point where they are wound, as shown.

Seventh, In combination with the reversible levers, A B, provided with sockets on their opposite faces, I claim the adjustable catch, H, for holding them together, in either position while the broom is being wound, as shown and described.

2,496.—CUTTING BOARD.—Roland C. Hussey, Milford, Mass. Patented Aug. 28, 1866.

I claim the sections, A and B, constructed of a series of seasoned strips, firmly glued or cemented to each other, in combination with the clamping device consisting of rods, D, bars, C, and nuts, c, for the purpose described, substantially as specified.

2,497.—CRIMPING MACHINE.—John P. Jamison, New York City. Patented May 15, 1866.

I claim, First, In combination with a crimping form or block, G, jaws or stretchers, F, carried by springs, D or E, so as to form thereof elastic jaws, and arranged to reciprocate in common with a cross piece, C, or its equivalent, substantially as specified.

Second, The springs, D and E, the one of which is stationary in its connection with the reciprocating cross piece, C, while the other is hung thereto so as to be capable of play, for operation of the jaw or stretcher which it carries, by the action of an inclined plane, H, or its equivalent, essentially as and for the purpose herein set forth.

2,498.—MELODEON.—La Fayette Louis, Providence, R. I. Patented Nov. 18, 1865.

I claim in combination with the reeds of a melodeon, or that class of instruments in which the air is draw through the reeds by the exhaust action of a bellows, a tremulo valve or valves, so arranged that when vibrated it or they shall interrupt the passage of air through the reeds, and thereby produce the tremulo sound at the will of the performer.

2,499.—CIDER MILL.—Wm. N. Whiteley, Jerome Fassler and O. S .Kelley, Springfield, Ohio. Patented Dec. 15, 1863.

We claim, First, A mill for grinding fruit when constructed with two grinding rollers, H H', placed beneath a crushing and feeding roller, M, which crushes the fruit against a serrated breast plate and feeds the same to the grinding rollers by which it is reduced to pulp, substantially as described.

Second, The rollers, H H', in combination with the metal segments, K K' constructed as described, and one of them provided with the scraping edge, Y, substantially as and for the purpose set forth.

Third, We claim the spiral ribbed grinding rollers, running together at different velocities, with the ribs of one roller crossing the ribs of the other at an angle where the grinding is effected, in combination with the crushing and feeding roller arranged above them.

Fourth, We claim the hopper, Q, serrated breast plate or ribbed segment, N, segments, K K', and sides, L L, with the roller, M, forming the crushing box, constructed so as to be readily removed from the grinding rollers and grinding frame, as described, for cleaning or repairing the mill.

Fifth, We claim the combination of the crushing roller, M, breast plate, N, stationary scraper, Y, grinding rollers, H H', and scrapers, J2 J2, when constructed and arranged for joint operation, substantially as shown and described.

DESIGNS

2,587.—PLATES OF A COOK'S STOVE.—Garrettson Smith and Henry Brown, Philadelphia, Pa., assignors to Buckwalter & Co.

2,588.—PICTURE FRAME.—John H. Bellamy (half assigned to David A. Titcomb), Charlestown, Mass.

2,589.—PLATES OF A COOK'S STOVE.—D. S. Colby and R. Scorer (assignors to Cox, Church & Co.), Troy, N. Y.

2,590, 2,591, 2,592, 2,593.—CARPET PATTERN.—E. J. Ney assignor to the Lowell Manufacturing Company), Lowell, Mass.

2,594.—OIL CAN.—Samuel R. Wilmot, Bridgeport, Conn.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,975.—MACHINERY FOR CARVING WOOD, ETC.—Wm. W. Marston, New York City. Nov. 13, 1866.

3,355.—COMPOUND FOR COATING SHIPS' BOTTOMS AND OTHER SURFACES.—Charles J. Eames, New York City. Dec. 20, 1866.

3,381.—BOOTS AND SHOES.—Geo. W. Tolhurst, New York City. Dec. 22, 1866.

3,405.—VALVE.—Samuel J. Peet, New York City. Dec. 28, 1866.

3,408.—DRYING APPARATUS.—Gilbert D. Jones, New York City. Dec. 28, 1866.

3,418.—SAFETY ATTACHMENT TO CARRIAGES.—Claude Ducrux, New York City. Dec. 29, 1866.

3,446.—CALENDAR MOVEMENTS FOR CLOCKS.—Henry Horton, Ithaca, N. Y. Dec. 31, 1866.

21.—APPLYING TEETH TO SAWS.—Wendell Lamoreux, New York City. Jan 3, 1867.

24.—CARTRIDGE.—Samuel Remington, Ilion, N. Y. Jan. 4, 1867.

63.—ARTIFICIAL LEG.—Alex. T. Watson, New York City. Jan. 9, 1867.

97.—MACHINERY FOR FELTING HAT BODIES.—Job W. Blackham, Brooklyn N. Y. Jan. 14, 1867.

96.—APPARATUS FOR LUBRICATING CARRIAGE AXLES.—John B. Powell, New York City. Jan. 14, 1867.

124.—SAFETY MATCH BOX.—Henry A. Gadsden, New York City. Jan. 17, 1867.

229.—FIRE-PROOF SAFES.—Rufus Sanborn, Ripon, Wis. Jan. 29, 1867.

PATENT OFFICE DECISIONS

BEFORE THE BOARD OF EXAMINERS-IN-CHIEF OF APPEAL.

ELISHA FOOTE for the Board.

Right of an applicant to amend after second rejection upon a new reference.—Application of J. K. O.

On the second rejection the applicant was referred to another patent as anticipating his invention, in addition to the references given on the first rejection. The applicant thereupon offered an amendment of his claim, which the Examiner refused to receive, on the ground that the additional reference given on the second rejection was merely to strengthen the reasons for the first rejection, and that the provisions of the 12lst Rule of the Patent Office applied only to cases in which the original references were abandoned.

In this construction of the rule, we think the Examiner has erred. Although the new reference may add nothing to his own conviction, yet to the applicant it may afford strong reasons for amending his specification, and we think the intent and object of the rule was to allow an amendment after a reference, whatever may have been the reason or motive for making it. We accordingly reverse the decision, without any examination into the merits of the application.

Right of an applicant for reissue to omit useless parts described in original patent.—Application of J. C.

The several parts that are claimed in combination in the application seem to us to be all found in the original specification and drawings. Other parts that are there described and claimed are now omitted, perhaps because they were found to be unnecessary and useless. But we do not understand that this circumstance will invalidate a claim for what was really new and useful. It happens not unfrequently that while some features of an invention are found in practice to be valuable, others turn out to be useless, and we see no objection to omitting such useless parts on a reissue if the party so chooses.

If a patentee has omitted to claim in his patent what he was really entitled to claim, it affords a strong presumption that the omission was caused by inadvertency, accident or mistake. This, in connection with the party's oath to the fact, has usually, in the absence of all proof to the contrary, been held to be sufficient to authorize a reissue.

We think, therefore, that the Examiner in charge should have examined the claims in the application with reference to their novelty and patentability, and we reverse his decision with a view to such an examination.

EXTENSION NOTICES.

George N. Reed and Percis L. Tuttle, administrators of the estate of Joseph H. Tuttle, deceased, of Geneva, N. Y., having petitioned for the extension of a patent granted to the said Joseph H. Tuttle on the 21st day of June, 1853, for an improvement in saws, for seven years from the expiration of said patent which takes place on the 21st day of June, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 3d day of June next.

Extensions.—The applicant for an extension must file his petition and pay in the requisite fee at least ninety days prior to the expiration of his patent. There is no power in the Patent Office to renew a patent after it has once expired. The preliminary business to extend a patent should be commenced at least six months prior to the expiration.

Many valuable patents are annually expiring which might readily be extended, and, if extended, might prove the source of wealth to their fortunate possessors.

All the documents connected with extensions require to be carefully drawn up and attended to, as any failure discrepancy, or untruth in the proceedings or papers is liable to defeat the application.

In case of the decease of the inventor, his administrator may apply for and receive the extension; but no extension can be applied for or granted to an assignee of an inventor. Parties desiring extensions will address MUNN & CO., 37 Park Row, N. Y.

Reissues.—A reissue is granted to the original patentee, his heirs, or the assignees of the entire interest, when by reason of an insufficient or defective specification the original patent is invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention.

The general rule is, that whatever is really embraced in the original invention, and so described or shown that it might have been embraced in the original patent, may be the subject of a reissue.

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A patentee may, at his option, have in his reissue a separate patent for each distinct part of the invention comprehended in his original application, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications.

Each division of a reissue constitutes the subject of a separate specification descriptive of the part or parts of the invention claimed in such division; and the drawing may represent only such part or parts.

One or more divisions of a reissue may be granted, though other divisions shall have been postponed or rejected.

In all cases of applications for reissues, the original claim is subject to re-examination, and may be revised and restricted in the same manner as in original applications.

But in all such cases, after the action of the Patent Office has been made known to the applicant, if he prefers the patent originally granted to that which will be allowed by the decision of the Office, he has the privilege of abandoning the latter and retaining the old patent.

The documents required for a Reissue are a Statement, Petition, Oath, Specification, Drawings. The official fee is $30. Our charge, in simple cases, is $30 for preparing and attending to the case. Total ordinary expense, $60. Reissues may be applied for by the owners of the patent.

By means of Reissue, a patent may sometimes be divided into several separate patents. Many of the most valuable patents have been several times reissued and subdivided. Where a patent is infringed and the claims are doubtful or defective, it is common to apply for a Reissue with new claims which shall specially meet the infringers.

On making application for Reissue, the old or original patent must be surrendered to the Patent Office, in order that a new patent may be issued in its place. If the original patent has been lost, a certified copy of the patent must be furnished, with affidavit as to the loss. To enable us to prepare a Reissue, the applicant should send to us the original patent, remit as stated, and give a clear statement of the points which he wishes to have corrected. We can then immediately proceed with the case. Address MUNN & CO., 37 Park Row, New York. We have had great experience in obtaining Reissues.

Other Information.—If you wish for *general information* as to the rules and law of Infringements, Reissues, Claims, etc., state your inquiries clearly, and remit $5. Opinions, in special cases of infringement, cost more.

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Preliminary Examination.—This consists of a *special search*, made at the U. S. Patent Office, Washington through the medium of our house in that city, to ascertain whether, among all the thousands of patents and models there stored, any invention can be found which is similar in character to that of the applicant. On the completion of this special search, we send a *written report* of the result to the party concerned, with suitable advice. Our charge for this service is $5.

If the device has been patented, the time and expense of constructing models, preparing documents, etc., will, in most cases, be saved by means of this search: if the invention has been in part patented, the applicant will be enabled to modify his claims and expectations accordingly.

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Infringements.—The general rule of law is, that the prior patentee is entitled to a broad interpretation of his claims. The scope of any patent is therefore governed by the inventions of prior date. To determine whether the use of a patent is an infringement of another, generally requires a most careful study of all analogous prior patents, and rejected applications. An opinion based upon such study requires for its preparation much time and labor.

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The expense of these examinations, with written opinion, varies from $25 to $100 or more, according to the labor involved.

When an application is found to conflict with a caveat, the caveator is allowed a period of three months within which to present an application, when an interference may be declared.

Upon the declaration of an interference, a day will be fixed for closing the testimony, and a further day fixed for the hearing of the cause. The arguments of counsel must be in the office on the day of hearing.

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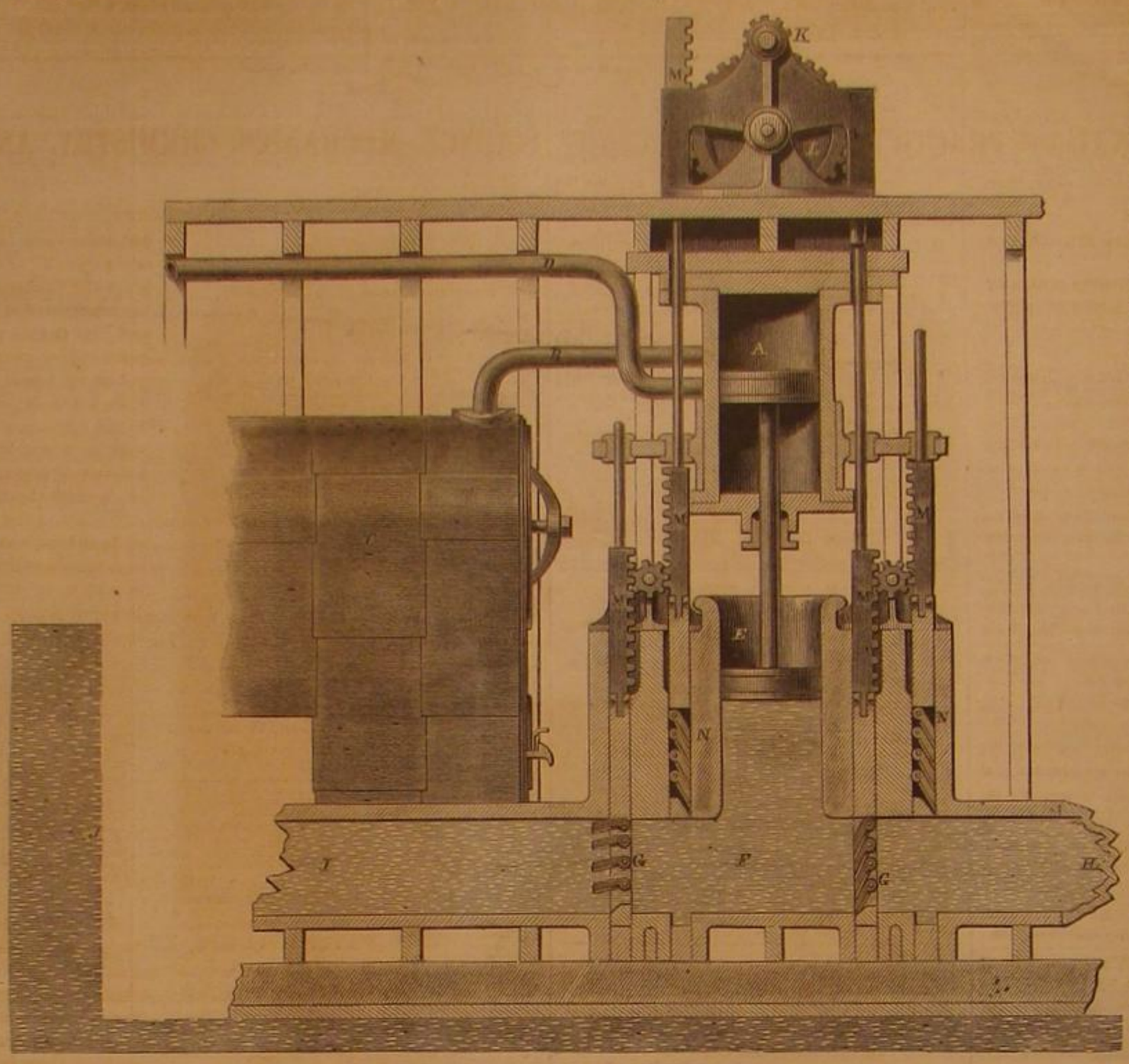
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The subject of propelling vessels by water has occupied the attention of inventors and mechanics from the time when Benjamin Franklin, then a boy, pumped himself across a mill pond astride a floating ship's pump to the trial of H. B. M. iron-clad *Watervitch*, which is propelled by a turbine driven by steam. No system of water propulsion has yet been tried which was without its serious objections, but it is possible a method may be devised which will present advantages for some vessels over that of the screw or paddle wheel. The engraving shows very plainly a plan which the inventor is sanguine possesses some excellent features that make it superior to others.

A description of the apparatus will aid in its comprehension. There are two cylinders placed one above the other in the same vertical line, each having a piston connected by a common rod. The upper cylinder, A, is an ordinary steam cylinder, fed with steam by the pipe, B, from the boiler, C, and exhausting through the pipe, D. The steam chest is not seen. A piston rod works through a stuffing box on the lower end of the cylinder and connects the piston in A, with that in the cylinder, E. This cylinder is open at the top, and at the bottom connects with the horizontal pipe, F, which, being of the same bore as the cylinder, may be considered a prolongation of it. The pipe, F, has gates or diaphragms which make water-tight partitions across its interior diameter. These are furnished on that portion corresponding with the bore of the pipe with hinged valves, G, which open and close automatically.

The intended operation is simple. If H represents that portion of the horizontal pipe nearest the bow of the vessel and I that portion nearest the stern, it will be seen that as the vessel moves, the current will open the valves which lift toward the water cylinder and the downward pressure of the pistons will force the column of water through those nearest I, at the same time closing the inlet valves. A jet is consequently forced against the water wall, J, sending the vessel ahead. If a reverse motion is required, the officer in charge, by revolving the pinion, K, by means of a hand wheel, puts in motion the large gear, L, and through the medium of the racks, M, and their engaging pinions, raises the valves, G, and lowers those marked N. These open in a contrary direction, giving consequently a reversed motion to the vessel, without either stopping or reversing the engine. The valves, G and N, are made multiple, to obviate the necessity of too great movement in opening or closing. The inventor believes that the objections to other plans from friction caused by changing the direction of the water column, and the unequal pressure on different parts of the apparatus will be obviated in this. Mechanics can easily understand the operation and merits of this apparatus. It is the subject of a patent procured through the Scientific American Patent Agency, for R. D. Chatterton, of Coburg, C. W., whom address for other particulars.



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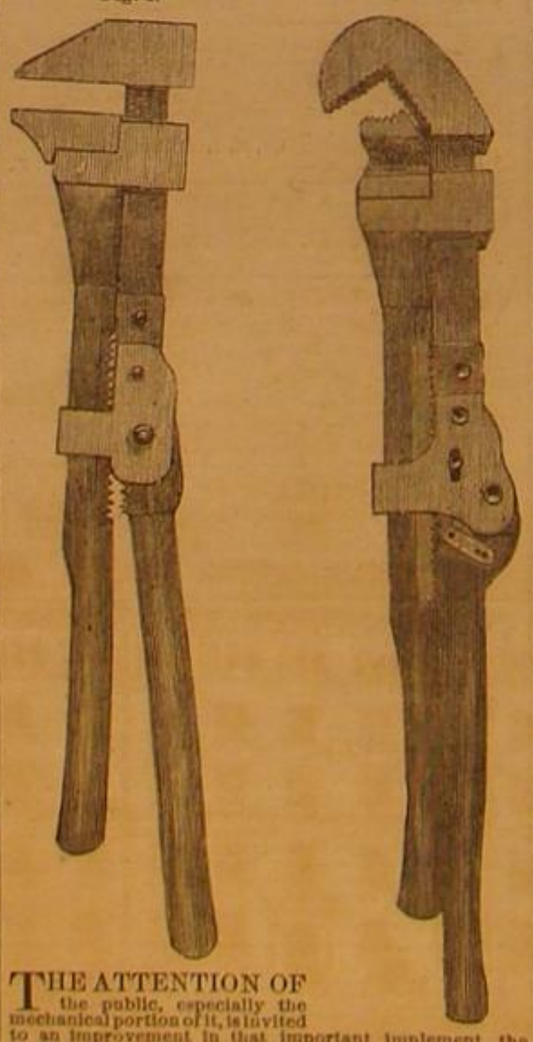
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Fig. 1. Fig. 2.



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The accompanying illustrations present the Improved Wrench in two forms, with detached portions of the same, which will afford an idea of the changes made in the instrument, and the advantages derived from them. The intent of the improvement is, so to construct and arrange the body of the Wrench as to enable it to receive adjuncts of various forms, changeable at pleasure, whereby various operations, regarding the use of the instrument, can be performed, thereby avoiding the necessity of a multiplicity of them, as is now the case with the old form of the Wrench. By the peculiar construction of this implement, in its modified form, parts are easily added or detached. Its several sections are so constructed and adjusted to each other as to give it entire and effective control over all forms of iron, whether round, square, or hexagonal. Its gripe is so perfect and tenacious as to render slipping impossible; hence it cannot fail of performing its office perfectly, on all occasions and under all circumstances.

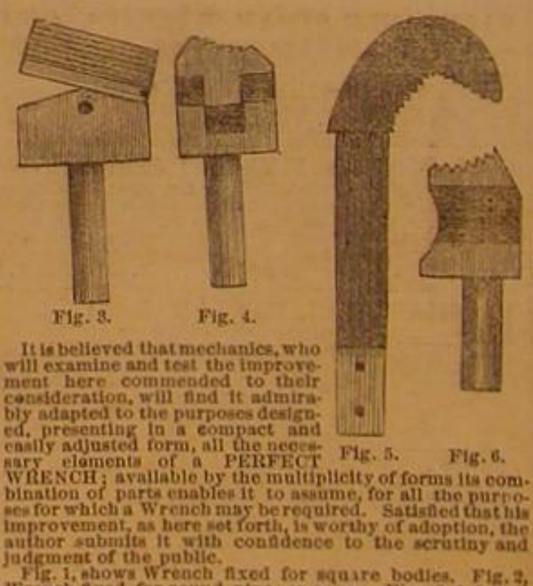


Fig. 3. Fig. 4. Fig. 5. Fig. 6.

It is believed that mechanics, who will examine and test the improvement here commended to their consideration, will find it admirably adapted to the purposes designed, presenting in a compact and easily adjusted form, all the necessary elements of a PERFECT WRENCH; available by the multiplicity of forms its combination of parts enables it to assume, for all the purposes for which a Wrench may be required. Satisfied that his improvement, as here set forth, is worthy of adoption, the author submits it with confidence to the scrutiny and judgment of the public.

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