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Improved Turbine.

The employment of turbine wheels seems to be on the increase, and numbers of manufacturers are investigating the merits of the several kinds brought before the public with the view of adopting those which yield the largest percentage of the water power. For factories of all kinds, and in places where steady power is required, turbines are fast superseding breast and over-shot wheels. The engravings here published (Figs. 1 and 2) represent a turbine wheel of peculiar construction. The wheel itself, shown isolated in Fig. 2, gives a clear idea of the conformation of the buckets—the principal feature—and the case broken out discloses the wheel as it stands when in use. The advantages of it are thus set forth by the inventor :—

Fig. 1

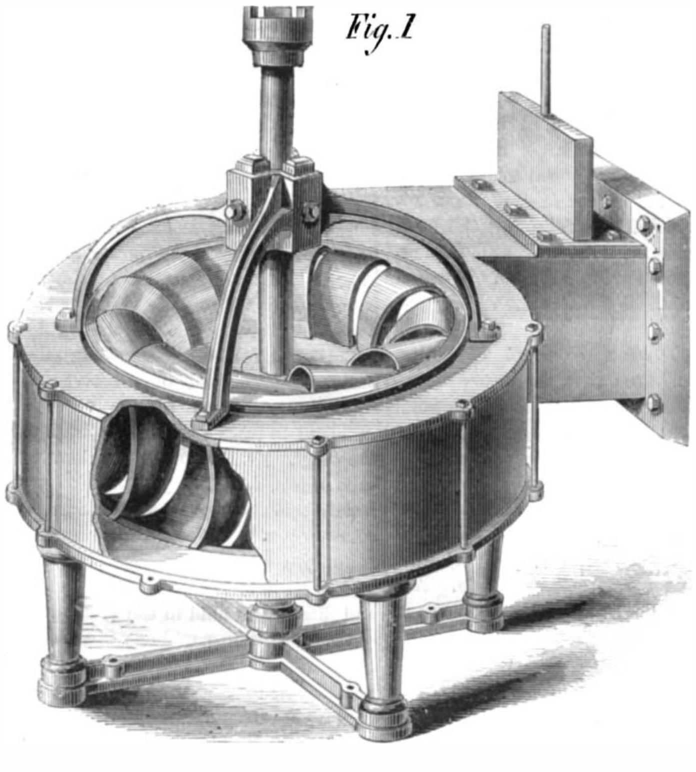
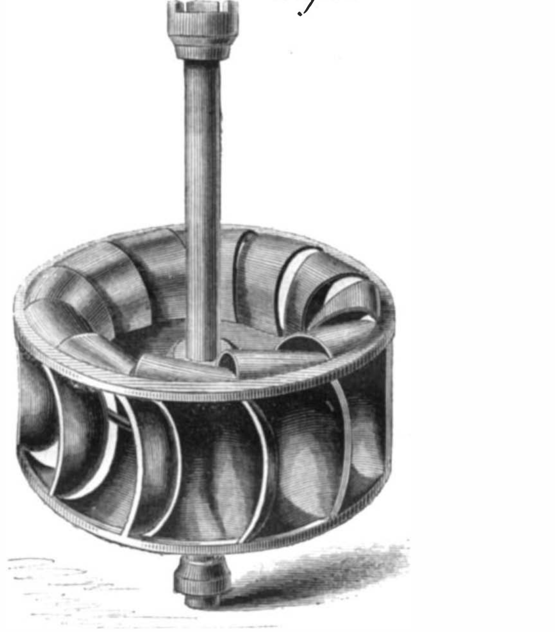


Fig. 2.



GALLAGHER'S TURBINE.

"One of the principal advantages of this turbine is the construction of the buckets, as plainly seen in the engraving, which, being the most important part of the whole machinery for the water to act upon, are prominently shown. In order to gain more power with the same quantity of water used in other turbines, and more fall or head of water, the friction must be reduced and the pit made deeper. To obtain a wheel of the class specified, the buckets must be so constructed that they will admit of the water being discharged immediately after it has acted upon or against the bucket, and without coming in contact with any part of the wheel which would detract from the effect or power of water obtained by its first impact with the buckets.

"This cheap and economical wheel can be put in the place of another wheel of its class in the same scroll or case without any trouble."

This invention was patented through the Scientific American Patent Agency on the 23d of September, 1862, by H. N. Gallagher. For further information address Messrs. Fuller & Lafely, manufacturers, Cohoes, N. Y.

A New French Steamer.

It seems that even in these days of engineering progress there are firms who build side-lever engines. A new French vessel built in Scotland has just received a pair of the dimensions stated below:—The *Europe* is 3,400 tuns B. M., and a sister ship to the *Washington* and *Lafayette*, at present plying between New York and Havre. The machinery of the *Europe*, like her sister ships, was made by the Greenock Foundery Company. The engines are side-levers of 800 nominal horse-power. The diameter of the cylinders is $94\frac{1}{2}$ inches, with a stroke of 108 inches. The levers are 24 feet long, and 7 feet broad at the center. The paddles are $37\frac{1}{2}$ feet in diameter. The fact that the start of these three vessels' engines was so successful, and that no after alterations had to be made on them, reflects credit on the engineering department of the company. The boilers of the *Europe* are six in number; four of them are for working the engine, the other two are donkey boilers. The four large boilers weigh, when empty, 60 tuns each. They are 22 feet long, 14 feet high, and 12 feet broad. The four boilers have collectively 1,131 brass tubes, each 7 feet long and 3 inches in diameter. They are fired by 24 furnaces, each 10 feet long.

How the Elswick, Eng., Colliery is Ventilated.

The *London Mining Journal* has the following: —"The ventilator is upon the principle of an exhausting fan; it consists of eight vanes, each of which is formed of $1\frac{1}{4}$ in. oak cleading, secured by bolts to a pair of bars and angle irons, which are bolted to two cast-iron octagonal bosses, keyed on the main shaft, and interlaced, as shown in an accompanying drawing, forming a very firm structure, at the same time simple and inexpensive, admitting of a speed of as much as 150 or 200 revolutions per minute without danger.

"The outside diameter of the vanes is 23 feet, the width 6 feet 6·75 inches, and each vane extends about 8 feet into the interior of the fan, being inclined at an angle of 67·5° to a radial line through the apex of the octagonal boss. The main shaft is driven by a vertical direct-acting engine-cylinder, $23\frac{5}{8}$ in. internal diameter, 19 11-16 in. stroke, worked high-pressure. A wall is built on each side of the fan, giving about 1 in. clearance to the side of the vanes.

Outside of one wall the engine is fixed, and in the other an inlet orifice of proper size is left—in the Elswick arrangement 10 feet diameter, such inlet being connected with the upcast-shaft.

"An arch is carried over the face, giving about 2 in. clearance to the vanes, and in continuation of this arch an invert to a point about one-eighth of the circumference below the center line, at which point the 2-in. clearance is increased gradually, expanding the lower curve of the casting till it ends in the sloping side of a chimney formed between the continuation of the side walls of the fan. A sliding shutter is fitted into cast-iron grooved rails for about one-fifth of the circumference, which enables the concentric circle of the top arch to be completed nearly round the fan—that is, giving the 2-in. clearance to the vanes. This shutter is worked by a chain passing over sheaves at the top of the chimney and to the outside. For convenience a man-hole door is left at the foot of the sloping side of the chimney. The fan being set in motion, the air is drawn through the inlet from the mine, and discharged below the shutter into the chimney, from the top of which it is seen to issue at no great velocity. This system, called from the inventor the Guibal Ventilator, possesses important advantages over other machine ventilators —1. In the simplicity of construction;—2. In the arrangements for covering in of the fan;—and 3. In the shutter chimney. Experimental trials, however, are necessary to determine the best size of outlet for any particular mine. The fan at Elswick was constructed specially for the circulation of 50,000 cubic feet of air per minute, with a water-gage of 1·5 in., which is guaranteed to yield at 60 revolutions; and the generally satisfactory working of the ventilator has been established."

CAPILLARITY.

When your cup of tea is all gone but a spoonful, rest your hand upon the edge of the cup and gradually lower your spoon till the point just touches the surface of the liquid. You will see the bits of leaves floating in the fluid immediately dart toward the spoon, converging from all directions.

Again, take two plates of glass, bring the vertical edges on one side in contact, and separate the two opposite edges by a thin wedge; then place the lower edges of the glass plates in a shallow pan of water. You will see the liquid rise up between the plates, ascending the highest where the edges are nearest together. The hight of the column will be inversely as its distance from the angle of contact between the plates, and the surface will consequently describe a hyperbolic curve.

The following facts in relation to capillarity are stated by Professor Miller :—

"The elevation of the column of liquid in tubes of equal diameter varies with the nature of the liquid, the variation depending partly on the difference of cohesion between the particles of the liquid, partly upon the difference of adhesion between the liquid and the glass. In consequence of the decrease of both these forces by heat, the hight of the column diminishes as the temperature rises.

"In liquids, such as mercury, where the force of cohesion preponderates over their tendency to adhere to the sides of the tube, the capillary action is reversed; the surface becomes convex instead of concave, and the hight of the column within the tube is depressed below the general level. In a mass of liquid, each particle is maintained in its place by the mutual attraction of all the surrounding ones; but if a column be isolated from the mass of liquid by the interposition of the walls of the tube, the sides of which exert little or no equivalent adhesive force, the cohesion of the mass below draws down the upper particles, and produces a depression of the column. This depression of mercury in glass renders a certain correction necessary in reading off the hight of the mercurial column in the barometer, which always stand a little lower than the elevation due to the atmospheric pressure. The narrower the bore of the tube the greater is the depression. Experiment has shown that this capillary depression is nearly one-half less in tubes that have had the mercury boiled within them, than in unboiled tubes, as the process of boiling expels the film of air, which adheres to the glass in unboiled tubes. By employing a tube of $\frac{3}{4}$ or $\frac{1}{2}$ an inch in the bore, this correction becomes so trifling that it may be neglected. In a tube of $\frac{1}{4}$ of an inch in diameter, in which the mercury had been boiled, the depression is 0·02 inch, while with a similar tube of $\frac{1}{2}$ an inch in diameter it is only 0·003. The capillary depression of mercury is slightly increased by elevation of temperature.

"Capillary action plays an important part in the operations of nature, and in a variety of ways has been rendered subservient to the wants of man. A familiar illustration of its employment is seen in the wicks of lamps and candles, which, being composed of a bundle of fibrous materials, furnish hair-like channels by which the oil or melted combustible is elevated to the flame, and supplied as fast as it is consumed. Capillary action influences the circulation of the liquids in the porous tissues of organized beings, and it is the principal mode in which water, with the various substances which it holds in solution, is supplied to the roots of growing plants. By its means, during the droughts of summer, fresh supplies of moisture are raised towards the surface, for the maintainance of vegetable life; and in the same way, when during winter the surface is hard bound by a long dry frost, water is constantly finding its way from beneath, is solidified upon the surface, and remains stored up until a thaw ensues; when this occurs, the accumulated moisture mellows the soil and produces the well known soft and plashy state of the ground which follows long-continued frosts, and which extends deeper, the longer the duration of the freezing temperature, although neither snow nor rain may have fallen. Few persons are aware of the immense force which may be developed by capillary action; if a plug of dried wood be fitted into a strong glass tube, and the end of the plug be immersed in water, the wood becomes swelled by the imbibition of liquid owing to capillary action, and the tube is split. In some parts of Germany this force is turned to account in splitting millstones from the rock: holes are bored into its substance in the direction in which it is to be split, and into these holes wedges of dry wood are driven tightly; when exposed to moisture they swell, and large blocks of stone are thus detached with little labor or expense.

"As adhesion takes place solely between the surface of bodies, it is evident that any circumstance which increases the extent of that surface must materially facilitate the exertion of this force. Minute subdivision, by thus increasing the extent of surface, greatly exalts the effect of adhesion:—for example, a cube of 1 inch in the side exposes a surface of 6 square inches, i. e., there is a square inch upon each of its six faces; if this cube be subdivided into a number of smaller cubes, each of which is only $\frac{1}{1000}$ of an inch in the side, it would furnish 1,000,000,000 of these minute cubes. Now as each little cube has 6 sides, the surface which it will expose is $\frac{6}{1000000}$ of a square inch, 1,000,000 of them will expose 6 square inches; that is, as much surface as a solid cube of an inch in the side; the 1,000,000,000 cubes will consequently expose 1000 times as great a surface, or upwards of 41·7 square feet. The force of adhesion, therefore, by such subdivision, should be increased somewhat in this proportion.

"The influence of this kind of subdivision in exalting the effect of adhesion is strikingly exhibited in the case of charcoal. The structure of the wood from which the charcoal is procured is cellular: when heated in vessels from which air is excluded, the volatile constituents of the wood are expelled; and the charcoal, which does not fuse, remains behind in a very porous condition, retaining the form of the wood which furnished it. Mitscherlich calculates that the cells of which a cubic inch of box-wood is formed expose a surface of not less than 73 square feet.

"Adhesion occurs between charcoal and other bodies with degrees of force that vary very much. For the coloring matters of vegetable and animal origin this adhesion is extremely energetic; so that if these bodies be dissolved in any liquid and agitated with charcoal, nearly the whole of the coloring matter will be retained by the charcoal, and on separating the latter by filtration, the liquid will run through colorless. Ordinary vinegar, and port wine may thus be obtained in a colorless condition. Advantage is taken of this fact in the refining of sugar, in which process the sirups are deprived of color by filtration through a column of charcoal twelve or thirteen feet in thickness. The species of charcoal which is most extensively employed for this purpose is that obtained by burning bones in closed vessels; and it is hence termed *bone black* or *ivory black*, or frequently *animal charcoal*. The charcoal is in this case in a state of extreme subdivision; it does not constitute above a tenth or a twelfth of the weight of the mass; the remainder consists of earthy matters, chiefly phosphate and carbonate of calcium. When bone black has been used for filtering liquids, and has ceased to take up any more coloring matter, it is thrown aside and allowed to ferment; if then it be well washed and re-burned, it may be used again with nearly equal effect. Other animal matters, especially dried blood, furnish, when calcined and well washed, a charcoal which is still more efficacious. The addition of carbonate of potassium to the mass before calcination, still further increases the discolorizing power.

Steam in France.

The Government of France has just issued a decree materially altering the regulations laid down in 1843. These were not in accordance with the growth of machinery and trade, and very irksome to those against whom they operated. In 1850 there were but 6,832 steam engines in all France; in 1863 there were 22,516, representing a force of 617,890 horse power, or nearly that of two millions of horses in reality, and which is set down as more than the force of all the men in the kingdom capable of labor. Under such circumstances, and the greatly extended practice and increased knowledge of engine-makers, the old regulations had become quite inapplicable. The new decree greatly simplifies the legislation on the subject. The testing of the various parts of the machinery officially, till now imperative, has been done away with, except as regards the boiler, which will, in future, have to be proved up to twice the effective pressure of the steam. Steam engines are to be no longer regarded as dangerous machines, and may henceforth be set up without authority from the Government officers and without any other form than a declaration of the fact. Boilers are, as heretofore, divided into three classes, according to their capacity and the pressure to be employed; the regulations concerning the first class are greatly simplified, those of the second class may be set up in any factory or workshop not connected with the dwelling houses of other parties than the proprietor, his family and workpeople, and the least dangerous class may be introduced even into houses occupied by any number of separate families; and even with regard to other cases, the consent of the neighbors is sufficient to set aside the regulations. Another important provision of the new law is, that all steam boilers shall consume their own smoke, six months grace being, however, allowed for the necessary arrangements to be made. There are other clauses well worthy the attention of governments and sanitary boards.

The Thames Embankment.

The works next to Westminster Bridge are those which attract the greatest amount of public attention, for there everything can be watched from the pumping out of water to the puddling in of clay between the timbers of the coffer-dam, and here, also, can be seen the whole plan of struts and cross timbers which enables the iron caissons to keep out the whole flood of the Thames for a depth of 40 feet above them, and resist a pressure of no less than 120 tuns on each caisson. The caissons are elliptical tubes of wrought iron rings or belts, each ring or belt being 12 feet long by 7 feet wide and 4 feet deep, with a flange or edge that admits of the rings being bolted one to another. Three or four of these rings are bolted together and sunk between guiding piles to their proper position in the bed of the river, then others are similarly added on till the hight of the whole is sufficient to raise them above high water mark, and the weight of the whole is sufficient to sink the hollow tube of iron which they form through the soft mud on which they rest and keep them water-tight from below. When this result has been attained the water is pumped out and the tube gradually weighted with iron to force it lower till it has reached a fair depth, and has a firm hold in the ground, when the agency of the pneumatic machinery is called into play. After the workmen have descended and dug out the gravel and shingle to a depth of some two or three feet below the lowest internal edges of the tube, a weight of sixty tuns of iron is placed upon it from the inside, with an air-tight iron cover, which closes in the top. Through an aperture in the top of this cover the air is forced in by steam power till it has reached a pressure of 8 lbs. to the inch—a pressure which dilates the tube more than half an inch, when the air is suddenly released, and the cylinder as suddenly contracts and sinks through the earth which it has itself enlarged to a depth of two or three feet lower. This process has to be repeated over and over again till all the superincumbent mud and silt and gravel has been penetrated, and that mysterious geological compound, like heavy, brown plaster of Paris, though hard as marble, and known by the name of the London clay, has been reached, when no effort of modern engineering can contrive to get anything much further. The presence of this London clay on the banks of the Thames varies in an almost unaccountable degree. In some cases it crops up close under the mud; in others it can only be found after a laborious penetration of 40 feet below it. Thus one caisson may only penetrate 10 feet below the surface, and its next neighbor may have to go to the depth of 40 feet or 45 feet. Once, however, that it is reached the sinking of the caissons stops, they are merely filled up to the level of low-water mark with solid concrete. The lower parts of these iron banks are never to be removed. The upper parts, which now shut out the Thames at Westminster, will, of course, be taken away, as the wall of the real embankment is built behind them. To take this part as exemplifying the process of construction, we have here a length of 240 feet of iron caissons towards the river, shut in by a cross dam near Montague House, which reaches back from the caissons to the shore, so as to enclose a water-tight space of nearly an acre and a quarter. From this place the water has been pumped and the mud flushed out, and here in this space next week the labor of building the embankment proper will begin. The first operation will be to clear out all the shingle and gravel to a depth of 14 feet behind the caissons, or more than 40 feet below high-water mark, additional and still more powerful timber supports being added to the caissons as the men get lower down beneath the river, and the pressure of the great mass of water overhead increases. This somewhat hazardous work will be done in short sections at a time, and as fast as the required depth is reached—that is to say, on a level with the concrete with which the caissons are half filled—the excavation will cease, and the space is then to be filled up rapidly with solid concrete. On this will be laid the brickwork, and over all, the river face, the solid blocks of granite, which are to rise in a massive wall to a hight of 30 feet above the river. It may give a good rough general idea of the gigantic proportions of this work if we merely mention the quantities with which Mr. Furness, the contractor for the first portion only, from Westminster to Waterloo Bridge, has to deal. First, then, 71,000 cartloads of earth have to be excavated, and 60,000 cartloads of concrete have to be "tipped in," 4,000 rods, or nearly 70,000 tuns, of brickwork have to be laid and faced with 30,000 tuns of granite, and the whole has afterwards to be filled up behind with 400,000 cartloads of earth. To those who are now so often blocked up in the Strand by the long, slow-moving, dismal string of carts laden with earth for the embankment it will be sorry tidings to hear that at the least 200,000 more cartloads have yet to pass that way. We fear however, that the nuisance is unavoidable. For the present, therefore, we fear that an abatement of this nuisance, however ardently to be desired, is not yet to be looked for. Another section of the embankment besides that we have mentioned, and which Mr. Furness is hurrying forward with the utmost possible speed, is that between Montague House and Hungerford, where the steam pile-drivers are busy every minute of the day. This section is composed entirely of wood. The coffer-dam is formed of wooden piles in two rows 7ft. apart, and driven through the shingle as close as they can be got together. The interval between the first and second row is then "puddled" in the usual manner with stiff clay till it is water-tight, when the water is pumped out, the coffer-dam strengthened with struts, as in the case of the iron caissons, and the work of excavation, filling in concrete, and, finally, building will go on as behind those we have already mentioned. Altogether, no less than 1,300 feet out of the 2,000 feet of the first section to Waterloo Bridge have been dammed in with piles or caissons, and this length will be subdivided by nine cross sections leading backwards, so as to render the work of pumping and subsequently building as easy as possible. The length, however, already inclosed towards the river, and over which the water now flows behind the coffer-dam only on sufferance, is very great, and will, when the Thames is entirely shut out, give a space of nearly eleven acres reclaimed from an unsightly, muddy, foreshore into one of the noblest, and the most needed, thoroughfares in Europe.—*Times.*

A Canal with a Leaky Bottom.

The London *Engineer* says:—

"An unexplained accident happened at Soho, near to Birmingham, on Wednesday evening, which for some time occasioned considerable alarm to the owners of property there and to the authorities of the Great Western Railway. That line between the Soho and the Hackley station runs under a tunnel, 100 yards long, of an arm, about a quarter of a mile in length, of the Birmingham canal. At about 5 o'clock in the afternoon the driver of a train saw some water running through the tunnel on to the line. Soon a stream of water poured out, and a channel was cut by a number of workmen through the embankment on which the station is built, so that the water might run off into some waste ground. The stream, however, increased in volume, and sweeping through this opening carried with it many tuns of the embankment. Subsequently it threw down about one hundred yards of the substantia stone wall which bounds the line from the Park road, and rushing on to the road tore up the roadway and inundated much property. The water seems to have percolated through the bottom of the canal under the wall of the towing path and the roadway beyond, a width of about twenty-six yards, and then found its way out principally at the bottom of the wall on the down line. As the water poured down it carried with it the whole of the sand that had formed the covering of the tunnel, and broke down the solid brickwork (about eight feet wide) which formed the towing path. This fell in masses on the roof of the tunnel, which, although bared by the water, withstood the pressure, and the roof remains quite solid."

Steam on Common Roads.

Between traction engines and pleasure carriages driven by steam on common roads there is a very wide difference, and those who have the greatest good of the greatest number at heart will continue to urge the claims of the former class over the latter. The London *Engineer* in a leading editorial, headed "Steam on Highways," very properly condemns high speed pleasure carriages in the following language:—

"It is to the last degree unlikely that any practical advantage whatever could follow on the general introduction of high speed road locomotives, and up to the present moment every exertion to produce such machines represents but so much mechanical skill wasted which might have borne good fruit if devoted to a better purpose. The advocates of the traction engine should now more than ever be careful to avoid giving even the semblance of offense; and we know of nothing garbed with a thin vail of science so offensive to the tastes and likings of those who use our highways as 'experimental trips' as they are grandiloquently termed, with machines whose only merit consists in running on crowded roads at a pace too fast to serve any good or useful end. Legislation under such circumstances becomes a necessity. We can hardly feel much surprise that it is very sweeping and indiscriminate."

Hot Ashes.

Fire-Marshal Blackburn, of Philadelphia, in his annual report, thus speaks of the danger from hot ashes:—

"Next to that strange and mysterious process of nature, chemical action, in the production of fires, the most insidious agent is hot ashes. They will retain heat for weeks, and start combustion at the moment least anticipated. Neither an ash box nor an ash barrel is ever safe an instant on one's premises, especially if placed on a wooden floor or against a frame wall or board partition. I have been actually amazed in witnessing the carelessness exhibited by people in getting rid of their ashes, and this, sometimes, too, in places, such, for instance, as large storehouses filled with stocks of goods of great value, important manufactories, depots, etc., where I had a right to expect better things of the good sense and forethought of the proprietors, or other persons in charge of them. I am convinced that many of the fires, the commencement of which is wrapped in mystery, come from depositing heated ashes in wooden vessels.

"The owners of dwellings and other buildings in which fire is required, should be compelled to construct bins of brick, stone, or other incombustible material, in their cellars, for the deposit of ashes which the occupants ought to be obliged to have removed, whenever necessary, at their own expense, and all ash carts employed for the purpose should be covered. This would soon diminish fires, and the abominable arrangements we now have for ridding our residences, counting-houses and workshops of ashes would no more annoy us, or mar the beauty and cleanliness of our metropolis.

"Another treacherous promotor of combustion is a cigar stump that has retained fire, thrown into a wooden spittoon containing sawdust, or allowed to smolder among the same ignitable material in a stove box made of boards. I have had some remarkable cases of burning from this cause. It spit-boxes of wood must be used, they should be filled with sand as an absorbent instead of sawdust. But when iron and earthen spittoons are so plenty, and can be bought so cheaply, I can see neither wisdom nor economy in having the wooden utensil in any one's place. As for stove boxes in bar rooms, and other places where there is much smoking, where sand to fill them can be had so readily, there is certainly no excuse for the use of sawdust."

Hydraulic Coal-Cutting Machine.

This machine is intended to take the place of manual labor in "nicking" or "kirving," or as it is termed in Yorkshire, "baring" the coal. It is now regularly at work in the Kippax Colliery, near Leeds, where it has been in successful operation for some months. The only portion of the seam removed by it at the Kippax Colliery is a band of shale, which is also the usual place for baring by hand labor; no portion of the seam is, therefore, reduced to small coal by its action. The direction of the workings is toward the rise. While the machine proceeds with the baring, completing the work at once going over, square pieces of wood and wedges are inserted loosely into the baring, at intervals of four or five feet, to keep the coal in position till the colliers come to remove it. This slight support does not, however, prevent the coal so bared from detaching itself from the unbared part of the bed; the line of fracture being a few inches beyond the extremity or back of the baring, and in one even straight line. The quantity of coal obtained for every yard face is about two tons, and the yield of small coal produced by the breaking up the detached coal and the bottom coal about 6 per cent. Water is the force employed to work this machine, and being for all actual purposes incompressible, it exerts its full power, allowing for the friction in its passage through the pipes, even when transmitted from great distances. This self-acting apparatus consists of an hydraulic reciprocating engine working horizontally, or at any angle to suit the inclination of the coal-seam, or at any required hight above the floor. The piston rod is a hollow trunk or ram, into which is fitted a cutter bar, easily removed, carrying three or more cutting tools. These tools can be adjusted so as to enter the coal at an angle with the line of the face; the actual length of the cutting stroke into the coal is 16 inches and, consequently, the three cutters conjointly give a total depth of four feet. The length of the cutting stroke can be varied according to circumstances. The cutting action of the tools being a steady push or thrust, without any percussion, it is necessary that the machine should be firmly held upon the rails during the cutting stroke, and be released so as to traverse forward at the end of the return or back stroke. This rigid fixing of the apparatus on the rails during the stroke is effected by means of a vertical self-acting holder, on which is a prolongation of the piston rod of another cylinder, mounted upon and becoming a part of the apparatus itself. The piston rod of this cylinder is actuated by means of the same self acting valvular motion as that of the cutting cylinder, and the "holder-on" retains its "grip" by means of a small keep-valve; which retains the water during the cutting stroke. At the return or back stroke, the valve motion opens the keep-valve and releases the water, thus enabling the holder-on to descend and to slacken its pressure against the roof, and thus the machine is free to traverse upon the rails the requisite distance for the next cut. The traversing or progressive motion is also self-acting. The results, as at present obtained, give an average rate of cutting of about ten yards on the face per hour, with a maximum under favorable conditions of thirteen yards. The amount of pressure required for working the machine varies from 150 to 300 lbs. per inch, according to the hardness of the metal.—*London Mining Journal.*

Pyroligneous Acid in Chimneys.

A correspondent of the Scientific American inquires whether there is any remedy for the condensation of moisture in a chimney, produced by burning wood in a close stove. The Scientific American knows no remedy and only comforts its correspondent with the assurance that the moisture is a solution of pyroligneous acid, and will destroy his chimney.

We beg the Scientific American to note and publish the following remedy, for which we have long been indebted to a first-rate practical mason. Pyroligenous acid is always formed in the burning of wood, as the pungency of wood-smoke, sufficiently shows. When wood is burned in open fire-places, the acid evolved has no noticeable effect on the mortar of the chimneys. Why not? Simply because it is largely diluted and rendered harmless by mixture with air. But where wood is burned in a stove with a checked draught, and the smoke-pipe enters a chimney with no other opening than at the top, the acid vapor collects and hangs in the chimney till it is condensed on the walls and destroys the mortar. The remedy is simply to make an opening into the chimney-flue somewhere below the entrance of the smoke-pipe—the lower the better, even if in a lower room. The air drawn through this opening will serve the double purpose of ventilating the room and of diluting and carrying off the acid vapor from the stove. If the chimney-draught is weak, it is well to have the opening into the flue controlled, so that it can be closed when there is need of draught to start the fire; but it should be opened again as soon as the fire will bear to be checked. Many years ago our good mason assured us that he had never known a flue injured where there was such an opening for the passage of air; and our experience since tends to confirm the fact.—*Waltham, (Mass.) Free Press.*

FARMERS' CLUB.

The Farmers' Club held its regular weekly meeting at its Room at the Cooper Institute, on Tuesday afternoon, March 7th, the President, N. C. Ely, Esq., in the chair.

EFFECT OF FREEZING FRUITS AND ROOTS.

Mr. Bergen remarked that turnips might be frozen and thawed without injury, but if the operation were repeated a number of times the root would be destroyed. The same is the case with the onion. But the potato is destroyed by a single freezing.

Mr. Carpenter disputed the statement in regard to the potato. If it is thawed gradually in the ground the freezing will not injure its germinating power.

Mr. Bergen said that the same statement was made in the Club a few years ago, and after that he found two fields of potatoes belonging to lazy farmers who did not finish their harvest before frost set in, and in both cases the tubers were utterly destroyed.

Mr. Carpenter still continued to contend for the correctness of his view of the matter. He said that he knew that it apples were frozen and then thawed suddenly in the air, they were ruined, but they might be frozen as solid as pebbles in tight barrels, and if they were left undisturbed to thaw in the barrels, no man could detect the least sign of their ever having been frozen.

SHORT LIFE OF THE PEACH.

Mr. Forest said that persons of the largest experience in the cultivation of the peach, had come to the conclusion that the best style of pruning, when the tree is transplanted, is to trim off all the side branches leaving the central trunk in the form of a whip-stock.

Mr. Carpenter remarked that the peach tree should always be transplanted at the age of one year from the bud. He also explained that the fruit of the peach grows on the wood of the previous year's growth, and hence the advantage of shortening-in, by cutting off one third or one-half of the new wood every year.

Mr. Quinn, of Newark, N. J., said that for the last six years he had set from 100 to 600 peach trees every year. He always sets the trees of one year's growth from the bud, and trims off all the side branches at the time of transplanting. The ground is well cultivated, the branches are shortened back every year one-third to one-half of the year's growth, and the trees are carefully examined every spring for worms; notwithstanding this care the trees invariably die at the age of four years.

Mr. Carpenter observed that this mortality is due to the borer, the worm which destroys ninety-nine of every hundred peach trees that are set out in this country. Were it not for this destructive pest we should have peaches in such abundance that we should feed them to the hogs, as was done forty years ago.

Several other subjects were discussed but we select the above for our columns.

HOLLY'S PEN RACK AND CALENDAR.

These engravings represent a neat and ornamental pen rack and inkstand combined with a perpetual calendar. The inventor says, concerning this affair, that the calendar consists of two independent cylinders of equal diameters, hung on a common axis. The circumference of one cylinder has upon it the days of the week; the other the dates of the month. The dates are arranged spirally, in such manner that when Fig. 1 is placed opposite to the day of the week on which any given month begins, the date of any day of that month will be found in the division opposite to that day. The spiral arrangement aids the eye in

Fig. 1

following the dates in regular succession, and relieves the calendar of the intricacy common to the several calendars hitherto in the market. The calendars can be readily used in combination with various articles. A few of the varieties are shown in the accompanying illustrations. Fig. 1 is a calendar in combination with a paper weight. The base of the paper-weight is perforated, and may be hung on the desk or wall if preferred. Fig. 2 is a calendar, pen rack and inkstand. Other sizes of pen racks are manufactured, and a sponge cup is also introduced in some of the varieties, with a pen rack. The calendars are

Fig. 2.

furnished in plain japan or in bronze, and are decorated with gold leaf. The artistic skill displayed in the several designs will render them ornaments to any desk or table, while their merits will doubtless make them standard articles. We are using these calendar pen racks in our office and find them admirably adapted to the purposes for which they are designed. The invention was patented January 3, 1865, through the Scientific American Patent Agency. For further information address the assignee of the patent, John T. Fanning, of Norwich, Conn.

New Bituminous Substance from Brazil.

At a recent meeting of the Royal Society of Scotland, Professor Archer read a communication on a new bituminous substance, imported at Liverpool from Brazil, under the name of coal. The Professor stated that the substance—a few specimens of which were presented to the meeting—had been submitted to chemical analysis, and had been found to yield a much larger percentage of oil than any of the bituminous coal which had been examined in Great Britain, not even excepting the Torbanehill mineral. It had little of the appearance of ordinary coal, but seemed to be indurated clay, and yielded a similar series of products to those afforded by other bituminous coal. It was very light, extremely buoyant in water, and was exceedingly inflammable, burning at a very low temperature.

PHOTOGRAPHIC ITEMS.

The Steaming of Albumen Paper prior to sensitizing is said to result in marked advantages. The albumen paper, prepared in the ordinary manner, is placed in a perforated box, within a chest, into which a jet of steam at 30 lbs. pressure is admitted, for 100 seconds. Albumen paper thus steamed will keep much longer, and is said not to discolor the sensitizing bath, the albumen being rendered partially insoluble. Another advantage is that the steamed paper, when sensitized, will keep in good condition twice or three times longer than the ordinary sensitive paper.

The Wothlytype.—This new process has met with but little favor thus far, having been voted "worthless" in the discussions of some of our photographic societies. Those who are so ready to condemn have probably had little practical acquaintance with the subject. Before long they will doubtless be glad to practice an improvement which just now they do not hesitate to reject. We have lately seen some most beautiful specimens of Wothly or uranium pictures. They compare with the best silver prints, and would do honor to any photographer. In London the Wothly collodion, also sensitized paper, which will keep in good condition for months, is now on sale; and at some of the photographic galleries negatives are taken, printed on paper by the Wothlytype process, and delivered to the sitter the same day.

New Intensifying Salt.—In Seely's *Journal of Photography* we find the following article by M. Carey Lea:—

"The extreme opacity of a strong red color to the actinic rays of light, renders it peculiarly adapted for negatives. Images of this color may be obtained in the following easy manner:—After fixing and washing the negative in the usual way it is first to be iodized to a bright yellow color. This may be effected in any convenient manner. It may be simply placed in a bath of iodine dissolved in water, or in a solution of iodine in alkaline iodide; or tincture of iodine may be poured over it. Or the negative may first be treated with bichloride of mercury, and subsequently with iodine solution, or both may be applied together in the form of a solution of corrosive sublimate in iodide of potassium. The conversion of the yellow picture to scarlet is effected by Schlippe's salt, the sulphantimoniate of sodium. A tolerably strong solution of this substance is poured over the plate, and moved backwards and forwards till its action is uniform. The color produced varies slightly in shade; when the operation has been properly performed, a brilliant scarlet color is obtained. The red coloring matter which gives the scarlet tint to the picture is probably the sulphantimoniate of silver, a substance of sufficient permanency to justify its employment, especially as it is to be further protected by varnish. The scarlet image thus obtained may be again modified by new treatment. An ammoniacal solution of nitrate of silver brings it from a scarlet to a purple color. This I mention merely as a matter of curiosity, the advantage being manifestly in favor of the first color.

"As Schlippe's salt is not everywhere to be had, and as many photographers may desire to prepare it for themselves, I give the following directions. Place in a closed vessel the following mixture, viz.:—

Gray sulphide of antimony	22 parts.
Crystallized carbonate of soda	44 "
Well-burnt lime	17 "
Water	48 "
Flowers of sulphur	4 "

"The lime is slaked with the water, and the whol is then mixed in the vessel, 140 more parts of water added; a large bottle is best, corked, and well shaken from time to time. At the end of twenty-four hours it is filtered, water poured on the filter to carry the soluble parts through, and the filtrate is evaporated to the crystallizing point. An abundant crop of large lemon-yellow crystals of beautiful forms (regular tetrahedral) is obtained. These should be dried and secured in a well-closed bottle. They are less permanent in solution, a ten per cent solution will however keep for some days; in proportion as the solution is weaker it becomes less stable.

"In preparing Schlippe's salt, the process may be very much expedited by heat. The materials may be placed in a large flask and boiled together for two or three hours. The test of the completion of the oper ation, whether heat is used or not, is that the gray insoluble powder at the bottom becomes white.

"The keeping properties of a solution of Schlippe's salt may be greatly increased by rendering it alkaline, for example, with a few drops of ammonia. But the brilliancy of the color produced is thereby greatly impaired. So, too, the mother water from which the Schlippe's salt has crystallized out, may be used. This produces a sort of deep red-black picture very opaque to the active rays. In fact it has occurred to me, latterly, that when it is merely wanted to produce an effectual strengthener, and a scarlet color is not especially sought for, it is scarcely necessary to crystallize the salt. This materially simplifies the operation. The ingredients already mentioned might simply be placed together in a large bottle, and set aside for a day or two until the whiteness of the insoluble portions indicates that the whole of the gray sulphide had been decomposed. It then might be simply filtered and placed aside for use. This liquid would doubtless keep well. I have not tried it, but as the mother water after crystallization does, it can scarcely be doubtful that this would also. I must repeat, however, that if a scarlet color is desired, the crystallized Schlippe's salt must be employed.

"I directed in the foregoing part of this paper to flow the plate with the solution of the salt. But I latterly prefer to use a rather weaker solution, or to drop the plate into a sufficient quantity to cover it, placed in a porcelain dish.

"There exist various compounds of a nature analogous to Schlippe's salt which would doubtless produce results very similar to it. The sulphantimonite of sodium, for example, would probably afford a very similar coloration. So, too, the various compounds of arsenic, sulphur and alkali, alkaline hyposulpharsenite, sulpharsenite and sulpharseniate. The reactions of these substances were not examined as there seemed no reason for expecting better results from them than from the sulphantimoniate, which is more easily prepared and less poisonous.

"In conclusion, I may remark that while a proper proportion of caustic soda is essential to the stability of the salt, an excess would be likely to be very injurious; the proportions I have given may be used with advantage. Red stains on the hands and on vessels, occasioned by the use of this substance, are easily removable with weak caustic alkali."

On Drops.

Mr. Guthrie, Professor of Chemistry and Physics at the Royal College, Mauritius, has made to the Royal Society an elaborate communication on Drops, from which we extract the "laws" which he deduced from his observation :—

Law 1.—The drop size depends upon the rate of dropping. Generally, the quicker the succession of the drops, the greater is the drop; the slower the rate, the more strictly is this the case. This law depends upon the difference, at different rates, of the thickness of the film from which the drop falls.

Law 2.—The drop size depends upon the nature and quantity of the solid which the dropping liquid holds in solution. If the liquid stands in no chemical relation to the solid, in general, the drop size diminishes as the quantity of solid contained in the liquid increases. The cause of this seems to be that the stubborn cohesion of the liquid is diminished by the solid in solution. When one or more combinations between the liquid and solid are possible, the drop size depends upon indeterminate data.

For example: certain variations in the drop size of solutions of chloride of calcium of different strengths point to the existence of definite hydrates ; while the regularity of the variation of drop size in the case of nitrate of potash points to the absence of hydrates.

Law 3.—The drop size depends upon the chemical nature of the dropping liquid, and little or nothing upon its density. Of all liquids examined, water has the greatest, and acetic acid the least drop size. It is remarkable that butyric acid, which has sensibly the same specific gravity as water, gives rise to a drop less than half the size of the water drop.

Law 4.—The drop size depends upon the geometric relation between the solid and the liquid. If the solid be spherical, the largest drops fall from the largest spheres. Absolute difference in radii takes a greater effect upon drops formed from smaller, than upon those formed from larger spheres. Of circular horizontal planes, within certain limits, the size of the drop varies directly with the size of the plane.

The fact that the drop increases in size according as the radius of the sphere increases from which the drop falls, and that the difference from this cause may amount to half the largest drop size, the author regards as important to dispensers of medicine. The lip of a bottle from which a drop falls is usually annuloid. The amount of solid in contact with the dropping liquid is determined by the size of two diameters, one measuring the width of the rim of the neck, the other thickness of that rim. In most cases the curvature and massing of the solid at the point whence the liquid drops is so irregular as not to admit of any mathematical expression.

Law 5.—The drop size depends upon the chemical nature of the solid from which the drop falls, and little or nothing upon its density. Of all the solids examined, antimony delivers the smallest, and tin the largest drops.

Law 6.—The drop size depends upon temperature; generally the higher the temperature the smaller the drop. With water the effect of a change of temperature of 20° C. to 30° C. is very small.

Law 7.—The nature or tension of the gaseous medium has little or no effect upon drop size.—*Druggists' Circular.*

Mining Phenomenon.

The effect of a current of warm air issuing from a mine in a cold day is sometimes quite remarkable, often giving the mouth of the mine the appearance of a hugh steam discharge pipe. The phenomenon is properly described, as follows, by the Virginia *Union*, in an account of a recent visit to the Savage mine near Virginia city:

We stopped a few minutes to watch the operations at the old hoisting works of the Company. Every moment or so a car, loaded with ore or waste dirt, would come rushing up the shaft to the surface, to be rolled out and sent thundering down the dump, where numerous heavy quartz teams were waiting to transport the ore to the mills. But to one uninitiated in such things the strangest phenomenon was the immense volume of steam which came rushing forcibly up and out the mouth of the shaft, enveloping the brakeman and the hoisting machinery in a dense fog, which, condensing, kept everything dripping with water. One would naturally suppose that some heavy steam machine was blowing off away down in the bowels of the earth. The philosophy of it is simply this, which we would state for the benefit of those who are not familiar with such things. In all shafts consisting of two or more compartments, a strong current of air invariably and unceasingly pours down one compartment and up another. Even when there is no air stirring on the surface, this current will pour up with such force that a newspaper, or other article, will not drop down that part of the shaft, and if thrown will immediately return to the surface. The air in the depths of the mine, is many degrees warmer than at the surface, and like all heated air has a tendency to rise; therefore, gathering in from the different drifts and chambers, it finds egress through the shaft—the supply and circulation being kept up by air shafts in different parts of the mine. This warm air, on arriving at the surface during the cold weather, and especially on a frosty day like that on which we made the visit in question, assumes the form of steam, and being condensed by the cold air, drips from everything which it envelops. Of course in warm weather none of this steam would be seen, for obvious reasons. It is decidedly an interesting sight to stand and see car after car come swiftly up to the surface, on the "cage," or little square platform, at the end of the big rope; and occasionally, while you are looking, a man will come bouncing up on a cage from the bowels of the earth, with startling suddenness, reminding you of one of those wonderful little painted boxes to be seen at any toy shop, which, if you unhook the lid, it flies back and a hideous little witch pops up before your astonished vision.

A MECHANIC of Milwaukie has manufactured two wonderful pieces of cabinet work intended as presents for the President and Mrs. Lincoln. One is an ordinary sized center table, of octagonal form, composed of twenty thousand different pieces of wood.

The British Army and Navy.

The British army and navy estimates for the year 1865-6 have just been announced. The cost of the aamy is £14,348,447—a reduction of £495,000 from last year; of the navy £10,392,447—a decrease of £316,000. Total estimates for the military and naval establishments for the coming year, £24,740,671; or, in American currency, $123,703,355.

In the naval estimates, a million of dollars are appropriated for the completion of the iron-clads *El Toussin* and *El Monassir*, which have cost heavily already. The officers and seamen in the navy number 88,000. There are also 7,000 boys in the service and 7,000 men in the coastguard service.

The navy consists of 540 vessels classified as follows:

Steamships, 445, of which 357 are screw, and 88 paddle; 26 screw ships are buiding; 69 effective sailing ships are afloat; making the total of steam and sailing ships 540. The building of three line-of-battle ships, 1 corvette, 4 gun vessels, and 4 gunboats is suspended. The classes into which these vessels are divided; deducting those which are suspended, are as follows: Screws—armor-plated ships, iron, third-rates, afloat 6, building 3; ditto, iron, fourth-rates, afloat, 2; ditto, wood, third-rates, afloat 6, building 1; ditto, wood, fourth-rates, afloat 4; ditto corvettes, wood, sixth-rates, afloat 1, building 1; ditto sloops, wood, afloat 2; ditto gunboats, iron, building 3; ditto floating batteries, iron, afloat 3; ditto ditto, wood, afloat 2; ships of the line, afloat 55; frigates, afloat, 37; building 1; block ships, afloat 8; corvettes, afloat 26; sloops, afloat 35, building 3; gun vessels, afloat 37; gunboats, afloat 105, building 2; tenders, tugs, etc., afloat 7; mortar ships, afloat 4; troop and store ships, afloat 15; yachts, afloat 1. Paddle: Frigates, afloat 6; sloops, afloat 19; small vessels, afloat 13; dispatch vessels, afloat 4; tenders, tugs, etc., afloat 40; troop and store ships, afloat 1; yachts, afloat 5.

Scale in Boilers.

[For the Scientific American.]

As incrustation is the sole cause of the destruction of boilers, we do not see why owners do not employ some means to obviate the evil. The thickness of an eggshell between the water and the iron compels the use of 15 per cent more fuel to generate steam; and as a crust, one-fourth to one-half inch is no uncommon occurrence, the immense waste of fuel, and the more rapid burning of the iron, are readily seen. Repairs to some of the western boilers cost $2,000 a year; this, and the fuel wasted, might both be saved if the boilers were kept clean, as iron cannot burn with water next it. Boilers using pure water have been run over thirty years without one dollar of repairs; hence will be seen the advantages and necessity of preventing scale. The item of stopping works "to scale boilers" is no inconsiderable amount; the apparent loss of the day is trifling, but in large establishments, where large capital is idle; the men off on a frolic, not to turn up when wanted, should induce every mill-owner to save this lost day, which need occur but once in six or twelve months if no scale formed. As proof, boilers in New York are cleaned but once a year, the water being pure enough to incur no risk of burning from incrustation formed in that time; boilers elsewhere could be run as long if kept free from scale. We, therefore, urge engineers and others to adopt some means to prevent scale, and as the Incrustation Powder, invented by Mr. H. N. Winans, of this city, has proved a reliable and uninjurious article for this purpose during the last ten years, and many of our citizens recommend it, we are confident it will save time and money where scale exists. E.

THE Lydians were the first who coined money, and they used iron first, then copper. "Athelstan first enacted regulations for the government of the English mint, in A. D. 928." The first gold coinage in England was in the reign of Edward the Third. Tin was coined by Charles the Second, and pewter by James the First.

THE first bank formed in the United States, was the Massachusetts Bank of Boston, in 1784; the first in New York was the Bank of New York, in 1800; and next the Manhattan Company.

Correspondence

Petroleum Gas for Engines.

MESSRS. EDITORS:—I propose to drive the engines in the oil regions by combustion of the gas arising at the mouth of the well, conveying it by a tube to the bottom of a tank of water under a tubular boiler, and inflaming this gas as it arises at the surface. The advantages of this plan will be, I think, these: No explosions from a volume of gas diffused in the atmosphere coming in contact with the furnaces; complete control of the amount of heat, which may be cut off in a moment, and as immediately re-applied, and an accumulation of force—the gas accumulating in the holders when the engine is not running; economy in the use of combustible material now wasted.

I propose to drive the machinery of a saw-mill, where there is but a small quantity of water but plenty of fall, by an overshot wheel with a drum beneath it, both covered by a band, to which the buckets shall be attached. In this case the weight of the water would act much longer than in the ordinary wheel.

I have read your paper for some years and have never met any suggestions of this kind. If in any way valuable I hope you will notice it in your next issue. W. S. H.

New York, March 4, 1865.

[Both good suggestions, but neither of them new. The plan of a water wheel, the same as a grain elevator reversed, has been a favorite one of ours for a small stream with great fall. In this situation we cannot see why it should not be a cheap, economical and efficient motor.—EDS.

Raw Pork and Tape-Worms.

MESSRS. EDITORS:—In your paper of Nov. 19th I noticed an article entitled "Beware of Raw Pork," and giving as the reason for the caution:—"Fortunately the tape-worm is very rare, but when it does occur, it is caused by eating raw pork."

Here in California the tape-worm is very common, and I should judge that two or three persons out of every hundred adults are troubled with them. All ages and both sexes, from 14 years and upward, and people of all classes and nationalities, are equally subject to them, so far as my observation extends. As for being caused by eating raw pork, that is about the last thing to which an intelligent observer who had resided any length of time in this southern part of California would attribute it. Many of the persons here who have a tape-worm have never eaten a mouthful of raw pork nor raw flesh of any kind. Not only this, but *herbivorous animals*—sheep, deer, antelopes, and neat cattle—after being killed, are frequently found with one or more tape-worms in the intestines. I once killed an antelope that had a tape-worm. In taking out the entrails, the small intestine was torn or cut, discovering the parasite still alive. Through this opening I drew out several yards of the worm. On inquiring of butchers who are reliable and observing men, I find also that they have frequently seen tape-worms in sheep and beef cattle.

Having been familiar with these facts for some time, it is difficult for me to understand how your Atlantic physicians could have adopted the theory stated by you. COLBERT A. CANFIELD, M. D.

Monterey, Cala., Dec. 26, 1864.

The Problem of Two Wheels.

MESSRS. EDITORS:—I noticed in your paper some time since a "Problem of Two Wheels," upon which, however, I had not bestowed much thought until I saw a reply in your last number. Your correspondent says that:—"The periphery of each wheel will, in rolling, require to travel a distance equal to twice that which the center moves," etc. A point in the circumference of a rolling wheel (rolling on a plane) generates a cycloid, and while the center of the wheel travels a distance equal to the circumference, a point in the periphery travels over the arc of a cycloid. Now the arc of a cycloid is proved by the higher mathematics to be four times the diameter of the generating circle. The distances passed over by the center and a point in the circumference of the wheel will therefore be to each other in the ratio of 3.14159 to 4. But this does not affect your correspondent's conclusions, and with regard to the motion of the two wheels I think he is right. For if two equal weights move over the same vertical space, impelled by gravity, one will perform precisely the same amount of work as the other, whatever may be their velocities. In the case under consideration, the work generated by the wheels in rolling down the plane, with the exception of the small amount necessary to overcome the rolling friction, is absorbed in imparting motion to the wheels, and will be given out when they come to a state of rest. As their weights are equal and the spaces passed over also equal, the amount of work accumulated will be equal. When the wheels roll along the horizontal plane, this accumulated work is used in overcoming the resistances, and, if the resistances encountered by each wheel are equal, both will come to rest at the same distance from the point of starting. As, however, more work is absorbed in imparting the rotary motion, and therefore less in imparting rectilinear motion to the wheel with the iron periphery than to the other, the former will reach the horizontal plane with less velocity and encounter less resistance from the air than the latter, and if the velocities be high enough for this difference to be appreciable, the former will be found to roll further than the latter along the horizontal plane. W. A. A.

Delaware Literary Institute, Franklin, N. Y., Feb. 27, 1865.

Loss of Heat in the Steam Engine.

MESSRS. EDITORS:—In our present modes of converting heat into mechanical power, and vice versa, it seems that one of two facts must exist. Either that our present modes of converting heat into power by mechanical means are very defective, or else there must be some error in the tables set down for the reconversion of mechanical power into heat. There is an irreconcilable disparity between the two processes. For instance, according to Joule's equivalent, the heat expended in raising the temperature of one pound of water one degree is equivalent to the mechanical work of raising the same weight of water 772 feet. Now taking this as a basis, let us see how much power there is in a pound of coal. Some boilers evaporate as high as 12 pounds of water for each pound of coal. It requires not less than 1,000° of heat to evaporate each pound of water—making 12,000° of heat given out by one pound of coal in evaporating 12 pounds of water. Now if we multiply these 12,000° of heat by Joule's equivalent for one degree, we have 12,000° multiplied by 772 foot-pounds, which gives 9,264,000 foot pounds—which reduced to horse-power is 4½ horse-power per hour for each pound of coal. Few engines give a better result than one horse-power for two pounds of coal; or, in other words, few engines give a better result than ⅑th part of the above indicated power of fuel.

Joule's equivalent may be correct; if so, it does not seem possible that we are always to continue to use fuel on so wasteful a plan, and it looks quite improbable that we must remain content for all time with a fragment only. A few bushels of coal used on the basis of Joule's equivalent would indeed work wonders.

The same amount of power can be derived from a degree of heat expended on water to form steam as though the degree of heat were expended on atmospheric air. The idea that a degree of heat expended on air gives four times the effect that it does on water is fallacious. This I hope to conclusively substantiate in a future article. F. A. MORLEY.

New York, March 8, 1865.

[It is not claimed that a *degree* of heat expended on air will give four times the effect that it does on water, but that a *unit* of heat will. The quantity of heat that will raise the temperature of a pound of water one degree will raise the temperature of a pound of air four degrees. Still we shall be pleased to see our correspondent's argument.—EDS.

Burgh's Rules for the Steam Engine.

MESSRS. EDITORS:—Please correct the error in regard to "Burgh's Rules" recently noticed in the SCIENTIFIC AMERICAN. The notice stated that the price is $2 by mail, free of postage. The application for free copies, *postage paid*, is becoming quite a nuisance, and I fear that those who have paid $2 will imagine they have been swindled. I presume the balance of the demand—certainly the entire demand created by that notice—will be for free copies. The demand promises to be unprecedented, and thus far one man has sent about half money enough to pay postage. All others have preferred free postage.

HENRY C. BAIRD.

Philadelphia, March 9, 1865.

RECENT AMERICAN PATENTS.

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

Riveting Buttons to Cloth.—This invention consists in constructing an automatic machine for riveting buttons to cloth or other material, whereby the cloth is pierced to receive the body of the rivet and the various movements and operations necessary to feed the rivet and the button, and insert the rivet in the cloth and through the center of the button, and clinch them together are performed automatically. W. J. Gordon, of Philadelphia, is the inventor.

Improved Padlock.—This invention consists in providing a padlock with a series of tumblers, having hooks at each side of them, and arranged in such a relation with the eye of the shackle that each tumbler, in unlocking the lock, will required to be moved in a certain position relatively with the eye, in order to release the shackle, a slight deviation from this position rendering it impossible to withdraw the shackle. The object of the invention is to obtain a padlock of simple and economical construction which cannot be readily picked or illegitimately opened. Edward Coyle, of Albany, N. Y., is the inventor.

Gas Stove.—This invention relates to a stove for heating apartments, cooking, etc., by gas, such as is used for illuminating purposes. The invention consists in the employment of a gas-chamber or reservoir in connection with a combined air and gas receiver and a series of flues, all arranged and combined in such a manner as to insure the perfect combustion of all the gas which passes into the stove and the radiation of all the heat generated by said combustion. The stove is very simple in construction and may be afforded at a moderate cost, and will prove an economical heat-diffusing device. Luther Erving, New York city, is the inventor.

Combustion Pump.—This invention is an improvement on that class of pumps or water elevators in which, by the combustion of a hydro-carbon liquid, a vacuum is produced whereby the water or other liquid is caused to rise through the suction pipe and to discharge at the desired point. The invention consists in the use of steam combined with the hydrocarbon liquid in the interior of the reservoir or chamber, in which the vacuum is to be produced in such a manner that, by the condensation of the steam, the intensity of the vacuum is considerably increased and the raising or elevating of the water is materially facilitated. The water from which the steam is to be formed is placed in a shallow pan over a similar pan containing the hydrocarbon liquids in such a manner that the heat evolved by the construction of the hydrocarbon liquid volatilizes the water and a sufficient quantity of steam is obtained to produce the desired result. The hydrocarbon liquid is measured by means of a bell-shaped or other vessel or spout attached to the supply tube, and it is ignited by introducing into said spout, after the pan in the interior of the reservoir has been filled, a small quantity of hydrocarbon liquid, and lighting the same, so that it runs into the reservoirs while burning, and ignites that portion of the liquid in the pan. The gaseous products of combustion are allowed to escape through the reservoir pipe, which is provided with a hinged drop valve fitting into a cavity filled with liquid in such a manner that, so soon as the gases have escaped, the valve can be dropped and an air-tight joint is obtained, whereby the operation of the apparatus is not disturbed. Thomas J. Linton, of Providence, R. I., is the inventor.

Machine for Gathering Quicksilver.—The water running off from amalgamators contains a large quantity of quicksilver mixed with the rock in a fine spray, and this quantity of quicksilver has hitherto been considered a mere waste. The object of this present invention is to collect this quicksilver and bring it to such a state that it can be used again and again. The invention consists in a vat provided with an amalgamated bottom and with a series of slats which do not extend close down to the bottom of the vat in combination with an agitator, or without, in such a manner that the water let into the vat at one side has to pass through all the spaces left between the slats and bottom before it is allowed to discharge through apertures in the opposite side of said vat, and during its passage under the slats the quicksilver is compelled to come in contact with the amalgamated surface of the bottom, and thereby it is caused to gather, so that it can be readily scooped out, and used again and again in the amalgamating process or for other purposes. By the use of an agitator moving between the slats, and by imparting to the vat a reciprocating motion the process of gathering the quicksilver can be materially facilitated. M. B. Dodge, No. 21 Broad street, New York, is the inventor.

Self-centering Chuck.—This invention consists in the employment of wedge-shaped jaws fitted into the head of the chuck and acted on by a spring which has a tendency to force said jaws out in combination with inclined diverging ways and with a screw cap, in such a manner that by unscrewing the cap the jaws will open, and by screwing the cap down the cap jaws close concentrically, and a rod or tool placed between is centered without loss of time. In order to prevent the jaws from dropping out of their ways, these outer edges are spread or expanded and fitted in corresponding cavities at the outer ends of their ways. A chuck is thus produced which is easily operated, and which is not liable to get out of order. T. H. Worrall, of Manchester, N. H., is the inventor.

Smoking Pipe.—This invention consists in constructing a connection or bracket for a pipe which shall have a socket in one part for receiving the stem and in the other the bowl of the pipe, and at the same time have a chamber or cup for receiving the nicotine from the smoke before it reaches the stem of the pipe; to effect this the cup is made with a neck which fits into a socket directly under the bowl, the communication to it being through a small tube set in the bottom of the bowl. This neck has a slot cut in its side which, by turning the cup, is made to correspond with a tube leading to the stem of the pipe. By this arrangement the smoke on reaching the neck of the cup becomes somewhat cooler, and the nicotine falls therefrom to the bottom of the cup, and then passes through a small tube to the stem, and there is no possibility of drawing the nicotine up into the stem. The pipe, as a whole, is a very neat and pretty article and seems to answer the ends for which it is designed. The inventor of the above is Robert Nagler, of No. 40 John street (*Belletristic Journal* office), New York, who may be addressed for the purchase of the patent or patent rights.

Hay Rake and Loader.—The improvements in this hay-raking and loading machine, consist, first, in a wedge shaped device situated at the top of the elevator, for clearing the hay from the elevating fingers when it arrives at the point from which it drops into the hay wagon; and, secondly, in an improved manner of suspending and holding each tooth of the rake so that, by a sliding vertical movement, they may readily pass obstructions, or accommodate themselves to any uneven surfaces of ground; and, thirdly, in combining and using, in connection with the rake teeth, a circular guard board, to prevent hay from escaping the elevating fingers by working through between the rake teeth, and also prevent hay from clogging and obstructing the rake teeth. William A. Duncan, of Syracuse, N. Y., is the inventor.

Well Borer.—This invention consists in the arrangement of an oscillating lever which has its fulcrum on a pivot secured in an upright post and which is provided with a roller at about the middle of its length to operate in combination with the rope from which the borer is suspended, and with a windlass and tappet wheel, in such a manner that when the rope, after having been wound round the windlass, is drawn through under the roller in the oscillating lever and over a pulley in the top of the upright post, any up-and-down motion imparted to the roller in the oscillating lever, produces twice as much motion of the drill; that is to say, if the roller be depressed an inch, the drill rises two inches, and *vice versa*, and by these means the hight of the stroke is doubled. A double gear is attached to the windlass and a hand crank to the pinion. By means of this crank the drill is easily raised or lowered, according to the pleasure of the operator, whether the machine is in motion or not, and the danger of breaking the drill is avoided, which arises either from too large an accumulation of drillings in the well or from the fact of the drill getting into bad openings in the rock. Furthermore, the hight of the stroke can be adjusted to a fraction of an inch. For the purpose of holding the drill when the joints are loosened, a pair of shears are applied to the platform which are locked together by a catch, so that they hold securely all the weight below against any accident. Two windlasses are combined with the boring machine, one to contain the drill rope, and intended to be worked by a belt from the main or fly-wheel shaft of the machine, and the other to contain the bucket rope, and intended to be operated by hand, and a double windlass being applied in combination with a stirrup catching over pins projecting from the sides of the upright post in such a manner that the drill can be readily raised and the drill hole bored out at any moment. Walter Hyde, of 769 Broadway, New York, is the inventor.

Machine for Cutting Stay Bolts, etc.—The numerous stay bolts in the fire-box sheets of steam boilers are usually cut off, after their ends are screwed to their proper place, by a cold chisel and hammer. This method of cutting them off is slow and expensive work, and the rest of the bolt is usually injured by reason of the jamming of the thread, so as to require trimming before it can be again inserted in the sheet. Besides this, that portion of the bolt which enters the sheets and the sheets themselves are subjected to injurious strains by the old method, owing to the successive and violent blows of the workman in cutting off the bolt, and the bolts are thereby often loosened in their holes, and the holes altered in their outline, whereby it becomes necessary, in riveting them upon the sheets, to subject the bolts to an excessive amount of hammering which is injurious to them. This invention provides against these injurious tendencies and the disadvantages of the present method of doing this sort of work by means of a tool composed of an annular stock, whose base is to rest upon or over the fire-box sheet, and whose sides are slotted to receive a cutting tool having its head pivoted to the side of the stock. The tool is held to the work by a clasp sleeve. Joseph Renshaw, of Michigan city, Ind., is the inventor.

Machine for Cleaning, Hulling, and Polishing Rice, etc.—This invention consists in the employment of two cones, one inside the other and revolving in opposite directions or in the same direction and with different velocities (in contradistinction to two cylinders), said cones being provided with suitable rubbing surfaces arranged in such a manner that either one or both can be adjusted in a longitudinal direction, and the rubbing surfaces can thereby set closer together or further apart, as may be desired, to suit the operation to be performed. The rubbing surfaces consist of a series of short pieces of wire set endwise into movable frames, or of brushes or stones or other suitable material secured in said frames, in such a manner that each rubbing surface can be adjusted independent of the others whenever it is desirable or necessary, and different rubbing surfaces applied to the same cylinders or cones by removing one set of frames and substituting therefore another set. Chas. E. Rowan, 131 Seventh street, Brooklyn (E. D.), N. Y., is the inventor.

On Silvering Surfaces of Glass.

[From the British Journal of Photography.]

The advantages of being able to produce reflecting surfaces are often very great, and it is desirable that the photographer should know how to produce them. On the Continent silvered specula are in many instances taking the place of the more costly achromatic object glasses of the telescope; and we have seen a large photograph of the moon, produced by a glass mirror silvered by one of the methods about to be described, which could not have been surpassed by an achromatic lens. All our astronomical and scientific readers are aware of the powers of such silvered specula, but only few, perhaps, know how the silvering is effected.

The first process is that of Mr. Bird. The mirror or speculum to be silvered is suspended, face downward, in a silver bath prepared thus:—A large flat shallow vessel of glass or porcelain is provided to contain the solution. 750 grains of nitrate of silver are dissolved in six ounces of distilled water, and to this is added pure liquid ammonia, drop by drop, until the precipitate which is thrown down is redissolved. 2 ounces of caustic potash are dissolved in fifty ounces, by measure, of rain water; and fifteen ounces of this solution are added to the ammoniacal solution, when a brown-black precipitate will be produced. Ammonia is again added, drop by drop, until this precipitate is just redissolved; and 29 ounces of distilled water are then added to the whole. To this mixture is again added, drop by drop, stirring with a glass rod, a strong solution of nitrate of silver, until a precipitate, which does not redissolve, begins to be formed.

Previous to immersing the speculum, one part, by weight, of powdered milk sugar to ten parts, by measure, of distilled water must be prepared in a separate vessel, and filtered until a clear solution is obtained. Then, to ten parts, by measure, of the silvering solution must be added one part, by measure, of the milk sugar solution and, finally, fifty ounces of the compound solution will be sufficient to silver a speculum nine inches in diameter.

As the success of the process depends greatly on the glass surface being made chemically clean previous to immersion in the bath, the utmost pains must be taken to accomplish this object. The surface is first covered with thick whiting cream free from grit, which, when dry, is rubbed off with the purest cotton wool. The surface is then wetted entirely with dilute nitric acid, and afterwards thoroughly washed with distilled water poured over it; and, last of all, the piece of coated glass is suspended in a flat vessel containing alcohol, where it remains until the bath is ready to receive it.

To facilitate the suspending, a circular block of wood is very firmly cemented to the back of the speculum with marine glue or pitch, and three pins inserted at equal distances round the margin, to which strings may be fastened. On lowering it into the bath care must be taken that no air bubbles intervene, that the speculum be not deeper in the liquid than half its thickness, and that a depth of two inches, at least, intervene between the face of the speculum and the bottom of the vessel. In ten minutes after immersion a metallic film will be seen forming on the glass, and in an hour or two a compact silver coating will be laid over the whole surface.

The speculum should remain in the bath for four hours, by which time the process is completed; it is then carefully removed, copiously washed with distilled water, and placed on its edge to dry.

It is now ready for polishing. To accomplish this, rub the surface gently, first with a clean pad of fine cotton wool, and afterwards with a similar pad covered over with cotton velvet which has been charged with fine rouge. The surface will, under this treatment, acquire a polish of intense brilliancy, quite free from any scratches. The method employed by our correspondent is as follows:—

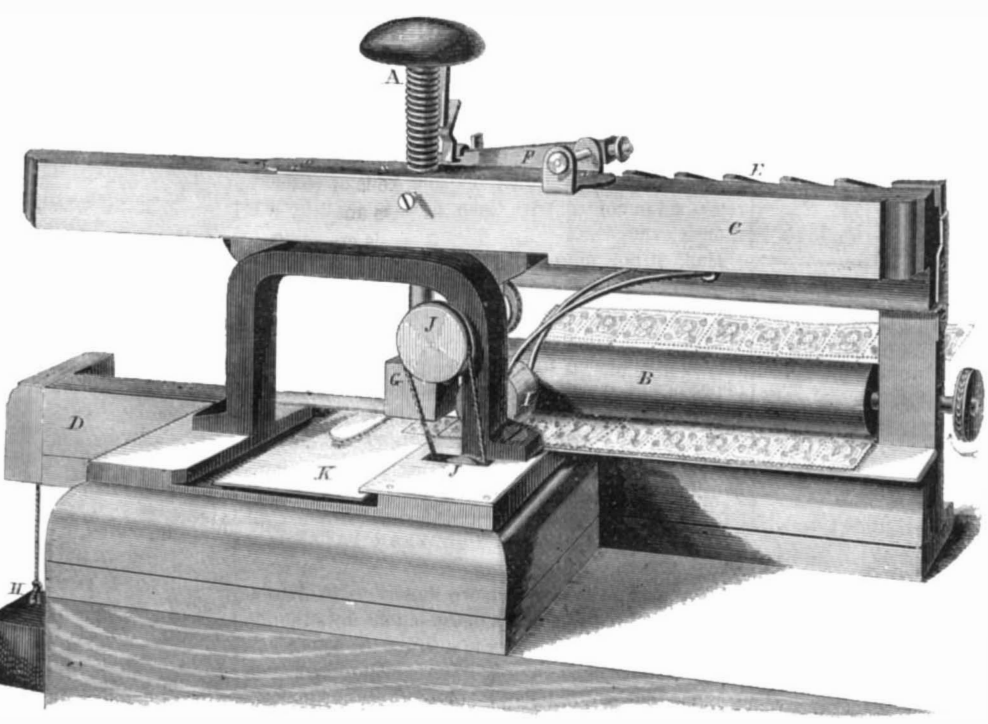
Make a solution of ammonio nitrate of silver, of the strength of three grains to the ounce. Render it very slightly turbid by excess of nitrate of silver, and then filter it. Just before using add to each ounce of the foregoing solution two and a-half grains of Rochelle salts.

Having scrupulously cleaned the glass intended to be silvered, place it in a convenient vessel about one inch from the bottom, supported on three little cones of white wax. The glass plate may be suspended; but in that case there is more difficulty in avoiding vibration, the absence of which is essential to success Expose to a northern light, or any other subdued light, and in about two hours the deposit of silver will be sufficiently thick. It must now be carefully removed, washed, and dried.

In the processes which we have detailed, when the surface next the glass is to be used as the reflector the glass side should be cleaned by nitric acid if the state of its surface so require; and the silvered side should receive a protecting coating of a good tough black varnish.

Machine for Applying Stamps.

Some months ago a photographer wrote a letter to the SCIENTIFIC AMERICAN, saying that a machine for applying stamps to *Carte de Visites* or other pictures, would be a very useful thing, and that one was much wanted by professional men. The inventor of the machine here illustrated has taken the hint thrown out, and in this engraving the means he has adopted to secure the end are shown. By a simple downward motion of the hand on the knob, A, the stamps are affixed as rapidly as the movement can be kept up, or the cards fed in. The stamps are inserted in the sheet, as shown at the roller, B. Below this roller there is another one, and the sheet is held between both; these rollers set in the carriage, C, which is made to slide in the frame, D, by a very simple arrangement. It is this. There is a rack, E, in the carriage which is held stationary (while the stamp is being stuck on) by the pawl, F; when the knob moves upward, after the stamp has been fastened by the block, G, this pawl is lifted and the carriage is drawn along the frame by means of the weight, H, at the end, thus carrying the stamp with it and presenting another to the action of the block, G.



SMITH'S MACHINE FOR APPLYING STAMPS.

Provision for moistening the stamps is made by the roll, I; this presses the sheet on a roller below which runs in a little tank of water, said under roll being operated by the pulleys, J.

When all the stamps on one row have been affixed, a new strip is presented by turning the rollers, B, in the direction of the arrow. The stamps are detached from the sheet by withdrawing the card, shown at K.

Thus all the requisite features in a machine of this class are provided for, and in its operation it answers the purpose. One of them, we are told, has been for some time used by Meade Brothers, this city. The machine is about two and a half times larger than the engraving. These machines can be used for applying stamps to labels, packages, envelopes, match boxes, or for any purpose where stamps are used. The inventor will sell State or shop rights to manufacture, and samples can be seen by applying to John Frank Smith, Box 5257, P. O., New York.

A patent is now pending on it through the Scientific American Patent Agency, by Robert L. Smith, of Stockport, N. Y.; for further information address him at that place.

A Mud Sucker.

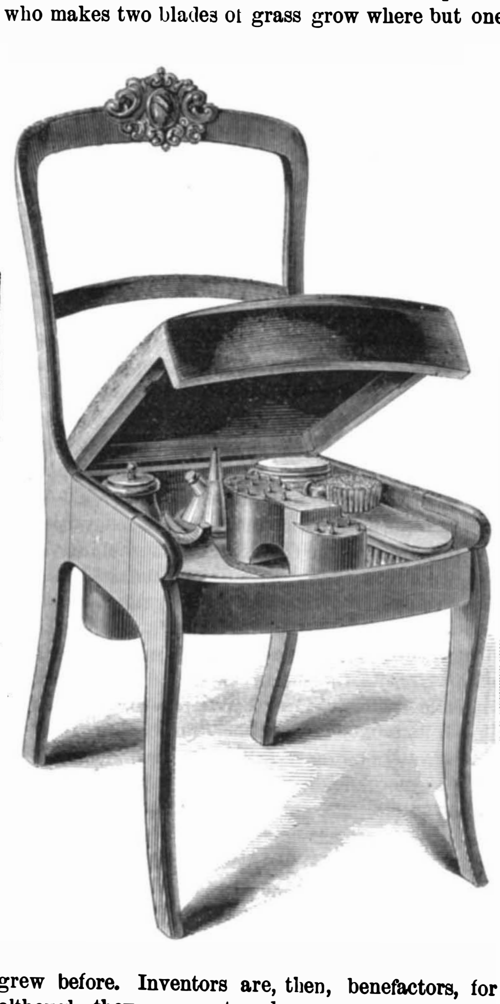
M. Agudio, the Italian engineer, who has undertaken the railroad which is to cross Mont Cenis, has invented a machine intended to be added to the mechanical sweepers, which are daily at work during this very muddy season, in the streets of Paris. The machine consists in a cast-metal receiver on four wheels, to the lower extremity of which is fixed a wide tube. A small air pump attached to the carriage creates a vacuum in the receiver. It is only requisite that the tube should graze the surface of the street for the mud to be, as it were, inhaled into this receiver—a sort of rake, fixed to the lower end of the tube, receiving the mud and facilitating its ascension.

New Method of Electro-Plating.

M. Well, a French chemist, announces a new method of depositing metals. The baths he employs consist of metallic salts or oxides in alkaline solutions by means of tartaric acid, glycerine, albumen, or other substances, which prevent the precipitation of the oxide by the fixed alkali, in some cases with, and in others without, the aid of zinc or lead, and at various temperatures, according to circumstances. He claims, also, to be able by like means, to give variety of color to articles covered with copper, by his process. M. Well says that the most important application of his discovery is the deposit of copper and the bronzing of iron (cast as well as wrought) and steel, without the preparatory dressings with conducting substances, which are necessary in proceeding according to the ordinary methods before the object is placed in the bath and submitted to galvanic action. This, if it bear the test of practice, is a very important fact. Iron and steel thus coated with copper may says M. Well, be afterwards silvered or nickelized by his process.

HARDING'S SHOE-POLISHING CHAIR.

A benefactor is by some one defined as a person who makes two blades of grass grow where but one



grew before. Inventors are, then, benefactors, for although they may not make grass grow literally, they make one thing serve two purposes sometimes, which is quite as much to the point, and very convenient to boot. The invention here illustrated relates to boots, and very closely, for those who desire to appear in a shining light, before men, as to their feet, must polish their shoes properly. It is all very well to throw the responsibility of this upon a servant; but what if one has no servant? What if one boards, or has a room of his own somewhere? What if one is a wretched bachelor without privileges or "fixins" of any kind, clearly he must provide himself with some such arrangement as that here illustrated. The object of it is apparent at once. The inventor has taken advantage of the fact that mankind are prone to put their feet on the nearest chair when their boots are to be polished, and has therefore provided an assortment of all the tools, instruments, and paraphernalia of whatsoever name and nature, used in the art and mystery of shoe-blacking within the compass of a common chair bottom, so that by merely lifting the seat there lies disclosed the wonderful machinery plain to the eye. The engraving illustrates this invention so clearly and beautifully that nothing is needed to explain it. Brushes, pots, boxes and water-can, are all at hand, ready for use. The model for this unique affair is one of the handsomest that has come into our hands for some time, and the inventor is deserving of praise for the skill and pains bestowed upon it. A patent is now pending through the Scientific American Patent Agency by F. G. Harding, of Boston, Mass.; for further information address him at 35 Sheafe street.

Subterranean Pneumatic Railway.

Of the new lines in London probably the most remarkable is that proposed under the name of the Waterloo and Whitehall Railway. This is a pneumatic line, not for the conveyance of parcels only, not an iron tube like the gigantic pipe between the Post Office and Euston Square; it is an extension of the plan that has been for some time exhibited in operation in the grounds of the Crystal Palace at Sydenham. The tunnel admits about a full sized omnibus carriage, which is impelled by a pressure of the atmosphere behind the vehicle, produced by lessening the density of the air in front. It is an underground railroad worked without locomotives. The proposed line will run in a tunnel under the Thames, and open a communication between Whitehall and Waterloo Station, near Vine street. As a means of communication between one part of London and another this line will be quite an experiment.

Burglars Using Wedges.

The Birmingham correspondent of a London contemporary says:—

"By the aid of the wedge now so much used by burglars, a safe, considered thief-proof, was opened in Birmingham on Friday night last, at the office of Mr. H. Dixon, of the Old Wharf. The safe was 3 feet by 2½ feet, and was made of three-eighth inch plates. The door was forced open, and such was the violence that had been applied that one of the sides was not only bent and broken, but the bolts by which the safe was riveted together were driven completely out of the metal. The noise of the concussion of a sledgehammer upon the wedge seems to have been muffled by the use of a book. There was only 3½d. in the safe."

THERE are now packed away in the different storehouses on the banks of the Hudson about 153,000 tuns of ice, gathered this season.

THE

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VOL. XII. NO. 12...|NEW SERIES.]....*Twentieth Year.*

'NEW YORK, SATURDAY, MARCH 18, 1865.

Contents:

(Illustrations are indicated by an asterisk.)

SMALL BOILERS.

One of the commonest mistakes committed in engineering practice is to allow too small a proportion of boiler to steam engine. We see evidences of it every day in steam vessels, and more frequently in factories. In ships with limited boiler power a continual struggle is going on between the water tenders, the coal passers, the firemen and the engine. It is a matter of interest which of these machines shall get ahead. The steam gage is anxiously inspected; the pressure is continually falling; a brief "spurt" on the part of the fireman for a time causes the pressure to gain, but when this ceases it falls to the old point again, and no judicious throttling; no loud and imperative commands to carry less water; no skillful slicing of fires; no scientific dilution of the gases with air through the furnace doors; no busy whirling of blowers, can raise the pressure beyond the point at which the capacity of the boiler stops. One may as well attempt to pour five quarts out of a four-quart vessel as to get more steam than it has the capacity to generate. Like spurs applied to a tired horse, the goading is of no avail, and, unless other boilers are put in, no results, except poor ones, are obtained.

A shocking waste of fuel occurs when small boilers are used. The green fuel thrown in is no sooner fairly aglow, and parting with what heat it contains, than fresh charges are put on top of it, the blast is turned on, and that heat which should have been devoted to raising steam is employed to burn the cold fuel, and is soon sent whirling up the smokestack, to be lost in the outer air. If a man fed the hopper of a fanning mill with greenbacks, and blew them out of the dust-opening thereof, he would have a practical exemplification of the waste occurring in boilers too small for their work. Not only is fuel wasted, but the boiler itself rapidly deteriorates, as does every other machine, implement, vessel or apparatus taxed beyond its capacity.

An incessant opening of furnace doors, a continual introduction of fresh fuel, an unremitting torture of said fuel by "slicing," poking, "rousting," and other ingenious devices, to prevent the coal from burning, transpires throughout the day when the boiler is too small. Every cook knows that if she give her range no peace there will be no dinner; the domestic steam will not be raised in a desirable manner, and with a steam boiler continually urged the proprietor suffers daily loss.

A most striking example of the utility of large boilers and the assertions here made was noticed by us some years ago in a factory. The proprietor of it had a small steam engine driven by a boiler large enough for two such engines. That boiler actually used less coal than one half its size for the same work; the fire once made in the morning burnt slowly through the day. Once or twice firing was all that was necessary, and the doors were continually ajar. The sluggish combustion was accelerated when new fuel was added by closing them for a few minutes. At night the fires were banked, remained so all night, and half an hour before work commenced they were ready for work. No kindlings were used from one week's end to the other, except to start the fire on Monday morning; no coal was burned to heat cold water every morning; no fuel was wasted, for it slowly roasted away to ashes, and the burning gases rising slowly through the flues and heating surfaces remained in contact with them, and gave forth their utmost value.

Half, if not more, of the miraculous economy claimed for cut-offs for engines with peculiar pistons; for valves with crooked openings instead of straight; for valves with three-fourth stems instead of seven-eighths, arises solely from their engines having surplus boiler power, wherein the coal is thoroughly burnt; where every ounce is reduced to ashes—not consolidated to cinder—and where the heat, instead of being discharged at the smokestack as soon as generated, is utilized in turning water into steam.

EXPIRATION OF THE GOODYEAR PATENT.

There has never been a more illustrious exhibition of the beneficent operation of the patent laws than in the case of Charles Goodyear's invention of the vulcanization of india-rubber. The unflagging perseverance that carried the inventor through his early struggles was the result of the splendid reward which these laws offered as the crown of his success. For twenty-one years the inventor and his assigns have enjoyed a monopoly of the invention, and a number of magnificent fortunes have been acquired from this monopoly.

But great as have been the profits to the owners of the patent, they are small indeed compared with the advantages which the invention has bestowed upon the community. The properties of vulcanized rubber are so peculiar and so valuable, that the article has come into use in almost every art and every department of life. The infant draws its first drop of nourishment from the tender bosom of its mother through a patent nipple shield of india-rubber, the little girl dances her rubber doll upon her knee, the boy bounds his rubber ball, or claps his hands with delight as his rose balloon of india-rubber floats away into the sky. India-rubber protects the watchman in dryness and comfort through the most violent storm, and it draws together with peculiar elegance and grace the corset of the belle, it keeps the dust from our hands and the water from our feet; we ride in a car which runs smoothly upon india-rubber springs, and is drawn by an engine packed with india-rubber in every joint. In short, all the comforts and conveniences of life are augmented, and all its jolts and jars are softened by this elastic and all-pervading substance.

But even yet there are some nooks and corners of the arts from which india-rubber has been excluded by the operation of the Goodyear patent. Many valuable inventions which depend upon the use of vulcanized rubber are lying dormant till this material can be had at a more moderate price. On the 15th of next June the patent will expire, and this great invention—one of the most valuable that has ever been made—will become the property of the public. Then will its innumerable applications be still further multiplied, and new devices for its use will come forth in endless succession from the inexhaustible brains of our inventors.

Reflecting Magic Lantern.

Mr. Chadburn, of Liverpool, has patented in England a magic lantern, by which engravings upon paper, photographs and all kinds of pictures are readily produced upon the wall by reflection. The principle upon which this instrument operates is the same as that patented in this country on the 19th of April, 1864, by Geo. Siebold, of Philadelphia, Pa.

CHEAP SOAP.

Soap for family use can be made very cheap and of excellent quality with little trouble by the use of a common article sold in all drug stores. This is lye put up in a concentrated form in small iron boxes holding one pound. These boxes cost twenty-five cents in ordinary times, now we believe they retail at forty or fifty cents, and will make twenty-five pounds of green or new soap. The plan of procedure is merely to take a box of this substance, knock off the lid and throw it into a gallon of boiling water. After standing ten hours the lye will be clear, and must be thrown into a wash boiler with another gallon of boiling water; when the contents of the vessel boil, four pounds of any grease must be added slowly, poured in in a thin stream and stirred well. When intimately mixed the boiler should simmer slowly for four or six hours, and half an hour before taking off another gallon of hot water may be added together with half a teacupfull of salt. The latter is not necessary, however, and if two much is thrown in the soap is curdled or made short so that it breaks and wastes. When the soap is thought to be done plunge a case knife in, if the mass drops clear and ropy and chills quickly it is soap and will be firm and hard when cold. Have ready a wash tub well wet on the bottom and sides; pour the soap in and let it set; in a few hours it will be hard enough to cut out and as white as snow. This process makes twenty-five pounds of soap, or, by the aid of grease, four pounds, lye, one pound, twenty-four pounds of water, less two quarts driven off in boiling, (one gallon weighs eight pounds nearly,) are converted into soap of excellent detersive properties. Since the grease is saved from the family waste the soap has only cost what the lye has come to, and, as the loss by drying is only 25 per cent, eighteen pounds of soap can be made for fifty cents, a little over three cents per pound. We have made hundreds of pounds of this soap in all varieties and use it constantly for domestic purposes.

A SIGNIFICANT FACT.

We have frequently called public attention to the fact that, notwithstanding the existence of war and the consequent disturbance of business, the arts do not languish nor does trade stagnate to the degree that might have been expected. Repeated calls for men to fight the battles of the nation have drained the North of large numbers of its most skillful craftsmen. Eager to uphold the national credit and honor under all circumstances, machinists, carpenters, engineers, farmers, masons, indeed, members of every calling, have laid down their several implements and hurried to the field. Nay, more, they have also unloosed their purse strings, and while they have shed their blood in their country's defense, they have loaned to the Government the wages received for this very service.

In consequence of the absence of manual labor, machinery has been, and still is largely in demand to supply the demands of trade, and we call attention to the unprecedentedly large list of patent claims in this number as the fullest evidence that inventors are awake and equal to the emergency. Machines, plans, processes, designs and apparatuses are all recorded there, and it would be difficult to find a branch of manufacturing not represented.

The present list is the largest ever issued from the United States Patent Office, and numbers no less than one hundred and fifty-one cases.

Our friends and patrons will be pleased to learn that the SCIENTIFIC AMERICAN PATENT AGENCY is, as usual, largely represented here, and may fairly claim the lion's share in the number of patents procured. Out of the whole number SEVENTY-THREE were obtained through this offie, and we present this naked fact as the best evidence of the confidence of the inventive portion of the community in our efforts to serve them.

NOTICE TO SUBSCRIBERS.

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

ISSUED FROM THE UNITED STATES PATENT-OFFICE FOR THE WEEK ENDING MARCH 7, 1865.

Reported Officially for the Scientific American.

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

46,616.—Protecting trees from Injury while Plowing.—Ruel Alden, East Toledo, Ohio:

I claim the employment or use of india-rubber or other elastic substance in the form of rollers or otherwise applied to one or both ends of a whiffletree to serve as a cushion or guard to protect, while plowing, trees from the action of the whiffletree substantially as set forth.

[This relates to a new and useful attachment to be applied to whiffletrees in plowing in order to prevent the latter abrading trees a contingency which always attends the plowing of grounds in orchards, especially young orchards, as the plow approaches the trees sufficiently near, or should, if the ground be properly plowed, to cause the whiffletrees to come in contact with the trees.]

46,617.—Cartridge Retractor for breech-loading Fire Arms.—Ethan Allen, Worcester, Mass.:

I claim a link, F, hung in front of the center of action of barrel, B, in combination with discharger, E, substantially as described.

46,618.—Apparatus for Oxidizing Metals.—Wm. Atwood, Cape Elizabeth, Maine:

I claim the invention of a revolving chamber so constructed as to admit the passage of a constant current of atmospheric air over and through the material to be oxidized while the same is kept in constant motion and exposed to any desirable degree of heat.

46,619.—Process for Desulphurizing and Disintegrating Ores.—Dr. James C. Ayer, Lowell, Mass. Ante-dated Jan. 24, 1865:

First, I claim the application of treating rock or ores while in the heated state with an alkaline solution substantially as described for the purpose of partial disintegration desulphurization and oxidation of the same.

Second, I claim the application of re-treating ores which have been heated substantially as above described and the same repeated for the complete disintegration desulphurization and oxidation of the same.

46,620.—Process for Desulphurizing and Disintegrating Ores, etc.—Dr. James C. Ayer, Lowell, Mass. Ante-dated Jan. 24, 1865:

First, I claim the application of treating rock or ores while in the heated state with a saline solution substantially as described for the purpose of partial disintegration, desulphurization and oxidation of the same.

Second, I claim the application of re-treating ores which have been heated substantially as above described and the same repeated for the complete disintegration, desulphurization and oxidation of the same.

46,621.—Process for Disintegrating, Desulphurizing and Oxidizing Ores.—Dr. James C. Ayer, Lowell, Mass. Ante-dated Jan. 24, 1865:

First, I claim the application of heating ore while in a heated state with water substantially as described for the purposes of partial disintegration, desulphurization and oxidation of the base metal in same.

Second, I claim re-treating ores which have been treated substantially as above described and repeating the same for the complete disintegration, desulphurization and oxidation of the metals in the same.

46,622. Gaiter Boots.—Samuel Babbit, Kokomo, Ind.:

I claim a gaiter boot constructed with a folding extension, C, substantially as and for the purposes set forth.

46,623.—Attaching Sleigh Bells to Straps.—Wm. E. Barton, East Hampton, Conn.:

First, The metallic seat having a recess conforming to the boss of the bell a hole for the coupling screw to pass and impinging surfaces on the leather side to keep the seat in place substantially as described.

Second, In combination the bell with short boss and screw hole the metallic seat strap and coupling screw substantially as described.

Third, In combination the coupling screw flaring washer strap metallic seat and bell substantially as described.

46,624.—System of Supporting Combustion.—J. A. Bassett and E. L. Norfolk, Salem, Mass.:

We claim supporting or effecting combustion in furnaces, stoves, etc., by the introduction of superheated steam with or without air substantially as herein described.

[This invention consists in supporting or effecting the combustion of carbonaceous fuel in furnaces or stoves by the introduction of superheated steam mixed with or without atmospheric air below or among the incandescent fuel by which an instantaneous decomposition takes place into hydrogen and carbonic oxide, both of which are combustible and burn as gas above the layer of fuel, and this decomposition is more or less energetic as the steam is more or less heated.]

46,625.—Ordnance and Projectile.—Benjamin F. Bates and Charles R. Macy, New York City:

First, we claim a projectile made with a small head, B, a smaller body, C, to pass through an aperture in the breech of the gun and a disk, D, to fit the bore of the gun substantially as herein described.

Second, A gun having guide blocks, G G', applied to its breech in the manner described and employed in connection with a projectile formed with a longitudinal rear extension, C, either for the purpose of guiding the latter in a central position or imparting rotation to the projectile as herein set forth.

46,626.—Seeding Machine.—Wm. N. Bates, Center Point, Iowa:

I claim the combination and arrangement of parts herein described consisting of a mitered seed box with a regulating slide, C, with its spring inside of the seed-box, a gate, I, operated by a handle from the exterior, and a toothed reciprocating agitator, F, moving on bearings at the upper part of the seed box, with its teeth extending down nearly to the seed aperture, and operated by connection with a vibrating block, and a link from a wrist on the driving wheel.

[This invention relates to certain improvements in that class of seeding machines which sow the seed broadcast, the end being placed in a suitable box and made to discharge through an opening or crevice the size of which can be regulated by a suitable slide or which can be closed by a gate, the discharge of the seed being facilitated by an agitator to which a reciprocating motion is imparted from the driving gear of the machine.]

46,627.—Bone Mill.—Edwin P. Baugh, Philadelphia, Pa.:

I claim, first, Making the grinding surface of mills for grinding bone and other substances, when the same are of cast metal, in sections or divisions so that the outer grinding surface shall be composed of vertical sections, b, surmounted and held in place by a ring, c, whose periphery is also a grinding surface, substantially as above described.

Second, I claim making the ring, L, which serves as a foundation for the lower edges of the grinding surface, separate and distinct from the shell, A, which surmounts the said outer grinding surface, substantially as above described.

[The object of this invention is to construct a mill suitable for grinding and reducing bones to the fine condition required when they are to be used as a fertilizer, and also for grinding other refractory substances, and it consists among other things of a novel construction of the grinding surfaces sometimes called the dress, an improved mode of securing them in the mill, and other improvements hereinafter set forth.]

46,628.—Harvesting Machine.—A. Belchamber, Ripley, Ohio:

I claim the flange, I, attached to a rod, H, at the upper end of the rotating shaft, D, and provided with sockets in which the rake-bars, J, are permanently secured and the reel-arms, J', secured by pivots or pins, g, in connection with the cam way, M, all arranged to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and improved reaping and mowing machine of that class in which horticultural rakes and reel-arms are employed, and it consists in a novel manner of arranging the same whereby machines of this class are much simplified.]

46,629.—Corn Planters.—George I. Bergen, Galesburg, Ill.:

First, I claim the runner, D, having a concave edge along its front part, and a slightly descending straight edge from a', to a'', as shown and described.

Second. I claim uniting the front and rear frames of a corn planter by means of the curved slotted box, f, and bar, g, in combination with the loose joint, d e.

Third, I claim a guide for planting, consisting either of two points, or a broad plane surface, substantially as set forth.

Fourth, I claim the hopper, C, when constructed as herein set forth.

Fifth, I claim the plate, k, when constructed and used as and for the purposes described.

Sixth, I claim the scrapers, H, constructed as described and mounted on the roller, I, in such a manner as to automatically remove themselves from contact with the wheels, as and for the purpose set forth.

Seventh, I claim the seed tube, E, when constructed as shown and described.

Eighth, I claim the rubber cut off, j, when constructed and operating as herein set forth.

Ninth, I claim the sliding rod, K, having the bent arms, t, and operating in conjunction with the standards, t, and seed slides, o, as and for the purpose set forth.

Tenth, I also claim pivoting the valve, m', on the removable pin, q, and having the stem of said valve resting loosely in a notch, o, in the edge of the seed slide outside of the hopper all arranged and operating as herein described.

46,630.—Reaping Machine.—H. W. Bill, Cuyahoga Falls, Ohio:

First, I claim removing the grain from the machine and depositing it upon the ground in gavels, by means of the frame, F, raised and rotated by one continuous operation substantially as set forth.

Second, I claim the guards, H, in connection with the frame, F, as and for the purpose set forth.

Third, I claim the bearers, c c, in connection with the frame, F, as and for the purpose set forth.

Fourth, I claim rotating the frame, F, by means of the pawl, e, and spring, s, in combination with the shaft, b, and catches c c, substantially as and for the purpose set forth.

46,631.—Street Lamps, Lanterns, etc.—John Binney, Boston, Mass.:

First, I claim the construction and arrangement of street lamps or lanterns or other lamps exposed to winds or currents of air substantially as herein described.

Second, A lantern or street lamp cap composed of a chimney provided with apertures and overhanging bands in combination with an annular shield the whole being constructed for operation in the manner and for the purpose set forth.

46,632.—Apparatus for Amalgamating Gold and Silver.—H. Bolthoff, Buddington, Iowa:

First, I claim the employment or use of the two mullers, O K, placed one above the other in the pan, B, and arranged in such a manner as to rotate in reverse or opposite directions, substantially as and for the purpose herein set forth.

Second, the arrangement and combination of the central fixed conical hub, C, at the center of the fan, B, spindle, E, tubular shaft, D, conical hub, J', of muller, K, and the hollow hub, Q, of muller, O, provided with arms, R, fitted on the sleeve, M, which is placed on the upper part of the spindle, E, with the screw, N, fitted in it, substantially as and for the purpose described.

[This invention consists in using within a pan two rotary mullers arranged in such a manner that they will rotate in reverse directions said mullers being provided with openings and placed one over the other, whereby the pulp will be thoroughly ground and the mercury intermixed therewith so that all the particles of precious metals contained in the former will be brought in contact with the mercury and amalgamated, the work being rapidly performed and in a very efficient manner.]

46,633.—Apparatus for Distilling Petroleum, etc.—Edward Braggins, Titusville, Penn.:

I claim the method described of producing a vacuum in the condenser, k, by water in the manner described when done by the aforesaid combination for the purposes set forth. I claim the combination of the water tank, P, with the tubes, O and N, the condenser, k, the tube, R, and the retort, A, with the tubes, E F C, when the same are constructed as described and in the aforesaid combination for the purposes set forth.

46,634.—Safe.—Martin Briggs, Rochester, N. Y.:

I claim the construction essentially as herein shown, the lock, C, being secured within the inner side or back of the door, with its back resting through in such a manner as to be readily opened and used in combination with the plates, A B, and packing, D, so that the packing will surround the lock on the outside and ends to protect it substantially as set forth.

In combination with lock, C, plates, A B, and packing, D, as above described, I also claim arranging the bar, H, and its bolts, g g, in the inner flange of the door and rendering them accessible by the chamber, i, substantially as herein set forth.

46,635.—Oil Can.—John Broughton, New York City:

I claim an oil can or oiler having a transparent chamber applied to or combined with its metallic or opaque body and nozzle to operate substantially as and for the purpose specified.

[This invention relates to an improvement in the construction of oil cans or oilers, such as are generally used by mechanics for lubricating machinery, depositing oil on stones or hones, etc., etc. The object of the invention is to facilitate the filling of the can and prevent the overflowing of the same, a contingency of frequent occurrence and which is the cause of considerable annoyance attended with waste of oil or other lubricating material used.]

46,636.—Composition for Lining Oil Barrels.—Wm. Budd and J. L. Husband, Philadelphia:

We claim the manufacture of the firm elastic impervious coating and the use of the same as herein before substantially set forth.

46,637.—Corn Planter.—W. E. Chesney, Abington, Ill.:

I claim the cams, L L, and lever, M, in combination with the bar, K, seed boxes, F F, and springs, j j, all arranged to operate as herein set forth.

[This invention relates, first, to a new and useful improvement in mounting the frame of the machine and annexing the driver's and dropper's seat thereon, whereby the same may be readily turned in the field at the ends of rows of planted corn, and at the same time remain in a proper position to admit of the forward shares being raised out of the earth and held in an elevated state while the machine is being turned.]

46,638.—Pump.—M. R. Clapp, New York City:

I claim inducting the water into the main cylinder, B, through openings, f' f2, which surround or nearly surround the cylinder at each end, controlled by valves, G' G2, as specified, and delivering the water through valves or sets of valves, M' M2, the several parts being arranged and adapted for joint operations and easy access substantially as set forth.

46,639.—Receiving Magnet for Telegraphs.—James J. Clark, New York City:

I claim the revolving wheel, A, with roughened edge in combination with a telegraph receiving or main magnet applied in the manner and for the purpose as herein before specified.

46,640.—Can for Preserving and Transporting Milk.—Moses M. Clark, Monroe, N. Y.:

I claim the filling in of milk cans between the inner and outer covers with pulverized charcoal as a means of preserving milk, in such a manner as to protect the milk from heat.

46,641.—Gold Washer.—N. D. Clark, Bentonsport, Iowa. Ante-dated March 3, 1865:

First, I claim the providing of a separator for the above described purpose with a series of elastic slips attached to the open end, to serve in separating nuggets from among the stones.

The providing of a separator as above with a second bottom, made hollowing or inclined from the sides inward to some point where there is an opening downwards, to serve in collecting and discharging the dirt at one place.

Third, The providing of the above described separator and gold-pan with a sifting or oscillating motion.

Fourth, The double use of the water, first as a propelling force and then to wash the dirt.

46,642.—Car Brake.—J. M. Collins, New Bedford, Mass.:

First, I claim the mode of securing the shoes, D D, to the heads, B B, by means of the dovetail projections, c, on the shoes fitted in the dovetail grooves, b, in the heads when combined with the dovetail plugs, E, and the bolts, e, provided with the dovetail heads, f, all arranged as set forth.

Second, The cast-iron shoe bar, A, when attached or fitted to the heads, B B, when constructed in the manner substantially as herein shown and described.

46,643.—Padlock.—Edward Coyle, Albany, N. Y.:

I claim the combination of the spring, E, with the shackle, B, plurality of double hooked tumblers, C, and springs, d, all constructed, arranged and operating as and for the purposes specified.

46,644.—Machine for Making Fish Hooks.—C. O. Crosby, New York City:

First, I claim the combination of an intermittent feeding device with a cutter, L, or its equivalent, when both are constructed substantially as herein set forth.

Second, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translating movement of the blank with a cutter, L, and header, B4, or their equivalents, substantially as described.

Third, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translating movement of the blank with header, B4, and barb cutting instrument, P2, or their equivalents, substantially as described.

Fourth, The presser, 13 when formed so as to press upon the blank forward of the barb to bend the blank over the bed P', on which it rests, and to prevent the barb from curling over, substantially as set forth.

Fifth, The combination of the holder, 14, back of the barb cutting instrument with the presser, 13, forward of the barb cutting instrument, substantially as and for the purpose specified.

Sixth, The combination of the holder, 14, back of the barb cutting instrument and the presser, 13, forward of the barb cutting instrument with the block or bed, P', on which the blank rests, substantially as and for the purpose set forth.

Seventh, The combination of the holder, 14, back of the barb cutting instrument the presser, 13, forward of the barb cutting instrument and the bed, P', on which the blank rests with the barb cutting instrument, P2, substantially as described.

Eighth, The combination of a carrier constructed and operating as described producing intermittingly a progressive translatory movement of the blank with barb cutting instrument, P2 and one or more pair pressing or clipping dies, substantially as specified.

Ninth, The combination of a carrier constructed and operating as described producing intermittingly a progressive translatory movement of the blank with one or more pair pressing or clipping dies, barb cutting instrument, cutter, L, or its equivalent and intermittent feeding device, substantially as described.

Tenth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with one or more pair pressing or clipping dies barb cutting instrument, P2, and header, B4, or their equivalents substantially as specified.

Eleventh, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with one or more milling devices, substantially as set forth.

Twelfth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with two or more pair of pressing or clipping dies, substantially as specified.

Thirteenth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with two or more milling devices, S, substantially as described.

Fourteenth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with a barb cutting instrument and one or more milling devices, substantially as set forth.

Fifteenth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with a header, barb cutting instrument and one or more milling devices substantially as described.

Sixteenth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with a bender or former, T2, substantially as described.

Seventeenth, the combination of a carrier constructed as described, producing intermittingly a progressive translatory movement of the blank with one or more milling devices, and a former or bender, T2, substantially as specified.

Eighteenth, The combination of a carrier constructed as described, producing intermittingly a progressive translatory movement of the blank with a barb cutting instrument and bender or former, T2, substantially as specified.

Nineteenth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with a header, B4, and barb cutting instrument substantially as described.

Twentieth, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with a bender, T2, and cutting device, L, substantially as described.

Twenty-first, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement with a grooved guide, 15, substantially as and for the purpose specified.

Twenty-second, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank with a holder, c', which grasps and securely holds the blanks during their movement from one instrument to another, substantially as set forth.

Twenty-third, The combination of a carrier constructed and operating as described, producing intermittingly a progressive translatory movement of the blank and holder, c', which grasps and securely holds the blanks during their movement from one instrument to another with a bender, T2, substantially as described.

Twenty-fourth, The combination in one machine of an intermittent feeding device, cutter, L, a carrier constructed and operating as described, header, B4, barb cutter, P2, pointing devices and bender, T2, or their equivalents, in the manner and for the purpose substantially as herein set forth.

Twenty-fifth, The adjusting guide, P3, for regulating the depth of the cut, in combination with the barb cutting instrument, P, substantially as described.

46,645.—Apparatus for Gathering Quicksilver.—M. B. Dodge, New York City:

I claim the slats, D, inserted into the vat, A, so as to have channels, a, between their lower edges and the bottom of the vat in combina-

tion with an amalgamated bottom, B, and with or without an agitat or, E, constructed and operating substantially as and for the purpose set forth.
Also, imparting to the vat, A, and to the agitator, E, a reciprocating motion in opposite directions, as and for the purpose specified.

46,646.—Water Filters.—Nicholas Downes, Syracuse, N. Y. Antedated Feb. 2, 1863 :
I claim the combination of the ice disk reservoir partition, K, and tube for cleansing with the filtering medium as and for the purposes set forth.

46,647.—Machine for Raking and Loading Hay.—William A. Duncan, Syracuse, N. Y.:
First, I claim the slotted clearing wedge, K, when located in front of the upper shaft, V, and constructed with slots, l l, projecting over the said shaft and with an inclined conductor, l, all as herein shown and described.
Second, the vertical sliding rake teeth, H, operating substantially in the manner and for the purpose set forth.
Third, I claim the springs, n, when constructed as herein shown and described and employed in combination with the channels, L, and teeth, H, in the manner and for the purpose specified.
Fourth, The combination of the springs, s, and the springs, n, with the teeth, H, whereby a yielding horizontal and a yielding vertical play is allowed to the teeth, H, substantially in the manner and for the purpose described.
Fifth, The longitudinal adjustment of the rake head, g, to and from the elevator, substantially in the manner and for the purpose set forth.
Sixth, The combination of the slotted clearing wedge, K, the curved guard board, m, and the vertical sliding rake teeth, H, with the endless apron or elevator, D, all arranged substantially in the manner and for the purpose described.

46,648.—Extension Ladder.—Calvin Eaton, Webster, N. Y.:
I claim the combination and arrangement of the detachable section or extension, B, constructed as set forth with the main ladder in the manner and for the purposes shown and described.

46,649.—Foot Warmer.—Augustus Eckert, Trenton, Ohio:
I claim in combination with the casing, A, and door, B, the lamp F, and chimney, G, flaring plate, J, horizontal plate, K, and channels, j j, constructed arranged and operating as and for the purposes described.
[This invention consists in an arrangement of parts whereby a foot-stove or foot-warmer is made to combine in itself a lantern and a nursing or cooking lamp also.]

46,650.—Latches.—Henry H. Elwell, South Norwalk, Conn.:
First, The employment or use of the catch or fastening, E, fitted on a pin, a', of the part, C, of the slide latch, and arranged substantially as shown to engage with the part, C, of the latch, for the purpose set forth.
Second, The actuating of the catch or fastening, E, by means of the key of the lock through the medium of the tumbler or any equivalent arrangement, substantially as described.
[This invention relates to a new and improved means employed for reversing the slide latch of a lock so that the same may be adjusted to suit either a right or left hand door.]

46,651.—Gas Stove.—Luther Erving, Brooklyn, N. Y.:
I claim the gas chamber, D, provided with a perforated top, E, in combination with the air and gas chamber, G, all arranged substantially as and for the purpose herein set forth.
I further claim the arrangement of the flues, F I J, when used in combination with the gas chamber, D, and air and gas chamber, G, substantially as and for the purpose specified.

46,652.—Chronometer Escapements.—Charles Fasoldt, Albany, N. Y.:
I claim the pallet, e, arranged in combination with the pallet lever, c, wheels, a b, and balance, f, in the manner and for the purpose substantially as herein shown and described.

46,653.—Latch for Doors.—Samuel W. Fordick and A. C. Dakin, Clinton, Mass.:
I claim the catch, C, formed with a horizontal gravitating hooked arm, e, adapted to catch in the plate, F, and an upwardly projecting arm provided with a knob, E, by a direct pull upon which the latch is retracted, all as herein described.
[This invention relates to a new and improved latch for doors, designed more especially for closet and cupboard doors.]

46,654.—Teeth for Cultivators.—Henry Francisco, Lake Mills, Wis.:
First, I claim the eccentric standard to a cultivator tooth, constructed and operated substantially as described.
Second, The slotted slide and set screw, arranged and operated in the manner and for the purpose described.
Third, The combination of the set and set retaining device with the eccentrically hung shank of a cultivator tooth, substantially as and for the purpose indicated.

46,655.—Making Volute Springs.—John Freeland and Danl. Ward, New York City :
I claim a volute spring composed or formed out of a single plate cut or divided longitudinally nearly its whole length with the cut portions spread apart, and the plate rolled, substantially as herein shown and described.
[This invention relates to a new and useful improvement in volute springs for railway cars, and for other purposes. The object of the invention is to obtain a spring of the class specified which will possess a greater degree of elasticity than usual and be stronger or less liable to break and more durable.

46,656.—Car Couplings.—Francis M. Gifford, Brant, N. Y.:
First, The drop bolt or pin, F, and link or shackle, D, in combination with the pivoted bar, H, and the brace or stay, E, all arranged in relation with the draw head to operate substantially in the manner as and for the purposes herein set forth.
Second, the pin, E', in the rear part of the draw head when used in connection with a link or shackle, D, and a brace or stay, E, substantially as and for the purpose specified.
[This invention relates to a new and improved car coupling, of the class which are commonly termed self coupling.]

46,657.—Cultivator.—John H. Given, Henry Hutsonpiller, and H. Chas. Gilbert, Des Moins, Iowa :
We claim the frame, D, pivoted or attached to the draught pole, A, as shown in connection with the jointed set bar, O, angle plates, p, and the plates, r, all arranged to admit of the ready elevation of the plows, as set forth.
We further claim the uprights, H H, connected at their upper parts to the lever, J, and connected at their lower parts to the plow standards, F F, and pivoted to the frame, d, substantially as shown and described, to admit of the lateral movement of the plows, G, as described.
[This invention relates to a new and improved cultivator for plowing or cultivating corn and other crops which are grown in hills or drills.

46,658.—Bolting Apparatus.—Henry B. Goodyear, New Haven, Conn.:
First, the combination with the wire instrument for seizing and drawing up and forcing internal elastic ball valves into the necks of bottles for the purpose of closing or stopping the same of a check piece, operating in conjunction with said wire instrument in the manner and for the purpose set forth.
Second, The machine or apparatus herein described for closing bottles by means of internal elastic valves, in the manner shown and set forth.

46,659.—Snap Hooks.—Robt. A. Goodyear, New Haven, Conn.:
I claim, first, The recessed shank of the closing bar, when constructed for operation substantially in the manne and for the purposes set forth.
Second, As a new article of manufacture I claim a snap hook, the same consisting of a hook, a recessed hinge or closing bar and spring combined in the manner substantially as set forth.
Third, In combination with the recessed hinge bar and hook of a vulcanized india rubber spring the whole being constructed and combined in the manner and for the purposes set forth.

46,660.—Machine for Riveting Buttons in Cloth.—William J. Gordon and Edmond D. Gilbert, Philadelphia, Pa.:
We claim, first, In machines for attaching buttons to cloth or other material, feeding the rivet and the button, perforating the material, placing the rivet therein, advancing the cloth and rivet to the button, and uniting them by riveting, by mechanical devices, constructed, arranged, and operating as a whole substantially as described.
Second, We claim the needle and its tubular casing, T, constructed and operating substantially as described.
Third, We claim the jointed hook, Q', with its inclined face, 29, for operating the hammer, in its connection with the button riveting machine, substantially as described.
Fourth, We claim the combination of the punch stick, K, casing, J', punch, M, and spring, K', constructed, arranged and operating substantially as described.
Fifth, We claim the button chamber, L', in the bottom of the punch stock, substantially as described.
Sixth, We claim the button chamber, L', in combination with the centering tube, J', constructed with a centering end, M', substantially as above described.
Seventh, We claim releasing the rivet from its carriage by the impact thereon of the punch stock, substantially as described.
Eighth, We claim the rivet-carriage, constructed substantially as above described.
Ninth, We claim the hopper in combination with the channel, V, chamber, L', and the feeding slide, W, substantially as described.
Tenth, We claim operating the punch stock by means of the upper arm of the lever, H, substantially as described.
Eleventh, We claim operating the button feeding slide, W, by means of its sliding rod, X, or its equivalent, and the sliding pin, 10, substantially as described.
Twelfth, We claim the combination of the ratchet, G, bent lever, I, 14, and lever, H, substantially as described.
Thirteenth, We claim operating the pawl, I, on the return movement of the lever, H, in the manner and by means substantially as described.
Fourteenth, We claim the cross heads, 18 and 19, constructed as described in combination with the standards, S S, and Q4, and cam, E, for the purpose described.
Fifteenth, We claim operating the cam by means of the pawl, I', on the lever, B, and the ratchet, G, on the cam shaft, substantially as described.
Sixteenth, We claim operating the rivet carriage by means of the lever, H, and lever, Y, substantially as described.

46,661.—Machine for Making Heads to Barrels.—John Greenwood, Rochester, N. Y.:
I claim so arranging the clamp heads, C C', upon the swing frame, B, and combining therewith the sliding shaft, D, that the said heads first clamp the boards in place, and then move up to cut the barrel head, substantially as herein set forth.
In combination with the sliding shaft, D, and clamps, C C', I also claim the lever, E, and wedge cam, G, operating substantially as and for the purpose specified.
I also claim the combination of the spring, d, pin, g, and collar, h, with the shaft, D, provided with the cavity, c, slot, f, the whole so arranged as to produce the reaction of said shaft, to separate the clamps, and so as not to interfere with the twining of the shaft substantially as described.
I also claim the disk wheel, M, mounted on the arm, N, and both used in combination with the swing frame, B, and piston wheel, O, in such a manner that the forward motion of said swing frame will bring the two wheels in contact, and the back motion of the frame will disengage them substantially as herein specified.
In combination with the subject matter of the preceding clause, I also claim the spring catch, t, substantially as specified.
I also claim the arms, S S', in combination with the clamp heads C C', and swing frame, B, to operate in such a manner that when the swing frame is drawn back, the said arms will rest under the clamps to sustain the boards, but when moved forward the clamps will clear from them, substantially as described.

46,662.—Collision Brake.—C. B. Guy, Lybrand, Iowa :
I claim a collision brake for railroad cars composed of a double inclined truck mounted on wheels and placed in front of a train, and arranged so that the locomotive or front cars of two approaching trains, in the event of a collision, will ascend the inclined tracks and loose their momentum during their ascent, substantially as herein described.
[The object of this invention is to prevent accidents arising from collisions on railroads, and it consists in the employment or use of a double inclined truck mounted on wheels and placed in front of the locomotive of a train, the locomotive being connected to the inclined track in such a manner that it will disconnect itself in the event of a collision and the locomotives and forward cars of the two trains will pass up the inclined tracks and lose their momentum in the ascent.

46,663.—Passenger Register.—Edward Hackett, New-York City:
I claim the roller, E, provided with a spiral groove, g, and marked with alternating figures and ciphers placed in a spiral row to operate in combination with the slide, l, and with the hinged step, A, sliding rod, B, and weight, C, or its equivalent, in the manner and for the purpose substantially as set forth.
[This invention consists in the employment or use of a roller to which an intermittent rotary motion is imparted by connecting it in a suitable manner with the hinged step of a street car, omnibus, or other public conveyance, and which is marked on its circumference with a series of figures placed in a spiral row, and also provided with a spiral groove to operate in combination with an endless apron carrying the indicating slide in such a manner that for each start given to the roller by the weight of a passenger acting on the step the slide is propelled a proportionate distance and a new figure is brought opposite to an opening in said slide, thus indicating the number of passenges passing in and out of the conveyance with perfect accuracy.]

46,664.—Horse Hay-fork.—A. M. Halsted, Rye, N. Y.
I claim a horse fork provided with a shank, C, having an oblong clot, c, for the pivot bolt, d, which connects the shank with the tines, to pass through in connection with the catch, D, in the head, B, and the lip or projection, e, on the shank—all arranged to operate in the manner substantially as and for the purpose set forth.
[This invention relates to a new and improved trip mechanism for a horse hay-fork—that is to say, a means whereby the fork is held in a position to retain its load while being elevated, and which will admit of being readily manipulated so that the fork may discharge its load when required.]

46,665.—Portable Heater for Liquids.—Wm. A. Hancock, Salem, N. J.
I claim the combination of the heater, A, provided with tubes, B, and the base, C, provided with sockets, C', the heater being adapted to slide up and down within the base and retained at any desirable hight, substantially as and for the purposes specified.
[This invention relates to an apparatus of very simple construction and compact form, especially adapted for the use of soldiers on picket duty, for heating coffee, water or any beverage or stimulant.]

46,666.—Cultivator.—Lorenzo D. Haughey, Atlanta, Ill.
I claim the pivoting of the axle, A, to the draught pole, D, to admit of the lateral movement or adjustment of the plows as set forth.
I also claim the semicircular frame, C, attached to the front side of the axle, in connection with the friction roller, F, and bolt or rod, G, attached to the draught pole, D, substantially as and for the purpose specified.
[This invention relates to a new and improved cultivator for cultivating or plowing corn and other crops which are grown in hills or drills, and it consists in a pivoted axle and a novel construction and arrangement of other parts whereby it is believed that several advantages are obtained over other devices for the purpose specified.]

46,667.—Construction and Hanging of Gates.—J. Healy, South Dansville, N.Y. :
I claim the gate above described, constructed and applied substantially as above set forth.
[This invention has for its object to produce a gate which may be opened from the right or left-hand sides, and suspended at different hights above the ground to allow small animals to pass beneath, and which may be lifted off its points of suspension without making any changes in the gate or its posts.]

46,668.—Pneumatic Drill.—Herman Haupt, Cambridge, Mass.
I claim the method of and apparatus for drilling rock for mining, tunneling, and boring purposes, substantially as herein before described.

46,669.—Apparatus for Folding Paper Collars.—Albert H. Hook, New-York City:
I claim the elastic folding surface in an inclined position on which the knife acts in folding as described, in combination with the gages, m, substantially as and for the purposes set forth.

46,670.—Stove-pipe Damper.—James L. Howard, Hartford, Conn.
I claim, First, Retaining the dampers of stove-pipes in any desired position by means of the elasticity of the pipe, substantially as above described.
Second, I also claim releasing the damper or its axis from the indentations, e, or other device for holding the damper in place, by shortening the diameter of the pipe in the line of the axis of the damper, substantially as described.
[This invention consists in a novel mode of applying a damper to a stove-pipe, wherein the elasticity of the pipe is employed to keep the damper in any desired position, and its flexibility is employed for the purpose of releasing it in order to take a new position.]

46,671.—Breech-loading Fire-arm.—Frederick Howe, Providence, R. I.
What I claim in combination with the hinged breech piece is constructing the hammer and the latch bolt substantially as herein described, that they shall act as a stop to prevent the closing of the breech unless the hammer be first drawn back as set forth and for the purpose specified.
And I also claim the special construction of the wing for drawing out the cartridge cases from the barrel with its flanches fitted to sockets in and combined with the breech piece, as herein described.
And I also claim making the hinged swinging breech piece hollow to receive and contain the mechanism of the lock, in combination with the abutting shoulders at the sides to resist the recoil by abutting against corresponding shoulders in the mortise of the surround ing metallic case, as and for the purpose described.

46,672.—Steam Engine.—W. Huston, Wilmington, Del.
I claim, First, The cylinders, E E* E' E'*, secured to the ends of heads, D D', mounted on eccentric shafts, C C', and operating in combination with a common piston rod and pistons, F F* F' F'*, in the manner and for the purpose substantially as set forth.
Second, The use of the compound piston rod, G, constructed as shown in figures 7 and 8.
The disk valves, H H', applied in combination with the revolving heads, D D', and with the common starting and reversing bar, I, in the manner and for the purpose substantially as described.
[This invention consists in an engine composed of four cylinders which are secured one to each end of two heads mounted on the ends of two shafts which are parallel but not situated in line with each other and coupled together by a compound piston rod, moving in suitable guide grooves in said heads in such a manner that each pair of cylinders revolve in a true circle around the shaft to which they are connected, but the pistons of one set of cylinders act eccentrically on the shaft of the other set, and vice versa.]

46,673.—Well Borer.—Walter Hyde, New York City:
I claim, First, The pulley, c, arranged in the oscillating lever, C, in combination with the drill rope, E', pulley, g, windlass, D, and tappet wheel or cams, constructed and operating substantially as and for the purpose set forth.
Second, The double gear, g h, pawl, j, or its equivalent, and hand crank, i, applied in combination with the drill rope and cams, substantially as herein described, so that the stroke of the drill can be adjusted and the drill raised or lowered while the machine is running.
Third, The shears, I, applied in combination with the platform, A, and sectional drill rod, H, substantially as and for the purposes specified.
Fourth, The use of a double windlass, W W', and adjustable stirrup, S, in combination with the drill rope, E', and bucket rope, E'', constructed and operating substantially as and for the purpose described.

46,674.—Elastic Fabric.—Hector Hyves, New York City:
I claim making an elastic fabric suitable for bed bottoms and other analogous purposes by means of securing the strands to the frame and lacing them to resemble lattice work by passing the adjacent angles formed by the sinuosities of the cord through thimbles or short sections of india-rubber tubing, as described and represented.
[The object of this invention is to produce a fabric which shall be suitable for the bottom surfaces and backs of chairs, settees, sofas, cots, beds, berths, and all manner of surfaces in which it is desirable to combine the qualities of lightness, elasticity, cleanliness, and economy.]

46,675.—Cultivator.—John W. Ingle and R. H. Wright, Livingston, Ill.
We claim the frame, D, attached to the axle, A, by a pivoted bolt, a, and provided with pivoted plow standards, H, connected by rods, k, the segment tears, J K, and levers, L L, in combination with the levers, G G, attached to the frame, D, and draught pole, C, all arranged to operate substantially as and for the purpose set forth.
[This invention relates to a new and improved cultivator designed for cultivating those crops which are grown in hills or drills.]

46,676.—Screw Plates.—John Jennings and George C. Sweet, West Meriden, Conn.
We claim the employment or use of pins, C C, fitted in the plate, A, and provided with recesses, e e, as shown, for the purpose of securing the dies, B B', in the plate, A, admitting of their ready removal from the plates, as set forth.

46,677.—Engine Lathe.—James L. Johnson, Ashburnham, Mass.
I claim, first, The method therein giving to the tool stock an automatic motion back and forth at the termini of the stroke of the slide rest by means of the slide, g, and cam slot, f, constructed and applied substantially as set forth.
Second, The application of adjustable lugs, l, to the hand wheel, d, and screw, b, which serves to operate the tool stock, in combination with a spring stop, k, constructed and operating substantially as and for the purpose described.

46,678.—Broom.—O. W. Kellogg, Ripon, Wis.
I claim the broom above described as a new and improved article of manufacture.
[This invention consists in making a broom for household and other uses by securing the handle in the upper and smaller end of a metallic holder, and the "brush," or other material composing the sweeping surface, in the other end.]

46,679.—Mode of Weaving Button-holes in Fabrics.—Lucius J. Knowles, Warren, Mass.
I claim my improved mode, substantially as described, of weaving a fabric with button holes, the same consisting in weaving alternately of increments of the two marginal portions inclosing the button-hole and running the weft thread on the outside of the fabric between the weaving of any two consecutive increments, the same being essentially as herein before explained.
In combination with my said improved process or mode of weaving webbing with a button-hole, I claim the running of the first and last shoots of the wefts of each increment of a marginal portion between the upper and lower sets of warps, the same being for the objects specified.

46,680.—Whip Socket.—John Lake, Haydenville, Mass.

First, I claim the springs, B, placed within the socket and arranged substantially as and for the purpose set forth.

Second, The plate, C, with the spring, D, underneath it, arranged with the lower part of the socket to operate substantially as and for the purpose specified.

Third, The securing of the socket to the dashboard by means of the spring, E, substantially as shown and described.

[This invention relates to an improvement in the whip socket whereby the whip will be firmly retained therein, and the lower end or bottom of the socket prevented from being broken out or detached under the thrust of the whip when hurriedly shoved into the socket—a contingency of frequent occurrence with the ordinary sockets in use. The invention further relates to an improved mode of attaching the socket to the dashboard of the vehicle, whereby the socket may be readily detached from the dashboard of one vehicle and applied to that of another.]

48,681.—Punch and Die.—William K. Lewis, Boston, Mass.:

First, I claim the pricking needle, F, applied in combination with the yielding center piece, D, die, B, and punch, A, substantially as and for the purpose set forth.

Second, The combination of the center piece, D, and needle, F, separately adjustable in hight, and employed in connection with the spring, E, in the manner and for the purposes explained.

[This invention relates to an improvement in that class of punches and dies which are used for cutting and pricking studs, cups or covers for tin cans, etc., at one operation.]

46,682.—Ice Sandal.—Thomas J. Linton, Providence, R. I.:

I claim an ice sandal, stamped or otherwise, produced out of sheet metal, to fit the sole of a tool or shoe, and provided with a grater surface and lugs, and with a suitable fastening, by which it can be secured to the foot, substantially as and for the purpose set forth.

[This invention consists in an ice sandal, stamped or otherwise, produced out of sheet metal, to fit the formation of the sole of a boot or shoe, and provided with a large number of holes punched in, so as to form beards on the outer surface similar to that of an ordinary grater, in combination with lugs or ears catching over the edges of the heel and sole, and with a series of leather straps or other suitable fastening, in such manner that the sandal can be readily and easily attached to the sole of a boot or shoe, to which it had been fitted, and that by the action of the grater surface a firm foothold is obtained on ice or snow.]

46,683.—Pump.—Thomas J. Linton, Providence, R. I.:

First, I claim the shallow pans, B B', in combination with the reservoir, A, and induction pipe, C, constructed substantially as set forth.

Second, The producing a vacuum in the reservoir, A, by the combined action of hydrocarbon liquid and steam, substantially in the manner set forth.

Third, The arrangement of the water pan, B, and hydrocarbon pan, B', and reservoir, A, whereby the combustion of the hydrocarbon liquid in the pan, B, will vaporize the water in the pan, B, and thereby produce a partial vacuum in the reservoir, substantially as described.

Fourth, The measuring spouts, d d', applied in combination with the pans, B B', and closed reservoir, A, substantially as specified.

Fifth, The method herein described of igniting the hydrocarbon liquid in the pan, B', by igniting a portion of said liquid in the spout and running such ignited liquid into the reservoir, A, substantially as set forth.

Sixth, The drop valve, E, in combination with the ascension pipe, D, induction pipe, C, and reservoir, A, all constructed substantially as and for the purpose described.

46,684.—Red Ink.—Thomas J. Lumnrus, Lynn, Mass.:

I claim the use of a solution of the above-named salt in alcohol or other equivalent neutral spirit, as a red writing ink or fluid, substantially as described.

46,685.—Globe Valve Cock.—F. Lunkenheimer, Cincinnati, Ohio:

I claim a globe valve, in which the nut and stuffing box for the valve stem are made of one piece, or rigidly connected, the same as in an ordinary globe valve, but the nut instead of being provided on its outer surface with a screw thread is turned off smooth, and fitted in the socket of the shell, where it is held by a cap, substantially in the manner and for the purpose set forth.

[This invention consists of a globe valve, in which the nut and stuffing box for the valve stem are made one, the same as in the ordinary globe valve, but the nut, instead of being provided with a screw thread on its surface, is turned off smooth and fitted into a socket in the body or shell of the globe valve, and it is held down by means of a cap fitting over the outside of the nut and socket, in such a manner that when said cap is unscrewed the friction of the spindle in the stuffing box prevents the same from turning in the nut, and the valve can be ground with the greatest ease and precision, the nut itself forming the guide during the operation of grinding.]

46,686.—Washing Machine.—Lansing Marble, Vassar, Mich.:

I claim the cylinder, C, provided with the balls or spheres, a, at its periphery, in combination with the endless apron, J, arranged in connection with the fixed rollers, e' e', all arranged to operate substantially as and for the purpose herein set forth.

[This invention consists in the employment or use of a cylinder, provided at its periphery with balls or spheres placed in rows parallel with the axis of the cylinder, in connection with an endless belt and rollers, arranged within a suds box.]

46,687.—Artificial Leg.—A. A. Marks, New York City:

I claim, first, The oblique boxes, b, applied in combination with the gudgeons of the T-shaped bracket, D, and with the shell of the leg and thigh, in the manner and for the purpose substantially as set forth.

Second, The pear-shaped button, f, in combination with the spring, d, oscillating box, g, and with the bracket, D, applied to the thigh and leg, in the manner and for the purpose substantially as described.

[An engraving and description of this invention will shortly be published in the SCIENTIFIC AMERICAN.]

46,688.—Trough for Raising Dough.—H. S. McKean, Alleghany, Pa.:

I claim the employment or use of a box or chest, A, provided with a steam pipe, B, arranged substantially as shown, in connection with a dough chest, C, provided with feet, or arranged in any suitable way, so that it may be fitted in A, with its bottom above the steam pipe, or above the bottom of A, for the purpose of raising dough for baking, as set forth.

I also claim, in combination with the box or chest, A, heated by steam, as described, one or more perforated shelves, D, for the purpose specified.

[This invention is designed to facilitate the raising in cold water of dough for bread.]

46,689.—Hot-air Engine.—Henry Messer, Roxbury, Mass.:

First, I claim the arrangement in a hot-air engine of the lower part of the cylinder, the air pump, the fire box and the feed box, substantially as specified.

Second, Also the arrangement of the conduit around the cylinder, substantially as described, for keeping the upper part of the cylinder cool, and utilizing the waste heat.

Third, Also the employment in the unoccupied space in the foundation m, of a hot-air engine, for reception of water, so that steam can be generated by utilization of radiated and conducted caloric, which would otherwise be wasted, substantially as described.

Fourth, Also in connection with the space in the foundation, m, the separation of the cylinder therefrom, by a casing, a, substantially as and for the purpose described.

Fifth, Also dividing the space contained in the foundation, m, of a hot-air engine, by means of the partition p, when provided with a flange, as shown, by which a tight joint between the partition and covering plate, n, can be secured, substantially as and for the purpose described.

Sixth, Also the grate, as constructed, when arranged with reference to passages admitting air, both with or through it, and with provision for discharging the air between the fire pot and its lining, substantially as described.

Seventh, Also the employment, in combination with cup packing, of springs, by which the cup packing is so held to its place as to operate as designed under pressure.

Eighth, Also in a hot-air engine a tightly-closed fire box, and working all the volatile products of combustion through the cylinder, the injection into the fire box, in connection with ignited solid fuel of combustible fuel, substantially as described.

46,690.—Combined Measure, Tunnel and Faucet.—Henry Mitchell, Richmond, Ind.:

I claim the arrangement, construction and combination of the pipe, B, cylinder, C, measurer, D, and faucet, H, as herein described and for the purposes set forth.

46,691.—Mode of Suspending Burners for Lamps.—Albert Moore and James A. Cole, Northville, N. Y.:

We claim, first, A temporary hinge for lamp burners, operating substantially in the manner and for the purpose specified.

Second, Providing a loop to guide the wick, for the purpose substantially as described.

Third, Hinging the spring, C, to the lower portion of the burner, substantially as shown.

46,692.—Knife, Fork and Spoon Holder.—G. Livingston Morse and L. M. Herrick, Harrison, N. J.:

We claim the combination of the hinged rest, A, with the clasp, B C, constructed and employed as described.

46,693.—Tobacco Pipe.—Robert Nagler, Brooklyn, E. D., N. Y.:

I claim the combination of the bracket, B, formed separately from and adapted for the reception of the pipe bowl, A, the sockets, a b, tubes, c d, stem, C, and reservoir, D, when the said parts are constructed and connected, as and for the purposes herein specified.

46,694.—Fruit Ladder.—A. W. Olds, Green Oak, Mich.:

I claim the two holders, A A', in connection with the brace or connecting rod, C, and the support, B, and wheels, d', all arranged substantially as and for the purpose specified.

[This invention consists in constructing a ladder in such a manner that it may be used as an ordinary step ladder for picking fruit, and for other purposes, and be capable of being readily moved from place to place, and also capable of being adjusted so as to form, when desired, a single or continuous ladder, such as are used by house painters and others.]

46,695.—Churn.—James N. Pease, Panama, N. Y.:

I claim the churn, A, placed in a frame, B, mounted on rockers, C C, in combination with the bars, F F, arms or levers, G G, and bar, I, attached to dasher rod, H', all arranged and applied to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to a new and improved churn of that class which are provided with rockers and have an oscillating motion. The object of the invention is to obtain a churn of the class specified, which will have, in connection with a rocking or oscillating movement, a reciprocating dasher, operated automatically from the rocking movement of the churn, whereby butter may be produced much more expeditiously than by either a rocking movement of the churn alone or with a fixed churn and reciprocating dasher.]

46,696.—Artificial Arm.—Jacob Peterson, Canoga, N. Y.:

I claim, first, The use of the flexor cords, f f f, Fig. 1, and the strap, F, for the purpose of closing the fingers and thumb, essentially as above described.

Second, The use of the elastic strap, o, Fig. 4, in combination with the strap, F, and the flexor cords, f f f, Fig. 1, for the purpose essentially as above described.

Third, The use of the hook and eye, marked p, Fig. 5, said cross piece, r, Fig. 5, in combination with the elastic strap, o, Fig. 4, and the flexor cords f f f, and strap, F, Fig. 1, and rod or shaft, X, Fig. 5, substantially as above described.

Fourth, The wrist joint, constructed essentially as above described, in combination with the flexor cords, f f f, and strap, F, Fig. 1, as above described.

46,697.—Spring Catch for Door.—J. Plumer, Boston, Mass.:

I claim, first, The use of rubber in spring catches, when so arranged in reference to the inelastic portion of the catch as to partially or entirely encompass it, and operating by means of its flexibility or bending property in any or all directions.

Second, The combination of the rubber with the catch, as above described, substantially as and for the purposes enumerated.

46,698.—Hot Blast Pipe.—Wm. B. Pollock, Youngstown, Ohio:

I claim, first, The combination of the trunks, B B', with the sectional pipes, C, and connecting pipe, D, arranged substantially in the manner and for the purpose set forth.

Second, The combination of the trunks, diaphragms and section pipes, substantially in the manner described, so that an injured or worn tube or section may be singly removed, and a new one inserted, without stopping the blast longer than merely to make the removal or change of the section.

Third, Making the continuous pipes in sections, and so uniting them with the trunks that any one of the several pipes may expand unequally and independently without fracturing the other, having a different expansion, as set forth.

46,699.—Picture Card Frame.—R. W. Potter, New York City:

I claim a card frame, A B, made in the manner herein shown and described.

Also cutting and embossing the hole, a, in border, B, in the card, A, by one and the same operation, as set forth.

46,700.—Process for Treating Navassa Guano.—Robert Potts, Camden, N. J.:

I claim the within-described process of making superphosphate of lime from Navassa guano, or all guano containing more than 6 per cent of iron and alumina, by sprinkling the requisite quantity of sulphuric acid over the guano, in the form of rain, or as near as possible in that form, while the mass is continually agitated, substantially as and for the purpose set forth.

[The object of this invention is to make a dry superphosphate of lime from Navassa guano, by adding sulphuric acid in small portions at a time, keeping the batch agitated or stirred with such rapidity as to prevent heating as much as possible, and thereby keep the batch dry and granular, ready for sale in a few hours, instead of a wet and sticky mass, totally unsaleable as made by the old process. Secured by patents in the United States and in Europe.]

46,701.—Machine for Washing and Cleaning Clothes, Etc.—Wm. Price, Cincinnati, Ohio:

I claim the combination of the arms, C C, with the horizontal pins, d d, the vertical pins, e e e, and hand lever, D, substantially as and for the purposes herein set forth.

46,702.—Sand-paper Holder.—Jerome Redding, Maplewood, Mass., and Nathaniel W. Redding, Charlestown, Mass.:

We claim, first, The employment, of two pieces, A B, of metal or other suitable material, in connection with a thumb nut and screw, for holding and affording a bearing for sand paper and emery cloth, substantially as herein described.

Second, We claim the deflected parts, b b, and fingers or prongs, b' b', in combination with the guide, A', and guideway, B', the whole being employed to facilitate the application of the emery cloth or sand paper to the holder, in the manner herein explained.

46,703.—Tool for Cutting Off Stay and other Bolts.—Joseph Renshaw, Michigan City, Ind.:

I claim, first, The clasp sleeve for holding the tool to the bolt to be cut, constructed substantially as described.

Second, The combination of the clasp sleeve and the stock, I, substantially as described.

46,704.—Key for Lock.—Edwin Reynolds, Mansfield, Conn.:

I claim a key made with a series of auxiliary bitts, interlocking with the main bitts, and so as to be capable of rotation and operation therewith, in one direction, and independently thereof in the other direction, substantially as set forth.

46,705.—Velocipede Trotting or Pacing Horse.—Harvey A. Reynolds, New York City:

I claim, first, A velocipede trotting or pacing horse, mounted on wheels, and having the axle of the forward or driving wheels provided with reversed cranks, to act on the jointed legs, B B, substantially as explained.

Second, The jointed legs, B C, connected by rods, L, and the latter secured to the stirrups, K, of the axle of the driving wheels, substantially as and for the purpose specified.

[This invention relates to a new and improved toy or velocipede horse for children, and it consists in having the horse mounted on wheels, the axle of the driving ones of which is provided with cranks, having stirrups applied to them, and arranged in such a manner that the driving wheels may be turned by a direct application of the feet of the rider to them.]

46,706.—Manufacture of White Lead.—Wm. Archer and Clinton Rice, New York City:

We claim the continuous or intermittent removal of the white lead from the surface of metallic lead, as fast as desirable, by means of a stationary revolving or reciprocating brush or scraper, applied in combination with a revolving or stationary drum or frame, substantially as described.

46,707.—Method of Preserving Fruit, Etc.—Esek C. Roberts, Salem, Mich.:

I claim, first, The herein-described construction of one or more chambers, arranged with an ice house or fruit house, and surrounding the same with a poor conductor of heat, as and for the purposes herein set forth.

Second, I claim one or more condensers, constructed as described, and placed within the chamber, as and for the purpose specified.

46,708.—Machine for Hulling, Cleaning and Polishing Rice.—Charles E. Rowan, Brooklyn, N. Y.:

I claim, first, The combination of the two concentric cones, D and E, provided with open removable frames, G, and adjustable endwise in relation to each other, in the manner and for the purposes herein specified.

Second, I further claim constructing the rubbing surfaces of steel wires, l, set endwise in the frames, G, as herein shown and described, so as to admit of setting or repairing the rubbing surfaces by tapping the wires from the back, as explained.

46,709.—Knife for Opening Tin Cans.—Charles A. Ruff, Providence, R. I. Ante-dated Feb. 23, 1865:

I claim a knife, provided with a fulcrum to rest or rock on, the tin being cut, constructed and arranged substantially as described.

46,710.—Curry-Comb.—Cyrus W. Saladee, Putnam, Ohio:

I claim the arched frame or back, A A1 A2, of the curry-comb, in combination with the handle, C C1, in the manner and for the purpose substantially as shown and described.

46,711.—Stirrup.—Cyrus W. Saladee, Putnam, Ohio:

I claim the cross bar, C, in combination with the guard, B, and the stirrup, A, in the manner and for the purpose substantially as shown and described.

46,712.—Stirrup.—Cyrus W. Saladee, Putnam, Ohio:

I claim the cap, A, in combination with the cross bar, F, and stirrup leather, E, in the manner substantially as shown and described.

46,713.—Machine for Pulverizing Sand, Etc.—Joseph G. Savage, South Reading, Mass.:

I claim the machine, constructed and operated substantially as above described, for pulverizing and reducing sand and other material, and sifting the same, as set forth.

46,714.—Machine for Rifling Gun Barrel.—William and Coleman Sellers, Philadelphia, Pa.:

We claim, first, Arranging the movements of a machine for rifling gun barrels in such a manner that they shall take place in a series or order, the starting of each one of the series being dependent upon the final movement of the previous one of the series, substantially as and for the purpose specified.

Second, Stopping the motion of the rifling rod at one end of its stroke, and causing the other movements to take place, as described, while the rifling rod is at rest.

Third, Arranging the driving power of the rifling rod, in such a manner that it shall be able to perform the work required, but will disconnect itself and stop under a strain too great for the rod to bear with safety.

Fourth, The use of a washing box or boxes, substantially as described and for the purpose specified.

46,715.—Liniment.—G. W. Smith, North Whitehall Township, Pa.:

I claim a liniment, composed of the ingredients herein specified, and mixed together, substantially in the manner and about in the proportion set forth.

[This invention is intended as a remedy for such diseases as the sweney in horses, or for other similar afflictions, and when applied twice or three times to the afflicted part it gives relief in a very short time.]

46,716.—Side-hill Plow.—Hannibal B. Smith, Springfield, Mass.:

I claim the combination of the mold board, D, with the share, B, flange beam, A, spring catch, c, and lip, d, or their equivalents, operating substantially as described.

46,717.—Machine for Making Heads of Casks.—E. R. Spaulding, St. Louis, Mo.:

First, I claim the combination in a lathe of the rotating disks or heads, I, the vibrating arms carrying tools for cutting out and chamfering the heads of kegs, and other work of like character, and the sliding table which carries the arms, substantially as and for the purpose described.

Second, I also claim constructing and arranging the chamfering tool stock, and the cutting tool stock, C, in the order and manner herein shown, upon vibrating arms, constructed and operated so as to be adjustable for different diameters and sizes of work, and for different thicknesses of bevel, substantially as above described.

[This machine is especially adapted for cutting out bottoms of pails and tubs and bottoms and heads of kegs. The cutters are set so as to work at right angles to the plane of the stuff, while the chamfering tools or planers are set so as to produce a bevel.]

46,718.—Manufacture of Skirt Wire.—T. S. Sperry, New York City:

I claim the above-described skirt wire as an article of manufacture, consisting of a close coiled covering of wire, with a non-corrosive surface over a central skirt wire, substantially as described and represented.

[This invention consists in the use of thin metal wire in place of cotton or other fibrous materal, for the purpose of covering skirt wire, said wire to be applied by braiding, or simply by winding it on in such a manner that a permanent and durable covering for the skirt wire is obtained, which will effectually protect said wire, and not be liable to pull off or break out.]

46,719.—Lever Buckle.—Leonard A. Sprague, New York City:

First, I claim a lever buckle in which the lever is composed of a single strip, and secured to the hinge bar by means of stoppers cut out of the body of the lever, substantially as set forth.

Second, In lever buckle, operating as described, I claim forming the frame of sheet metal, and corrugating or bending the front or impinged bar thereof, so as to prevent a lever surface to the front edge of the lever, substantially as set forth.

46,720.—Fruit Can.—John J. Squire, Windsor Locks, Conn.:

First, I claim, in jars for preserving fruits, meats and other substances forming pedestals on the bottom thereof, so as to obtain a free circulation of the heating medium beneath them when they are placed in such medium, in the process of putting them up for market, substantially as described.
Second, I also claim the cover, C, formed with projections, c F F', in the described combination with the packing ring, b, and locking bar, E, for the purposes set forth.

[This improvement embraces two particulars, one being the providing the bottom of jars in which fruits, meats or other substances are to be preserved, with pedestals or feet, and the other consisting in a novel method of applying a packing ring to the cover, to make a tight joint with the neck of the jar.]

46,721.—Lock.—Nelson Stafford, Brooklyn, N. Y.:

First, I claim a series of tumblers, swinging in a plane at right angles, or nearly so, to the line of motion of the bolt, and moving with said bolt, in combination with stationary wards, substantially as specified.
Second, I claim the combination of a plate key with a sliding bolt and tumblers, when said bolt is moved by an endless motion given to said key, as specified.
Third, I claim the bolt carrying the tumblers, and fitted as specified, in combination with the key and stationary ward bar, as set forth.

46,722.—Binding Attachment for Sewing Machines.—Jacob S. Steiner, St. Louis, Mo.

First, I claim, in combination with the edge turners, e e', the inclosed pressure guide, d, secured to the adjustable plate, B, and arranged and operating substantially in the manner and for the purpose herein set forth.
Second, The spring pressure plate or foot, h, combined with the tapering edge turners, e e', and inclosed pressure guide, d, arranged and operating substantially as and for the purpose herein set forth.
Third, The slides, m m', and guides, i and t, combined and arranged substantially in the manner and for the purpose herein set forth.
Fourth, The employment of the adjustable guide, w, substantially in the manner and for the purpose herein set forth.

46,723.—Piston Packing.—A. J. Stevens, San Francisco, Cala.

I claim the arrangement of a T-shaped ring, E, two L-shaped rings, F, piston head, A, and follower, D, constructed and operating in the manner and for the purpose substantially as herein shown and described.

This invention consists in the employment or use of a T-shaped and two L-shaped rings in combination with the head and follower of a steam piston in such a manner that the three rings are held in position by each other and by the piston head and follower, and that the L-shaped rings project up over the outer edges of the head and follower and flush with the outer surfaces of the same, and thus an increased bearing surface is obtained between the piston and cylinder, and said piston is more securely guarded than a piston of the same size constructed in the usual manner.]

46,724.—Apparatus for Filtering Liquids.—Robert Stewart, Brooklyn, N. Y.

First, In connection with the filtering chamber, G, I claim the construction and arrangement of the central receiving chamber, K, and hollow shaft adapted to prevent the escape of the vapor and the overflow of the liquid, substantially as set forth.
Second, I claim the distributing disk, L, arranged and employed substantially in the manner and for the purpose herein described.

[The principal object of this invention is to prevent the escape of vapor during the process of distillation, and preclude the possibility of overflow while providing adequate means for the introduction of the liquid.]

46,725.—Boiler Furnace.—Emerson C. Strange and Geo. R. Huntley, Taunton, Mass.

First, We claim the combination of a wind wheel with a series of perforated pipes placed in the walls of a furnace, either above or below the grate bars thereof, substantially as and for the purpose above set forth.
Second, The combination of the open casing, B, provided with perforated pipes leading from a central hub, as described, with doors, F, for shutting off the supply of atmospheric air, substantially as above set forth.

[This invention consists in a new method of supplying mingled or separate currents of air and steam to furnaces of steam boilers and to other furnaces.]

46,726.—Faucet.—Herman Strater, Jr., Boston, Mass.

I claim the arrangement of the sleeve, o o, and the elastic packing, p p, placed within the cap, n n, as described.
Also, in combination with the above arrangement, the metallic packing furnished with an elastic backing, and operating substantially as described.
Also, the stop, m, for preventing the wear of the metallic washer on its backing, as described.

46,727.—Faucet.—Herman Strater, Boston, Mass.

First, I claim the spaces or chambers to which air has free access around the tube through which the liquid passes in such a manner that when a vacuum or partial vacuum is created in the chamber in which the said tube is located by the downward current of the said liquid, the air and liquid will be commingled, substantially as specified.
Second, The combination of the screw plug, h h, extension tube, d d, and in spaces or chambers, g g, arranged and operating with regard to each other substantially as described.

46,728.—Faucet.—Herman Strater, Jr., Boston, Mass.

I claim the arrangement of the traveling socket and extension tube, operating together substantially as described.

46,729.—Stove.—T. L. Sturtevant, Boston, Mass.

I claim a stove provided with an internal heating chamber, B, open at its top, closed at its bottom, and communicating at its lower end with the external air by means of a number of radial tubes, b, which extend across the space or flue, a, between the chamber, B, and the case of the stove, substantially as and for the purpose specified.
I further claim, in combination with the air heating chamber, B, arranged as shown, the perforated plate, D, as and for the purpose set forth.

[The object of this invention is to obtain a stove which will possess a greater heat-radiating surface and greater heat-radiating capacity than any now constructed.]

46,730.—Lamp.—Dexter Symonds, Lowell, Mass.

I claim the thin metal jacket, B, formed with elongated air openings, b b, placed on or around the wick tube, C, and insulated from the latter by means of a non-conducting plug, E, all substantially as and for the purpose herein set forth.

46,731.—Clothes Dryer.—E. B. Taylor, Natick, Mass.

First, I claim the frame, B, provided with the rope, D, and applied to the window, A, substantially as shown, in connection with a clothes frame, F, suspended to B, and provided with cords for the purpose specified.
Second, The construction and arrangement of frame, F, to admit of the revolving of the same, and the winding of the clothes upon it, for its ready application to and removal from frame, B, substantially as described.

[This invention relates to a new and improved clothes dryer of that class designed to be applied to windows.]

46,732.—Attaching Drill Teeth to Seeding Machines.—J. H. Thomas and P. P. Mast, Springfield, Ohio:

We claim bracing a drill tooth or tube to a drag bar by means of a separate brace bar in such a manner as to allow the drill tooth to swing or fold forward without breaking the wooden pin, substantially as and for the purpose set forth.

46,733.—Piston Packing.—Wm. R. Thomas, Catasauqua, Pa.

I claim the double shell, D E, provided with holes, f, in the outside shell, and with a partition, a, and flange, c, in combination with holes, d d, in the head and follower of the piston, and with secondary packing rings, F, and main packing rings, G—all constructed and operating in the manner and for the purpose substantially as herein set forth.

[This invention relates to an improvement in that class of pistons in which steam is used to keep the packing rings in contact with the inside surface of the cylinder.]

46,734.—Composition for Coating Oil Barrels and for other purposes.—Jesse G. Thompson, Carbondale, Pa.

I claim mixing linseed oil with glue as herein described, for the purpose set forth.

46,735.—Machine for Cutting the Curd of Cheese.—Sardis Thomson, Monterey, Mass.

First, I claim the hollow cylinder with the groove fleams, knives, and throats, in combination with the cams.
Second, The semi-cylinder or bed-piece with its grooves, slides, springs, and fleams, in combination with the cylinder.

46,736.—Flexible Forms for Graining, Printing, etc.—Henry Tubesing, Pittsburgh, Pa.

I claim making flexible and elastic forms for printing, graining, etc., of india-rubber or gutta-percha, or a mixture of india-rubber and gutta-percha, with a body or backing of printers' roller composition (glue and molasses), substantially as herein before described.

46,737.—Adjustable Eccentric.—D. F. Walker, Bowling Green, Ky.

I claim the sleeve, h, provided with wedges, g, inclined in opposite directions, and fitted to the shaft, A, by feathers, i, in combination with the disk, B, furnished with an oblong slot, c, and fitted to the shaft by notches, d—all constructed and operating substantially as and for the purpose set forth.

[This invention consists in the use of a grooved sleeve provided with two wedge-shaped projections and made to slide in a longitudinal direction on the shaft which carries the eccentric disk, said wedge-shaped projections being made to operate in combination with the eccentric disk in such a manner that by shifting the sleeve on the shaft the eccentricity or throw of the eccentric can be regulated at pleasure without stopping or interrupting the motion of the shaft on which the eccentric is mounted or that of the eccentric itself.]

46,738.—Corn Planter.—C. L. Westbrook, New-York City:

I claim the peculiar A-shaped harrow, or its equivalent, with the plowshare, F, the converging covers, l, the peculiar placing of the share, flexible tube and coverers, together with the arms, k and j, and cross-piece, k, as attached—the whole, as constructed and described, as and for the uses and purposes herein stated.

46,739.—Churn.—Amos Westcott, Syracuse, N. Y.

I claim, First, The use of the funnel-shaped box, T, figure 5, with the method of packing the same, essentially as above described, in combination with the rectangular bars, H, the body of the churn, and the shaft and dasher paddles, as above described.
Second, The method of attaching and securing the shaft, I, figure 3, in the body of the churn, as above described, in combination with the body, rectangular bar, pinion wheel and shaft, as above described.
Third, The method of introducing air into the body of the churn, essentially as above described, in combination with the shaft and dasher, paddles, body, and rectangular bar, as above described.

46,740.—Bolt for Doors.—Amos Westcott, Syracuse, N. Y.

I claim, First, The method of fastening the bolt when the same is thrown out and also when it is drawn back, substantially as above described.
Second, The use of the spiral spring, or other similar device, in combination with the projection, a, figure 2, and the holes in the side of the bolt, substantially as and for the purpose above described.

46,741.—Animal Trap.—Jay Wheelock, San Francisco, Cala.

I claim the lever, G, provided with the plate, H, and spring, I, in combination with the slot, e, in the partition, F, and the revolving platforms, C, all arranged in connection with the box or animal receptacle, A, to operate substantially as and for the purpose specified.
I further claim the bait-box, E, connected to the box or animal receptacle, A, and arranged in relation with the lever, G, partition, F, and revolving platforms, C, substantially as and for the purpose set forth.

46,742.—Ox-yoke.—John H. Whitney, Sandisfield, Mass.

I claim the adjustable fulcrum screw, D, and the thumb screw, E, in combination with the bow slides, H, as and for the purposes set forth.

46,743.—Sugar-cane Mills.—E. A. Williams, Columbus, Ohio:

I claim, First, The application of one or more screens to the troughs or side conduits of the bottom plate of a cane mill in such a manner that the juice flowing over the angles formed by the said plate and the troughs into the troughs, b b', will be deprived of cane trash, substantially as described.
Second, The flaring spring guides, J J, in combination with the side fenders, G G, substantially as described.
Third, The combination of the bottom plate with side troughs, crushing rollers, partly overhanging the troughs, and the screens, substantially as and for the purpose set forth.
Fourth, Providing for the removal of the cane trash from both ends of the crushing rollers when the top and bottom plates of the mill are brought in close proximity to the ends of said rollers, substantially as described.
Fifth, The arrangement of guides and fenders as described, or their equivalents, directly over the front trough, b, substantially as described.

46,744.—Self-rocking Cradle.—Horace G. Williams, Hamilton, Iowa:

I claim the operating of a cradle, A, and fan if desired, through the medium of a weight, F, or an equivalent spring, an ordinary clock movement and rocking pallet bar, Q, with its upright, R, engaging with the forked bar, S, of the cradle, in combination with the counterpoise, laterally adjustable, weighted bar, T, substantially as described and represented.

[This invention relates to a new and improved arrangement for operating a child's cradle and fan whereby the use of the hand or foot for that purpose is entirely avoided, and the cradle rendered capable of being perfectly balanced and regulated, so as to operate with greater or less speed as may be desired.]

46,745.—Roasting and Desulphuring Ores.—Riley P. Wilson, New York City:

First, I claim fire-clay retorts, A, in combination with conveyers, C, as a whole or in sections, for the purpose of desulphurizing gold, silver, and other metalliferous bearing ores.
Second, I claim the construction of a furnace in such manner that a series of clay retorts, A, may be placed in a horizontal position side by side, or one above the other, so that the desulphurized ores may be conveyed back and forth during the process of calcination.
Third, I claim the hollow shaft, C, in combination with the retorts, A, as shown herein.
Fourth, I claim the flanges or wings, K, of the conveyers as adjusted to the shaft for the use and purpose herein stated.
Fifth, I claim the use and application of copper or gun metal, or its equivalent, both for a sheathing for the shafts of the retorts, as also for the flanges or wings, K.
Sixth, I claim the introduction of a jet of steam into the retorts in combination with the air; also, the box or vessel, J, containing the salt or brine, substantially for the uses and purposes herein described.
Seventh, I claim the use of a receiving vessel or vat, G, in combination with the mullers or stirrers, g, into which the desulphurized ores collect—said vat being partly filled with water, having a flue or pipe for the egress of the steam into the furnace; a faucet, j, for the extraction of surplus water; a syphon, i, for the discharge of the debris or refuse material, and the faucet, h, for drawing the amalgam.

46,746.—Twin Wood Stove.—Adam Worley, Saint Paul, Minn.

I claim, First, The convexo-concave plate, C, and curved or elbow pipe, d, in combination with the inner or fire cylinder, B, substantially in the manner and for the purpose herein described.
Second, The curved or bent partitions, c c, in the receiver, in combination with the inner cylinder, D, and outer one, A', substantially in the manner and for the purpose herein described.
Third, The combination of the stove, A, with the receiver, A', when used with their interior arrangements as described, substantially in the manner and for the purpose herein set forth.

46,747.—Self-centering Chuck.—Thomas H. Worral, Manchester, N. H.

I claim the wedge-shaped jaws, b, and corresponding ways, a, in combination with the spring slide, d, and cap, B, constructed and operating substantially as and for the purpose set forth.

46,748.—Lamp Shade.—Henry Zahn, New York City:

I claim suspending the shade of a lamp from the top edge of the cylinder by means of hooks or straps, a, or by any other equivalent means, substantially as and for the purposes herein shown and described.

[This invention consists in suspending the metal ring which supports the shade by means of two or more straps or hooks from the top edge of the cylinder or chimney in such a manner that said ring does not come in contact with the surface of the cylinder, and that by the current of air passing up between the cylinder and ring the temperature of the latter is kept at such a degree as to prevent the paper shade from being scorched or burned, and at the same time the liability of the cylinder to break is materially reduced.

46,749.—Churn.—John Aiken (assignor to Erastus Wilkins), Warner, N. H.

I claim the combination in a churn of the rocking shaft, B, vibrating lever, C, and adjustable connecting rod, D, attached to the lever by a swivel joint, and to the dasher by a rigid joint, in the manner and for the purpose above described.]

[This invention effects a compound movement of the dasher—that is to say, a change from a horizontal to an angular position during each ascent of the dasher, and from an angular to a horizontal position during each descent, thereby producing a very energetic agitation of the contents of the churn by a slight movement of the erating lever.]

46,750.—Composition for Insulating Telegraph Wires.—Samuel C. Bishop (assignor to the "Bishop Gutta-Percha Company"), New-York City:

I claim a composition for insulating telegraph wire, consisting of gutta-percha or india-rubber and paraffine mixed with either resin and wheat flour, or with a tannate of gelatine and white oxide of zinc, substantially in the manner and about in the proportion herein set forth.

[The object of this invention is a composition which will serve to insulate telegraph wire over or under ground, and particularly under water, and to effect this purpose a composition must be used which is absolutely impervious to water, and which will protect the wire even if the same should be immersed to a considerable depth.]

46,751.—Clothes and Hat Rack.—Charles Bradfield (assignor to himself and Paul Swenson), Newark, N. J.:

I claim, first, The combination of the escutcheons, b and d, connecting bar, c, the whole constituting a shank for the attachment of the hook, D, in the manner explained.
Second, In combination with a hook constructed as above specified, I further claim the bars, A B, and divided sockets, C C, constructed, arranged and employed as described.

[This invention consists of a clothes and hat rack in which there are two rails inserted in a metal s ket without fastenings so as to be removable; the hooks being so formed that their shanks fit between the rails and can be made to slide along between them to any desired position.]

46,752.—Corn Plow.—S. W. Hammon, (assignor to himself, Joseph H. Lincoln, S. Lincoln and A. P. Hammon,) Montford, Wis.:

I claim, first, The two semicircular frames, E C, applied to the draught pole, D, in the manner substantially as shown to form the main frame of the machine.
Second, The axle, A, connected to the draught pole, D, by the pivot bolt, a' in the manner as shown or in any equivalent way to operate as herein described.
Third, The toothed segments, C C, arranged as shown in combination with the shaft, F, and bar, H, for the purpose of moving or adjusting the axle, A, as set forth.
Fourth, The attaching of the plows, T, to the standards, S, by means of the stems, h, fitted in bearings, i, the former being provided with nuts, j, and all arranged substantially as described.
Fifth the method of adjusting and holding the frame, k, by means of the toothed segment, N, segment bar, M, and lever, Q, all arranged substantially as set forth.

46,753.—Rudders.—Jonas Higbee, Northport, N. S., assignor to himself and Joseph B. Denton, Newton, N. S.:

I claim the hinged segmental rudders, B B', provided with fins, a a', and applied in combination with the posts, C C', in the manner and for the purpose substantially as herein shown and described.

[This invention consists in the employment or use of two segmental rudders one at the bow and one at the stern and hinged to the lower ends of the rudder posts in combination with pins attached to the surfaces of each rudder in such a manner that said rudders adjust themselves automatically according to the direction in which the vessel moves, that at the rear end or stern of the vessel being turned out in its working position and at the bow or forward end being turned in out of harms way.]

46,754.—Loom for Weaving plush or piled Fabrics.—Samuel Holt, Newark, N. J., assignor to Charles A. Bulkley, New York City:

I claim, first, The levers, k l, attached to the heddles as specified in combination with the tappets, f g h, and levers, l m n, to actuate the warps in the manner set forth for weaving two pieces of cloth with the pile between substantially as specified.
Second, I claim the arrangement of the wheel, v, drum, w, levers, x, and tappets, y, for actuating the center knife, z, by means of the cord or strap, t, as specified.

46,755.—Plow.—Josiah Kilmer, Barnesville, N. Y., assignor to himself and August Kilmer:

I claim a regulator, R, to be employed in combination with the drag chain, C, in the manner and for the purposes set forth.

[The present improvement consists in the application of a regulator, in combination with the drag chain above referred to, in such a manner that the position of the chain can be adjusted instantaneously, according to the force required to throw the stalks, etc., under.]

46,756.—Sand Pump for Artesian Well.—Thomas J. Lovegrove (assignor to himself and Henry Baldwin, Jr.), Philadelphia, Pa.:

I claim, first, An air chamber, connected to and vibrated with a sand pump, substantially in the manner described, for the purpose set forth.
Second, A chamber connected to and vibrated with a sand pump, to receive the heaviest portions of the detritus passing through the pump.
Third, The combination with a vibrating sand pump of a flexible and extensible hose or discharge pipe, for the purpose of accommodating the movements of the pipe to those of the pump, without lifting the weight of the pipe at every stroke of the pump.
Fourth, The combination in a sand pump of an air chamber next the valve, with a sand chamber above the air chamber.
Fifth, The combination with a sand pump of a sand chamber, hav-

ing an induction pipe projecting above its bottom, substantially as described, to relieve the induction valve from the weight of the detritus, as set forth.

Sixth, The combination in a sand pump of an air chamber, and conducting pipe with a sand chamber, when so arranged that the eduction pipe of the air chamber forms the induction pipe of the sand chamber.

Seventh, The combination in a sand pump of an air chamber, a valve, a conducting pipe, a sand chamber and a discharge pipe.

46,757.—Rock Drill.—Thomas J. Lovegrove (assignor to himself and Henry Baldwin, Jr.), Philadelphia, Pa.:

I claim, first, A rock drill, having its cutting edges sloped with the center to the circumference, and with more cutting edges on one side than on the other, so that the stroke of the drill will tend to force the drill to one side, and thus make a hole larger than the drill, substantially in the manner described.

Second, A rock drill, having a chamber or concavity in its face, surrounded by polygonal cutting edges, substantially in the manner described, for the purpose set forth.

Third, A rock drill, having one cutting edge on one side, three or more cutting edges on the other, substantially in the manner described, for the purpose of cutting both radial and transverse lines, as set forth.

Fourth, A rock drill, having a chamber on its face surrounded by cutting edges, substantially as described, and a channel leading therefrom to the head of the drill, for the purpose of cleaning away the chip at every stroke of the drill, and thus leaving a clear surface to operate upon.

Fifth, The combination of a perforated drill with a flexible hose or discharge pipe, substantially as and for the purpose set forth.

Sixth, The combination of a perforated drill, a valve and a flexible hose, substantially in the manner and for the purpose described.

64,758.—Machine for Cutting Keyseats.—J. C. Morgan (assignor to Wm. A. Nixon and J. S. Everhard), Alliance, Ohio:

I claim, first, Chucking the piece of work, while the key-seat is being cut to a slotted mandrel, which may be fixed or movable, substantially as set forth.

Second, Providing the mandrel with a slot, substantially as described, so as to allow the saw to pass through it.

Third, The set screws or guides, a' a', applied in combination with the socket, C, mandrel, D, and saw, E, substantially as and for the purpose set forth.

Fourth, The knuckle, I, and shoe, k, applied in combination with the slide, n, feed screw, f, and saw, E, substantially as and for the purpose described.

[This invention consists in a machine provided with a mandrel, which may be fixed or movable, and on which the piece in which the keyseat is to be cut, can be chucked. This mandrel is slotted, so as to allow the saw to pass through it, and the saw is adjusted at the requisite angle for cutting by a guide or set screws, which hold the lower part of the same in position. The feeding arrangement is composed of a screw with a dog hinged to a knuckle in such a manner that the saw is thrown forward when cutting and allowed to drop back when not cutting.]

46,759.—Piano-forte.—S. T. Parmelee (assignor to Parmelee Piano Company), New Haven, Conn.:

I claim, first, The entire isolation of both the metallic frame and sounding, in the manner and for the purpose substantially as specified.

Second, Combining and uniting the sounding board with the frame, substantially as and for the purpose specified.

46,760.—Cranberry Gatherer.—Geo. Shove (assignor to himself and Chas. Thacher), Yarmouth, Mass.:

I claim the arrangement and combination of the lifting comb, B, in the manner substantially as described, with the receiver, A, provided with teeth, as explained.

I also claim the combination of the partition, h, with the toothed receiver, A, and the lifting comb, B, arranged and so as to operate together, substantially as described.

I also claim the arrangement of the handle of the lifting comb at an inclination as described, with the comb, when such comb is disposed with a toothed receiver, substantially in manner as set forth, the purpose of such arrangement being to cause the comb while being raised upward, to be tilted backward so as to discharge the berries into the space in rear of the partition of the receiver.

46,761.—Heel Polishing Machine.—James M. Thompson, Stoneham, Mass., and Seth D. Tripp, Lynn, Mass., Assignors to Seth D. Tripp, Lynn, Mass.:

We claim, first, The rocking plate, L, in combination with the supports of the rotating disk, J, substantially as above described.

Second, We claim the adjustable arm, M, and spring, N, in combination with the frame, K, which holds the rocking plate, substantially as above described.

Third, We also claim operating the disk, J, and its supports, I H, by means of the treadle, C, and spring, D, substantially as described.

Fourth, We also claim cooling the polishing wheels of machines for polishing heels of boots and shoes by the application of a blast of air to the same, substantially as and for the purpose above described.

Fifth, We also claim the combination in machines for polishing the heels of boots of a grinding and a polishing wheel upon the same shaft, substantially as above described.

[This invention consists in various improvements in the devices for holding the work up to the polishing wheels; in providing two or more polishing wheels which slide upon their shaft and so are brought opposite to the holding devices, and in a method of cooling the polishing wheels during their operation.

46,762.—Repeating Cannon.—Timothy Tufts, Somerville, Mass., assignor to J. H. W. Page, Boston, Mass.:

I claim the combination composed of machinery for imparting to the magazine its intermittent rotary motion—machinery for stopping the magazine when a charge chamber may be brought in line and in communication with the barrel—machinery for releasing at the proper time the stopping mechanism of the magazine, in order to enable the rotation of the magazine to be effected—machinery for elevating the hammer—machinery for holding the hammer at cock—machinery for discharging the hammer, and finally, machinery for advancing the priming ribbon, and operated by the reciprocating movements of a hand lever or brake, arranged and applied with respect to the stock, substantially as specified.

I also claim the application of the stock to the axle, and the carriage by a compound joint (as described) in combination with the vertical and horizontal screws and their blocks, the whole being substantially as and for the purpose specified.

And in combination with the barrel, the stock and the magazine, and the boxes of its journals. I claim a mechanism substantially as described, for moving the said boxes, so as to maintain the periphery of the magazine in its proper relation to the breech of the barrel.

46,763.—Machines for Planing Buttons.—John G. Valentine (assignor to himself and R. H. Isbell), Naugatuck, Conn.:

I claim, First, The use of a series of cutters, F F, in a rotary head, E, to operate in combination with a clamp, G, secured to a reciprocating slide, H, in the manner and for the purpose substantially as herein set forth.

Second, The springs, f, studs, g, and abutment, h, applied in combination with the movable jaw of the clamp and with the reciprocating slide, H, substantially as and for the purpose described.

[This invention relates to a machine for making square or polygonal buttons of bone, ivory, india-rubber, or other suitable materials, and said machine is composed of a revolving cutter head, carrying a series of cutters calculated to shape the face or back of the button and its edges, and operating in combination with a sliding clamp in which the button is fastened in such a manner that by passing said sliding clamp with the button through under the cutter head its face or back and two of its edges are brought to the proper shape, and a large number of buttons can be made with little trouble or loss of time.]

46,764.—Submerged Pump.—J. H. Williamson (assignor to himself and Levi Boemer), Branchville, N. J.:

I claim the tubular post or standard, A, with the two pump cylinders, B B, permanently attached with valves, b, at their upper parts, in connection with the reciprocating yokes, D D, provided with the tubular pistons, F F, having valves, f, at their upper ends, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to a new and improved double-acting pump, and it consists in a novel arrangement of parts, hereinafter shown and described, whereby a very simple and economical pump is obtained, and one which may be kept in repair or proper working order by any one of ordinary ability.]

RE-ISSUES.

1,898.—Machine for Making Paper and Paper Boards.—John F. Jones, Rochester, N. Y. Patented Oct. 13, 1863:

First, I claim forming paper or paper board of any thickness, in a continuous sheet, by adding to the web a succession of any number of layers of pulp, each succeeding layer being added and pressed to the preceding one in the aggregate or compound web, before leaving its felt, and the compound web being subjected to pressure, after each addition of a layer of pulp, substantially as and for the purposes herein specified.

Second, I claim forming paper board of a continuous or indefinite length, by means of any required number of separate paper-making machines, arranged as a whole or as a combined machine, in such a manner that each separate machine successively deposits a layer or web of its own to form the aggregate layers of the board in the act of formation, or passing through the combined machine, substantially as herein set forth.

Third, The combination of a system of cylinder molds, as herein above specified, and a continuous series of drying cylinders and calendering rolls, in such a manner that the manufacture either of boards of any thickness or of several webs of paper may be carried on by a single continuous process, substantially as herein described.

Fourth, The arrangement of the several spouts, G E J, pipes, c m and j, valve, i2, and self-acting feed gate, d, in combination with each other and with the several vats, substantially as and for the purpose herein specified.

Fifth, The saveall, composed of a vat, a cylinder mold, a concher and a scraper, combined and applied in connection with one or more paper-making machines, substantially as herein specified.

Sixth, The combination of press rolls, illustrated by M7 M7 M7, in Fig. 1, to obtain two pressures from three rolls, as herein described.

Seventh, The employment of calender rolls on the top of drying cylinders, substantially as herein described, to equalize the water in the board and make it of uniform dryness as it passes over the dryers, and partially effect the glazing and calendering process while the board is being dried.

Eighth, The cutting apparatus, X Z, operated by the means and in the manner herein set forth.

Ninth, The lay box, Z Z, constructed and operating in the manner and by the means herein described.

1,899—Straw Cutter.—H. K. Parsons (assignee by mesne assignments of Jacob H. Mumma), Harrisburg, Pa. Patented Jan. 26, 1859. Re-issued Sept. 6, 1859. Again March 29, 1864:

First, I claim broadly a knife for use in straw cutters so constructed that its cutting edge shall be on a line with its outer surface, instead of its inner surface—said edge being formed by beveling or grinding the knife from its inner instead of its outer side; and this I claim whether the whole or a portion only of the body of said knife shall form the arc of a circle coincident with the axis around which it revolves in the operation of cutting.

Second, I claim a knife constructed as above described, and having two under beveled cutting edges—one at its front and the other at its near edge.

Third, I claim so constructing a knife for straw cutters, whether single or double edged, that its cutting edge shall continue to revolve in the same circle when partially worn or ground away as when new, and thus avoid the necessity of adjusting either the knives, the cylinder, or the cutting box, as herein set forth.

Fourth, I claim the reversible feed gear, in combination with double-edged knives, when arranged to operate as herein set forth.

Fifth, I claim the combination of the rubber springs, e, with the feed rollers, H H', when arranged and operating as herein set forth.

Sixth, I claim operating the roller, I, by means of the tappets, g, as and for the purpose set forth.

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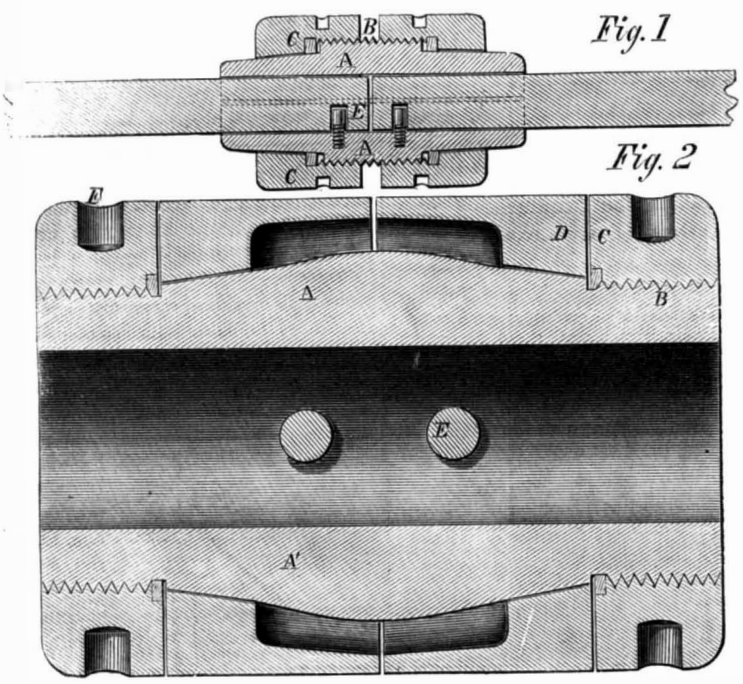

COLLINS'S SHAFT COUPLING.

for the purpose than the cast heads; it can also be put on or taken off in half the time, and allows lateral adjustment in the length of the line, all of which renders it useful to machinists and others erecting or running machinery.

In construction it consists of two halved couplings, A, in shape like the brasses in a journal box. These couplings have a thread, B, in the center, over which nuts, C—one on each end—work. The ends of the couplings are tapered, as are also the nuts inside, to correspond, so that when the nuts are drawn up the boxes or couplings are shut together.

Figs. 1 and 2 show two ways in which the arrangement is applied. In Fig. 2 there are center pieces, D, which are cast, if necessary, and forced together by the collar nuts. The pins, E, fit in holes drilled in the shaft so as to cause them to turn; they perform the same office as keys in the coupling, and the holes, F, are for the application of wrenches, should these holes for the pins get worn at any time it is a simple matter to renew them by turning the shaft partly around. This coupling is also much safer where shafting runs in close proximity to thoroughfares or where men are obliged to pass and repass; there are no projecting bolt heads to catch in belts that happen to run off or carry unfortunate individuals around the shafting when their shirt sleeves happen to touch; this often occurs with bolts.

This arrangement was patented through the Scientific American Patent Agency, on the 20th of December, 1864, by James P. Collins, of Troy, N. Y., address him for further information at that place.

Flow of Solids under Pressure.

M. H. Tresca has communicated a paper on this subject to the French Academy, in which he details experiments to show that "solid bodies can, without change of condition, flow after the manner of liquids, if sufficient pressure is exerted upon them." His method consists in operating upon solids composed of separate pieces, the joints of which are known before the experiment begins, and so that their position after the trial indicates the amount and kind of displacement that has been produced. When a block composed of disks was placed in a cylinder and exposed to pressure on one of its bases, in some cases amounting to 100,000 kilogrammes, and allowed to flop through a round hole, concentric with the cylinder, it was found that the plane surfaces of the disks were modified so as to form surfaces of revolution in the jet, which were almost cylindrical, descending into it to greater or less distance, and ending in a cap turning its convexity toward the extremity of the jet. The tubes thus formed were perfectly continuous, and fitted one to each other, so that each line of junction was represented in slices cut at right angles to the axis of the jet. "These lines," says the writer, "show that all the molecules composing the primitive block came individually to take their place in the jet exactly as the molecules of a running liquid do." Mr. Tresca thinks that operations of this kind may explain certain geological cases of intrusion of one rock into another.—*Intellectual Observer.*

ZAHN'S KEROSENE LAMP SCREEN.

Those who use kerosene lamps know that very eat expense occurs from frequent breakage of

chimneys. This accident is especially liable to happen where the common shades are used. The difference in the temperature and conducting power between the metal top of the screen and the glass chimney breaks the latter very often. Sometimes persons forget to apply the shade until the lamp has been lighted for some time; contact with the cold metal of the screen, if it be put on at the time spoken of, is sure to crack the glass immediately. Screens of the ordinary kind are also fixed in one place, and no adjustment is possible, and the hot metal chars or burns the paper of the screen, so that the same soon drops off and requires renewal.

The screen top here shown is a great improvement on the ordinary kind. It can be adjusted, limitedly, so as to be at different hights; this is done by slipping the arms, A, up or down; these arms are like the clasps on spectacles, and operate by slipping in the same way. The hooks, B, by which the screen is suspended, are so small at the points of contact that no danger of breakage need be apprehended, while the liability of scorching, so common in the ordinary shades, is here entirely obviated; so also is the breaking of glasses from striking against the cooler metal. This screen top does not touch the glass at all, being suspended, as shown, so that it is clear all round. This arrangement was patented through the Scientific American Patent Agency on the 28th of December, 1864, by Henry Zahn, of New York city. For further information address him at 79 Chatham street. The entire patent is for sale.

FROM THE STEAM PRESS OF JOHN A. GRAY & GREEN.