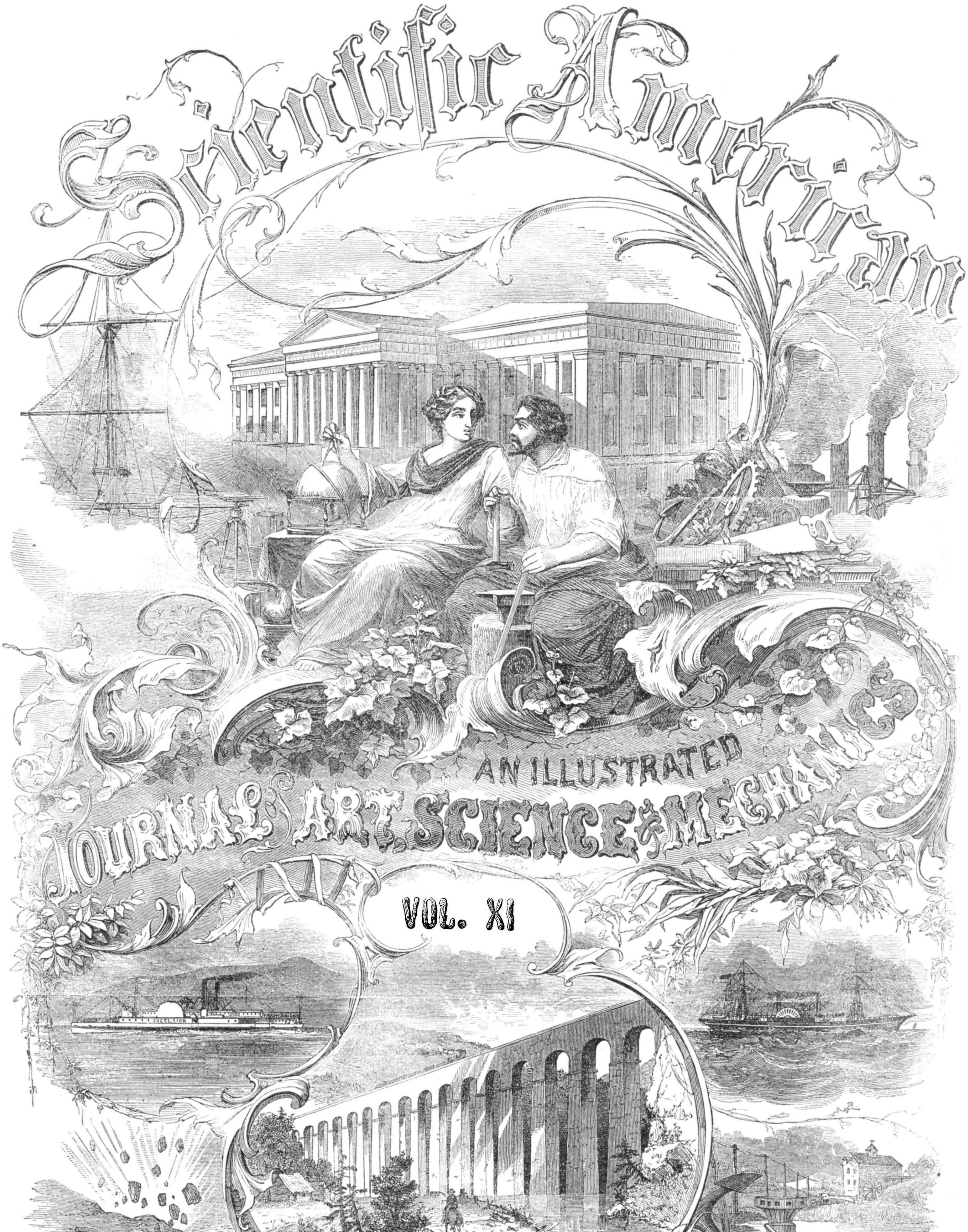
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THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL, AND OTHER IMPROVEMENTS.

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New Force Pump.

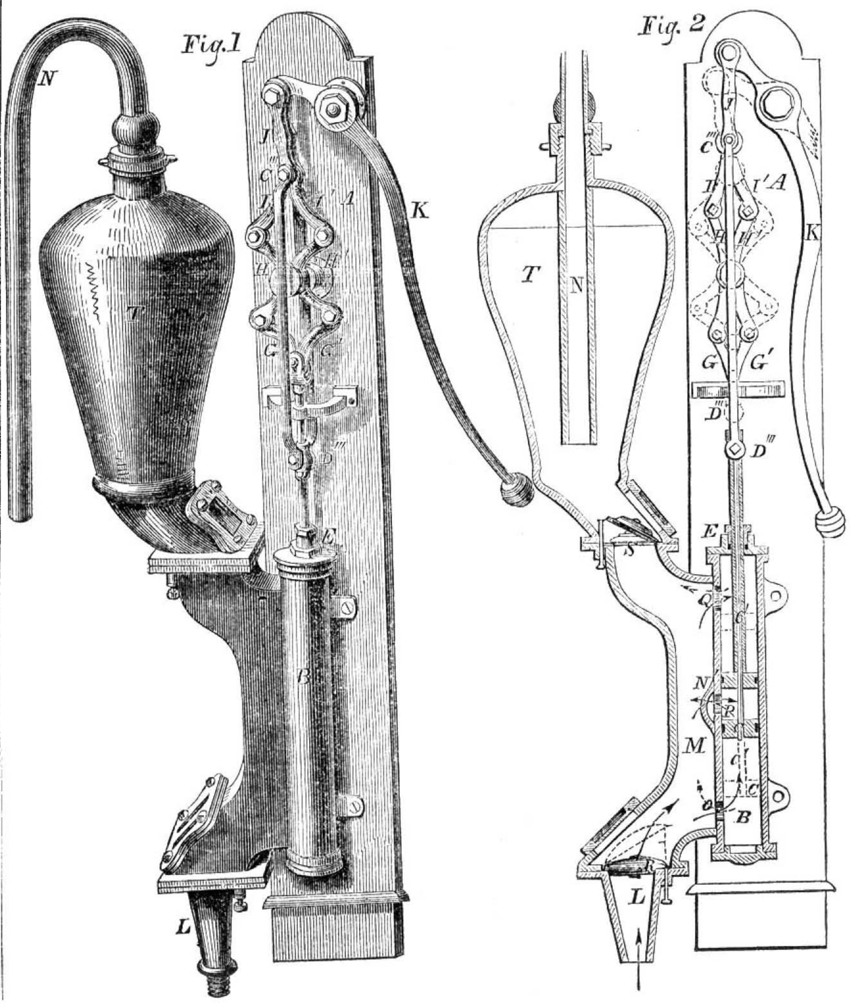
The figures in the accompanying engravings represent the improved force pump for which a patent was granted to D. W. Clark and S. H. Gray, of Bridgeport, Conn., on the 19th of last December.

Fig. 1 is a side elevation of the pump, and fig. 2 is a side vertical section.

The nature of the invention consists in combining two pistons and piston rods with one pump barrel or cylinder, and one brake or lever, when one of the rods is made to pass through the interior of the other, and when both rods are connected with the brake by connecting links and cross levers.

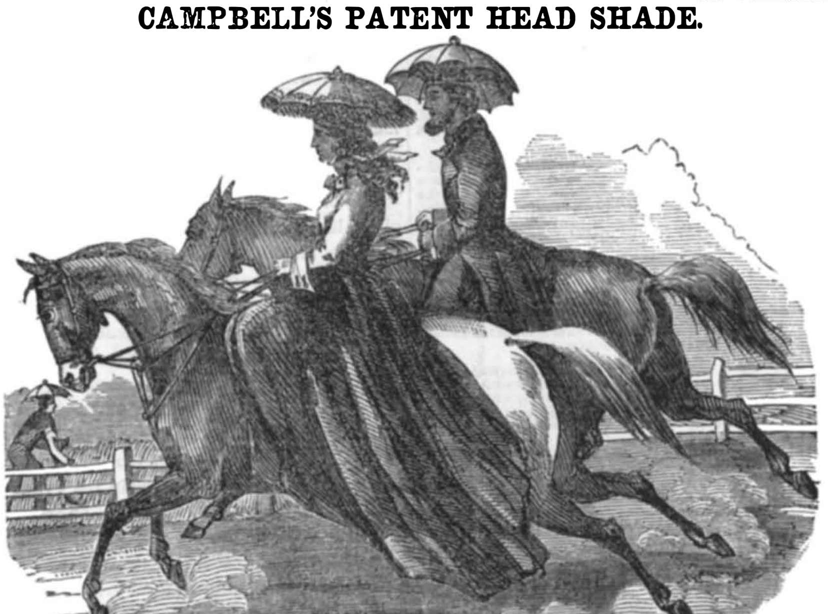
A represents the frame to which the pump is secured. B is the pump cylinder, C the lower piston—the upper piston is shown above it. C' is the rod of the lower piston which passes through the hollow rod of the upper piston.—E is a stuffing box, through which the hollow piston rod passes, the inner piston rod also works through a stuffing box. G G' are connecting links which unite the head, D''', of the upper piston rod with the cross levers, H H'. I I', are the connecting links which unite the head, C''', of the lower piston rod, C', with the levers, H H', and connecting links, J unite the head, C''', with the lever handle or brake, K. L is the supply pipe, and M N' represent supply and discharge chambers, having appropriate valves and placed side by side. O P and Q are the orifices in the pump barrel. R is the valve of the supply pipe, and S that of the air chamber, T. N is the discharge pipe. The cross levers work on a center pin. This is a description of the various parts of this pump; mechanics will observe that the links are of the character known by the name of "lazy tongs." The two chambers, M N', placed side by side, receive water at their junction from the supply pipe, L. Each chamber is provided with an inlet valve, R, but only one of them is shown—that belonging to chamber M. Both chambers empty into the air chamber, T, at their junction, each being furnished with an outlet valve—the one, S, of chamber, M, is only shown. By the act of pushing down the lever, K, the lower piston, C, is raised towards the center of the cylinder and the upper piston is correspondingly depressed; the upper piston traverses the upper half, and the lower one the lower half of the cylinder. The chamber M supplies and conveys away the water that enters and leaves the cylinder through the orifices, O Q; the chamber N' supplies and conveys away the water which passes through the orifice P. When the brake, K, is pressed down the two pistons in the cylinder approach one another towards the center, and by raising the brake, they recede from one another. A vacuum is produced under the lower and above the upper piston, as they approach one another, consequently the water follows the pistons, as shown by the arrows, to fill the two parts of the cylinder. The water in the intermediate space between the pistons, is then being discharged through the opening, P, into the chamber N', and rises through it into chamber T, the ingress valve at the bottom of chamber N' being closed. When the brake is raised, the water is forced through the openings O Q, and passes through chamber M into the air chamber, T. While the water is being discharged above the upper piston, and below piston C, a vacuum is formed between the two pistons which is filled from the chamber N', which is also connected with the supply and discharge pipes. The dotted lines show the pistons and links in different positions. The object of this invention is to combine a double acting force pump with the working of one brake, and in a very compact form. This is clearly shown in fig. 1. It will be understood that there is a vertical division separating the chambers, M N', they are placed side by side, and have each the appropriate valves, for the inlet and discharge of the water from under and above both pistons. A plate covered with glass is placed above the inlet and discharge valves of the two chambers, M N', so that their working can be observed, and easy access to them obtained. All the parts are strong and durable, and easily constructed.

CLARK AND GRAY'S PATENT FORCE PUMP.



More information may be obtained by letter addressed to D. W. Clark, agent of the Clark and Gray Pump Co., Bridgeport, Ct.

CAMPBELL'S PATENT HEAD SHADE.

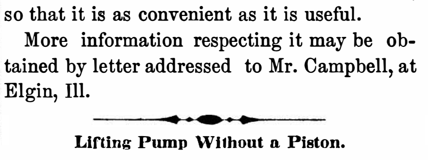


The accompanying engravings illustrate the improved head shade of S. N. Campbell, of Elgin, Ill., for which a patent was granted on the 10th of July last.

The perspective view exhibits a farmer under the noonday sun with one of the shades on his head, making the harvest bend beneath the sturdy sweeps of his cradle; also a lady and gentleman equestrian gracefully wearing the shade while they are enjoying a rapid and exciting recreation. Fig. 2 is a vertical section of the shade in a distended state.

The nature of the invention consists in having a covering of silk, muslin, or other suitable material stretched over a frame similar to the ordinary shades and umbrellas, and having said frame so modified or arranged that it may be permanently secured to a band or cap which may be placed upon the head, thereby not only forming a sun shade, but also an article of wearing apparel, protecting the wearer from the rays of the sun, and also, if necessary, forming a covering for the head.

The frame of the implement is formed of a series of curved rods, C, of whalebone, rattan, or the usual material. The inner ends of these rods are connected as usual by pivots to a button, E, which forms the center of the frame. The rods project at equal distances apart from the button. To each rod there is attached by pivots, D, metallic rods, B, the lower ends of which are connected to a band, A. This band has strings attached to its upper edge, and the upper ends of the strings attached to a hook at the under side of the button, E. The band, A, is intended to fit the head of the person using the shade, and it may be enlarged or contracted by a buckle or by strings. When the band is applied to the head, the rods, C, will be distended as shown, and as the rods are covered with silk or other material similar to ordinary sun shades, the neck, head, and face will be perfectly protected from the sun. Instead of the band, A, a cap may be used such as are commonly termed "skull caps," the top of the cap being attached to the under side of the button. The rods, C, are also provided with joints, by which their lower ends may be turned or folded back when the shade is not in use.



This head sun shade is very simple and useful for sheltering the head from the sun's rays, while persons are exposed during labor of any kind, or when walking or riding for pleasure and recreation. It keeps the head cool, does not require to be supported by the hand when worn, like common sun shades, and it can be carried folded up in the hand when not used, so that it is as convenient as it is useful.

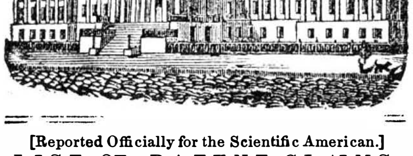
More information respecting it may be obtained by letter addressed to Mr. Campbell, at Elgin, Ill.

Lifting Pump Without a Piston.

E. Bonnet, of this city, has sent us a drawing of a pump without a piston, published in *l'Industriel* in 1825—30 years ago. The upper part of the cylinder extending into the well, is stationary, but a lower section is movable, answering the purposes of a piston, and is moved up and down by a rod attached to a lever. It embraces the same principle of action, although it is somewhat different in construction, as the pump of M. Malbeck, described in No. 49 of our last volume.

The Burlington Railroad Accident.

The coroner's Jury appointed to investigate the causes of the above named fatal accident—noticed by us last week—have returned a verdict censuring the railroad Company and Doctor Henigen, whose horses were the immediate cause of the disaster. The Company will no doubt have to pay very heavy damages to the unfortunate passengers who have been wounded, and the relatives of those who were killed. The State of New Jersey should compel the Company to build a double track forthwith.



[Reported Officially for the Scientific American.]

LIST OF PATENT CLAIMS

Issued from the United States Patent Office

FOR THE WEEK ENDING SEPT. 4, 1855.

ELECTROTYPING—J. A. Adams, of Brooklyn, N. Y.: I claim the reciprocating or vibrating brush, operated as shown, or in an equivalent way, for the purpose of covering or coating the molds for electrotyping purposes with any proper powdered substance, the said vibrating brush being combined when necessary, with a carriage, N, arranged as shown, or in an equivalent way, so that the whole surface of the molds may be presented gradually or successively to the action of the brush as the molds pass underneath.

[When a page of type, or a wood engraving, is to be duplicated by the electrotype process, an impression of the article to be reproduced, is taken in soft beeswax. The mold thus made is dusted over with finely ground plumbago, and then placed in a solution of sulphate of copper, where it is subjected to the galvanic battery. The plumbago serves as a metallic base, on which copper is deposited in the same manner that substances composed wholly of metal, are coated or galvanized.

The dusting of the wax molds has heretofore been done by hand, which is a slow and laborious operation; it is also imperfect, for unless great care is taken to dust every portion evenly, the electrotype will prove defective. The present improvement accomplishes the dusting wholly by mechanism, and executes the work better, cheaper, and far quicker than it can otherwise be done.

The above is an important improvement: it is now in successful operation at the large Electrotyping establishment of Filmer & Co., 128 Fulton street, over the SCIENTIFIC AMERICAN office. The Electrotype is fast superseding the Stereotype, in the art of printing.]

MOWING MACHINES—C. B. Brown, of Alton, Ill.: I claim, first, attaching the finger bar, F, to the bar, D, of the frame by means of the plates, i i, placed each side of the bars near their ends, which overlap each other, the plates being bound or pressed against the sides of the bars, by means of screw bolts, jj, which pass between the two bars. The ends of the bars having screws or screw bolts, k k, passing vertically through them.

Second, I claim constructing the frame of the machine of two metallic sides, d d', between which the driving wheel, A, is placed, and attaching the bar, D, to the lower ends of said side pieces, and also the draught pole or tongue, E, as shown.

[Without engravings it would be difficult to give a correct idea of the precise application of these improvements. It is sufficient to say that they tend to cheapen the construction of the machine, to render it more durable, lighter, and easier of draft. Every such advantage gained is an advance worthy of special note. Mowing machines are coming into such extensive use that their improvement, in any respect, is a matter of deep interest to agriculturists. Mr. Brown's invention is ingenious and excellent. It consists, first, in a peculiar way of attaching the finger bar to the main bar of the machine. Second, in the construction of the frame of the machine; and, third, in the management of the gearing, by which motion is communicated to the sickle.]

VALVES FOR REGULATING STEAM ENGINES—P. W. Mackenzie, of Jersey City, N. J.: I claim, first, the construction and arrangement of the cut-off valve, I, and its seat, H m I, and the disk, k, and the application to the said valve of a variable spring, P, or their equivalents, whereby the valve is made to cut off the supply of steam by the action of the current of steam in the passage from the boiler to the engine, when it has attained the desired speed.

Second, the employment, in connection with the cut-off valve of the piston, I, working in the cylinder, E, which is provided with a valve, d, and adjustable valve, k, to prevent the too sudden opening of the said valve, the said piston cylinders and valves operating as set forth.

Third, providing for the opening of the cut-off valve by means of the spring, P, as soon as the slide or other induction valve, covers the part of the cylinder by the employment of a stop, p2, to prevent the entire closing of the said valves.

OPERATING AND DUMPING EARTH CARTS—Rich. Ray of Lowisport, Ky.: I claim the method of operating alternate trucks, upon a double railway track, by the several devices, as described.

I also claim the automatic delivery of the loaded cars, constructed as described by several devices thereon, in combination with a post, o, situated between the tracks.

I claim the device for closing the bottoms, a a, of the cars, as described.

OPERATING DUMPING CARS—Richard Ray, of Lowisport, Ky.: I claim the use of the guide bars, k and m, when in combination with car d, constructed with the arc, e.

SEEDING MACHINES—E. and G. Stephenson, of Plainfield, Mass.: We claim distributing or conveying the seed from the box, E, to the conveying spout, F, by means of the tube, L, with plate a' attached, the tube being secured within a shaft, L, which has a reciprocating rotary motion.

[This seed sower is very simple in its construction; the above claims are as explanatory of the mechanism as any description would be without diagrams. The machine is capable of sowing the seed either in drills or in hills, according to the pleasure of the operator; the change from one to the other involves only the turning of a nut or two. Corn or clover—the largest or the smallest seeds—each may be sown with equal facility, without delay or inconvenience in adjusting the parts.

The machine is cheap, effective, and easily managed. It ranks, in our opinion, among the best implements of its class.]

SAWING HOOPS—Elias Strange and Thos. B. Smith, of Taunton, Mass.: We claim the employment of two reciprocating saws, G G, arranged as shown, viz., one saw being secured in a laterally sliding sash, and the other in a permanent sash, or one which only has a reciprocating motion in a vertical direction.

[Considerable difficulty has been hitherto experienced, in pole hoop sawing machinery, to retain an even thickness in the hoops,—cut off, as they are, from long, tapering, crooked poles. The present improvement accomplishes this peculiar operation with an uncommon degree of perfection and rapidity.

Two upright saws are arranged, side by side, and against them the hoop pole is fed, by means of roller One of the saws, and one set of the rollers, are placed in a yielding frame, which readily expands or contracts, according to the irregularities of the pole. Two hoops, both of an even thickness, are cut by one passage of the stuff through the machine. For the purposes intended, this is a valuable improvement. To its ingenious inventor it will doubtless prove, in a pecuniary point of view, highly remunera-ive.]

SUPPORTING SHIPS' TOPMASTS—Thos. Batty, of Brooklyn, N. Y.: I claim the employment, for the purpose of supporting or assisting to support the topmast or top-gallant mast and superincumbent spars and rigging, and for setting up the same when necessary, of two diagonal double screwed iron stays, e, constructed and applied as described between the cap of the lower mast and the heel of the topmast.

[Ordinarily, the lower end of a ship's topmast is supported on what is known, in nautical parlance, as a "fid." This consists of a square bar of iron, which passes through the heel of the topmast, at right angles to the latter. The "fid" rests on the "trestle trees." which are two stout horizontally projecting pieces, secured near the top of the lower mast. In all vessels there is more or less tendency in the "trestle trees" to sag down out of a horizontal position; for upon them falls the entire weight of the topmasts with all their spars, sails and rigging. It is no easy matter to restore the topmasts of their proper position, when once the "trestle trees" have given way,

Mr. Batty supports the topmast by providing two iron straps, which extend, on an angle, from the cap of the lower mast, to the ends of a bolt that passes through the heel of the topmast and answers as a "fid." The heel is also furnished with a strong iron thimble. Both straps are made in two pieces, united at their centers by nut and screw; whenever it becomes necessary to raise the heel of the topmast, it may be done in a moment, by screwing up the straps.

Mariners, and all others acquainted with the rigging of vessels will see, at a glance, the great superiority of this improvement over the common plan. It is so much cheaper and better that it must soon come into very extensive use.]

TELEGRAPHIC TIDE GAUGES—Alex. Boyd, of Lumberland, N. Y.: I do not claim the employment of a float and weight for indicating the hight and weight of water in channels and passages, irrespective of the mechanism shown for transmitting motion to the slides by which the lights are obscured and exposed, for they have been previously used.

But I claim showing and obscuring a series of lights, j, successively so that the hight of the water may be indicated by the number of lights visible by means of the slides, h, provided with projections, m m, and the rod, s, attached to a rope or chain, v, said rod, s, operating the slides, the rope or chain, v, working over pulleys, b, and moved and operated by the shaft, G, which receives its motion by means of the float, c, and weight, H.

[Throughout the long exten of the American sea-board there are many harbors, much frequented by coasting and other vessels, where the entrances are blocked by sand bars or reefs, over which, at certain stages of the tides, there is not a sufficient depth of water to permit safe navigation. The same may be said of various shoals. It is often a matter of difficulty for a mariner, in approaching such places, to determine whether or not the depth is sufficient for his vessel; through a want of correct information he is often delayed from going into port, and is driven off by a storm; or, what is more frequent, his ship strikes bottom and becomes a wreck.

Mr. Boyd has produced a very excellent invention whereby all such difficulties may be avoided. He erects a frame-work on the locality of danger, in which he places a combination of simple mechanism for raising and lowering signals,—flags, or balls, for the day time, and colo ed lights for the night. The mechanism is operated by a float resting in the water. As the tide rises and falls the machinery moves and the signals change. Thus, there may be a signal for each foot of depth; when the water is two feet deep, two signals will be shown; as soon as the tide has risen another foot, three signals will be exhibited —and so on, vice versa.

The advantages of this invention are so self-evident that we need not enter into a detail of them. We regard it as an important improvement, and trust that it may find a very extensive introduction. The number of lives, and the amount of property annually lost, for want of some such systen of signalization along our coasts, is immense.]

CHIMNEY STACK OR CAP.—M. M. Camp, of New Haven, Ct.: I do not claim either of the parts, as such, nor any two of them combined.

But I claim the combination of the three parts, A C D, when constructed, arranged, and combined, as described.

MOLD FOR BACKING ELECTROTYPE SHELLS—Aaron D. Farmer and Ransom Rathbone, of Brooklyn, N. Y.: We claim the use of the mold frame, B, or its equivalent, in combination with the bed plate, A, to plate, C, and clamps, and handle, G, or their equivalents, for the purpose substantially as described, for backing electrotype shells.

DOVETAILING MACHINE—J. J. Haley, of Philadelphia, Pa.: I claim the forming of a dovetail, either as a morise or a tenon, at a single operation, by angularly placed reciprocating chisels, a a, in combination with horizontally placed chisels, o o, arranged substantially as set forth.

I claim giving a reciprocating motion to the chisels, o o, by the snail cam, I, on shaft B, in combination with chisels, a a, gear, d o, to and pitman rods, h h, for the purpose of actuating the chisels in unison with each other, in the manner described.

I claim the arrangement of the angular, E E, in combination with the guides, F, for the purpose of effecting the under cut or sides of the dovetail.

I claim the arrangement and combination of the angular guides, E E, and chisels, a a, on stocks, F F, with the horizontal chisels, o o, and guides, m, and snail, I, on shaft, H, for producing the dovetail and completing the mortise, in the manner set forth.

GRASS HARVESTERS—Jonathan Haines, of Pekin, Ill.: Adjustable seats, or seats that can be adjusted, have been used; but to do this the machine must be stopped, and the adjustment, when made, is permanent, this I do not claim.

But I claim, first, the hanging of the cutter bar to the main frame, by means of the longitudinal, k, and transverse rods, m, so that said cutter bar may be free to rise and fall to the undulations of the ground, while it is prevented from all lateral motion.

I also claim the use of a driver's seat when mounted on ways or rails, so that the driver can, at pleasure, throw his weight forward or backward, to aid in balancing or relieving the cutters, as the variable character of the ground or condition of the grass may require.

CORN SHELLER.—J. V. Horne, of Magnolia, Ill. I claim the revolving cylinder, E, furnished with buckets, d, flanching, p, and holes, f, in combination with the revolving cylindrical screen, F, for the purpose of cleaning the grain separating the chaff, and elevating the grain and delivering it, in the manner set forth.

[In this corn sheller, the ear passes between a toothed cylinder and a concave plate, whereby the grain s instantly stripped off; the corn and cob then fall into a revolving screen, which conveys the cob away out of the machine, while the corn falls through the meshes of the wire on to a concave receiving pan. The winnowing is done by a fan which sends a blast of air, lengthwise, through the screen. The grain is elevated high enough for bagging, by means of miniature elevators.

This improvement combines all the conveniences that could possibly be desired in a corn sheller. The old-fashioned shellers are simpler in construction, but they only half do the work. Mr. Haine's machine shells, separates the cob, cleans and bags the grain, all by the turning of one crank.]

BRICK MACHINES—J. A. Victor, of Montgomery, Co., Ky.: I claim the combination of the endless chain of molds connected substantially as described, with the two sets of rollers, one of the upper of which, in addition to aiding in drawing the mold through, at the same time compress the clay in the mold.

HARVESTERS—A. E. Kroger, of Norwalk, Ct.: I claim attaching the finger bar, D, to the front bar, a, of the frame, A by means of the rods, c c, which slide through the ends of the bar, a. The rods, c c, being encompassed by springs, d' d', at shown.

[New England soil is proverbial for its stones and rocks. Many of her meadows are so abundantly supplied, in this respect, that the mowing machines of ordinary construction cannot be operated in them to advantage, although on smoother soils they are entirely successful.

Mr. Kroger's improvement is intended to obviate all the difficulties which have hitherto attended the use of this species of mechanism on rough grounds. In the first place, he curves up the fingers a little, in front, so that, on meeting an obstruction, they will be likely to rise up and slide over the same; second, in the attachment of the finger bar to the frame, he employs springs, in such a manner that when one end of the finger bar strikes a stone, the bar yields and easily glides over the obstacle, without raising the whole machine. These are excellent improvements, and reflect much credit upon the mechanical genius of the inventor.]

TO PREVENT AN OVER-SUPPLY OF COAL TO THE FIRE BOX OF HOT AIR FURNACES—L. W. Leeds, of Germantown, Pa.: I claim the arrangement in the fire chamber of the balance valves, H H, for the purpose of preventing an undue quantity of coal from remaining in the fire box.

CONSUMING ESCAPE STEAM AS AN ADJUNCT IN HEATING FURNACES—Thos. Maskell, of Franklin, La.: I claim the use of escape steam decomposed at a high heat by means of a pipe, B, and bulb, C, or their equivalents, so placed above the bed of coal, as to admit of the combining readily with the gases eliminated therefrom as an economical adjunct in heating boilers, as set forth.

FOUNTAIN PEN—G. W. White, of Mt. Vernon, N. Y.: I claim the manner of constructing the holder by having two small tubes, one fitting close over the other, the inner tube joined to the main band, and the outer tube having the holder for the pen attached, and having a hole drilled through both tubes, on the side that the pen if attached, so that the ink may flow out into the pen, r, when the outer tube is turned or revolved around on the inner tube, the holes are turned away from each other, and the holder closed; this outer tube to be turned and regulated by means of a small projection on each tube to the place desired.

SPIKE MACHINE—Amos Whittemore, of Cambridgeport, Mass.: I claim pointing the spike by means of the inclined bed, s, the advancing roller, e', the inclined surface, f, and the pressing roller, j, as set forth.

UNIVERSAL DOG FOR PLANING MACHINES—Solm. S. Gray, of South Boston, Mass., assignor to himself and S. A. Woods: I claim, first, the arms, f f', in combination with a pivoted clamp, whereby it is rendered rigid when desired, as described.

Second, I claim placing the screw which forces up the clamp above the level of the dogs, for the purpose set forth.

LOCOMOTIVE LAMP CASE—Salmon Bidwell, of Rochester, N. Y.: I claim the placing of the chimney, horizontally, and in such a position as to discharge the smoke near the top and behind the lamp, as described.

DESIGNS.

TRADE MARKS—Thomas Lewis, of Malden, Mass.

COOKING STOVES—Wm. T. Coggeshall, of Fall River, Mass

Steamships Building in New York.

The new steamship *Adriatic*, for the Collins' line, is being built by George Steers, and is intended to be ready for launching early next spring. The steam frigate *Niagara*, which is being constructed by the same nautical architect, will be ready for launching in December next.

The large steamship *Cornelius Vanderbilt*, (the name of its owner), for his Havre line, is being pushed forward rapidly by its builder, Mr. Simonson, at Green Point. It will be 3,500 tuns burden, and be driven by two immense *over head* beam engines, which are now being constructed at the Allaire Works.

The steamship *Fulton* has just been launched from the yard of Smith & Dimon. She is 2,500 tuns burden, and is intended for the Havre trade. We have been informed that the engines of the *Adriatic* and the *Fulton* are to be oscillators—vibrating cylinders—like the Arago. They are more simple and cost less than either "side levers" or over-head beams, but whether they will prove as economical in the long run, has yet to be determined. These steamers will, no doubt, settle the question, which has hitherto been a mooted one with marine engineers.

A Farm Steam Engine.

One of our correspondents—A. C. Ireland, of Chillicothe, Ohio—informs us that a neat portable steam engine, for driving a grain thrasher and separator, has been constructed at the machine shop of Wm. Welsh, of that place, under the superintendence of John Ritchie, and has been in operation since the 5th of last July, thrashing and cleaning from five to six hundred bushels per day. It is capable of doing more than this, but H. Wade—for whom it was built—says that this is excellent work. The boiler is tubular, the cylinder is of 6 inches bore and 12 inches stroke. It makes 175 revolutions per minute, with steam at 40 lbs. pressure, and does more work than any common thrashing machine driven by eight horses. It is placed on broad tread wheels, four feet in diameter, is easily drawn from place to place by two horses, with the boiler filled, and is very economical in the use of fuel. This engine is capable of driving various agricultural machines and sawing firewood for the family. We have no doubt but portable steam engines will yet come into more general use among our farmers, as they are so convenient and easily managed in comparison with horses. We believe that on every farm numbering a hundred acres, and upwards, a portable steam engine could be profitably used.

The Greatest Coal Field in the World.

The coal field of what is called "The Ohio Valley," is by far the largest in our globe.—This valley comprehends all that space of country penetrated and watered by the Ohio river and its tributaries, such as Western Pennsylvania, Western Virginia, all of Ohio, Indiana, and Illinois, up to the narrow rim of the Lakes and the States of Kentucky and Tennessee. It embraces a surface of about 230,000 square miles; and on that surface the coal basins, or in other words, the surface which is underlaid with coal is, according to the best authorities as follows:

	Surface, sq. miles.	Coal Surface.
Western Pennsylvania,	20,000	10,000
Western Virginia, - -	25,000	18,000
Ohio, - - - - - - - -	35,000	10,000
Indiana, - - - - - -	33,000	7,500
Illinois, - - - - - -	40,000	35,000
Kentucky, - - - - -	40,000	13,500
Tennessee, - - - - -	40,000	5,000
Aggregate, - - - -	233,000	99,000

The above surfaces are not all those of the States named; but that part in the valley of the Ohio. We see then the extraordinary fact that more than one-third of the valley of the Ohio is underlined with coal, and it therefore gives promise of being the great manufacturing center of the world at some future day.—In the State of Illinois alone there is a total coal area of 44,000 square miles, some of which is comprehended in the Mississippi valley. This State has the largest coal area on our continent, and greater by 26,696 miles than the whole coal area of Europe, which amounts only to 17,504 miles.

The New York Observer and the Scientific American.

THE EARTH A BURYING GROUND—Our attention has been directed to an article in the *New York Observer* of the 23rd, by an anonymous correspondent of this city, signing himself R. L., who charges us with endorsing as "ingenious, authentic, and valuable," some statistical work "just published," which says, "It will require 5,200,000,000 square miles" to bury all the world's dead. The author of the article asks some questions of the editor of the SCIENTIFIC AMERICAN respecting the endorsement of the said work, and does so in rather a tart manner. We are sorry we do not know his name, so that we might give him personal public advice respecting the use he has made of ours in connection with his profuse vindication of the capacity of the earth to contain all its dead. The work to which he refers, we have never seen, nor has it been endorsed in the columns of the SCIENTIFIC AMERICAN.

To our Subscribers in Canada.

By a late enactment of the Canadian Parliament the SCIENTIFIC AMERICAN passes free of postage through all parts of Upper and Lower Canada. This liberal law was made for the purpose of encouraging the spread of knowledge among the people of those Provinces. We trust that the receipt of a very long list of subscribers from Canada will enable us to bear testimony to the practical excellence of the new postal regulation.

A Monster Railroad Enterprise.

A correspondent of the Dubuque (Iowa) *Tribune*, has presented a formidable array of facts to show that the time is not far distant when there will be an uninterrupted line of railway communication between the Falls of St. Anthony, on the Mississippi, and the Gulf of Mexico, a distance of some twelve hundred miles. For most of the distance it appears the work is already commenced.

New Historical Lyceum.

Nathan Jackson, Esq., of New York city, has presented $3500 to the Lyceum of Natural History of Williams College, to aid in the erection of a building for scientific purposes. This Hall (to be called after the name of the donor), is of brick, and nearly completed. On the occasion of the Society's twentieth anniversary, Aug. 14th, a learned and eloquent address was delivered by Prof. Wm. B. Rodgers, of Virginia, on the Relationship of the Natural Sciences.

American Association for the Advancement of Science.—No. 3.

Geology of California.—W. P. Blake read a paper on the Geology and Mineral Association of the Quicksilver Mine of New Almaden, California. He gave a general description of the mine and the character of the vein. The ore is a massive sulphuret or cinnabar, and is identical in composition with the vermillion of commerce. It is found in a series of beds interlaminated with the slaty rocks, some of the hard shales being highly charged with the ore. It also occurs in long, irregular veins, traversing the rocks at right angles to the bedding, forming beautiful specimens for the cabinet. Some of the beds of ore reach a thickness of eight feet, but the thickness of the series has not been ascertained. Veins of carbonate of lime traverse the beds of ore and fault all the small veins, being more recent in its formation. The only minerals yet observed are iron and copper pyrites, arsenical pyrytes, talc spar and bitumen. Gold has also been reported. The rocks in which this ore occurs are similar to those of San Francisco, and like them have the peculiar flinty metamorphic character. They are probably of tertiary age, and are associated with trappean and serpentine rocks. Mr. Blake made further observations on this ore, and exhibited numerous specimens. The mercury is very pure, and is obtained from the ore by distillation in close brick chambers.

Mr. Blake exhibited some beautiful specimens of crystallized and arborescent gold—some of them found in the neighborhood of Sutter's Fort. The arborescence was perfect, and some of the crystals an inch in diameter.

Geology of New England.—Prof. Guyot spoke on the configuration of the soil in New England. He said that our one great want was reliable maps. Except those of the Coast Survey we have no reliable maps. But there are features of country that no ordinary maps can give. New England is a part of a mass o land cut off from the rest of North America by the low valleys of the Hudson and Lake Champlain, and the river and Gulf of St. Lawrence. The highest point in this demarkation is at the south of Lake Champlain, where it is only 140 feet high. The mountains are a continuation of the Appalachian chain. A section west from Boston rises gradually with an undulating character and elongated hills to Worcester. Beyond Worcester is a terrace about 1000 feet high and 40 miles wide—a broad, undulating plateau that extends down to the State of Connecticut. The low lands have the Blue Hills near Boston, and in the plateau are more hills of some 1,200 feet, and some higher peaks of 3,000 feet. We come now to the Connecticut, and go down nearly to the sea level at Springfield, only 40 feet above. Here are trap-rocks of some 1,200 feet high. On west we have 20 miles high of rolling plateau. Then we come to greater elevations. The railroad passes at 1,475. Passing still higher peaks we come to the elevated valley of Pittsfield, with peaks of 3,500 feet, and after that we descend to tide water. Thus the Connecticut river divides a plateau. The rise is to the west, and this rise extends to a plateau of 1,500 to 2,000 feet, where rises the Susquehannah. Further north the country rises, and the Connecticut river in Vermont is 800 feet high. Still further north is an immense and very high plateau, and here the character of the swells below is broken up but still traceable. This is the great valley of the St. Johns, where the streams run parallel to the coast till they find a chance to break over the edge. So there are two great chains that continue from the Sound to the Bay of Chaleurs. These chains have a bend at the White Mountains. The peaks though not so high, are still quite high, 4,000 feet, and Mount Kladhna, is said to rise to even 5,000. The Eastern mountains are peaks on a swelled base—the west are a continuous chain. They are upheavals of a different age. The White Mountains are high peaks on a high swell, but not on the highest swell, which is still further north. The White Mountains are not in accordance with the chain. There are two systems crossing each other, and Mount Washington is at the intersection of the two. We may find three or four upheavals in the whole tract east of the Hudson, but a common law seems to pervade them all.

Prof. Hall said that what was called the granite of the Green Mountains was but beds of the Lower Silurian group, and that the eastern ridge consisted of the Niagara group and limestone identical with the Hilderberg. The continuation of the western range towards Gaspe belonged to the Upper Silurian and continuation of the eastern range to the Baie des Chaleurs consisted of carboniferous strata. The carboniferous rocks in New Brunswick were 18,000 feet thick, and it was well known that causes connected with the thickest strata produced the highest mountains.

Improvements in the Electric Telegraphing.—M. G. Farmer, of Boston, read an interesting paper on this subject. He said, by a very simple combination and arrangement of the two systems of House and Morse, from two to twenty-eight messages might be in the process of transmission over the same wire at one and the same time. Thus: suppose we have two letter-printing telegraphs, one situated in Boston, the other in New York, and connected as usual for the purpose of transmitting messages; suppose, further, that the axis of the type-wheel in the Boston machine was connected by a wire with one pole of a suitable galvanic battery, while the other pole of this battery was connected by an extended wire with the axis of the type-wheel of the machine in New York; further, let us remove the two type-wheels from their axis and substitute therefor a slender spring on each, at right angles to the axes, and which in the course of a revolution of the shafts shall make contact with the twenty-eight circular segments arranged concentrically around the axis of the type-wheel and insulated from it and from one another; still further, let each of the twenty-eight segments in the Boston instrument be connected severally with one pole of a complete "Morse" machine, which is, at the other pole, in connection with the earth; there will then be twenty-eight "Morse" machines at Boston attached to the "House" machine, and by the revolution of the type-wheel axis these twenty-eight machines will be successively put into connection with the common communicating wire. Suppose twenty-eight "Morse" machines similarly connected with the "House" machine at New-York; if now the slender spring in each "House" machine presses on the "A" segment and the two type-wheel shafts be made to rotate rapidly in the usual manner, at every revolution of the type-wheels the "A" machines at Boston and New York will be at once in connection with each other by means of the slender springs, the segments, and the common wire. If the type-wheels should make twenty revolutions per second, the dots or impulses would succeed each other so rapidly as to make nearly a continuous line, which could be broken up into short and long lines by means of the key in the usual manner. He had operated with this arrangement on a circuit of several miles in length at Boston.

Recent Foreign Inventions.

To Make Glue from old Leather—J. H. Johnson, of London, has obtained a patent for preparing old leather scraps to render them fit to be made into glue. The leather is first chopped into small pieces and thoroughly washed, then placed in vats where it is digested with a potash or soda. It is taken out, after a few hours, and subjected to pressure, and again immersed in a stronger alkaline solution for some hours, which processes remove all the tannic acid. It is now taken out and washed well with water, and submitted to a steep of a very weak sulphuric acid for twenty-four hours, to remove all the coloring matter. This being accomplished, it is again submitted to a weak alkaline solution of the carbonate of soda, then washed in water, and is fit to be made into glue by the common process.

Ornamenting Glass—James Wood, of London, has taken out a patent for lettering and ornamenting glass in the following manner:—He prints letters or devices on paper gold leaf, or other suitable thin material, then cuts them out and attaches them to the back of a piece of glass, and afterwards coats the back of both letters, devices, and glass with an opaque paint.

[This process is not new here. It has long been in use.

Marbleizing the Surface of Stone—J. Claudot, of Paris, has obtained a patent for covering the suface of common stone or plaster of Paris figures with a coating of marble, as follows: He lays upon the surface of the stone successive coats of milk of lime, allowing each to dry before the other is put on. When these coats have attained to a proper thickness, he smooths them down and polishes them until the surface resembles marble in brilliancy. Carbonic acid is then thrown upon the outer surfaces, when it becomes real marble. The milk of lime may be colored so as to produce the exact appearance of variegated marble.

Liquid for Preventing Sea Sickness—Jean A. F. V. Oudin, a French priest, has obtained a patent for the following liquid for the prevention of sea sickness: "I distil," says the inventor "one-third of an ounce (troy weight) of hydrochloric acid in five ounces of alcohol, and mix the product in 32 ounces of water, sweetened with a little sugar or syrup. I, however, prefer to compose the liquid of 2 2-3 ounces of dry chloride of lime mixed with 8 ounces of water and 10 2-3 ounces of alcohol. This is distilled in a common still, and the product mixed with 32 ounces of sweetened water, to which are added a few drops of the essence of mint, and a few grains of cochineal to give it a pink color." A few drops of this are to be taken at sea, to prevent and allay sea sickness, and if it accomplishes this object priest Oudin will deserve great credit for his discovery. As this liquid, however, is of the same composition as chloroform, the latter may answer equally as well.

Aiming with Cannon.—Capt. D. Davidson, of Stirling, Britain, has obtained a patent for applying to cannons, with a plain or telescopic sight, cross wires, so that by means of them and a collimator, the piece of ordnance may be brought into its proper position by day or night, after every discharge, without the necessity of observing the object aimed at, after the proper range and aim have been first obtained. For breaching walls this appears to be a good improvement.

Artificial Coral—S. Isaacs, of London, has taken out a patent for making artificial coral, by causing alabaster to be impregnated with oil containing red coloring matter, such as madder, after the alabaster has been treated with a very weak solution of sulphuric acid.

Rotary Steam Engine—J. Webster, of York, England, a miller, has taken out a patent for a rotary steam engine consisting of a hollow shaft mounted on a wheel, and having a number of elbow pipes branching off from it. The steam passes through the hollow central shaft, and flows out of the elbow pipes, where it strikes against apertures, on a wheel secured to another shaft, and gives the said wheel and shaft motion. This invention is not complex, still it is not quite so simple as old Hero's engine, and hardly so effective. It is one of those rotary improvements which revolve in the wrong direction.

Interesting Lawsuit,—Process of Galvanizing Iron.

A case was tried at the recent Assizes for Staffordshire, England, in which a question arose as to the effects produced on land and cattle from the manufacture of galvanized iron. It was an action brought by Benjamin Smith, a farmer, against Messrs. Walker, iron manufacturers, in that county. The plaintiff's land had been in the occupation of his ancestors, and in his own, for upwards of a century; and it appeared that there ran a brook through it, which had been formerly sufficiently pure for cows and cattle to drink of, but, before entering his land, it flowed down to the defendant's iron-works. About three years ago, the defendants adopted a new process of galvanizing iron; and the plaintiff now complained of having lost several of his cattle by reason of the impurity of the water, and also that he had, in his farming operations, by deterioration of his land, sustained other damage.

A variety of evidence was given on the part of the plaintiff, in order to establish that he had lost at least $375 a year upon his cows and calves for the last three years, and that he was, therefore, entitled to at least $1125 damages on that head; that $525 would be but a small compensation for his loss in the supply of milk; and that there was then the value of his land which had been destroyed. Mr. John Walker, one of the defendants, was examined, and he described the process of galvanizing iron. They cleaned the iron plates with dilute sulphuric acid, there being one part of acid to nine parts of water. After some time, this mixture became sulphate of iron, and, thus losing its peculiar property, had to be let off into the brook. There was also zinc used in the process; it was placed in a molten state on the plates. The sulphuric acid was kept in vats. They let off generally about a vat per day. In the process there was also consumption of zinc, and, after draining the plates from the zinc bath, they were dipped in water, which water afterwards ran off into the brook. Evidence was then given to show that the injuries to plaintiff's land and cattle, were generally exaggerated; and scientific witnesses, who had analyzed the water, were also examined. Some of the water, after it had passed the works, was found to contain neither tin nor zinc, but merely a little iron; but both tin and zinc were found, in very small quantities, in a specimen of the deposit from the brook which was examined. Mr. James Simmons, Professor of the Royal Veterinary College, was of opinion that water containing sulphate of zinc in the minute proportion stated, would not only not be injurious to cows, but would be beneficial to them, by acting as a tonic. The same proportion of chloride of zinc would have precisely the same effect. In his cross-examination, he stated that 10 grains of chloride of zinc might be given to a cow without injury.

In directing attention to the question of damages, the learned Judge commented with much severity on the fact that, the plaintiff had allowed the evil to go on year after year, and then came forward with a heavy claim. He thought that there was not any discrepancy in the medical and scientific evidence, for it showed that zinc was found in the deposits taken from the brook, and that, if the cattle drank continuously from that water, injurious consequences would result. The defendants had previously paid $250 into court, acknowledging the plaintiff's claim to that extent, and the jury refused to add any further damages. So farmer Smith only received $250 out of his cash claim of $2025, and lost his land damage claim altogether. The testimony of Professor Simmons, to the effect that the zinc impregnation of the water was beneficial to the cows, than otherwise, is rather rich. Some persons appear to think that Providence made a mistake in creating pure water—it is so much superior when mixed with some poisonous drug or other compound.

Telegraph from England to Australia.

While American capitalists are busy in laying down the wires for a telegraph between New York and London, our transatlantic friends are occupied in doing their share towards the complete encircling of the world. The far-off regions of Australia have been put down upon the telegraphic chart as the eastern terminus of the great Mediterranean Electric Telegraph Company.

This company is formed for establishing a communication between Europe, Africa, Malta, the Ionian Islands, Greece, Constantinople, India, and Australia. They have a concession, with exclusive privileges, for fifty years, from France and Sardinia, and interest at the rate of five per cent. per annum guaranteed for the same period by the French and Sardinian Governments. Mr. John W. Brett, the telegraph engineer, states that the lines have been in active and successful operation from Cagliari to Spezzia, Italy, about six hundred miles, since the 15th of August last, and the messages transmitted have already far exceeded the number originally anticipated. The remaining portion of the present lines will be completed within a few weeks, as the third cable, one hundred and sixty-two miles in length, is now on board the *Result*, at Greenwich, and was to leave England in a few days. This important complement of the line will unite the southernmost point of Sardinia with Algiers, Africa, when the guarantee of five per cent. interest from the French Government will come into force, as is already the case with the Sardinian Government. The Mediterranean submarine cable is the largest and strongest which has yet been laid down; it consists of six electric wires throughout, weighing eight tuns per mile, or over two thousand tuns.

New Inventions.

Machines for Planing and Jointing Staves.

The first annexed figures represent the improved machine of M. T. Kennedy, of Fallston, Pa., for which a patent was obtained on the 12th of last June.

Fig. 1 is a transverse section of the machine. Fig. 2 is a side view, and fig. 3 a top view. The invention relates to planing the outer sides of keg and barrel staves, and consists in the combination of a rotating disk provided with cutters, and a rotating clamp for holding the staves while being operated upon by the cutters. A represents the frame of the machine. B a horizontal shaft running in suitable bearings, *a a*, and having a circular metallic disk at one end provided with radial cut ters, *b*, near its periphery, of which there may be four or more. The cutting edges of these cutters are on the outer side of the disk, as shown in figs, 2 and 3. D E are driving pulleys, by which motion is given to shaft, B, by a belt from some main driver. D' is a horizontal shaft having a driving pulley, E, at one end and a screw, F, at the opposite end. On the shaft, H, there are two circular disks, I I', permanently secured to the shaft, at a suitable distance apart, corresponding to the length of the staves to be planed. Around the disk, I, there is a band, J, having its inner edge serrated. K K K are rods, the ends of which pass through the disks, I I'. Each rod has a lip, *c*, at one end. The outer ends of these lips are bent over the outer edge of the disk, I', and their edges are serrated. Around each of the rods, K, there is wound a spiral spring, L, which keeps the lips, *c*, over the edge of disk, I'. M M are stationary cams at the ends of a semicircular band, N, attached to one end of the frame, and at the back of disk I. The disks, I I', rods, K, and spring, L, with lips, *c*, form a rotating clamp.

Motion is given to disk, C, by means of a belt passing over either of the driving pulleys, D E, and motion is given to the clamp by a belt passing over the pulley, E, on shaft, D', the shaft H and clamp being rotated by screw F, and worm wheel, G. As the clamp rotates, the uppermost rod, K, will be acted upon by cam, M, which bears against its end and forces it forward, so that its lip, *c*, will be forced outwards from the disk, I', and the stave is then inserted between the lips, *c*, and the edge of band or loop, J. When the uppermost rod, K, passes the cam, M, its spiral spring, L, will draw the lip, *c*, of said rod firmly against the edge of the stave which will then be secured between the edge of the lip and that of the hoop or band, J. The staves are all secured in the clamp in this manner, viz.: inserted as the clamp rotates, between the uppermost rod, K, and the hoop, J, the cam, M, permitting this by forcing out the lip and allowing the insertion of the stave. The clamp rotates in the direction of arrow 1, and the disk C in the direction of arrow 2, fig. 2. As the staves come in contact with the cutters, *b*, they are planed and dressed while passing round on the clamp. When the ends of the rods come in contact with the lower cam, M, fig. 2, the lips, *c*, are again forced forward or out from the disk, I', and the dressed stave then falls from the clamp. This is a simple and good operative machine. The claim is for the disk, C, and the clamp, the latter being formed of a series of rods, K K, passing through the disks, I I', and provided with springs and lips, operated and formed as described and represented.

The succeeding figures represent the improved stave jointing machine of M. T. Kennedy, for which a patent was granted to him on the same date as the one for his above described stave dresser. The nature of the invention of this machine consits in the combination of two reciprocating planes and an adjustable clamp, constructed, arranged, and operated as will be described, for jointing staves for barrels, kegs, and such like purposes.

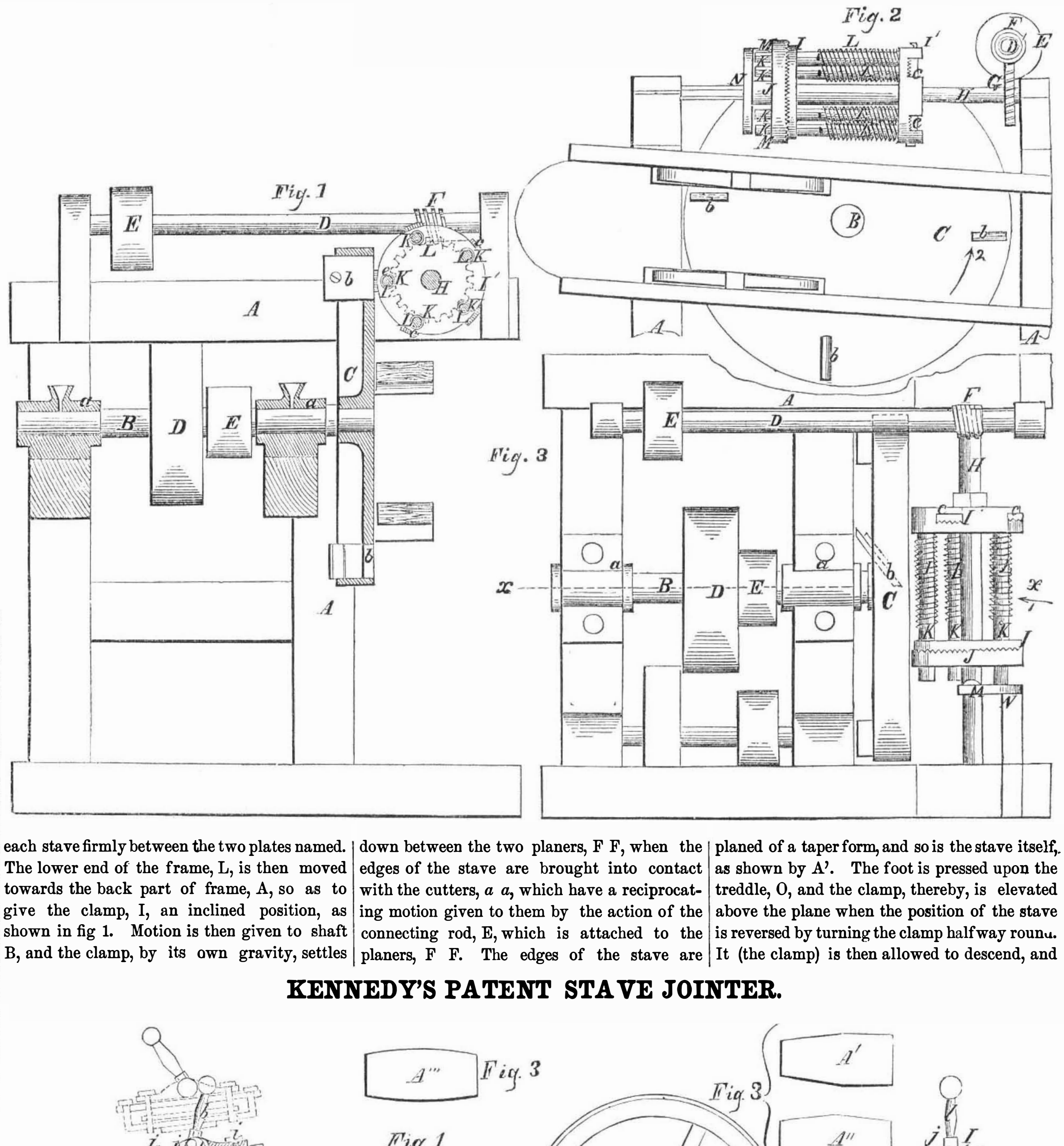
Fig. 1 is a vertical longitudinal section of the machine; fig. 2 is a transverse vertical section of it, and A' A'' A''' embraced in fig. 3, show three staves—one partly, and two finished.

A is the frame of the machine. B is a shaft running in suitable bearings, and having a pulley, C, and a fly wheel, D, at one end. E is a connecting rod united by a pin eccentrically to the fly wheel. The opposite end of this rod is attached to two reciprocating planes, F F, which work in guide ways on the front part of the frame. The planers, F F, are formed by inserting cutters, *a a*, in metallic plates, *b b*, which are placed a suitable distance apart, and have their upper edges inclined outwards, as shown in fig. 2. The ends of these plates are attached to blocks, H H, which work on guides. I represents a clamp attached to the upper end of rod, J. This rod passes through a socket, K, in the upper part of frame L, which is secured by bolts, *c c*, to frame, A, the lower end of frame L being also secured to the base of frame A. The rod, J, has a small cross bar, M, passing through it, the ends of which work in grooves in the frame as shown in fig. 2. The lower end of rod J, rests upon the end of a treddle, N, which is connected to another treddle, O, by a strap, O', passing over pulley *d*.

The clamp, I, is formed by two metallic plates, *e e*, connected by end pieces, *f f*, as shown in fig. 1. Between these plates there is placed another plate, *g*, which has a bolt, *h*, at each end. These bolts pass through the upper plate *e*, and have nuts, *i i*, upon them. A plate, *j*, is also placed above the upper plate, *e*, the nuts, *i*, securing it by the bolts, *h*. A cam, *k*, is inserted in plate *j*; it is provided with a handle, *l*, and its edge bears upon the surface of the upper plate, *e*.

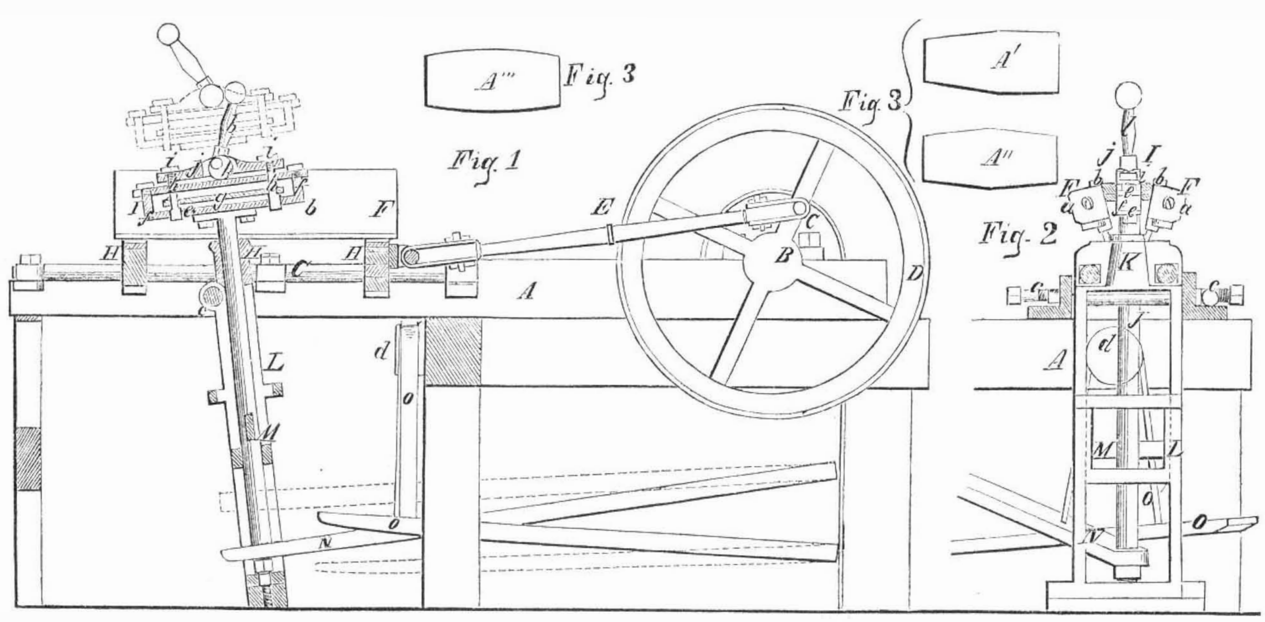
The staves to be jointed are secured in the clamp, I, by placing them—one at a time—between the upper plate, *e*, and plate *g*, and by moving or turning the cam, *k*, which secures

KENNEDY'S PATENT MACHINE FOR PLANING STAVES.



each stave firmly between the two plates named. The lower end of the frame, L, is then moved towards the back part of frame, A, so as to give the clamp, I, an inclined position, as shown in fig 1. Motion is then given to shaft B, and the clamp, by its own gravity, settles down between the two planers, F F, when the edges of the stave are brought into contact with the cutters, *a a*, which have a reciprocating motion given to them by the action of the connecting rod, E, which is attached to the planers, F F. The edges of the stave are planed of a taper form, and so is the stave itself, as shown by A'. The foot is pressed upon the treddle, O, and the clamp, thereby, is elevated above the plane when the position of the stave is reversed by turning the clamp half way round. It (the clamp) is then allowed to descend, and

KENNEDY'S PATENT STAVE JOINTER.



the opposite end of the stave is jointed in a similar manner to the first, when it will be of the form of A''. If the staves require to have rounded edges, as shown by A''', they are bent or sprung upwards at their centers in clamp I. More or less taper may be given to the staves, by adjusting frame L, so that the clamp, I, may be more or less inclined. Some kinds of staves such as those used for pails, kegs, &c., require one taper only, and these of course are not reversed in the clamp. This machine is extremely simple, not liable to get out of repair, nor is it expensive to manufacture. For making tight vessels, it possesses great advantages, as the planes act upon the staves from the center to the ends, thereby working with the grain of the wood and making a very smooth joint.—Mr. Kennedy is now manufacturing lead kegs at the rate of 50 per hour, upon a single set of the above described machines.

More information respecting them may be obtained by letter addressed to him at his residence, Fallston, Beaver Co., Pa.

Iron Steamboats at Wilmington, Delaware.

One of our correspondents states that there are, among other industrial works existing at Wilmington, Del., two establishments for the construction of iron vessels, in which 600 men are employed. Within the past year they have turned out ten iron steamboats and one schooner.

White's Reporter, of Louisville, Ky., speaks in a most flattering manner of the plow manufactured by Thos. E. C. Brinly, of Simpsonville, in that State, stating that it has taken the premium at every Fair in Kentucky at which it has been exhibited.

Scientific American.

NEW-YORK, SEPTEMBER 15, 1855.

The Opening of Our New Year.

We begin, to-day, a new volume, and enter upon the duties of a new year, under circumstances both flattering and peculiar. Material interests of every kind are flourishing with unwonted activity. The cries of distress and the sights of poverty, which but a few months since so often met the eye or fell upon the ear, are now no longer seen or heard. No armies of laborers, out of employment, parade our streets, asking for work. Their honest wives and children no longer beg, from door to door, the necessaries of life. No idle shops, vacant and abandoned, attest a general gloom. But, on the contrary, the whole land, from North to South, from East to West, presents one universal scene of industry and prosperity. The ringing anvil, and the clickering loom, join their mixed sounds to songs of hearty joy, from busy operatives. The earth repays the farmer's toil, with over-running measures. Wherever we turn, all is activity and gladness.

In view of these great blessings, how should our hearts swell with thanksgiving and praise toward that All-wise Being "Whose glory and Whose presence the Heavens declare, and Whose handiwork the firmament showeth forth."

To us, it is pleasing to observe that, amid the bustle of this uncommon material prosperity, the intellectual powers of our people are not left unexercised. Since spring opened, and the prospect of so glorious a harvest became apparent, the student, the inventor, and the thinker, appear to have applied themselves to new tasks, with redoubled vigor. The number of discoveries and inventions which have come under our notice, within the four past months, exceeds, by far, the developements of a similar nature, during the same space of time, in any preceding year. It is also observable that, in the character of the subjects pursued, and the results produced, there is a decided improvement; they evince closer study, and a higher degree of mental effort.

It is this disciplining and stretching of the intellect,—this constant endeavor to exceed in the future, whatever has been done in the past, that our people should ever try to cultivate. In all the new triumphs of mind over matter, the Americans, from this very cause, stand every where pre-eminent. Who does not remember with pride, the splendid victories of our countrymen at the Exhibition of All-Nations in London. Acres and acres of space were there covered over, with rare and brilliant specimens of goods and products, from every clime. Diminutive, compared with the displays of other large nations, the Department of America, away in its lonely corner, became, for a time, the butt of ridicule and contempt. But when, at last, the hour of trial came, her genius and her superior intelligence, shone forth with dazzling splendor. The vast and magnificent display, by which she was surrounded no longer served to overawe and hide her strength, but rather helped to lift her up conspicuous above the whole, "the observed of all observers."

The Parisian Exhibition affords another illustration, in some degree similar. The French, the English, and every other Department, teem with endless displays of riches and beauty: yet there is, throughout them all, a strange absence of novelty. The articles exhibited have, for the most part, long been known, made, and vended. It is only when the comparatively small Division of the United States is reached, that anything absolutely new is seen: while, among the most striking features of the entire Exhibition, are the marked triumphs which American genius obtains, in every prominent contest.

Such are some of the results that have already attended the efforts of our people at self-advancement. Knowledge, the world over, gives power and fame: this is true in regard to individuals, as well as nations. Let us, therefore, in the future, strive onward. In the new year that is before us, now so propitious of good, let every individual make a new exertion to rise above the level of the past.

For ourselves, in the conduct of our journal, such always has and ever will be, a ruling endeavor. On every side it is allowed that the Scientific American, in point of vigor, interest, reliability, and influence, stands at the head of all analogous journals; indeed, we can add, as an absolute fact, that its regular weekly circulation exceeds that of all other publications of its kind, in the world, combined together.

These proud positions we shall ever try to maintain. If an increased desired to benefit our readers,—to spread before them the honest truth, to enlighten, to encourage, and in every way to promote their advantage, can do aught to retain and augment the confidence with which they have honored us in the past, then have we no fears for the future. Boldly, therefore, we launch out upon the voyage of a new year, fully believing that, at its termination, not only ourselves, but all who have gone with us, will be found to have made a permanent and a satisfactory progress.

Experiments with Turbine Water Wheels.

We owe an apology to James B. Francis, Engineer of the Corporations of Lowell, Mass., for not noticing at an earlier date his work on the above subject, which does him great credit as a man of science and engineering skill. We had received communications last year from two of our correspondents, in which they stated they were preparing works descriptive of their experiments with turbine water wheels, and anticipating the early publication of these, we waited till now in the vain hope of being able to compare and present some of the peculiar information belonging to each.

The work of Mr. Francis is a large volume, illustrated with beautiful plates, and is the only book worthy of the name ever published in our country, or any other, on the subject of "Turbine wheels." The experiments described in this work were made on that hard worked stream, the "Merrimack River," at Pawtucket Falls, where throbs the heart of busy Lowell, the greatest manufacturing city on our continent. The fall, in ordinary low water, is 33 feet, and the proprietors of the locks and canals on the river at Lowell have granted 139, 11-30 mill powers, of 3595·933 cubic feet of water per second, amounting in all to 8965·4 horse power, which is now employed in turning the busy wheels, and giving motion to thousands of spindles, looms, &c., belonging to eleven companies, employing the immense invested capital of $13,000,000 in manufacturing. Much of this great water power is employed on turbine water wheels of a very superior description, as the results of experiments show. At one time breast wheels were exclusively used at Lowell, and until the year 1844 much prejudice existed against re-action wheels. "The attention," says Mr. Francis, "of American engineers was first directed to improved re-action wheels in France, by some articles published in the *Journal of the Franklin Institute*, and by a translation of Morin's French treatise in 1843, by Elwood Morris. The experiments with one of Mr. Morris' wheels indicated a useful effect of 75 per cent., and this being as good as that claimed for over-shot wheels, the attention of our millwrights was directed to their merits." It appears to us that the pamphlet of William Whitelaw, on re-action waterwheels, published in 1840, deserves some credit for bringing the subject prominently before our people, as his water wheel, erected in that year, indicated a useful effect of 75 per cent.

From the detailed experiments of Mr. Francis, we are led to conclude that over-shot, breast, and under-shot wheels should no longer be tolerated, as the very best of them give out no more than 75 per cent of the water power, and are far inferior in efficiency to the most improved turbines.

In 1844, Uriah A. Boyden, an eminent hydraulic engineer of Massachusetts, constructed a turbine wheel for the Appleton Co.'s cotton mill at Lowell, which was found by experiments with the dynamometer to give out 78 per cent. of the water power. This was first rate, but greater triumphs were yet in store for Mr. Boyden. In 1846, he superintended the construction of three turbines of 190 horse power each, for the same company, and by the terms of the contract his compensation depended upon their performance. If the mean power derived from them was equal to 78 per cent. of the water power expended, he was to be paid $1200 for his services, exclusive of patent rights; and if still greater he was to receive an additional compensation of $400 for each per cent. of power gained. In accordance with the contract, the useful effect of two of these wheels were tested by a very perfect Prony dynamometer, and the quantity of water gauged by a wier. The observations on them were put into the possession of Mr. Francis for computation, and he found that the mean maximum of their effective power was 88 per cent of the water expended.—According to the terms of the contract, Mr. Boyden was then fully paid $5200 for his services and patent rights. This was certainly a great triumph for him—one worthy of universal admiration. The experiments upon one of these wheels, and the flow of water over the wiers, are ably and fully detailed, with illustrations, in this work, which should be in the possession of every hydraulic engineer.

There is no subject which has engaged more discussion, and respecting which a greater variety of opinion prevails among millwrights than turbine water wheels. We are convinced that the dynamometer is the only test of the working qualities of each wheel, and no other should be admitted, for it is a positive fact that the effective value of such wheels, according to their construction, varies from 50 to 88 per cent.

We have a letter now before us from Heath & Arthur, of Laurel, Md., in which they state that one of H. Van Dewater's 6 feet Jonval turbines does all the work of their factory, driving 1260 dead spindles, 36 looms, and the necessary machinery and shafting for making No. 6 1-2 yarn and cloth from it, with 20 per cent. less water than three of Parker's wheels. They do not state what the total useful effect of the wheel is, but, that it is a gain of from 25 to 30 per cent over the three Parker's, which it has superseded, for with these wheels the factory never could turn out over 600 lbs. of yarn per day, while with the Van Dewater wheel, it turns out 750 lbs. without difficulty,—sometimes running in two feet of back water.

This information which we have presented, respecting the value of turbine water wheels, should claim universal attention. No other kind of wheel, not the best overshot in the world,—has been known to give out within ten per cent. as much power as the Lowell ones. Turbine wheels then, should be used in preference to all others, not only because of their economy of water power, but also because of their compactness, simplicity, and cheapness. No doubt much depends on the workmanship of each wheel, for the principle of applying the water, on Boyden's wheels—giving the inlet water a whirling motion in the wheel's direction—is that discovered and first applied by Parker. We scarcely expect much further improvement to be made in such wheels, for 12 per cent allowance for friction is very small. Yet in this era of great mechanical skill, and progressive science, we dare not place a limit to improvements on any machine. To struggle for *perfection*, as the standard of effort, is the only way to improve and progress.

The Tribune and the Scientific American on Air Pressure.

The *Tribune* of the 6th inst. contains another article in answer to ours in No. 51, last Vol. It says "the Scientific American now admits the existence of the law that atmospheric resistance increases in the duplicate ratio of a moving body." This is an insinuation which does no honor to an honest man. It is intended to convey the idea that we had denied the existence of such a law, while the fact is we did no such thing.

The first article of the *Tribune* which led to this discussion was grandiloquent about disembodied spirits and planets moving with awful velocities, and about railroad trains being whirled through space swift as cannon balls, and very economically, by the removal of atmospheric pressure. Being silenced on the latter point, it now proceeds to rush packages through a vacuum tube—with an accelerated velocity of thousands of miles in an hour by some constant force. Although we explained the action of gravity in the article alluded to, and showed that the conditions of a package moving in a vacuum tube, were entirely different from those of a falling body acted upon by gravity, the *Tribune* has such obtuse ideas of the law of gravity, that it mistakes our description of its effects for a mere statement of what the law is, and its own statement of what the law is, for a description of its effects. It thus confuses itself.

A cannon ball falling from an elevation will acquire a uniformly accelerated velocity. The same ball projected upwards will have its speed uniformly retarded. If the same ball be placed in a vacuum tube, it will not move a single inch. What produces these different results? Gravity, which is ever constant; but the conditions of the three cases are entirely different. The *Tribune* seems sublimely regardless of conditions, hence, it talks of a vacuum tube as if it were to be placed vertically, and receive packages from the uttermost boundaries of the atmosphere, instead of being laid horizontally on the ground, and its packages propelled by the simple pressure of the atmosphere.

On the day the *Tribune's* article was published, a correspondent—J. O. Gilvie, No. 54 State street, this city—saw at once through the absurdity of its positions, and sent us a short article on the subject; we cannot do better than quote his remarks.

"The problem to be solved is simply this, 'what is the velocity of a stream of air flowing through a given aperture into a vacuum by the ordinary pressure of the atmosphere, the capacity of the vacuum being also given to find how long time will be required to fill it?' It is very plain to me, that if the body impelled by the stream of air accelerates its velocity, the original motive power would become null, because the air would not follow it up faster than the uniform pressure of the atmosphere forces it into the tube. Insert a pipe into the bottom of a reservoir of water, and the stream which commences to flow through it will not increase in velocity with the increase of distance though the horizontal pipe were a thousand miles long."

This is pointed and clear. The maximum velocity of the water is to be found at the bottom of the cistern, and the maximum velocity of the air at the entrance of the vacuum tube; it cannot be otherwise, according to the law of gravitation. The velocity of air rushing into a perfect vacuum on the surface of the earth, is very great, but it is not uniformly accelerated in the tube. If such a law prevailed, it would be the easiest thing in the world to increase the power of water for a wheel, independent of the hight of the fall, by simply increasing the length of the water flume.

Prizes.

We wish it to be distinctly remembered, that although the new volume of our paper begins to-day, the opportunity of competing for the cash prizes which we offer, continues until the first of January nezt. This will afford all those of our friends who desire to immortalize themselves,—and, at the same time time, get well paid for the labor—ample time to extend the field of their canvassing, and thus to swell their lists of subscribers.

Names should be sent in, with the funds, as fast as received, in order to make sure of commencing with the volume. We will keep correct accounts with each competitor, of all names forwarded. It matters not whether they come to us singly or by dozens. They will be credited as fast as received, and the gross amount footed up on the appointed day.

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The proprietors of the Scientific American will pay in cash the following splendid prizes for the fourteen largest list of subscribers sent in between the present time and the 1st of January, 1856; to wit:

For the largest List - - - - - -	$100
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For the 11th largest List - - - -	20
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For the 14th largest List - - - -	5

Names can be sent in at different times, and from different Post Offices. The cash will be paid to the order of the successful competitor immediately after the 1st of January, 1856.—

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Steam versus all other Gases.

This has become a very important subject of late; and when we see such men as Ericsson, in America, and Du Tremblay, in France, spending thousands of dollars to find a substitute for steam, we are bound to believe that the subject is not well understood by all scientific men.

The steam engine was at first called an atmospheric engine, because the inventors were trying to give motion by the pressure of the atmosphere, and only used steam in one end of the cylinder. After the improvements of Watt, it was called a steam engine, because he admitted steam to both ends of the cylinder. Would it not be well to change the name once more, and call it a "Caloric Engine," for it is caloric and not steam that gives life and motion to the machine. Viewing steam as the motor, is the cause of many naturally turning their attention to other fluids more volatile than water, and requiring so much less latent heat to convert them into vapor—such as ether, alcohol, oil of turpentine, &c. The cost of these fluids would be an insuperable objection to their use, for although the vapor might be condensed, and the fluid worked over continually, yet no machinery can be made so perfect that the loss would not be considerable. But it can be shown that there is no advantage in using them, if they were as cheap as water, for the volume of vapor is in exact proportion to the latent heat required to form it. The latent heat of ether is 300 deg., less than one-third that of water, and accordingly we find the vapor of ether occupying less than one-third the space of steam. The same is true of every other vapor. The heat required to vaporize a fluid being the exact measure of the volume of that fluid. In aeriform matter, the atoms are forced so far asunder as to destroy cohesive attraction; we do not know what this distance is, but it is less than one-third for ether, as compared with water, and still less for some other substances. This property of matter depends upon the cohesive attraction of the different kinds of matter, and not on the heat, which is always the same. A similar property belongs to solid matter, in that expansibility is in proportion to compressibility; thus a bar of steel will require double the heat to produce the same elongation required for a bar of brass, but will sustain double the weight before it is forced back to its original length.

The size of solid bodies is ever varying, depending upon the amount of heat in them, and the cohesive attraction of the different kinds of matter elevate the temperature enough to destroy this cohesive attraction; and we have gas, varying in volume in proportion to the force of the cohesive attraction that existed. This gas will now, however, occupy a space limited on the one hand by heat, and on the other by external pressure. The various kinds of matter, in its three forms—solid, fluid, and gas—are acted upon variously by heat. But heat itself—sensible, latent, or specific—like gravitation, is always the same. The only possible advantage of using any of these volatile fluids would be, that the engine might begin to play a little sooner, just as we can load a small vessel sooner than a large one; but to make their vapor occupy the same space, or expand with the same power as steam, the same amount of heat must be used, except a small advantage, in the heat being more occupied in expanding than making gas.

Atmospheric air is really the only competitor of steam, nothing else is cheap enough, it is even cheaper than water, and would be free from explosions by decomposition, as its elements are not chemically combined.

Let us bear in mind that steam once formed is equal to air or anything else,—much of the power of steam is obtained by heating it after it is formed. Now steam, air, and all gases are just alike—a volume of any of them will gain one part in three, if the temperature be raised 180 degs.—from freezing to boiling water,—no difference which gas it is, they are all alike. The advantage, then, of air or any permanent gas, is, to save a part of the heat that vaporizes the water. It requires 1000 deg. of heat to form steam, which has an expansive force of 15 lbs. to the square inch, as all gases must have. Now 500 deg. will double the volume of that steam, or any gas, giving it 15 lbs. additional force, so that if we could begin with air at once, we would save 500 deg. This does appear to be the fact.

But how are we to get the air into the boiler or heater to supply the consumption of hot air. Any temperature that the heater could stand would only be a few doubles of volume, to force back a fourth or an eighth, would be a great loss of power; nor could we afford to condense the air. True, we would get back the expansive power pressed into the air, but the friction of so large and powerful an air pump would be very great.

How fortunate that Nature supplies us so bountifully with a material that she condenses herself, if we only withdraw a little heat, compressing 1700 volumes into one, so that while in this compact form a small force pump supplies the loss, although the cylinder is throwing off great volumes of steam. Nor should we omit the power saved by condensing the steam—a process that looks more like gaining power than anything else in practical physics.

Heat is then the grand motor in the steam caloric engine. Steam, air, ether, or any fluid or gas, is nothing but the gross matter for the heat to act upon, and in our present state of knowledge, water possesses great advantages over everything else. The road to improvement is to direct our energies to the cheapest way to produce artificial heat, the best way to preserve it, and the most advantageous way to use it. J. G. H.

[For the Scientific American.]

The Mechanical Calf.

"*There is nothing* new under the sun," and I am obliged to accept your wager in behalf of old Solomon, for *supposing there might* be. To save your correspondent G. W. S., of Broome Co., N. Y., the trouble of experiments, I will state that in the spring of 1847 a dairyman by the name of Greenlee, in Crawford Co., Pa., applied to me to construct an apparatus for milking cows by atmospheric pressure, or through the medium of an air pump.

I detailed to him a variety of apparatus that I knew would extract the milk if the cows could be *broke* to the new process. I however advised him that I did not think the process could come extensively into use on account of the expense, and the difficulty of keeping air pumps in proper order in hands unused to delicate mechanical apparatus. He, nevertheless, ventured boldly into the project, and footed the bills like a gentleman for three "Patent Milkers," holding about four gallons each, having two well-constructed air pumps to each, and four elastic rubber tubes, stop cocks, &c., affording me an opportunity to expend some of my best mechanical skill for a couple of months. The apparatus was completed, and on gentle cows and easy milkers it worked beyond all my expectations, and my friend Greenlee began arranging his stables to milk his sixty cows by one great air pump, precisely on the plan detailed by your correspondent. But alas! for human hopes! the milk-maids are yet milking with their hands, and will continue to do so till some one has enterprise enough to manufacture without a patent, which was then duly applied for, model furnished, and long specifications detailing various appliances intended to cover every contingency, but the claim was rejected "for want of novelty, the same process having been applied to the human breast!" I denied the validity of the objections, as the apparatus as detailed was new and should have been patented; it was overruled, and my friend Greenlee, because he could not get a patent, neglected to milk even his own cows by machinery. I presume G. W. S. can get one of them for his experiments at half first cost, and with the thanks of one who spent some hundreds of dollars in such experiments.

Newark, Ohio. JOSEPH E. HOLMES.

The Mechanical Calf Once More.

For the benefit of your correspondent G. W. S., of Broome Co., N. Y., and all others interested, I send you the following, as my experience in milking by machinery:

I made an apparatus, seven years ago this summer, for milking. It consisted of a vessel made of thick tin, in form and size of a large watering-pot; it was furnished with an exhausting pump nicely fitted on the top by a screw joint, also a flexible tube attached to the top by a screw joint fitted on the end of a short spout, intended by removing the tube by unscrewing, as a discharge for the milk from the vessel. I had a stop cock in this spout to enable me to exhaust the vessel before applying the apparatus to the cow. The flexible tube had four branches, each branch was furnished with a thimble of size and shape to receive the teats of the cow. This completed my apparatus for milking cows by machinery; it now remains to be told how it operated.

Well, I took it out to my friend, John Rinnard, near Westchester, who was kind enough to let me try it on his cow. After exhausting the vessel I applied the thimbles to the teats and turned the stop cock. The suckers laid hold like a calf. The milk flowed into the vessel until all, or nearly all, was drawn from the cow, which required double the time it would to have milked the cow by hand.

I tried it on the same cow several times, and on different cows with the same results, and came to the conclusion that it would be of little or no use unless applied upon a large scale, as your correspondent suggests.

It is a gentle, easy way of milking, and the cows seemed to like it much, and would probably give their milk more freely after becoming accustomed to the process. On the whole, I am not satisfied that milking cannot be done by machinery. Respectfully yours,

Philadelphia, Pa. WM. H. HOWARD.

One Hundred Miles per Hour on Railroads.

MESSRS. EDITORS—In your issue of August 11, you say, "Railroad trains will yet be running at the rate of one hundred miles per hour, it is our opinion."

Instances of cars running from 80 to 100 miles per hour, cannot be news to gentlemen in your position in the community. You may not be apprised that there is now before the U. S. Senate a proposition for the construction of a "speed locomotive," which the inventor is confident will attain safely 400 to 500 miles per hour. The track is to be adapted to a peculiarly constructed locomotive, which is to be as light as may be compatible with requisite strength, to have four to six wheels ten feet diameter. The vehicle is to embrace or constitute the engine, tender, and mail department, and to carry an engine and an attendant. The object is to transport mail matter and light articles exclusively. The importance of the realization of auch a result you are fully qualified to appreciate. JOHN VANBLARCUM.

Jacksonville, Ill.

[In alluding to the above remark of ours, referred to by our correspondent, the *American Railway Times* (Boston) of the 16th of August, in a very candid manner, said "there was no physical impossibility about the matter, but we doubt whether the present generation will witness any portion of the passenger traffic carried at that high rate, and the reasons are obvious. It will not pay, and the commercial question settles the question of speed. The expense of operation increases with great rapidity as the speed is increased, and the liability to danger and destruction is so greatly increased that few men feel like being hurled through the air at such fearful risk. Not until there is a radical and entire change in the superstructure and machinery used in the operation of railways, will the speed be increased to any considerable amount."

With some of these remarks we perfectly agree; with others we do not. The question of payability no doubt settles the matter, but with proper roads and machinery, higher speeds are just as safe as our present low speeds on railways. Fewer accidents take place on English railways than on ours, and yet the speed on them is a third higher. A *radical* change of road and machinery is not required for higher speeds. Level and straight lines, more solid roads, and more powerful engines, are all that is required for higher speeds—these do not involve a radical change. But higher speeds than those now adopted on our railroads will not pay excepting on lines running through very thickly peopled districts, and would not be safe under the system of railroad management generally pursued. A very intelligent correspondent, apparently an engineer, who appears to have studied the subject carefully, writing to the *Railway Times* of the 30th ult., contends that "it can be demonstrated to the conviction of any practical man, that by a simple combination of machinery in common use, a speed of 100 miles per hour can be obtained without any increase of tear and wear."

We are no advocates of a higher speed on our common railroads than that now adopted—perhaps it is a little too high for the present system; but we believe, and have asserted, that we have engineers who can build railroads and engines to run trains at the rate of 100 miles per hour as safely, though not so economically, as those running at the present speeds of from 35 to 40 miles per hour.

The Farmer's Future.

An English correspondent of the New York *Tribune*, expatiates on the prospective introduction of steam power as an aid in agricultural operations, as follows:—"The Farmers' Future will be found in the *application of steam to the cultivation of the soil!* We are rapidly coming to the conclusion here that the good old plow is a humbug. We begin to think that spade-husbandry applied by steam is the right thing; indeed, there are some among us of the opinion that a machine may be invented which should, in effect, plow, sow, harrow and roll altogether—a machine, in fact, which should make a seed-bed and sow the seed all at one operation. There has already been one steam-engine exhibited in this country which will walk anywhere, and do anything it is required to do. It has feet about the size of yours, Sir, and it puts them down upon the ground, one after the other, very much in the fashion of a dandy going up Broadway, only the feet of the machine are fixed on wheels, and revolve regularly, instead of moving up and down awkwardly, like his. This machine will go through a plowed field very comfortably, and rather quicker than a good hunter will get over it; and as it will drag a dozen plows after it, I do not see, for my part, why it should not be made to carry, as part and parcel of itself, a mechanism that will readily convert the untilled ground into a seed-bed. Well, then as to drainage. I saw a machine the other day that would dig, drain, and lay down sixteen and a half feet of piping per minute, the pipes being rather more regularly and satisfactorily laid than any skilled workman can lay them. The machine labored under the disadvantage of being cumbrous, and of being made to be worked by a stationary engine. But having got thus far, it seems to be only one step further to give us steam application to the soil so as to enable twenty times the quantity of land to be put under cultivation by the same amount of labor, and at no greater cost than now. Then we may hope for a produce of cheap corn, the great desideratum in this land of sweat and toil, where it depends upon a shilling or two, more or less, in the price of food, not only whether a man can reap the advantages of his labor, but absolutely, too often, whether he can continue to exist.

Yes, to the application of improved machinery to the earth must we look for an accession of home comforts, of world-wide prosperity, of universal happiness! To Thee! O, bountiful God of Nature, we offer our first thanks that Thou hast given us the great seed-bed whereon we live and move, and whence we have our being. To Industry be given our next best tribute, and then let us thank Art and Science that teach us how to make the best uses of the means so bountifully placed at our disposal."

A War Balloon.

Experiments are said to have been ordered at Vincennes, France, on an incendiary balloon of immense size, to see if it can be usefully employed at the seige of Sebastopol. A first experiment was made not long since, but the balloon, after being filled in the court-yard of the fortress, caught the towers in rising, and was torn open. Subsequently the balloon was repaired and again filled; but after a short time it burst open, owing to the pressure of gas from within.

Explosion of Percussion Caps.

An awful explosion at Naples occurred in the Castel Nuovo, on the 20th July, where percussion caps are made. The entire building was blown up, and it is said that at least two hundred persons were buried in the *debris*. Fearing that another revolution had broken out, the soldiers rushed to arms, whilst the inhabitants, magining that an earthquake had happened, are reported to have run about in a frantic condition.

TO CORRESPONDENTS.

B. B., of Ohio—Your premises are entirely erroneous. The marble business is much more extensive than you appear to be aware of, Mr. Manly'soffer was $10,000 for the right to four States only. The original terms of Mr. M.'s proposal carried with them, to most minds, the explanations we gave in our subsequent article. Your interpretation is too literal. Would any man be so foolish as to offer such a premium for a thing that was no improvement'? You seem to think that the money ought to be paid for the first machine that would cut two sides on a taper, even if such device were so clumsy as to involve in its use, twice the time and expense that the single saw requires to do the same labor. In other words, that the prize should be given for a machine that lengthened the process, rather than shortened it. You are down on "prizes" without reflecting that every good invention generally brings to the inventor a large premium in money. You ask, "Has a premium for an invention ever been paid'?" We reply, Yes, We have known of many prizes being paid for inventions. They are offered in private very often: nothing is more common than for manufacturers to say to ingenious mechanics, "Here, get me up a machine that will do this or that work, and I will give you such a sum." It is not often that such offers are thrown open to the public. We wish they were more frequently, for there is no question of their benefit. If you were present in our office to see the splendid and ingenious models that are sometimes brought in—could converse with the inventors and ascertain, as we often do, that this or that invention was brought out in consequence of the offer of a prize, you would no longer question the reality or the advantages of such stimulations. The day is past when "poor inventors" complain that their genius is unappreciated. If you hear such complaints you will generally find, on examination, that their inventions are good for nothing—which is the secret of the bad success of their authors. There never was a time when labor-saving inventions of all kinds were in greater demand or brought more rich rewards to inventors, than the present. No melancholic John Fitches or Oliver Evanses, travel our streets and lanes, now-a-days, lamenting that they search in vain for minds capable of appreciating the value of their discoveries. Witness the success of Morse with his Telegraph, Howe with his his Sewing Machine, Colt with his Pistol, Hoe with his Printing Press, Carey with his Pump, Babbit with his Alloy, Winans with his Car Truck,—and hosts of others. Unless the world goes backwards, inventions must progress.

East Guilford.—We have received a letter from some person, dated at the above place; but as no name is signed or State is mentioned, we cannot reply. We wish that correspondents would always be careful to write their names, post office, and State, plainly.

H. H., of Ind.—Goods manufactured in Great Britain, no matter if they come from Nova Scotia, must pay the regular tariff.

S. M. Van W., of N. C.—No machine can take out the coloring matter of yellow oak bark. If the leather be as good as the northern kind, its color ought to be no objection to its obtaining as high a price. You can darken the color by using a very minute quantity of copperas dissolved in water in a separate liquor, previous to the hides receiving the last bark liquor.

C. D. & Co., of Wis.—We do not know where you can obtain a planing machine, for cabinet stuff 10 feet long and 22 inches wide, to make the work fit for varnishing without the use of a hand plane. The rotary planers will not perform such smooth work, but the stationary and reciprocatiog cutters will; yet none that we have seen appear to be adapted exactly for your kind of work.

H. A. M., of Ohio—Your particular method of increasing the size of drivers for locomotives, without raising the boiler or other parts of the machinery higher, may be patentable; the objects to be accomplished are well known, and your views are correct respecting them. The saddle seat to which you allude would be objectionable we think. The air packing would not be so good as curled hair. There is a public large wash house in this city. A machine for washing and pressing clothes at one continuous operation, we think, would be patentable.

W. O. G., of Ct.—Your chances on the marble saw remain as stated in our letter.

W. B., of Mo.—We have never seen india rubber blown like glass. It can be rendered into a solution with turpentine kept somewhat warm, and agitated in a close vessel for a number of days. You might try the experiment of blowing globes of it.

J. S. H., of Pa.—It will not be easy for you to conduct a stove pipe along the floor of a hall in a school house; the only way will be to enclose it in a wide cast-iron pipe, filling in between the two with plaster of Paris; or you might enclose it in section tubes of stone ware cemented.

S. L., of Nova Scotia—We should think Bristol's Rotary Engine would answer your purpose very well. Mr, Bristol's address is Chicago, Ill. The Irving Boiler we think a good one, but could not say that it could be used to burn such fuel as you specify,—we think it could not.

J. H., of N. Y.—We see nothing patentable in your perspective arrangement. Send a copy of your chart to the U. S. Clerk of your District, and pay a dollar in order to obtain a copyright.

S. O., of Ind.—Ask the M. C. from your District to procure you a copy of the Report.

F. P., of Ind.—We believe there is a good market here for willows for baskets, but we do not know their price per tun; nor have we learned of such a machine being used for cleaning them as you describe. Brewster's Optics is to be found in almost every bookstore.

J. J. G., of Mass.—You can get a number of the Coachmaker's Magazine by writing to Mr, Saladee, Columbus, Ohio.

S. G.B., of N. Y.—We have not a copy of the work you refer to.

A. B., of Mass.—It is indeed lamentable, as you say, that so many young men read foolish and neglect useful papers. We thank you for your efforts to extend the circulation of the Sci. Am. You can take impressions of the leaves by submitting them to a severe pressure, between two sheets of paper dipped in glycerine,—pressure is required.

L. K. M., of Mass,—We are not acquainted with any work which gives instructions for cutting boots and shoes.

N. M. A., of N. Y.—There are several patents on hay rakes. Cannot tell which you mean unless you give the name of the inventor. $1 received.

A. L., of Mass.—Connecting wires to windows and doors in such a way as to ring an alarm bell in case of an attempt to open the same, is an old idea. Any new arrangement of connections would be patentable. We thank you for your efforts in procuring subscribers for us. Shall be happy to receive your list.

W. E. F., of Ill.—We cannot tell you the proper consistency for the printers' rollers made with sugar.

H. B. C., ot N. J.—The book which you want on mill-wrighting and flouring mills, has yet to be published. See another column for opinions on turbine water wheels.

B. J. S., of N. J.—You cannot find in any work a complete account of the practical manufacture of corn starch. A very briet account of the manufacture of paper mache will be found in Tomlinson's Encyclopædia.

W. B. G., of N. Y.—Griffith's work on Naval Architecture is the latest and best book on the subject. Address Stringer & Townsend, 222 Broadway for the same. $2 received.

L. W. W., of Mass.—The Government keeps all caveats secret, therefore we cannot inform you whether a caveat for a spinning machine for spinning wool, consisting of a revolving plate, carrying a pair of drawing rollers for drawing the roping has been filed.

J. P., of Pa.—Steam at atmospheric pressure will require but little less water to condense it than when at the pressure usually admitted to the condenser. The quantity of water estimated to be necessary to condense steam at 212 degs., to water at 100 degs., which is the best heat for useful effect, is nearly 30 times the quantity evaporated. 212 degs. is the temperature of steam at atmospheric pressure. You will see, therefore, that you can do comparatively nothing towards producing a vacuum with the quantity of water required for the boiler.

S. M., of Me.—The initial velocity of a one pound cannon ball, with a charge of 12 ozs. powder is 1680 feet per second. Address Editor of *Silliman's Journal*, New Haven, Ct. Cannot say as to *Astronomical Magazine*. We are all out of No. 30, Sci. Am.

L. J., of Wis.—Before the patent is obtained, inventors cannot prevent others from manufacturing their inventions. Indeed, their rights do not begin till the patent issues, after which they can procure injunctions and damages for subsequent infringements. At present patents cannot be obtained at all in Canada, by Americans or their attorneys. It is expected that the Canadian laws will be modified in this respect ere long.

E, A. J., of N. Y.—It matters not what the shape of your marble saw is, or how the block is cut, provided the work is done. You had better go to some marble quarry and post yourself up a little.

C. E. D., of Mass.—The use of a roll of printing paper, to be cut off into sheets, after passing through the press, is not new or patentable. It is not applicable to common presses.

K A., of N, Y.—We have no doubt the contrivance you have for flavoring the smoke of cigars, as it passes out of the cigar, is patentable. Turkish pipes have a receptacle for scented water, but your device, we should infer from your description, was different. Let us see it.

J. L. G., of Canada.—Ventilating R.R. cars by means of a fan blower operated by connections with the axles, and thus forcing air through water, into the car, is an old idea in this country, and not patentable.

W, B. G., of N. Y.—Putting screws into the legs of billiard tables in order to level the tables, is very old. The arrangement of levels in the frame, as you propose, we do not remember to have seen. We do think its patentability doubtful, however, for it is common in many instruments.

E. W. F., of N. J.—Thos. Blanchard's address is Boston, Mass.

Dr. W. P. Ewing, of Bells Valley, Va., desires to know who is the patentee of the best washing machine out. We cannot tell him, for we know so many good ones that it would be difficult to decide. Will some of our readers inform the Doctor?

J. F. S., of N. Y.—No person has a right to make a patented article, for his own use, without the consent of the patentee.

H, Z., of Pa.—The *Horticulturist*, a monthly magazine, published at Rochester, N. Y., is a most excellent work, and would probably suit your purposes. Address the editor for a specimen. We note your remarks on health: they are very good $2 received.

J. A. R., of Mass.—There is nothing eminently practicable in your paddle wheel device. Boxing in the ends of the paddles has been tried before. Movable floats somewhat analagous but not exactly like yours, have been tried. We think there are chances for a patent on your invention. But we doubt whether any striking advantage would result therefrom.

D. M., of N. Y.—We never received your letter ordering the change of your paper. The bark mill has not yet been sent in; will report when it arrives. $55 will be the charge.

J. A. C., of Ala.—You do not state what the advantages of your brake are. We do not discover any. $2 received.

P. S., of Va.—Making the cylinder of a thrashing machine larger than those ordinarily used, is not patentable.

James H. Thompson, McLeod's P. O., Green Co., Miss., wants to know whose is the best washing machine.

S. H. W., of Ohio—We know of no valve like yours, and think a patent might be secured.

Money received at the Scientific American Office on account of Patent Office business for the week ending Saturday, Sep. 8, 1855:—

D. E. R., of Mich., $30; W. M., of N. Y., $15; W. G. H., of Pa., $30; J. W., of Ct., $25: J. R. G., of O., $30; W. H., of O., $25; J. W. R., of O., $10; G. W. W., of N. Y., $25; C. & S., of Pa., $30; J. H., of Iowa, $30; J. A. B., of Mich., $35; J. C., of N. Y., $10; J. A. S., of N. Y., $20; J. C. D., of N. J., $250; A. P. K. W., of Mass., $30; G. W. B., of L. I., $30; W. B. K., of N. H., $25; J. H. W., of Mass., $30; W. R. C., of Tenn., $10; C. D. M., of N. Y., $30; W. F. F., of Me., $15; F. P., of Md., $25; D. G., of Pa., $25; H. W., of Wis., $55: W. R., of N. Y., $30; S. M., of N. H., $10; J. E., of Masss., $25; W. N. M., of Mass., $25; E. W., of N. Y., $25; J. A. S., of Pa., $25; S. T., of Ind.. $30; J. H., of Pa., $25; W. R. T., of O., $30; A. C., of N. J., $30; W. S. & Co., of N. Y., $150; D. W. C., of Ct., $30; R. G. R., of Ct., $30; W, W. & Co., N.Y., $205; B. & H., of Mass., $30; W. B. & Co., R. I., $15; B. O'R., of N. Y., $20; B. R. E., of Me., $20: W. P. C., of N. Y., $50; W. J. S., of N. Y., $45; T. C., of N. Y., $27.; S. & C., of Pa., $30.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Sept. 8st:—

G, W. W., of N. Y.; J. W., of Ct.; S. P. B., of N. Y.; W. H., of O.; W. G. H., of Pa.; H. L., of Mass.; W. M., of N. Y.; A. L. F., of Ct.; D. G., of Pa.; B. R. E., of Me.; B. O'R., of N. Y.; W. B. K., of N. H.; F. P., of Md.; W. F. F., of Me.; W. P. C., of N. Y.; W. J. S., of N. Y.; W. N. M., of Mass.; J. H., of Pa.; T. C., of N Y.; E. W., of N. Y.; J. A. S., of Pa.; A. M. B., of N Y

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Advertisements exceeding 16 lines cannot be admitted, neither can engravings be inserted in the advertising columns at any price,

☞ All advertisements must be paid for before inserting.

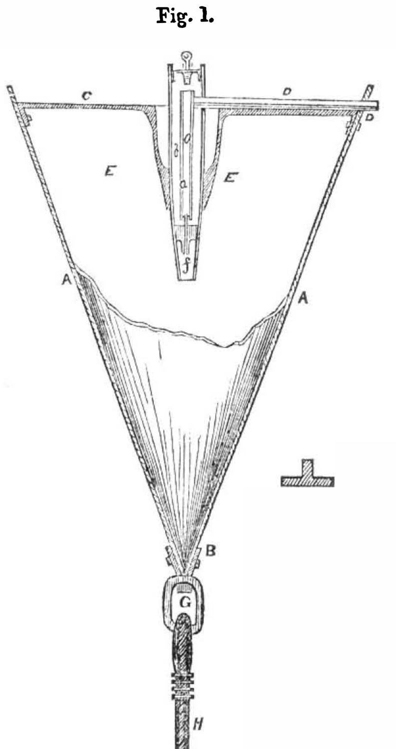
Science and Art.

Russian Infernal Machine.

In No. 46 of the last volume, we published an engraving of one of the Russian infernal machines, which have caused so much trouble to the vessels of the Allied English and French fleets in and about the harbors of Cronstadt. We now present additional diagrams, showing more completely the internal arrangement and construction of these much dreaded apparatuses. We copy from the London *Mechanics Magazine.*

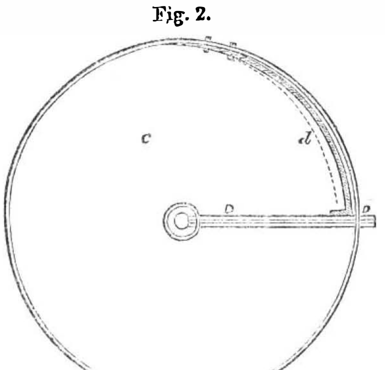
The Russian torpedo consists of an iron case, A A, in the form of a cone, on the apex of which, at B, is fitted a swivel, to which is affixed the mooring rope, H, adjusted to such a length as to hold the machine at the required depth below the surface of the water. On the base, C, fig. 2, is fitted a movable or sliding bar, D D, sustained in its outward position by the spring, *d d*, which bar projects, as shown, slightly beyond the base of the cone. In the center of the base of the cone is fitted the arrangement shown partly in section in fig. 1, which consists of a strong hollow plug of nine inches in length and nearly two inches in diameter, but tapering to one inch at its lower end. In the interior of this hollow plug is fitted the hollow tube, *a a*, suspended by its center, *b*, which tube can oscillate, when the cap, *e*, is drawn upward, in the outer plug or tube, as shown. The *modus operandi* is as follows: the cone, or what we may call more correctly the "hydraulic shell," is charged with the explosive mixture in the whole of its interior, E E, and the tube, as shown in section, being fitted in its place, the torpedo has only to be sunk to

Fig. 1.



the requisite depth, and on a vessel coming in contact, the cone being free to revolve, it will turn on its axis, G, until the projecting point or end of the sliding bar, D D (a section of which is given in fig. 3,) is pressed inward, when the tension of the spring, *d d*, being overcome, it assumes the position shown by the dotted lines, and pressing against the inner

Fig. 2.



tube, *a a*, causes it to move out of the vertical position in which it is shown, and at the same time break the fine glass tube, *f*, which contains the chemical fluid for causing the explosion.

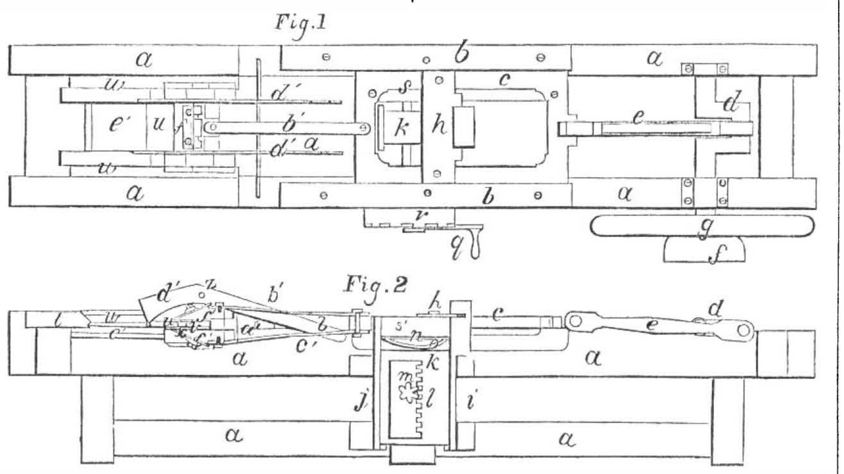
LEAVITT'S PATENT SHINGLE MACHINE.

The accompanying figures represent the improved shingle machine of Charles Leavitt, of Quincy, Illinois, for which a patent was granted on the 27th of March last.

Fig. 1 is a top view of the machine, and fig. 2 is a longitudinal section through the center. The same letters indicate similar parts.

The nature of the invention consists, first, in combining and arranging the various parts of a shingle machine so as to enable the bolt to be split in equal parts each time after the first cut, at the same time removing the sap. Secondly, in an elastic holder which retains the shingle in position while being planed or shaved to the proper taper. Thirdly, in the use and operation of the jointing knives, which finish the edges of the shingles with a drawing cut.

The frame, *a*, is made with suitable cross piece, and supports, in a strong and substantial manner; upon its top, near the center, are two horizontal rabated guides, *b*, in which slides a sash or gate, *c*, with corresponding rabates.—The gate, *c*, is connected with the crank shaft, *d*, by the connecting rod, *e*, and derives a reciprocating motion therefrom by means of power applied to the pulley, *f*, attached to the fly wheel, *g*. Upon the upper side of the gate, *c*, is a froe, or splitting knife, *h*, which extends across the gate. Between the vertical guides, *i* and *j*, is a table, *k*, capable of being elevated



or depressed by means of the internal rack, *l*, operated by the pinion, *m*, a cap piece, *n*, forms the upper portion of the table, *k*, upon which the shingle bolt is placed. Between this cap and the lower portion is a spring, *o*, which renders the table elastic, and allows it to give half the thickness of the knife, or more if required, when the bolt splits irregularly. The shaft, which carries the pinion, *m*, has on one of its extremities outside of the frame, a spring crank handle, *q*, which rests in one of the notches in the circular flange, *r*, which is fixed on the outside of the frame concentric with the shaft, *p*. The notches are nine in number, the handle, *q*, being placed in the first marked *o*, brings the table close up to the level of the knife, *h*, and when in any of the others the numbers thereon from 1 to 8 indicate that it is depressed the thickness of that number of shingles. Another froe or knife, S, is attached to the gate parallel to the side thereof which occupies vertically a space equal to a little more than that between the underside of the froe, *h*, and the top of the table, *k*, when brought down to its lowest point. Its vertical edge comes up close to the underside of the knife, *h*, and a little back of its edge. Its object is to take off the sap wood from that portion of the bolt split off by the froe, *h*. At the opposite end of the frame to that where the crank shaft is placed, is the apparatus by which the shingles are planed or shaved to the proper taper upon both sides at once, and jointed at the same time. For this purpose two plane stocks, *f*, are used, of any convenient construction, one for the top of the shingle, the other in a reversed position for the underside. They traverse in guides which converge to the end of their stroke. Also upon the upper plane stock two jointing knives, *d'*, one on each side, the prolonged tail pieces of which form levers having their fulcra at the pivots, Z. These levers overbalancing the forward portions rest upon a bar, *a'*, extending across the frame. When the plane stock is forced forward, the levers are necessarily elevated by the bar, *a'*, and the cutting edges of the knives describe arcs, which produce drawing cuts on the edges of the shingle, *e'*, which form smooth jointed edges parallel with each other. The shingle holder consists of a wooden tail block, and two pieces *u* and *v*, placed horizontally between the guides, *w v* being fixed in mortices, and *u* in slots which admit of horizontal motion. Between these two pieces is a spring, *x*, operating to keep *u* and *v* apart, but yielding to inequalities in the length of the shingles, or when the ends are not square, the ends of the piece, *u*, and tail block, are made with V-shaped grooves in which the ends of the shingles to be planed and jointed are placed. The plane stocks are attached to the gate, *c*, by the connecting rods, *b'* and *c'*, and receive the motion therefrom.

In operation the handle, *q*, is placed in a notch of *r*, so as to lower the table, *k*, to its lowest point, and the bolt is then placed on the table, and the machine put in motion. A piece sufficient to make eight shingles is then split off the bolt by the froe, *h*, and the sap stripped off by froe *s*. The handle, *q*, is then set in a notch so as to divide the piece into equal parts; then these are halved, and subdivided thus until the whole eight shingles are cut out. This method of splitting the shingles differs from that of those machines which split off shingle after shingle—one at a time—regularly from bolts; it embraces the principle of making shingles by hand, which experience has found to produce superior shingles, because wood bolts will not split so straight and regular except by equally subdividing them to take out the requisite number of shingles in each. This machine does the work with greater accuracy than by hand, and with far greater rapidity. The shingle holder is very simple and convenient, and its elastic spring enables it to hold the shingles firmly, though they may vary in length, or be of an irregular form.—The drawing cut of the jointing knives prevents the knife from splitting off the edge of the shingle, and thus produces a smooth edge and a beautiful shingle.

More information may be obtained by letter addressed to Mr. Leavitt, at Quincy, Ill.

The Telegraph Submarine Cable.

The loss of this cable, as noticed in our last number, has been confirmed, and the cause of the disaster made public by those who went on the excursion from this city in the steamer *James Adger*. A severe storm came on when the cable was being run off from the vessel which contained it, and when forty miles out, the said cable had to be cut, in order to prevent the vessel foundering. Forty miles of it have been sunk in the sea, and the remaining thirty miles saved. As one end of this cable was secured to the shore at Newfoundland, it is to be hoped that its severed end will yet be fished up, and united to the other section at some future day. This we believe the Company intends to do. At present the accident is a most unfortunate one, and we regret it sincerely.

Worcester Mechanics Association.

The mechanics of Worcester, Mass., laid the foundation stone of their new hall on the 3rd inst., and celebrated the occasion in a noble and praiseworthy manner, by a procession, various exercises, and an able address by the President, Henry S. Washburn, and afterwards by a dinner. The mechanics of Worcester are celebrated for their skill, industry, and intelligence. Long may their association flourish, and bring forth good fruits. There should be a Mechanics' Association in every city and village in our land. Such institutions tend to cultivate the better qualities of the mind, and increase knowledge.

Decease of Judge Cranch.

The venerable Judge Cranch, of the District of Columbia, died at his residence in Washington, on the 1st inst. He was the Judge to whom appeals were made by inventors for many years, and his decisions were always characterized by a solid understanding of the subject, and a profound regard for justice to all parties. A number of his decisions are to be found in the reports of the Commissioners of Patents.

Literary Notices.

THE LONDON QUARTERLY REVIEW—The last number of this Review, published by Leonard Scott & Co., 54 Gold street, this city, contains an article on the circulation of the blood, in which due credit is given to Harvey, for his discovery: modern physiology may be dated from Harvey's discovery. An article on the "Supply of Paper," contains much useful information respecting its history and manufacture. The other articles, as usual, are good. This is the first number of a new volume, and is an excellent time to subscribe.

REPUBLICAN QUARTERLY REVIEW—This is the title of a new Review published in this city, by James M. Law, Wall street. It is professedly independent in everything, and open to free discussion. This is rather a new feature in critical literature, and a most difficult one to manage. This number contains some very good articles.

THE EDINBURGH REVIEW—The number for this quarter of the above-named periodical, published by Leonard Scott & Co., 54 Gold street, contains ten original articles of profound literary excellence, One on "Modern Fortification" is able and scientific and worthy the attention of all military men. This Review always maintains a fair and candid tone in discussing every question.

☞ For List of Prizes see Editorial page.