SCIENTIFIC AMERICAN

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

Vol. XVI.---No. 11. [NEW SERIES.] NEW YORK, MARCH 16, 1867. $3 per Annum. [IN ADVANCE.]

The Pneumatic Sub-aqueous Tube.

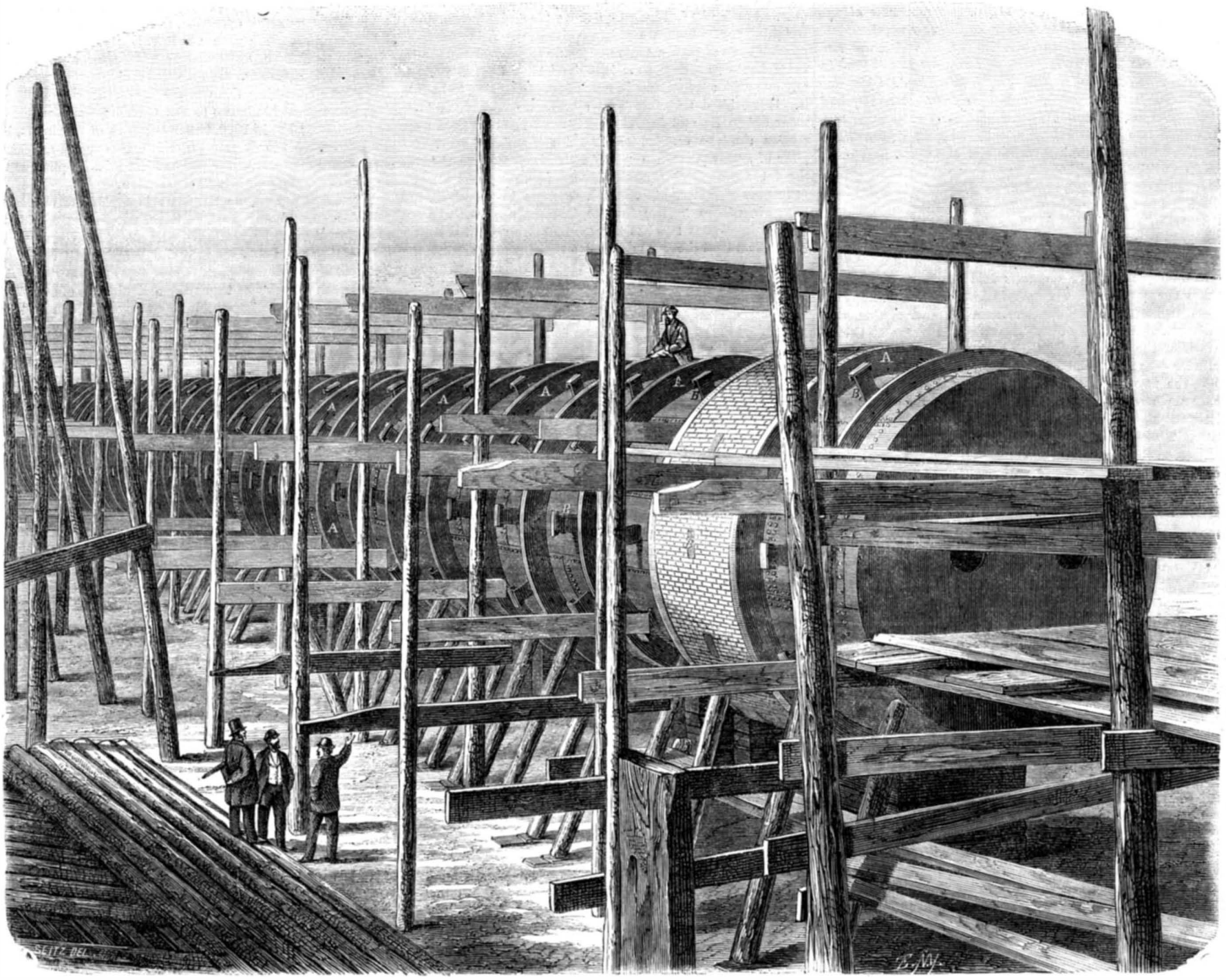
Much interest is manifested by the people generally, as well as by business men particularly, in the subject of additional means of intercommunication between different portions of the metropolis; and several plans are now before a legislative committee at Albany to accomplish this result. The engraving, 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 1,882 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.

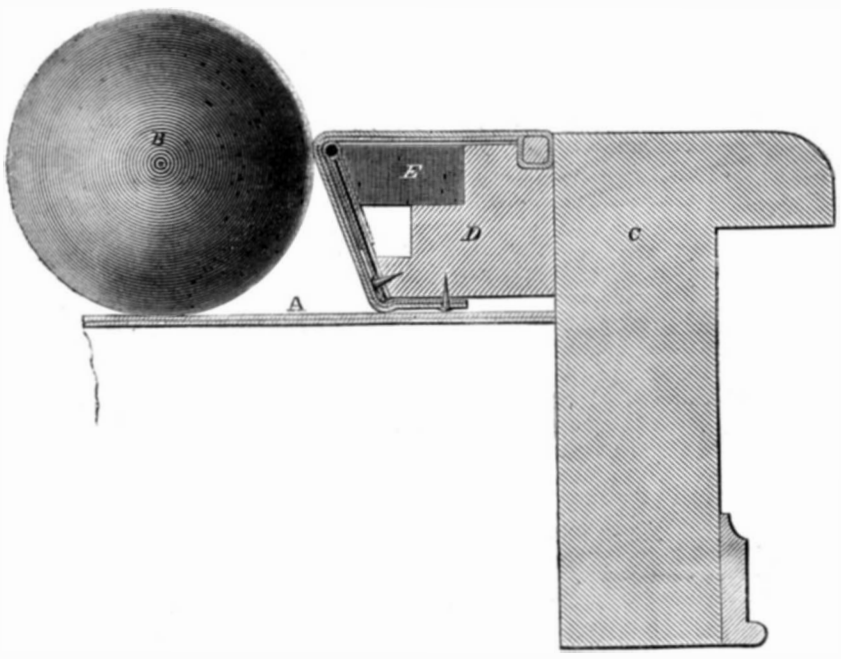
MISCELLANEOUS.—A company, with a capital of $50,000 has been organized at Springfield, for the manufacture of "repeating lights." The igniting composition is placed at regular intervals on a piece of tape, saturated with stearine. The tape is cut into yard lengths, and coiled inside a case; and by simple 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 821,250,000 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 46,221,499.

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 ramming 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.

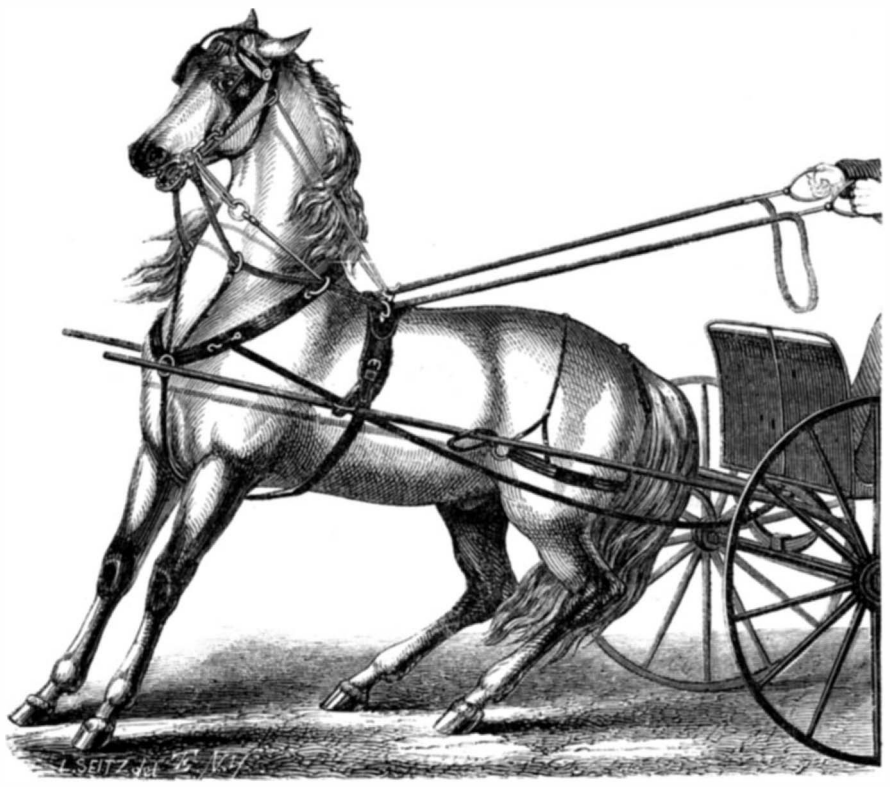
A New Explosive Compound, introduced by Mr. Peter Griess, according to one of our foreign exchanges, explodes with great violence, far surpassing that of fulminating silver, at less than 100° centigrade, and also by friction, pressure or concussion. Iron plates several lines (twelfths of an inch) in 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.

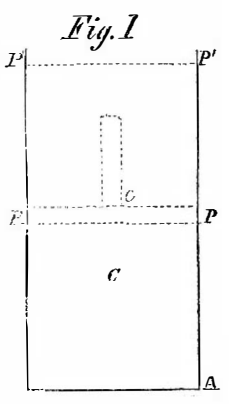
Prepared for the Scientific American.

[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.

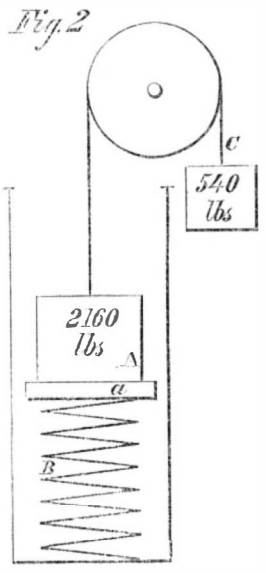
In order to prove this, and find what the amount of work performed really is, suppose the piston, *e*, Fig. 1, is elevated by the application of outside force, and without applying heat; then the force necessary to raise the piston, *e*, one foot, from P to P′, will be 540 foot pounds, and not 2,160 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 CHRLNOMETER.—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 138.)

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 30 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 OF SURFACES FOR PRINTING, STEREOTYPING, AND ELECTROTYPING.—Jamas 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 HAIR.—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 lock 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 the ir 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. Noples & 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 commu. nications on the subject should be addressed. Patent pending through the Scientific American Patent Agency.

Fig. 1.

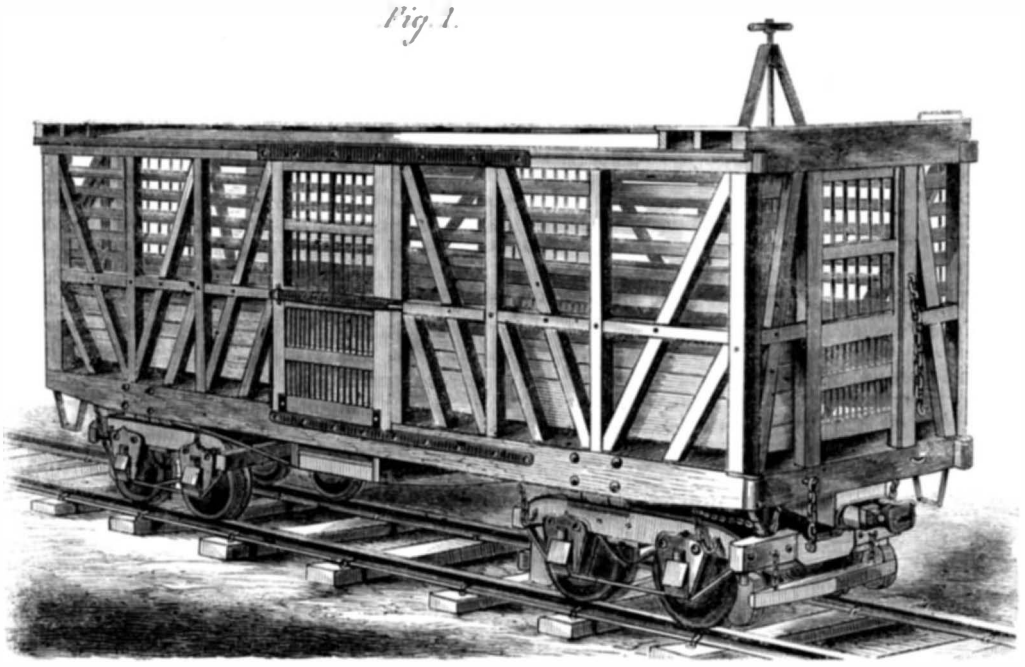


Fig. 2.

HARROP'S DRAW BARS FOR CARS.

Chemical Novelties.

At the February meeting of the Massachusetts Institute of Technology Mr. Fleury, of New York, explained the patented process of M. Rene 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.

Fig. 1

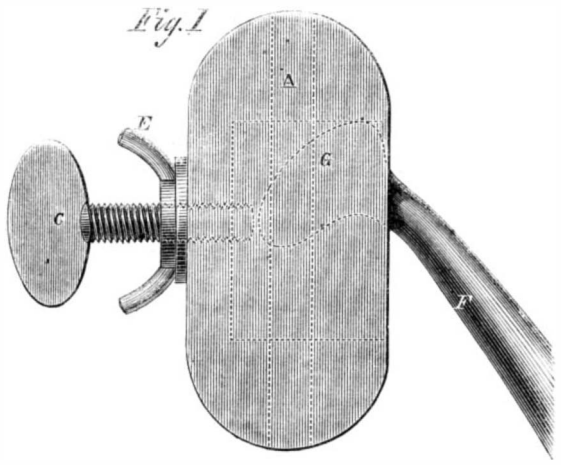
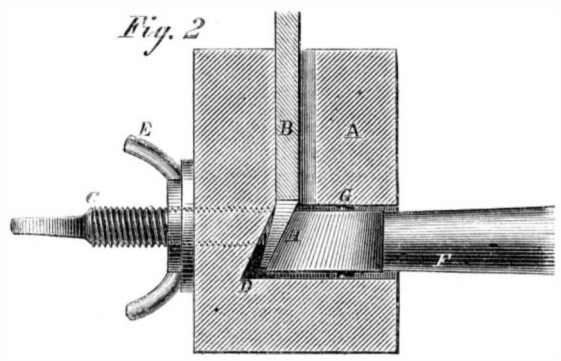


Fig. 2



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.

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.

SCIENTIFIC AMERICAN.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES. A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York

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VOL. XVI., No. 11....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, MARCH 16, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

CAUTION.

It has become necessary for us to state very distinctly that the 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, 22 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.

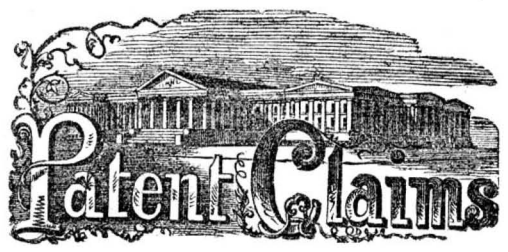
During the trip the consumption of coal was but eighty-one tuns, less than three tuns per hour, and during the most of the time she was blowing off. This shows her tremendous powers for generating steam. Although the top of her smoke stack is but a comparatively short distance above her spar deck, it 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 d'Italia* and *Re Don Portogallo*, 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 or 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
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On appeal to Commissioner of Patents	$20
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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.

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 generators, 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, e, 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 e, D, and damper, G, the series of flues, a, the series of flues, b, the connections, e, 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 e, 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 I, 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 o, 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, e, 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 J 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, i i, 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 joined 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, i i', 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 l, 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 tie 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 forth.

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 pring, 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 purpose 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 scorer, 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, 1, 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, 3, 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. Goslihg, 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, I, 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, e and e2, 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 plate 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, i, 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, H, 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 i, 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, e, 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 SIRUP.—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 substantially 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'', stem 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, h, 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 lug, 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 laterally 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, e, 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 iodique 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 with or without the uptake flue, n.

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, a, with an opening through which to fill the lamp, in combination with the rods, c, 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.

68.—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 121st 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 reissne.

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.

Reissued patents expire at the same time that the original patent would have done. For this reason, applications for reissue will be acted upon immediately after they are completed.

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.

If you wish for advice in regard to assignments, or upon the rights of parties under assignments, joint ownership in patents, contracts, or licenses, state the points clearly upon which information is wanted, and remit $5.

If you desire to know in whose name the title to a Patent is officially recorded, at Washington; or if you wish for an abstract of all the deeds of transfer connected with a Patent, send us the name of the patentee, date of patent, etc., and remit $5.

If you desire a sketch from the drawings of any Patent, and a description from the specification, give the patentee's name, date of the patent, and remit $5.

If you desire to have an assignment of a Patent, or any share thereof, or a license, made out in the proper manner, and placed on record, give us the full names of the parties, residences title of the invention, etc., and remit $5. This includes record fee.

Inventions or shares thereof may be assigned either before or after the grant of a patent. Agreements and contracts in regard to inventions need to be recorded, like assignments, at Washington. For any agreement or contract that you wish prepared, remit $5.

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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.

Parties desiring the Preliminary Examination are requested to remit the fee ($5), and furnish us with a sketch or photograph, and a brief description of the invention.

Where examination is wanted upon more than one invention, $5 for each must be sent, as each device requires a separate, careful search. Address MUNN & CO., 37 Park Row, New York.

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.

Having access to all the patents, models, public records, drawings, and other documents pertaining to the Patent Office, we are prepared to make examinations, and give opinions upon all infringement questions, advice as to the scope and ground covered by patents, and direct with vigor any legal proceedings therewith connected. Address MUNN & CO., 37 Park Row, N. Y.

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.

If either party wishes a postponement, either of the day for closing the testimony, or of the day of hearing, he must, before the day he thus seeks to postpone is past, show by affidavit, a sufficient reason for such postponement.

The management of Interferences is one of the most important duties in connection with Patent-Office business. Our terms for attention to Interferences are moderate, and dependent upon the time required. Address all letters to MUNN & CO., No. 37 Park Row, New York.

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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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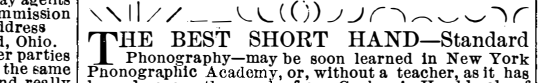

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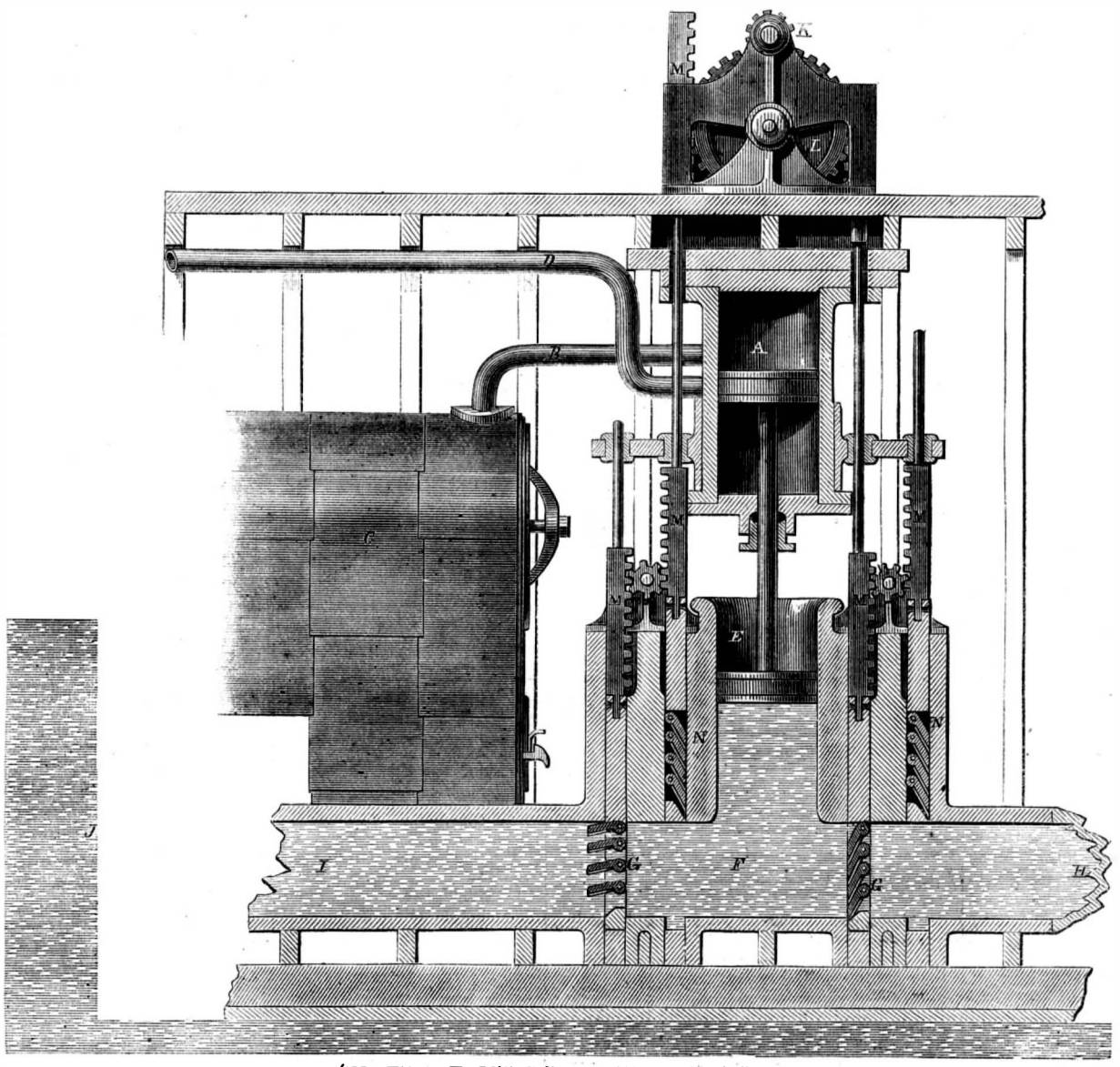

CHATTERTON'S HYDRO-PROPELLER.

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.

How the Initial Velocity of Shot Is Measured.—The discharged ball passes through two open frames, one near the gun and one forty feet distant, each strung with fine copper wires connected with a galvanic battery, and so arranged that the cutting of the wires in the first frame by the ball, sets in motion an electric clock, and the cutting of those in the second stops it. The dial is so minutely graduated as to show just how many thousandths of a second are occupied by the ball in passing the forty feet between the two frames.

Power will drive the heaviest machinery, but a lubricator is cheaper and, in many cases, as effective.