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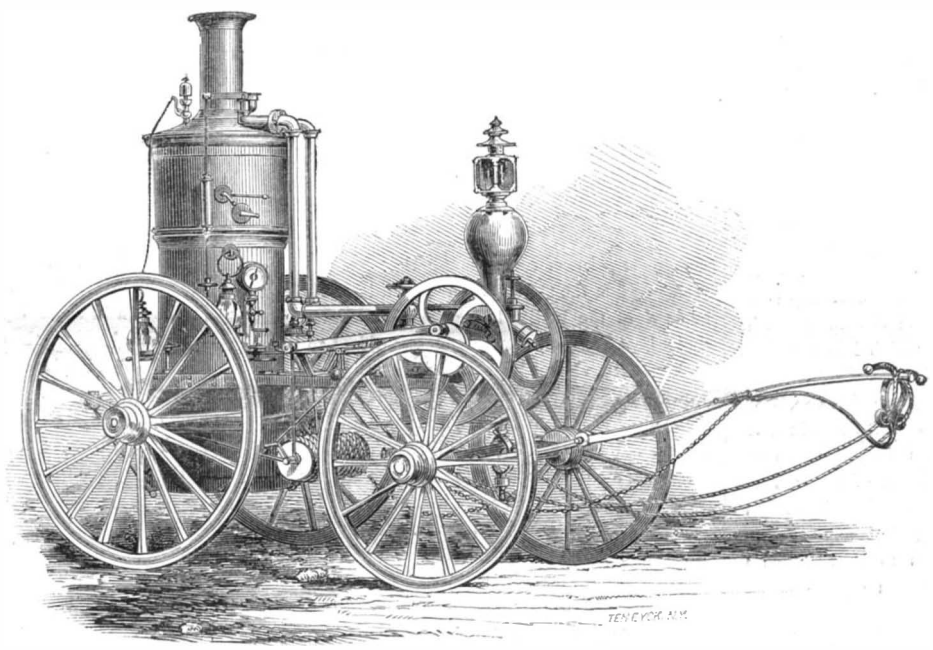
A LIGHT STEAM FIRE-ENGINE.

We present herewith an illustration of the steam fire-engines built by Messrs. Lee & Larned, of this city, at the Novelty Iron Works. These engines are fitted to be drawn by hand, being intended especially for the use of engine and hose companies; so that villages and small cities may now avail themselves of the superior and untiring power of steam, for fire-engine purposes, with no change in existing organizations, and without the expense of a horse establishment. The engine from which the view is taken has been on duty for several months, in the hands of the Valley Forge Hose Company, stationed in Thirty-seventh-street, this city, and it has rendered signal service on several occasions. It is about 10 feet in length, exclusive of the pole, and weighs 3,700 pounds; which weight, we understand, will be reduced at least 200 pounds, in engines of the same style to be hereafter built. Having large wheels and sensitive springs, it runs as easily as an ordinary fire-engine of 500 or 600 pounds less weight, and easier than the average of first-class hand engines. Its best single stream, for distance, is one inch diameter, ; for quantity, $1\frac{1}{8}$; but for ordinary fire duty, it will handle, with good effect, *two* one-inch streams, drawing its own water. This it did, for ten consecutive hours at the fire on the ship *John J. Boyd*, in January last.



LEE & LARNED'S STEAM FIRE-ENGINE.

The steam power is derived from one of Lee & Larned's patent annular boilers, of 125 feet of heating surface, with which steam can be raised to working pressure in from six to eight minutes. The pump, which is of brass, and highly finished, is Cary's patent rotary, driven by a single reciprocating engine, of 7 inches bore and $8\frac{1}{2}$ inches stroke, with a pair of light balance wheels to carry it over the centers. It is intended to make from 200 to 400 revolutions per minute. A flange-disk, cast on the pump shell, makes one of the heads of the steam cylinder; the two, thus combined, forming a steam pump, of novel form and unequaled simplicity and compactness; occupying, indeed, so small a space (only 27 inches in length) that they are hardly seen in the engraving. The piston rod, passing out through the opposite head, acts on a cross-head of such length as to allow a connecting rod from each end of it to pass the cylinder and take hold of cranks on the pump shaft. The valve movement is obtained by means of a rockshaft, actuated by an eccentric rod from the main shaft. The boiler is supplied from an independent feed pump, but has also a connection with the main pump, which may be used at pleasure. The carriage frame is, in front, simply a horizontal bed plate of iron, of less than a foot in breadth, expanding, behind, into a ring, to the inside of which is bolted an upright open cylinder of thin, but stiff, sheet iron, strengthened at the bottom by an angle-iron ring, the whole forming at once a seat and a casing for the boiler, which is placed within it. This end of the bed or frame is hung on platform springs, arranged like those of an omnibus, by means of tension rods and braces, taking hold of the angle-iron ring. The center of weight is directly over the hinder axle, which opens into a hoop allowing the boiler to hang within it. The springs are plates of steel, one or more to each, of uniform thickness, but tapering in width from the middle towards either end. In front, two springs of this form are used, placed one above the other, in line with and directly under the bed, receiving the weight of the machinery at the middle or widest part. These serve the two-fold purpose of spring and reach, taking hold in front, by means of forked ends, on swivel-boxes at each end of a short vertical shaft, forming a universal joint with the front axle; giving thus a single point of front suspension, annihilating the tendency of the bed to wring and twist under its load in traveling over rough roads, saving all the weight of metal needed under the ordinary arrangement to counteract that tendency and secure the necessary stiffness, protecting the machinery perfectly against the concussions of travel, and dispensing with the complication and friction of a fifth wheel.

These engines are built of several different sizes, the one we have described being the smallest. The next size larger, weighing 5,200 pounds, is also a hand engine (though either can be fitted to be drawn by a horse or horses, if required), and being of proportionally greater power, it is to be preferred where the condition of the streets is favorable, in respect to surface and grades, and the company is strong enough in numbers to manage it. This engine has thrown a $1\frac{1}{4}$-inch stream 260 feet, a $1\frac{3}{8}$-inch 228 feet, and for fire duty not unfrequently plays a $1\frac{1}{2}$-inch stream with great effect. The *Manhattan* engine, which, in the hands of Manhattan Company, No. VIII., of this city, has done such admirable service at the severe fires of the past winter, and has been, according to the estimate of competent authorities, the means of saving property to the amount of at least a hundred times its cost, is of this size.

For any further information address Lee & Larned, at the Novelty Iron Works, this city.

VELOCITY OF ELECTRICITY.

Messrs. Guillemin and Burnouf have been making numerous experiments on the transmission of electricity by telegraphic wires, with a view of discovering some law which governs this transmission. They conclude from their researches that the electric fluid is not propagated like the waves or undulations of light, and that it has not a constant and uniform velocity. They find it necessary to fall back upon the idea of Ohm, expressed in 1827, that electricity is propagated through wires, in virtue of the same kind of laws which govern the propagation of heat in a metallic bar. To determine experimentally which of these two opinions ought to prevail—that is, whether electricity is propagated with a constant and uniform velocity, or whether it is transmitted like heat—the authors disposed an apparatus, showing the intensity of the electric current in a certain point of a conducting wire, at different instants of its propagation. The first or the second opinion would then be justified, according as the current acquired suddenly in this point its definite intensity, or arrived at this intensity gradually. The authors found that the current at the point in question began with a very feeble intensity (the galvano-meter marking 0° 50′) which augmented gradually, and soon attained a maximum which it did not surpass, however long the contact of the pile with the conducting wire was continued. This maximum or permanent state was obtained in 0·024 of a second of time (the galvanometer then marking 19° 50′) in four lines of different lengths. The experiments were made during very fine weather, from 10 to 12 o'clock at night, from the 4th to the 6th of October, on a telegraph circuit of 104 leagues in length, passing from Nancy to Strasbourg, Mulhouse and Vesul, back to Nancy.

POISONED PERFUMES.—A Paris correspondent of the *New York Daily Times* says that the police of Paris have been for some months engaged in the examination of a variety of falsifications, and among the rest that of perfumery. Several actresses have been suffering from the effects of poison absorbed from the face, without suspecting that their sufferings came from this source. The quantity of corrosive sublimate, arsenic, verdigris, vitriol, and other poisonous substances daily absorbed in Paris must in effect be immense, and the reform did not commence too soon. The investigation was instigated by an actress of the Varieties Theater against a perfumer for damages for indisposition attributed to his cosmetics. At the same time the Academy of Sciences is occupying itself with the question of lucifer matches, and the reform necessary in their mode of fabrication. Several deaths from poisoning in the use of these agents directed this learned body to the subject.

OUR thanks are hereby tendered to the Hon. John Cochrane, member of Congress from this city, for a full set of the Patent Office Reports for 1858.

THE OBSTRUCTION TO THE NAVIGATION OF RIVERS CAUSED BY THE PIERS OF BRIDGES.

BY J. W. SPRAGUE.

Before proceeding to the discussion, to which this article will be principally devoted, for the sake of comparing the method usually adopted for determining the hight of *remou* with that recommended in this series, I will here give D'Aubuisson's formula:—

$x = Q^2 \div 2g\,[\,(1 \div m^3\, l^2\, h^2) - 1 \div L^2\,(h+x)^2]$

where x is the value of the hight of *remou*; m a variable co-efficient; and the other quantities are constants to be determined for each particular case. It will be observed that x enters both sides of the equation, and that on one side its square is in the denominator. Hence, to obtain an expression for the value of x, in which its own value does not enter, requires the solution of a complicated equation of the third degree. D'Aubuisson recommends, instead of this, the introduction of experimental values for x into both sides of the equation, until one is found which will fulfill its requirements; which is, in fact, a solution of the equation by gradually *approximating* to the value of x. Whoever attempts this will find himself involved in a labyrinth of figures, from which he will gladly escape to the more simple and *more accurate* method I have indicated.

In the suit alluded to in the first article of this series, a distinguished engineer quotes D'Aubuisson's formula as above, and states that for a certain stage of water the velocity will be increased from 5.9 feet per second to 6.36 feet per second, and the corresponding hight of *remou* will be $2\frac{1}{8}$ inches. This value of the hight of *remou* is more than twice as great as is required to produce such a change. Inconsistencies like this, between the changes of velocity and hight of *remou*, which are extremely liable to creep into investigations made under such complicated formulæ, are entirely guarded against in the method now recommended. The change in velocity and hight of *remou* being made to depend directly upon each other, both being arrived at by a short series of easy approximations, each acts as a check on the other, and renders error in calculation almost impossible to escape detection. There are some circumstances influencing the results already given which I do not deem it necessary to describe, because their influence is so small that it would not materially affect the result, in such cases as generally occur, while to treat them in detail would crowd out more important matter. One other element affecting the value of the hight of *remou*, I had intended to discuss, but have since concluded merely to make this illusion to it, thinking that any engineer competent to carry on investigations to that degree of refinement, implied by the introduction of this element into the investigation, would himself readily see how it was to be introduced. The element to which I allude is the effect of the water impinging upon the starling of the pier, and causing a loss of head by impact, to regain which would require an increase in the hight of *remou*.

Having indicated the method of determining the increase of velocity between the piers, and the hight of *remou* or back-water, we now pass on to another branch of the subject—the actual obstruction offered to the ascent of a steamboat through the draw. It is evident that when the boat is in the draw, the water-way of the river will suffer an additional contraction, equal to the greatest cross section of the submerged portion of the boat. This additional contraction of the water-way will cause an increase in the velocity between the piers, and an increased hight of *remou*. Hence, in determining the maximum values of velocity and hight of *remou*, we must add to the cross section of the submerged portion of the piers and abutments, the greatest cross section of the submerged portion of the largest boat liable to attempt the passage of the draw—that is, the boat is to be treated as if it were an immovable floating pier.

We have now determined the greatest velocity and hight of *remou* which can oppose the passage of a steamboat. What is the measure of the obstruction offered to the passage of an ascending boat? Is it the velocity of the water in the draw? I answer: *the velocity of the current passing through the draw is no criterion whatever of the obstruction to navigation caused by the intervention of the draw.* In a subsequent article it will be shown that of two draws, constructed precisely alike, both having the lines of their piers parallel to the current, it may require *less power* for any boat to ascend through one of them, where the velocity is *six* miles per hour than for the same boat to ascend through the other, where the velocity is *one* mile less or *five* miles per hour.

The true key to the solution of the problem is this:—Is the velocity of the current one that is *increasing* at the point where it is to be resisted; or is the current moving on *uniformly* with a velocity acquired at some point above? Where the longitudinal surface of a river is horizontal, or in other words, where the velocity of the current is uniform, having been acquired at some point above, the measure of the resistance offered to an ascending boat may be taken as the velocity of the boat plus the velocity of the current. Hence, if a boat ascends at the rate of five miles an hour against a current of three miles an hour, the power expended in propelling it is the same as would be required to move it at the rate of eight miles per hour in still water.

It is evident that the surface of the water above the piers is higher than the surface of the water between the piers, and that this difference in level is measured by b, the hight of *remou*. A boat in ascending the draw must then, besides resisting the current, lift itself from the lower to the upper level. This rising of the boat takes place gradually, not abruptly; hence we may compare the ascent to one up an inclined plane whose hight is b, What is the length of the inclined plane up which the boat ascends? Let a represent the horizontal distance within which the surface of the water passes from the upper to the lower level; then $b \div a$ represents the tangent of the angle which the inclined surface makes with the horizontal, and measures the steepness of the inclined plane formed by the water. If the boat could be regarded as a material point, then as it moved upon the surface of the water it would follow every undulation of the surface, and $b \div a$ would measure the steepness of its ascent from the lower to the upper level. But we cannot regard the boat as a material point; we cannot neglect its length. When the bow of an upward-bound boat is at the *foot* of the inclined surface of the water, then the whole boat is floating in the lower level, and is just on the point of commencing the ascent to the upper level. When the stern of an upward-bound boat is at the *head* of the inclined surface of the water, then the whole boat has just completed the ascent to the upper level. Is it a violent supposition to consider that an uniform ascent between these two points is equivalent to the actual ascent? Granting this, and representing the length of the boat by l; then $l + a$ will represent the horizontal distance passed over in making the ascent, b, and $b \div (l + a)$ will represent the inclination of the plane up which the ascent has been made. The quantity, a, is however so inconsiderable, when compared with l, that the difference between $b \div (l + a)$ and $b \div l$ will not be of material consequence. Hence if we *divide the hight of the remou in feet, by the length of the boat in feet, the quotient will give the tangent of the angle, which the line of ascent of the boat makes with the horizontal.*

If, as before, v represent the velocity of the current above the piers, and V the velocity between the piers, then a boat, in ascending the inclined plane of the *remou*, passes from water whose velocity is V into water whose velocity is v. Taking the arithmetic mean of these two, as the equivalent mean velocity of the water through which the ascent is made, and representing it by v^o, we have $v^o = (V + v) \div 2$.

The condition of the boat is then reduced to this: in moving its own length (l) it ascends the height of the *remou* (b), through a current whose velocity is v^o. They who measure the power required to ascend through a draw, by the power required to resist a horizontal current V, plus the power required to lift the boat vertically from the lower to the upper level, greatly underrate the real power.

[To be continued.]

THE SHEATHING OF SHIPS.

We pay to England, annually, $111,698 for copper and $183,394 for brass sheathing; and as one or the other is employed on all our ships and steamers, useful information relating to the subject is of interest to our shipbuilders and merchants. In recent numbers of the London *Mechanics' Magazine*, we find a history of the applications and patents granted for ships' sheathing. It stated that, as far back as the reign of Edward the III. —in 1336—several compositions containing pitch, tar, sulphur and oil were employed for coating the hulls of ships to prevent the attack of sea worms and the adherance of barnacles and sea weeds. It was also a common practice to use a thin planking, secured by nails, over the main planking, in those olden times. In 1625, a patent was granted to one William Beale, in England, for a composition not described, but the object of which was to render the hull and rigging incombustible. In 1670, a patent was granted to Sir Philip Howard and Francis Watson, for sheathing ships with milled lead. These inventors state that they had discovered they could draw out lead into thin sheets by passing it between rollers, which was a very valuable invention. After this, many of the English ships were sheathed with thin lead fastened by copper nails, and it continued in moderate use for about a century. It was better than nothing, but was too soft for the purpose. In 1727, Benjamin Robinson and Francis Hanksbee obtained a patent for sheathing ships either with thin copper, brass, tin or iron plates. This was the first application of brass and copper to the purpose; but it was not until 1761 that copper sheathing was applied to any war vessel. In that year, the *Alarm* (a 32-gun frigate) was sheathed with this metal, and she soon afterwards made a voyage to the West Indies—the very place to test the sheathing completely. Upon her return to England, the metal was found clean, and as good as when it was put on; but the iron straps of the rudder were rusted almost entirely off, and when some of the copper sheets were removed for examination, the naval authorities were surprised and alarmed to witness all the iron fastenings corroded to a dangerous extent. To prevent this in other vessels which were afterwards coppered, the holes at the outer ends of the iron bolts were filled with pitch, and over these pieces of canvas were laid, then the copper on the top; and the rudder braces were covered with lead. These measures all failed to prevent considerable deterioration of the iron fastenings when copper sheathing was used, and it therefore became a question whether to use some other fastenings than iron, or else give up the use of copper sheathing. The former course was adopted, and brass and copper bolts were employed in 1783. The reason why the iron fastenings corroded so rapidly, in connection with the copper, was unknown in those days; but since the discovery of the galvanic battery, the cause has been obvious to scientific men. A simple galvanic battery is composed of two plates of different metals (the one more oxydisable than the other), and when they come in contact with moisture, such as sea-water, a galvanic action at once ensues, at the expense of the rapid destruction of the positive or most oxydizable metal. Iron-fastened and copper-sheathed ships generate galvanic action when the two metals are connected, and, as a consequence, the most oxydizable metal (the iron) corrodes rapidly.

The green oxyd formed on copper sheathing is a benefit rather than an injury, because, although it is a sign of slight decay in the metal, the oxyd prevents the adhesion of barnacles because it is very poisonous. The copper of ships may be kept perfectly bright by connecting it with small plates of zinc; the latter are decomposed and the former remains perfect. This was a discovery of Sir Humphrey Davy; and it was supposed that by it the copper of a vessel might be made to last forever, with only the expense of some zinc plates. Such hopes, however, proved fallacious.

An important question arises, namely, what is the best metal, as a whole, for sheathing ships? Copper possesses the advantage that, no matter how old it may be, the sheets will sell for only about five cents less per pound than when new. On the other hand, it is not very durable, while it is very dear. By experience, it has been found that the purest copper sheets decay most rapidly; some of the sheets will wear into holes in one year, while sheets of alloys endure much longer. In 1800, M. Collins secured a patent in England for alloys to make sheathing more durable. These consisted, first, of 8 parts of copper and 1 of zinc, which could be rolled cold; the second consisted of 180 of copper and 80 of zinc, which required a low red heat to work; and a third was composed of 16 of tin, 16 of zinc and 1 of copper. In 1817, he obtained another patent for a bronze sheathing, composed of 80 of copper and 20 of tin. In 1823, John Revere secured a patent for a brass sheathing composed of 95 of zinc and 5 of copper. Subsequent to this (in 1832), the Muntz metal was patented, which is simply a brass sheathing composed of copper and zinc, and had been previously patented by Collins, but, for all this, it made a fortune to Mr. Muntz.

His proportions were about equal weights of copper and zinc; but he preferred an alloy of 60 of copper and 40 of zinc, which is like the second alloy of Mr. Collins, patented in 1800. A very small portion of zinc, tin or iron, mixed with copper, for sheathing, renders it far more durable.

THE PRESENCE OF SILVER IN THE WATERS OF THE SEA.

[Translated expressly for the Scientific American.]

We believe that we shall interest our readers by extracting from a paper, read before the Academy of Sciences, the following interesting historical details relative to the ascertaining of the fact of the presence of silver in the waters of the sea. This interesting discovery was made, according to Mr. Chevreul, more than 70 years ago, having been, if not perfected, at least indicated as probable by Proust. In support of this assertion, the following letter is cited, written on April 4, 1787, by that learned chemist, from Madrid, and addressed to La Metherie, who published it in the *Journal de Physique*, of the same year:—

OF THE ACTION OF THE WATERS OF THE SEA ON SILVER.—If the bed on which the waters of the ocean repose should one day become habitable land, the men who will then traverse that new continent will, without doubt, begin to recover those immense treasures which the voracity of the seas have ceaselessly swallowed ever since the New World has been frequented from the Old. The wrecking of the vessel, *Le Saint-Pierre d' Alcantarra*, on the coast of Portugal, has just put us in position to predict the metamorphosis under which silver will show itself in the times to come Marine acid—that first element of the saltness of the sea—overcoming the attraction which fixes it to its base, will have changed that metal into a mine of horn silver (chloride of silver). The short space of time in which the money was under the water after the wreck until it was recovered, sufficed to alter the surface of the coins to the depth of a quarter of a line. On being taken from the water they were found to be covered with a black film, which came off in scales, and which I have recognized as horn silver.

In another note of a little later date, published in 1799, in the *Journal de Physique*, we find the following passage relating principally to the indications of mercury in the waters of the sea and in sea salt:—

If some one, after reading this, will take the trouble to observe whether the copper sheathing of a new vessel becomes silvered in any part, especially when it goes to sea for the first time; if he will furthermore suspend a plate of gold in the water and observe the changes in it, he may be able, perhaps, on his return, to furnish one fact more to the natural history of marine salt. Who knows that the destruction of sheathings (sometimes so rapid and the cause of which is so unknown) may not depend on the existence of mercury being more abundant in certain seas than in others?

Such was the state of the question when, some years after, Messrs. Malaguti, Durocher & Sarzeau, by a series of the most interesting experiments, proved the existence of chloride of silver in the waters of the ocean. A short time after, a more distinguished *savant* (Mr. Forchammer, of Copenhagen) confirmed the fact in regard to the waters of the Baltic.

It would seem to result from the citations above, that Proust concluded, not that silver exists in solution in the ocean, but that silver cast to the bottom of the sea (by wrecked ships) is not preserved in the metallic state, but passes to the state of chloride of silver soluble in chloride of sodium, and that if the bottom of the sea should ever rise and become a continent, the precious metal would be recovered in the form of that ore. Furthermore, it will be understood that the quantity of silver dissolved in marine waters from the ingots or coins lost in wrecks would be too small, considering the great extent of the seas, to be perceptible. It was from an entirely different point of view that Messrs. Malaguti, Durocher and Sarzeau commenced their researches; the diffusion of silver in metallic minerals being a fact well established, these learned men thought that this metal ought also to be found in the waters of the sea. By multiplied experiments they have fully proved its presence in the waters of the ocean, and they have even succeeded in determining approximately the quantity, which amounts to about the one-thousandth part of a pound of silver in 100,000 lbs. of water. They have also detected the existence of a small quantity of silver in a sample of rock salt taken from the mines of the department of La Meurthe, where it constitutes, as is well known, a marine deposit formed in regular beds intercalated in marl; which leaves no doubt in the minds of these chemists that silver existed in ancient seas as well as in those of the present day.

It is, then, to causes inherent in the physical elements of the globe, and wholly independent of the existence of man, that the introduction of silver into the waters of the globe is to be attributed. Messrs. Maluguti and Durocher have pointed out two sources from which it may have come—one the emanations of the chloride of silver coming from the bosom of the earth, or more simply, by the slow action which salt water exercises on the argentiferous sulphurets of existing formations, either at the surface of continents or at the bottom of the sea.

We shall terminate this curious historical sketch by informing our readers of the experiments made in connection with this subject (during the last year) by Mr. Tuld, who, by repeating in America the experiments of Messrs. Malaguti, Durocher and Sarzeau, has confirmed in a very interesting manner the fact established several years ago by these chemists. Considering the reductive action which a plate of copper exercises on chloride of silver dissolved in chloride of sodium, Mr. Tuld thought that the copper and brass used in protecting vessels which have been some time in the sea, ought to contain silver. On examining a piece of copper sheathing taken from a ship which had cruised seven years in the Pacific Ocean, he found it so friable that it could be pulverized between the fingers. It contained more than a half per cent of silver. Another experiment was made on two specimens of copper sheathing, one of which had been used three years in the Pacific Ocean, while the other had never been in salt water. The former contained eight times more silver than the latter.

In a word, the silver contained in solution in the waters of the sea represents a mass more considerable than that which has been extracted by man since the origin of the actual epoch from the bosom of the earth! Mr. Tuld comes to the conclusion that the ocean contains at least 2,000,000 tuns of silver. What able chemist will find the practical means of extracting this enormous mass of treasure?—*L' Invention.*

ADULTERATION OF WINES.

Many people seem to doubt the extent to which wines and liquors are adulterated. The following cool letter, which we have just received from Indiana, may help to open their eyes. That liquors may be made by mixing oils with alcohol which will produce the same effect as genuine fruit brandy, we have no doubt is erroneous. Saratoga water may be analyzed and all the substances discovered in it by chemical tests may then be mixed together, and a liquid produced resembling the genuine, but all physicians know that the effect of this factitious stuff on the human system is entirely different from that of the real Congress water. The same principle holds in factitious liquors. The proof and the flavor may be closely copied, but the subtle and mysterious influence upon the stomach, nerves and other viscera is entirely different, the pure juice of the grape or current being healthful in many cases, while the mixed drugs are simply liquid death.

MESSRS. EDITORS:—The subject which I desire to bring before you is the fabrication of wines. My invention is founded on a quantitative and qualitative chemical analysis of natural wines, and consists in the fabrication of all kinds of wines, red or white, of whatsoever quality and in any quantity to suit, from pure vegetable ingredients representing the constituents of the grape-juice. The wines by this method, are made both without grapes and without fermentation; merely from mixing the ingredients, and after the short time of only 12 or 24 hours, a clear, sound wine, of a natural taste and flavor, is formed, improving more and more by age, so that wines made according to my method, after long keeping, have been mistaken for natural wines by good judges. The manufacture of wines by this method will pay large profits on the capital invested, as the cost of one gallon amounts to 25 cents only. According to my method, one acre of a single vineyard will produce as many gallons of wine as one vineyard of 40 acres will produce in the ordinary way.

A wine is wanting whose price would be within the means of all—a sound and pure table drink, to relish our dinners, enliven our too low spirits, help gently our poor digestion, correct our sour stomachs, expel the evil humors of our blood, and abate the whisky plague in our land. A continent without wine cannot but be a drunken continent! Please let me know (either by letter or through the journal) your opinion, of what has already been done in the matter under consideration, and oblige me by giving your advice accordingly. A. S.

Hankstadt, Ind., March 26, 1860.

CAN PARTICLES OF MATTER BE INHALED INTO THE LUNGS?

MESSRS. EDITORS:—The possibility of the inhalation of matter by the lungs is denied by some with plausibility. It is said that Claude Bernard made some experiments to determine this—that he tied a bladder containing a quantity of powdered charcoal about the nose of a rabbit. Except during feeding, the bladder was kept constantly on for several days, and when the rabbit was killed and opened no powder was found in the lungs or bronchial tubes; the *cilia* (which protect the lungs of all animals) having acted as a strainer to keep all particles from the air tubes. Is this statement correct? if so, many have a wrong idea of the subject. I take the account substantially from an article on "Animal Life," published in the *Cornhill Magazine*. E. T. C.

Philadelphia, Pa., March 26, 1860.

[We consider the *Cornhill Magazine* in error and the statement about Bernard of little or no value in comparison with other well-known facts which have never been disputed. Take the case of coal miners, for example. Some of them are troubled with what is called the "black spit" when they become old, and this usually ends fatally. The lungs of several who have died from this disease have been dissected and found perfectly black in color, and containing a substance similar to coal tar, which could only get in by being inhaled in very minute floating particles. Take the cases of stone-cutters and tool-grinders also, and we find testimony going to prove that many of them die by inhaling fine stone dust. It is well-known that the dry grinders of tools are very unhealthy; they die early of lung disease. Did they not inhale particles of matter, such as fine dust, we see no reason why they should not be as healthy as other men. We were recently informed of the case of a dry grinder of tools who died suddenly in a factory not many miles from this city, and when his lungs were dissected they were found entirely coated with stone dust and particles of iron. We had the information from one who was conversant with all the circumstances.

It puzzles us to conceive how the poor rabbit of Claude Bernard could live two or three days with its nose tied in a bladder. How could it breath at all?

STEAM FIRE-ENGINES.

MESSRS. EDITORS:—Here in Louisville we have disbanded the old companies of hand engines; we have five steam fire-engines of Cincinnati manufacture, I believe, and the wonderful change to the citizens is highly agreeable. The loss by fire is trifling compared to former times. Besides the saving of property and expense to the city, there is also the great luxury of resting after retiring to bed. Fires now seldom take place, and when they do, instead of the great noise and confusion usually attending them, everything is conducted quietly and with dispatch. When the alarm is given, the fuel is lighted, two horses in the meantime being attached to the engine (these operations occupying but four minutes), and the machine is driven through the streets with as much ease as a private carriage. When arrived at the fire, steam is up, and the engine ready for operation. The result is a quick extinguishment of the flames. Thus is seen the importance of small machines; but little time is required to get them on the spot, and when there they can be handled with ease—can be taken to alleys and back places, which it would be impossible to do with larger machines. There is not a town or city but would save a large amount of property by using small steam fire-engines. I trust the time is not far off when these kind of machines will come into general use. G. V. B.

Louisville, Ky., March 28, 1860.

BELTS FOR DRIVING MACHINERY.

MESSRS. EDITORS:—On page 150 of the present volume of the SCIENTIFIC AMERICAN, in an article bearing the above caption, Mr. W Barbour (of Lawrence, Mass.) gives a table of the power, width, &c., of belts (a very useful table for all persons interested in machinery), with a promise to extend the table at a future period to 30-inch belts. From Mr. Barbour's long experience, I conclude he has fully tested the relative merits of leather and rubber belting, and my main object in writing this note is to request him to give his experience on this subject. Which is the cheapest kind of belting in the end? INQUIRER.

Memphis, Tenn., March 29, 1860.

TRUE PHILOSOPHY OF BUTTER-MAKING.

The following most lucid and intelligible statement of the science and art of butter-making, which is made by the proprietors of the patent of Fitch's "Pendulum Churn," is so interesting that we present it in full to our readers:—

"As we all know, butter exists in the form of minute balls or globules, each being enclosed in a sac or membrane-like covering. It is not the *material of which butter is made* that is contained in these little sacs, but *butter itself*, in a perfect state. While invested with their coverings. these globules float about in the milk, or rise to the top as cream, but cannot be made to adhere together. Before this can take place, the coverings must be removed. The effect of 'churning' is to remove them, thus liberating the butter, and then to bring them together into a mass. These facts are known to all intelligent dairymen. But now comes the error, namely, the supposition that it is of no consequence *how* the coverings of the butter globules are removed and the contained butter liberated; that it is of no moment whether the butter globules are crushed or ground between hard surfaces, or burst by concussion from being dashed violently against hard substances, or by whirling bars, slats or rods rapidly though the milk or cream; or whether they are released from their investments in some more gentle manner. Now this is all a mistake. It *is* of the most essential importance, if we would have good butter, how the globule is divested of its covering; and we will state why.

"Butter being in the most perfect condition possible while it is in its globular state, and covered with its natural investment, any change of that condition excepting the mere removal of this investment, whether from the temperature being raised too high, from the globules being crushed, mashed or broken down, or their natural conformation being in any other manner destroyed or to any extent altered, necessarily injures the quality of the butter. (This fact, hitherto entirely overlooked, is the discovery hereinbefore alluded to.) It is for this reason that too much butter is injured by being 'worked,' which is only a process of pressing the globules upon each other, and thereby crushing them out of their original shape and state into a compact mass, like lard. It is for this reason, also, that the modern contrivances for *grinding* milk and cream between metallic rollers or revolving disks, and all the quick-moving rotary churns, while they may 'bring the butter' quickly, injure its quality, making good grease rather than good butter. The best butter is said to have a 'grain.' What does this mean? Simply that the original globular formation of the butter has not been broken down, and just to the extent that it *is* broken down is the quality injured; the 'grain' disappearing, and the mass becoming 'greasy' and lard-like. The butter globule must not, then, be divested of its covering by any process which shall break down its original structure, if we would have good butter.

"What, then, is the true method of removing the coverings of the butter globules? We answer that it is to wear them off by the rubbing of the globules against each other and upon the fluid surrounding them; not by crushing or bursting them by grinding, pressing or striking them with or against hard substances, but by a continous but gentle *agitation*, causing friction among the globules themselves.

"Another essential is that all the butter globules shall be divested of their coverings, as nearly as possible, at the same time; otherwise, some are too much 'worked' before the others are free, and some may not be liberated at all, and remain in the butter-milk.

"Now, if the reader will notice the construction and operation of the 'Pendulum Churn,' as represented in the annexed cut, he will see that it fulfils all the requisites we have pointed out. There is no violent dashing about of the cream; there are no slats or bars or rods whipped rapidly through it; but, from the peculiar shape of the body of the churn and dasher, by slowly swinging the dasher to and fro, the cream is thrown into agitation which, while it is not violent, and therefore cannot heat it or disturb the natural condition of the butter globules is, at the same time, of such a character as to cause the most effective friction among the globules upon each other, quickly removing their investments, but leaving them *whole*. Then the entire mass of the cream being moved with each vibration of the dasher, and the butter globules being thus all subjected to equal and uniform friction, they must all be liberated at about the same time; then, by a few strokes of the dasher, the butter is 'gathered,' and the work is done."

The swinging or pendulum dasher, A, is firmly secured in the axle, B, so that it swings very near the bottom of the churn without quite touching it. The plate,

Fig. 2

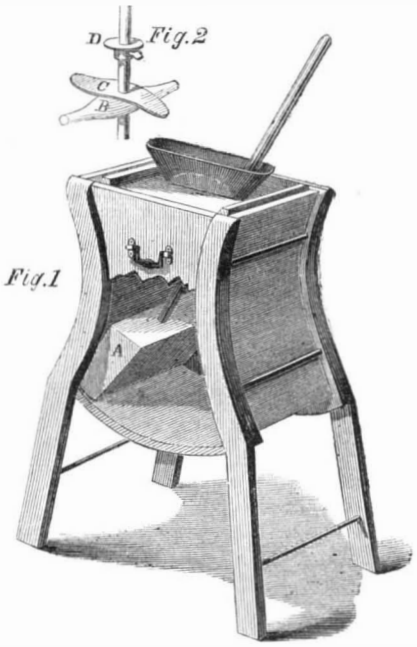


Fig. 1

C, is used merely to close the slit in the cover of the churn, to prevent the cream or milk from being dashed out. A plate, D, adjustable with a set screw, is secured to the handle to prevent the hand from sliding down. This swinging motion allows a given amount of agitation to be given to the cream or milk, with less fatigue, probably, than is caused by any other kind of motion, from the relation of the resistance to the muscles which overcome it.

Judging from merely mechanical principles, and from the science of butter-making, it seems to us that this is an admirable churn; and it comes recommended by several of the large dairymen of Vermont who have tried it.

The patent for this invention was issued (through the Scientific American Patent Agency) to Josiah P. Fitch, on Jan. 17, 1860; and persons desiring further information in relation to it will please address H. Carlisle & Co., No. 37 Park-row, this city, or to the same firm at Sheldon, Vt.

MELHUISH'S METAL CAMERA.

It is a characteristic of most useful inventions, that when they are produced, we marvel that they were not thought of before. For upwards of 20 years we have been using cameras of various kinds of wood, which, although very elegant as specimens of cabinet work, have possessed the undesirable qualities of great weight, liability to warping and breaking, and distortion. These objections are felt in their full force, especially in traveling, and in hot climates; to meet which objections the metal camera especially recommends itself. In a comparison between the cameras now in use and the metal camera, we find that when the two kinds are made or equal strength, the metal one, if of brass, is one third lighter in weight, while, if made of aluminium, it will weigh one-sixth of the weight of a wooden camera. Thus, a camera, &c., weighing eighteen pounds, when made of Spanish mahogany, will weigh twelve pounds if made of brass, and three pounds if of aluminium.

With a photographic camera constructed of aluminium the problem so frequently proposed—the lightest possible weight of the traveling artist's baggage—will be solved; while it is evident, that changes of climate, heat or moisture, which, sooner or later, materially damage a wooden camera, can have no effect upon a metal one. Aluminium is a metal that resists oxidation, and is not acted upon by vegetable and mineral acids, with the exception of hydrochloric acid. Besides, it is as hard, ductile, and malleable as iron—qualities that especially recommend it for the purpose to which it is now applied—the construction of a light portable camera.

In manipulation, metal presents many important advantages over wood, the latter material absorbs heat from the sun, and moisture from the wet plates, while metal reflects the sun's heat, and really prevents evaporation. A wet metal plate will keep as well five or ten minutes in a metal slide, as one minute in a wooden one---a great advantage in a hot climate.

The wet collodion slide hitherto in use, generally stains the plate more or less, and the bath solution that drains from the plate gradually rots the slide. Just the opposite result takes place in the metal slide, which being electrotpped with silver, neither affects nor is affected by the nitrate solution of the sensitized plate, but exhibits the rare phenomenon of a negative clean to the edges.

The metal dry plate slide does not effect the sensitive plate, but rather preserves it, the fittings being nearly air-tight. In wooden slides the plate is soon injured by the development of spots, doubtless nuclei of decomposition arising from emanations from the wood. Dr. Norris found that when his dry plates were sent out packed in wooden grooves, they were generally spoiled before reaching the customer.

There is a mechanical feature in Melhuish's metal camera which possesses strong claims upon our admiration: it is, that the metal shutter of the dark side draws *downwards* instead of upwards, thereby preventing the posibility of light reaching the sensitive plate. Under the usual arrangement, the shutter of the dark slide draws upwards, requiring no little care and dexterity, even when covered with a cloth, to prevent the light penetrating and fogging the plate.

The great economy of space presented by the metal camera is not the least of its recommendations. For instance, a stereoscopic camera, for plates $6\frac{1}{2} \times 3\frac{1}{8}$, with sliding front, six double dry plate slides, one wet collodion slide, and a focusing frame, together with a pair of quarter-plate double combination lenses, adapted for taking portraits and views, packs, without taking to pieces, in a leather case, 7 inches long, $3\frac{7}{8}$ wide, and 8 inches deep, and weighs about six pounds: if constructed of aluminium, it would weigh about two pounds. The average thickness of the dark slides, double or single is only $\frac{3}{8}$ of an inch.

By constructing the frame work of the metal camera of suitable strength, to insure rigidity and firmness, the filling-up may be of metal of any degree of thinness, since the purpose it serves is only to exclude the light. in large cameras this filling-up might be of any light material, such as *papier machè*.

In taking stereoscopic views, a metal sliding bar, upon which the camera works, enables the operator to command an angle of 200 degrees.

We consider, therefore, that for certain purposes, the metal possesses advantages over wood. It is probable, however, that for home operations, in the operating room, the wooden camera will continue to obtain the preference, on account of its more showy appearance; even in that case it would be an advantage to have it furnished with metal slides. For out-of-door operations, and for hot climates, there can be little doubt that the metal camera will obtain the preference.—*London Photographic News.*

THE EARLY PLANTING OF POTATOES.—Professional gardeners here adopt a method of producing early potatoes which is probably not as well known as it deserves to be. It consists in allowing the potatoes intended for seed to push forth shoots before they are planted; with this view some early kinds are placed in a layer about three or four inches in depth, in some warm place, such as a stable, on the loft or floor of any out-house, &c. The potatoes are covered with straw sufficient to protect them from frost, and some time in April, or early in May, the sets, each with a robust bud or shoot a couple of inches in length, more or less, are planted in rows about fifteen inches apart, and eight or nine inches from set to set in the rows. With respect to manure, it may either be applied in the usual way under and in contact with the sets, in which case short stable stuff is preferred, but any kind of short manure or compost will answer. The sets, with the shoots retained in an upright position, are covered to the depth of five or six inches with fine mold; and as the plants advance in growth, additional earth is drawn up to them with the hoe. So managed, the crop will be fit for use in June, when the ground from which it has been removed may be cropped with cabbage, turnips, &c. Of course this method is only for securing early potatoes, and they must be protected, with matting, from the late frosts which sometimes take place in May, after severe thunderstorms.

PATENT HEMMER.

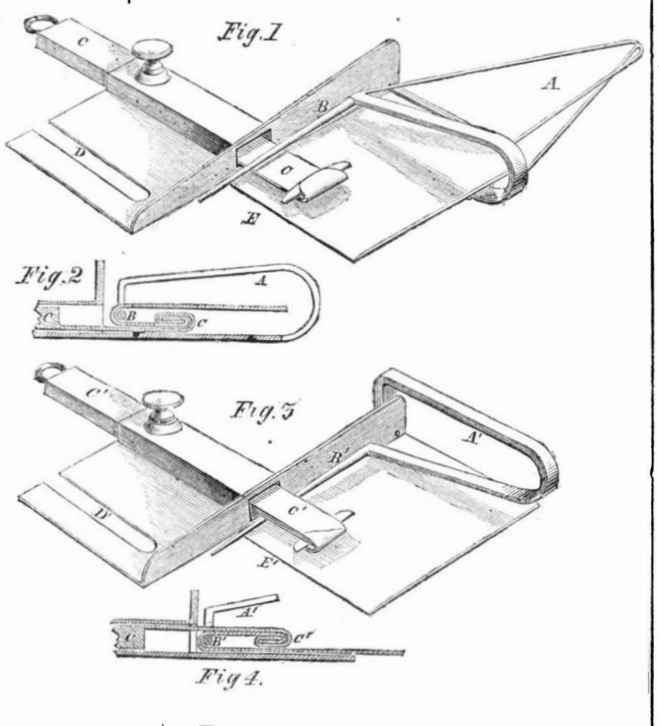
Those of our readers who have followed the course of improvements in the sewing machine are aware that it does not sew "over and over," and that the only way in which hemming can be done by it is by folding the cloth over at the edge, so as to roll the edge completely into the fold, amd then fasten the fold down by sewing along it with the "through and through" stitch. Many devices have been planned for folding the hem, but, so far as we are aware, they all turn the fold on the upper edge of the cloth, and consequently when they are used with a machine which forms a loop stitch, as Grover & Baker's, for instance, the wrong side of the stitch comes on the right side of the hem. The hemmer which we here illustrate will turn the fold either on the upper or under side of the cloth, and thus obviates the important objections which we have mentioned.

Figs. 1 and 2 show the arrangement for turning the hem on the upper side of the cloth; the frame, A, with the tongue, *b*, which is attached to it, being removable, and the folder, C, being capable of being turned with the opposite side up. The manner in which the cloth is wrapped around the tongue and into the turns of the folder, is clearly shown in Fig. 2. The hemmer is attached to the sewing machine by screws passing through the slot, D, in such position that the needle will pass through the cloth at E, just after it leaves the folder. It will be seen that the distance of the seam from the edge of the cloth may be adjusted by sliding the folder in its case, and by slipping the slot, D, beneath the screws which hold it.

For folding the hem on the lower side of the cloth, the frame, A′, shown in Figs. 3 and 4, is used, and the folder, C′, is turned over. This arrangement brings the right side of the stitch in loop-stitch machines on the right side of the hem.

This hem-folder may be used in hemming by hand, or it may be attached to any variety of sewing machine.

The patent for this invention was obtained, through the Scientific American Patent Agency, Oct. 18, 1859, and persons desiring further information in relation to it will please address the inventor, Leverett Clark, at Monticello, N. Y.



CLARK'S PATENT HEMMER.

LIABILITIES OF COMPANIES FOR ACCIDENTS.

Mortimer Lee vs. the New York Car and Steamboat Gas Company.—This case was brought by the plaintiff to recover damages from the defendants for injuries received while in the defendants' factory. The defendants are manufacturers of gas cylinders for the use of steamboats and cars, at No. 8 Gold-street, this city. These cylinders are made to be filled with gas, compressed to a pressure of 200 or 300 lbs. to the inch, so that the gas taken therefrom would burn so long as any pressure above that of the atmosphere continued. The company had, up to July 13, 1858 (when the accident occured) manufactured and put into successful operation many cylinders, the proportions of which were ten inches in diameter and six feet in length. These were tested at the factory by hydrostatic pressure (the air pump), and not one of them burst. A short time before the accident, the company caused a cylinder to be constructed, *four* feet long and *eighteen* inches in diameter, by way of experiment, as a short cylinder of equal internal capacity would be more convenient in cars, &c., than a long one.

This cylinder was tested, as usual, at the factory by the air pump. After the pressure had run up to 344 lbs., as indicated by the gages, the person in charge of the experiment left it and went into the office without, as is alleged, leaving any one in charge of the pump, or to observe the amount of pressure, or whether the cylinder yielded. The plaintiff and six other workmen were employed in different parts of the shop at the time. While the cylinder was thus left, it burst with great noise and violence; a workman, named Sharp, was instantly killed, and the plaintiff's right leg was so badly burnt, that amputation was necessary. It is alleged that he is still unable to work at his trade, and has not yet earned anything since the injury. The plaintiff claims $20,000 damages, on the ground that the defendants' negligence and recklessness caused the exposion. The defense is a denial of the statements in the complaint, and asserts that the explosion was caused by the negligence of a fellow servant; that the plaintiff had left his place of business where he should have been at work, and seated himself on the cylinder, and was so seated when it exploded; that the explosion was an inevitable accident, not caused by any negligence of the defendants. The jury rendered a verdict of $6,000 for the plaintiff.

SAVING NITRATE OF SILVER.

Ninety-eight per cent of the nitrate of silver employed by the most experienced photographers to sensitize their plates or their paper, is carried away into the fixing and washing baths, in other terms, on a sum of one hundred shillings expended, or converted into nitrate, about five shillings only are utilized in the production of the photographic image. These figures give us an idea of the immense loss any photographer must sustain if the contents of the fixing and washing baths are not turned to account in one way or another. Then comes the question, which is the most economical and effective manner of extracting from these baths the silver they contain? I do not know how you operate this in England, but in France the liquid residues are carefully collected in appropriate glass jars, and the silver they contain precipitated, without any previous operation, by sulphide of potassium. The precipitate, which is principally formed of sulphide of silver, contains, also, sulphur organic matter, &c.; it is collected either upon a filter or by decantation, and then dried. It is afterwards calcined in a crucible with nitrate of potash. The result of this calcination is a melted lump of pure silver. It is curious enough that in this case a reduction takes place by means of a powerful oxydizing agent. The nitrate of potash employed, however, plays here, as everywhere, the part of a powerful oxydizer; its oxygen is given to the sulphur of the sulphide of silver precipitated, to produce sulphuric acid, this unites with the potash of the saltpeter, forming sulphate of potash, whilst pure silver is put in liberty by the decomposition of the sulphide; at the same time, gases (oxyds of azote) are evolved from the decomposition of the saltpeter. Waste photographic paper, impregnated with salts of silver, may be carefully burned in wide, open crucibles, and their ashes collected. To these ashes must be added their own weight of a mixture of nitrate of potash and carbonate of soda, both dry; and this mixture may then be added to the sulphide of silver to be reduced, or heated separately.—*Paris Correspondent of the London Photographic News.*

[The French chemists pursue very refined chemical processes; and if there is one feature above another for which they deserve credit, it is that of economy in the arts—nothing is allowed to be lost. In the reduction of silver from the nitrate, at our Assay Office, a more simple method than the above is pursued. The nitrate of silver formed in purifying the gold is reduced first by the chloride of soda, then by granulated zinc.—EDS.

LINSEED OIL AND OIL-CAKE.

MESSRS. EDITORS:—A recent editorial suggests the following communication in reference to the manufacture of linseed oil. There is a great quantity of linseed oil made in Louisville, Ky., and the oil-cake left from this was, a few years ago, and probably is now, exported from this country to Liverpool in order to obtain a market, which, in this country, it has not. This cake is most excellent food for cattle, but it seems that our farmers are so dead to their own interests that they suffer it to to be taken to England where its value is appreciated. Thus this country is robbed of its due. I cordially agree with all of your editorial on this subject, especially as to the importance of linseed oil manufacture in this country. E. T. C.

Philadelphia, Pa., April 2, 1860.

[Our farmers are also very blind, we think, to their own interests in regard to the cultivation of flax. We have to import a vast amount of flax seed annually from the East Indies, to make our oil for painting. No less than 153,205 bags have been imported since Jan. 1st, and 215,000 bags are now on their way in 23 vessels which have sailed from Calcutta and Bombay. The stock of linseed on hand is but limited at the present moment. We import both linseed and linseed oil in large quantities, and we might cultivate all our own seed and make all our own oil. A lot of 30,000 gallons of English linseed oil was lately sold in this city for Boston. It brought 57½ cents per gallon, being from a half to one cent more than city-made linseed. A more extensive use of flax in manufactures would tend to increase the product of home-grown linseed. It is the opinion of some merchants that the export of linseed oil-cake ought to be encouraged, upon the principle that all the products which can be exported tends to increase the wealth of the country. This is an intricate commercial question, regarding which there are a variety of opinions.—EDS.

THE MANUFACTURE OF MOSAICS.—A letter from Rome, in the Rochester *Democrat*, gives the following account of the manufacture of mosaics at the Vatican factory:—"The mosaic copies of celebrated pictures, which are now almost the only ones which adorn the interior of St. Peter's, are the product of this manufactory, and are far superior to the ancient mosaics. The ancients, besides their inferiority in painting, show no such delicacy of shading, or such variety of coloring as has been attained in modern times. The material used for these mosaics is an artificial stone, of which 20,000 different shades are used. No one but a real artist, however one might at first imagine, can excel in such work. It was interesting enough to see a workman with a picture of enormous size before him, working for hours in the selection and fitting of one little piece of stone into the mosaic which is to be its copy. The large mosaics, eighteen feet in height, which adorn St. Peter's, have some of them cost twenty-five years of the labor of several artists. It seems to me that, rather than undertake so endless and unproductive a task, I would be the slave of a silver mine—and yet the perfection of the work is wonderful. At a little distance it is impossible to tell it from an oil painting, and it is next to indestructible. The mosaics of the Roman churches still last, while the churches themselves have been changed in almost everything else except the solid walls."

PORTER'S STEAM GOVERNOR.—On page 36, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN, we published an illustrated description of the above governor for steam engines, and its very original character soon afterwards attracted the attention of persons capable of estimating its value. Since then it has been extensively applied to engines; and in every case which has come to our knowledge, it has given satisfaction. On the advertisement page of this number, W. J. McAlpine, ex-Chief Engineer of the United States Navy—whose reputation stands very high—certifies, in a very flattering manner, to its good qualities, and in his opinion we are fully agreed.

WIARD'S ICE BOAT.—We have received, from a Russian company in St. Petersburgh, a letter addressed to Mr. Wiard, the inventor of a steam ice sledge. As we do not know his post-office address, we are unable to forward him the letter. It is held subject to his order.

IRON COMBINATION BEAMS FOR BUILDINGS.

MESSRS. EDITORS:—In answer to your recent call for practical information on the use of 9-inch "I" wrought iron beams of 17 feet span in the construction of the floor for a drill room, I will say that, notwithstanding the fact that such beams are used quite extensively in the ordinary floors, yet I think they are not the best, and that they are not suited to the severe use of a drill room. They will probably be too flexible, they ought to have more depth, say 13 inches, which is equal to that of the brick and concrete work. Another kind of beams, of 13-inch depth, can be made that will have full one-third more strength and stability; they will answer all the requirements of this floor, and cost no more than the 9-inch beams. I mean such as I described in Vol. XIV. (old series) of the SCIENTIFIC AMERICAN, commencing page 62, and the tests of which were published on page 117, this volume. The question of merit between the two kinds of beams can be determined by trial, or by a comparison of the published results of tests. But as the superiority of these beams is due to a wide departure from recognized or popular theories on this subject, it may be well to show in what respect they differ, and wherein their merit consists.

The question of beam construction has become sadly mystified by authors who have advanced fallacious theories in advocating their own notions. As most of the fallacies of writers on this subject have been adopted by Mr Fairbairn, and concentrated in his late work on iron beams, I will direct my attention mainly to this. What I consider as one of his greatest errors, and second only to that of his theories relating to forces and forms (already discussed in Vol. XIV., SCIENTIFIC AMERICAN), is his advocacy of an exclusive use of wrought iron in the construction of beams, girders and bridges, simply because this material possesses high tensile strength; also, because he condemns the use of cast iron for any part of such a structure, for the reason that its tensile capacity is low, though its capacity to sustain pressure is known to be very great; as if this latter quality was not as important as the other in structures where the pressure is as great as the tension, and in which these two forces are nearly distinct and opposite in their action. His theories on this point are delusive, and at variance with common practice—even with his own. Although it may be supposed by many that the Britannia and other tubular bridges, in the construction of which Mr. Fairbairn has taken part, are composed of wrought iron, they, in fact, contain hundreds of tuns of cast iron, used for the purpose of *strengthening the wrought iron tubes.* Nearly all iron structures of considerable extent (certainly, the best of them) contain a large proportion of cast iron. Notwithstanding the well-known and extensive use of cast iron in columns, large rafters and in upper chords of girders and bridges of the highest importance, where the action upon the parts are mainly compressive, Mr. Fairbairn says (on page 54 of his work) that, "even where *well*-proportioned, *it* will suddenly snap without any apparent cause." But then (on the same page) he shows that such results are due to *bad* proportions. On page 56, in speaking of defects in cast iron from scoria, he says: "This *can never* occur in wrought iron beams;" then, in the fourth line after, he admits that "it *will*, however, sometimes occur." These are a few of the inconsistencies and contradictions with which his work abounds. His views are veiled in a plausible garb, and the more superficial reader cannot detect their real character; but this will not do for the practical engineer, who has to deal with hard and uncompromising realities.

Experiments with purely cast iron beams are of but little practical consequence, as this metal in this form is neither good nor economical; it is wholly unfit for the duties of the lower chords, owing to its low tensile capacity But, on account of its superior power to resist pressure, and the facility with which it may be molded to any form, it is peculiarly well suited to the opposite duties belonging to the upper chords, while wrought iron is, on account of its great tensive capacity, best adapted to the duties of the lower chords. These being the facts of the matter, it is absurd to advocate the exclusive use of wrought iron in the construction of beams, in which the strains are as opposite in their character, as well as in the direction of their action, as is the quality and nature of these two kinds of iron. As their qualities are opposite, and each is suited to the opposite duties of the upper and lower parts of beams, there can be no good reason why they should not be thus used in combination. It is done extensively, as before stated; and successfully, too, notwithstanding all the specious teaching to the contrary. Using one form, such as the rolled "I" beams alluded to, and having the section of both chords uniform and parallel with each other, for various and opposite purposes, is certainly not consistent with good construction. Such practice, in other professions, would very properly be called "quackery" or "monomania." It has been said that the difference in the contraction and expansion of cast and wrought iron must preclude their use in combination. This objection is rather fine spun. The difference between them is a little less than .009 of an inch in a length of 20 feet, in consequence of a change of 60° of temperature; this is hardly discernable by unaided eye-sight. The parts of beams are seldom made as nearly of one length in practice, it requires good workmanship to do it. It is less than 1-10th of an inch in a length of 100 feet, and is readily and imperceptibly overcome by a slight and unimportant compression or extension of the parts; therefore, it is of no consequence in practice, and it is a pity that learned theorists have attached so much importance to it. As to the objections urged against cast iron on account of possible defects, arising from air-bubbles or scoria in it, it is only necessary to say that these objections have no weight with practical men, for they know how to prevent their occurrence. And if, in consequence of neglect or mismanagement, there should be any of such an extent as would seriously injure the part, the faithful attention and supervision of a practical engineer will be sure to find them. This is a matter that is completed under the control of the engineer and founder, and when they understand their business there is no danger; as men of observation and practice well know. But, admitting that slight defects of this kind may occur, say in a cast designed for the upper chord of a beam, and that it is equal to 1-6th of its entire transverse section, this would not endanger a properly proportioned structure, for there will then still be 5-6ths left to be crushed before it can fail; but this will not be possible, because the force will be only about 1-4th or 1-5th of what would be required for this purpose. It is to guard against just such possible contingencies that we make the size of the parts equal to five or six times of what the applied force can crush. The defects incident to cast and wrought iron are of as opposite natures as are the purposes to which it is proposed to confine their use in beams—the defects of each are least injurious when they are thus used. A slight defect in the cast iron of a beam will not seriously impair its effectiveness; and as the defects in wrought iron are usually in the form of splits or laminæ, these, when not extensive, will not seriously impair its tensile capacity in a lower chord. Such a defect, however, when the part in which it exists is used to sustain pressure, is very bad; wrought iron should not be used in upper chords, for the pressure of these will cause the split or laminated part to "buckle." This and other facts and principles of equal importance are often overlooked or neglected in practice, especially when the work is designed and directed by those who are not familiar with such matters. To illustrate this fact, I will state that a learned and eminent engineer in this country had occasion to construct a wrought iron roof of considerable span, and knowing that the amount of force required to crush and to tear this material asunder by tension is about equal; and knowing, also, that the amount of pressure in the upper chords is about equal to the tension of the lower chords, he made the section of the rafters and the ties or lower chords also about equal, thus making their sizes to correspond with the ultimate tensile and crushing capacity of this iron, though it is calculated that the actual strain will never exceed 10,000 pounds to the inch. Now, these proportions seem fair in theory, and I believe this roof has been inspected and admired by many engineers of the highest eminence; yet it is only necessary to call the attention of a thoroughly practical engineer to the arrangement of the parts to convince him that the rafters will, for want of proper lateral support, deflect from their normal direction, buckle, and fail under the action of a load that is less than half of what the ties can bear with safety. The roof, however stands as yet, because there is a great excess of material in it. I allude to it only to show how a bad distribution may affect its capacity, and to indicate how similar blunders may be avoided by considering, not so much the ultimate capacity of the material as what it will bear *in the manner used.*

B. SEVERSON.

[To be continued.]

SAVE THE SAWDUST!

MESSRS. EDITORS:—As *utility* seems to be one of the characteristics of the day, it may interest the inexperienced to know how to make that ever-growing "pile" (of sawdust) a source of profit. For years I have not wasted any of it, and find its use the saving of a large per centage of wood. Our mill has a 42-inch boiler, 22 feet long, 2 return flues, and set so as to conform to the principles of the formula given by Joseph E. Holmes on page 315, Vol. X. (old series) of the SCIENTIFIC AMERICAN. The cylinder is 10 by 50 inches stroke, cutting off the steam at half stroke, and the motion regulated by a Judson valve. The engine makes about 80 revolutions per minute, driving a 7-foot muley saw and one of J. E. Holmes' circular mills, with 30-inch saw, making 300 revolutions per minute. The steam blows off at 120 lbs.; using green wood and burning all the walnut, oak, poplar or gum dust the mill makes, and easily maintaining the steam at the point named. Cypress dust contains more water than any we have; and once I had a lazy fireman who thought he could not burn cypress, and so he let the pile grow until it frightened him away from the mill, when I took the shovel, and in three days caught up.

Several years practical work has taught me that sawdust needs a tight fire-front, a strong draft through the grates, wood to prevent its packing, unless the boiler is longer than the usual size, and the chambering alluded to above, in order for the gaseous matter to reverberate and produce a perfect combustion. After our furnace becomes heated, the utmost crowding of dust does not show the *least sign* of smoke at the chimney top; this non-appearance is the most conclusive evidence of perfect combustion. In firing dust never stir it, unless it be with a small rod, to make a road for the flame; and after firing half a day without stirring, I have gathered as perfect cinders as from the smith's forge. I have taken the shovel from an inexperienced hand when steam was down to 75 or 80, and gradually raised it to the blow-off point with little besides dust.

I once visited a friend who was carting all his dust out from the mill, and on asking the fireman why he did not burn it, I was told: "It smokes the fire out," and from the small space underneath the boiler, it was quite evident the gaseous matter would be half strangled in "running the gauntlet" to the outer world. I sketched the plan alluded to and gave my friend the reasons why that must come nearer, producing a perfect combustion. He ordered the mason to re-construct the walls, but he (true to the way he had learned) at first refused, and nothing could convince him of his prepossession but the sight of the living flames rolling over the walls and filling the chambers, and that from the same kind of dust that was said to have smoked the fire out. In two months I saw my friend again, and he said that all the dust went under the boiler with ease; and in that time the slabs, as they were thrown off, had reached the top of the first story of the mill; it not needing them, while before it took all of them. If possible, let some one who has handled the dust-shovel show a more perfect way of economy of fuel.

J. L.

Smith's Mills, Ky., March 14, 1860.

RAIN WATER NOT ABSORBED BY LEAVES.—It has always been thought that the rain water which falls upon the leaves and stems of vegetables is gradually absorbed, and nourishes the plant. It appears, however, that this opinion is merely instinctive, and when tested by careful experiment, it proves unfounded, as is shown by a small paper lately published by M. Duchartre. For four years this author has endeavored to discover, by direct experiment, whether or no such absorption takes place. The plants submitted to these experiments were in pots, their stems and leaves being exposed to the rain, whilst the roots were prevented from absorbing any moisture, being hermetically closed up in the pot. All the plants submitted to this kind of investigation gave similar results; after remaining exposed to the rain, sometimes for eighteen consecutive hours, they showed no increase in weight; indeed, in some cases, they appeared to have experienced a slight diminution.—*London Photographic News.*

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, the 22d ult., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the president, C. Mason, in the chair.

MISCELLANEOUS BUSINESS.

Grain-hulling Machine.—Mr. Bruce presented the claims of a grain-hulling machine, invented by O. P. Stevens, of Cleveland, Ohio. Mr. Stevens' machine is designed to preserve much of the valuable nutritive matter of the grain which, in other machines, is removed in the hulls. The virtue of a kernel of grain increases from the center outward to the silicious skin. Mr. Stevens claims only to separate this silicious and worthless skin.

Prosser's Boiler.—Mr. Rowell read a letter addressed to the club from Mr. Thomas Prosser, complaining of alleged erroneous statements lately made before the club in relation to his boiler. As to priority of invention, the letter states that Mr. Prosser first built the boiler in question in 1855, and that in 1856 he defended it in public before a committee of fire company umpires.

Montgomery's Boiler.—Mr. James Montgomery claims that his boiler is the most economical yet invented. He said: The boiler of the steamer *Glasgow*, for each pound of fuel, evaporates 2⅔ lbs. of water, and the *Vigo* 3⅓ lbs., while my boiler evaporates, for the same amount of fuel, 10 to 15⅛ lbs. of water. I have generated steam at 110 lbs. pressure, when the temperature of the escaping products of combustion was only 140°.

Mr. Godwin—Was not one of your boilers taken out of a vessel built in Boston for a Turkish Pasha?

Mr. Montgomery—Yes. The boiler was taken out and everything else, and the vessel altered. The vessel was intended to be a fast sailer, but it was a failure. It was taken to England, and English engineers said it was the fault of the machinery. The machinery was replaced with no better success, when they made the discovery that the hull was built on a wrong model. The Pasha was advised to cut the boat in two and add about a third to its length; in short to make a new one out of her. My boiler had nothing to do with the failure.

Gas and Steam Engine.—Mr. Pappay (a German) presented his plan for a new motor. The steam generated in the usual way passes by a tube leading through the fire. In the part of the tube which is heated is enclosed a material which sets free the hydrogen of the steam, which, with the steam decomposed and superheated, operates the piston. The chemical substance which decomposes the steam is a part of the invention which at present he holds as a secret. He says it is more effective than iron or coal.

The President then announced the regular subject: "Means of Transport to and from New York."

DISCUSSION.

The President read a short paper showing the importance of the subject, and suggesting the various points for consideration.

Mr. Fisher read a very able and elaborate paper on the economy of locomotion by steam, and recommending more railroads, and especially advising iron pavements for all crowded thoroughfares. He believes that iron pavements and steam carriages will remove many of the most serious ills of city life.

Mr. Latson believed that much of the over-crowding in the streets would be obviated by requiring that North and East river steamers be required to land above Canal-street. Passengers would sooner reach their destination, and freight could be easily transported down town by railroads in unfrequented streets.

The President—The objection to the up-town landing of river steamers commonly made is, that foreign vessels would be obliged to go up to meet them, or that the freight must be carried through the city. As far as passengers are concerned, an up-town landing would be preferable.

Mr. Garbanati—All things are good in their places. We cannot exterminate horses; a little more steam in the city may be well, but it can never be the only power of locomotion and transport—perhaps not the chief.

Mr. Montgomery—Iron is better than any other material for pavements. Stone disintegrates by changes of temperature, the percolation of water and the shock of hoofs and wheels. Stone never lasts longer on a road than in the field. Most of our soil was once solid rock. Our iron sewer covers have lasted 60 years, and have lost only 1½ per cent. An iron pavement should be cast in blocks a yard square, and with grooves (to be packed with sand) so narrow that they will not disturb the even plane on which the wheel moves and yet afford foothold for horses. The under surface should be the same as the upper, so that, when it is worn, it may be turned, and the pavement be as a good as new. Such a pavement would last 100 years on Broadway, and 90 per cent of the iron, better than at first, would be left for re-casting. It may be laid for $5 per square yard. The Russ pavement cost $5 to $7; the Belgian, $2 25 to $2 37; and lasts on a street like Broadway three years.

The President—The first iron pavement was laid in Court-street, Boston, at a cost of $5 per square yard. It has now been used seven years and is still perfect.

Mr. Montgomery—The iron pavement in Nassau-street has been ordered to be taken up. The difficulty was not in the iron, but from the fact that it was laid so near the old burying ground that it settled. Any other pavement would have been affected in the same way. [This statement was doubted by some of the members.] Iron pavement is demanded for the sake of the health of the city. Our streets now are a vast sponge which absorbs every kind of filth and uncleanness, to be given out again on warm days in poisonous stench.

Mr. Godwin advocated one-horse omnibuses, running on tramways of stone, 8 or 10 inches wide.

Mr. Garvey—No doubt we shall some day use steam for locomotion in the city, but there are many practical details to be settled. Shall we have locomotives, or get the moving power from stationary engines? But there must ever be a necessity of accommodation for horse carriages and country wagons. There are a hundred thousand horses in the city, and we cannot dispose of all of them at once.

Mr. Seely believed that a motor, in which compressed air is used, might be found practicable. Condensed gas is sold for light; why not condensed air for power?

The President—Our city government was always slow to grant charters for city railroads, but no one questions their utility now. I rank our city railroads as a blessing next to Croton water.

The same subject was ordered to be resumed at the next meeting.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

Horsepower.—Norman Shelden and Jane Cary, executors of Daniel Cary, deceased, of Chili, N. Y., have applied for the extension of a patent granted to said Daniel Cary, on the 27th of June, 1846, for an improvement in horsepowers. The petition is to be heard at the Patent Office on the 11th of June next; and the testimony closes on the 26th of May.

Netting Machine.—John McMullen, of Baltimore, Md., has applied for the extension of a patent granted to him on the 27th of June, 1846, for an improvement in netting machines. The petition is to be heard at the Patent Office on the 13th of June next; and the testimony closes on the 26th of May.

Carving Machine.—James Angur, administrator of Hezekiah Angur, deceased, of Whitneyville, Conn., has applied for the extension of a patent granted to him on the 23d of Dec., 1846, for an improvement in carving machines. The petition is to be heard at the Patent Office on the 3d of December next; and the testimony closes on the 16th of November.

THE PEMBERTON MILL.

MESSRS. EDITORS:—I noticed, on page 186 of the present volume of the SCIENTIFIC AMERICAN, an article headed "The Pemberton Mill to be Rebuilt." In this article it was asserted:—"In the architect's order allowance was made for strength to support tenfold the weight that was placed upon the pillars; but they were not in accordance with the order." This is not so. The architect's size for the largest pillars was 6 inches diameter at bottom, 5 inches near the top, 5½ inches at middle and 12½ feet long and ⅝ of an inch thick. The manner in which they were set up and designed to be set up, not being accurately fitted or fixed at top and bottom, their breaking weight is 49 tuns. The weight to come upon them was estimated at 25 tuns; being an allowance of only *twofold* instead of tenfold, as shown in a previous article.

O. B. M.

Lawrence, Mass., March 27, 1860.

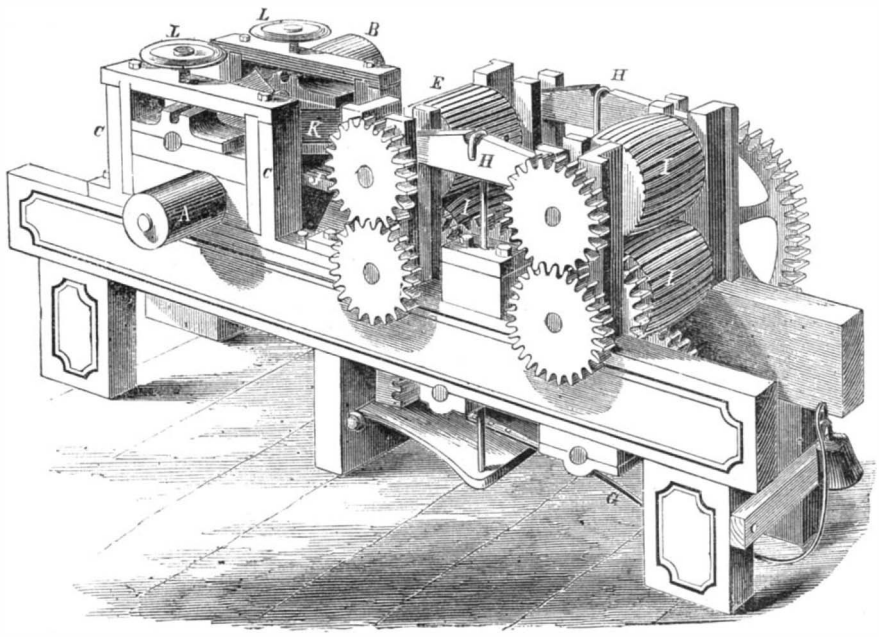
A COLUMN OF VARIETIES.

Indigo as good as was ever produced has been raised in South Carolina; its manufacture, however, was so fatal to the negroes that its cultivation was discontinued. It absorbs oxygen in the process of manufacture so rapidly as to render the air unfit to breathe.....To remove lead from water, put a little chalk or whiting into the water and let it settle.....The power of a triangular prism to reflect the violet rays of light more than the red rays, is called its dispersive power, and it is found that flint glass, which contains a considerable proportion of the oxyd of lead, possesses this dispersive power in a much higher degree than crown glass, which contains no lead. This property has been turned to account in the construction of lenses for microscopes, telescopes, &c..... It is calculated by Morin, in his work on mechanics, that a child growing at the rate of four inches a year, grows 0.000,000,000,9 of a foot per second.....To draw a load weighing a tun along level ground, requires a force sufficient to raise about 600 lbs., if the load is on a sledge, if in a common wagon about 70 lbs., if in a railroad car about 7 lbs.....A railroad company has purchased the right of way through the Thames tunnel, London, and will proceed to lay a track.....The London *Spectator* states that one firm in London consumes 7,200,000 corks per annum.....The fatal disease among cattle which is causing so much alarm in the towns of North Brookfield and New Braintree, Mass., is an inflammation on the lungs and of the membrane which lines the chest. A committee has reported a bill to the Legislature providing for the killing and buying by the public authorities of cattle affected by it, the owners to be paid by the State.....A man is taller in the morning than at night to the extent of half an inch, owing to the relaxation of the cartilages.... .The human brain is the twenty-eighth of the body, but in a horse but the four-hundredth..... Ten days per annum is the average sickness of human life. About the age of 36, the lean man generally becomes fatter, and the fat man leaner.....Richter enumerates 600 distinct species of disease in the eye..... The pulse of children is 180 in a minute; at puberty it is 80; and at 60, only 60.....Dr. Lettom ascribes health and wealth to water; happiness to small beer; and all diseases and crimes to the use of spirits.....Elephants live for 200, 300, and even 400 years. A healthy full-grown elephant consumes 30 pounds of grain per day. .....Bats in India are called flying foxes, and measure six feet from tip to tip.....Sheep in wild pastures practice self-defense by an army in which rams stand foremost, in concert with ewes and lambs in the center of a hollow square.....Three Hudson's Bay dogs draw a sledge, loaded with 300 pounds, 15 miles per day..... One pair of pigs will increase in six years to 119,160, taking the increase at 14 per annum. A pair of sheep, in the same time would be but 64. A single female horsefly produces in one season 20,080,320 eggs.....The flea, grass-hopper and locust jump 200 times their own length, equal to a quarter of a mile for a man.....One of the items of foreign news states, that "no more floating batteries with iron sides are to be constructed in England, owing to the Armstrong guns having completely riddled the immensely thick iron plates of the experimental vessel." How will this conclusion affect the iron floating battery, now in process of construction at Hoboken?.....Water in large volumes is blue by reflected, and green by transmitted light.....Coprolites are the fossil excrements of extinct animals, and when found in any quantities form valuable manure. They are found in the lias, chalk, and coal formations at Bristol and Lyme Regis, and in Fifeshire, Scotland.....There are no means at present of cleaning the bottom of the *Great Eastern*, and it is probable that in consequence of fouling she would not now go as fast, by 1½ or 2 knots an hour, as if her plates were clean.....The estimated consumption of coal per horse-power per hour in steam-vessels is estimated to be one-half greater in regular working on long voyages than upon careful trials with new machinery.....As little as two square feet of surface for each indicated horse-power is now found sufficient for a surface condenser, except when condensing water much warmer than 60° has to be used.....The lime salts of the sea are taken up in the formation of coral, and, accordingly, in the vicinity of coral reefs the sea is found to be deficient in these salts.....A square metre is 10·764 English square feet.....The temperature of glass furnaces is about 21,632.

MACHINE FOR DRESSING RIVED STAVES.

Extensive as has been the application of the revolving planer invented by Woodworth, it would seem, judging from the number of important new machines in which it has been introduced within the last few weeks, to be in the very infancy of its career. We meet with it in molding machines, in box-making machines, in dovetailing machines; indeed, in almost all machinery for cutting wood, and we never take up a new invention in this department without expecting to find this ever-present device.

In the machine which we here illustrate revolving cutters are used for dressing staves, and its peculiarity consists in its dressing staves without cutting the wood across the grain, that is, in leaving the staves winding as they were rived from the bolt. This apparently impossible feat is accomplished by holding the stave between two rollers, one of which is straight and the other convex, and by permitting the frame which supports the cutters to have a rocking motion, by which the cutters adapt themselves to the twist of the stave.



HOLMES' MACHINE FOR DRESSING RIVED STAVES.

A series of revolving convex cutters, to dress the inner or concave side of the stave, are secured to the axle of the pulley, A, while a series of concave cutters for the outer side are fastened to the axle of the pulley, B. Either d of the frame which supports these cutters may rise between the stationary standards, C C, thus permitting a rocking motion endwise of the cutters. The upper feed roll, E, is cylindrical, while the lower one, F, is made larger in the middle, or with a convex surface, this arrangement allowing a stave which is thicker on one edge than the other to pass between the rollers, to be pressed with its upper side flat against the straight roller, and to have its lower side pressed in the middle only by the convex roller below. The journals of the upper roller have a vertical motion and are held down by the weighted lever, G, acting through the rods, H H. Two supplementary rollers, I I, also aid in guiding the staves to the cutters. As the stave leaves the rollers, E and F, it passes over a stationary bed-plate, J, of a convexity corresponding to that of the lower roller, by which it is guided forward to the cutters. A flat plate, K, is fastened to the cutter frame so that it may partake of its rocking motion, and near each edge of this plate, and fastened to it, is a spring pressing down against the stave. By this arrangement it will be seen that the cutters are held in a position parallel to the upper side of the stave and must conform to its windings in its passage through the machine, thus dressing it to an even thickness without cutting the wood across the grain. The thickness of the stave is adjusted by raising or lowering the journals of the upper cutter by means of the screws, L L.

This machine makes handsome work, as we have seen, and the inventors state that it will dress 4,000 to 5,000 staves per day.

The patent for this invention was issued Jan. 10, 1860, and persons desiring further information in relation to it will please address the inventors, E. & B. Holmes, at Buffalo, N. Y.

IMPROVED STAVE-JOINTER.

In shaping the edge of a barrel stave, several things are required; it must be wider in the middle than at the ends, and the edges must be fashioned in a peculiar curve to form the bilge of the barrel, this increase of width varying with the width of the staves. The edges, too, must not be at right angles with the sides of the staves, but must be beveled to a line with the radius of the circle which they surround, and this bevel must not only vary with different sized casks, but also with staves of different widths. In a machine for practical use all these changes must be properly related to each other, and must be readily adjustable. All these formidable tasks are here accomplished by the most simple and direct agencies, and a machine is produced which is compact and not complicated, and which turns out a large amount of very perfect work.

Fig. 1

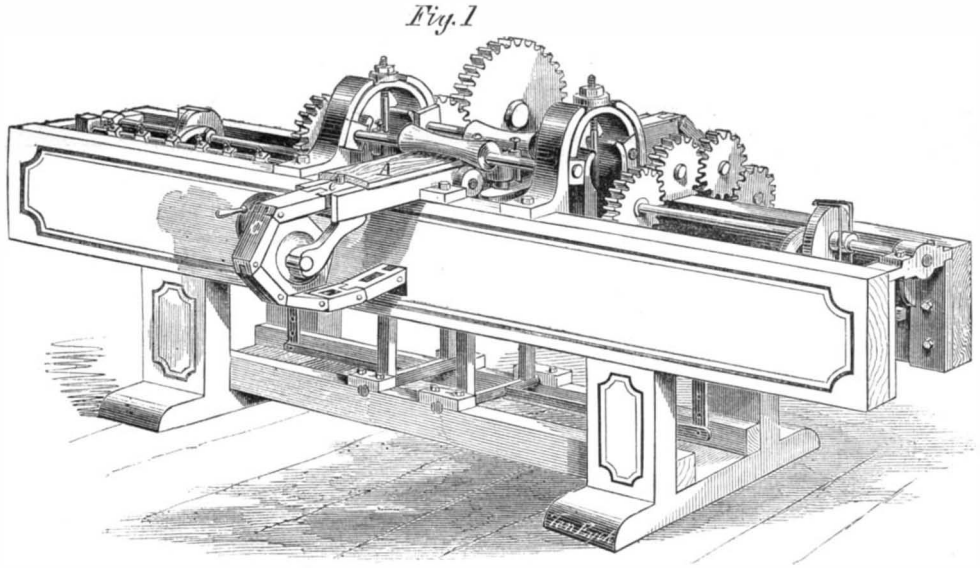
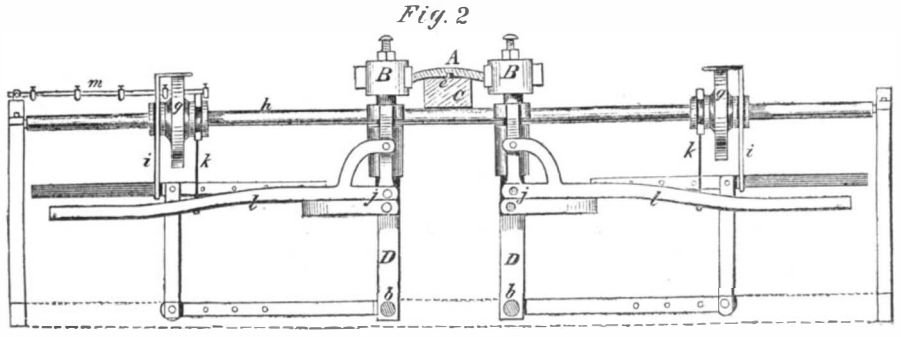


Fig. 2



HOLMES' IMPROVED STAVE-JOINTER

The principal peculiarities of the machine are clearly shown in Fig. 2, which is a longitudinal section. The stave, A, to be jointed is placed upon the iron belt or endless chain, C, and fed forward between the rapidly revolving cutters, B B. The position of the stave upon the chain is determined by the stud, *e*, and as the chain is moved by cog wheels which gear into it, its position in relation to the cutters is adjusted. The vertical frames, D D, in which the cutters are secured, have an oscillating motion on the fulcra, *f f*, by which the cutters are first carried further apart and then brought nearer together as the stave passes through, thus making the stave wider in the middle than at either end. This oscillating motion is produced by means of the two cams, *g g*, which revolve with the shaft, *h*, and are connected with the frames, D D, by means of the bent rods, *i i*. It will be seen that the extent of this oscillation, and consequently the degree of taper in the stave, may be varied by carrying the cams, *g g*, with the rods, *i i*, along the shaft, *h*, which has a groove along it, into which a projection from the bore of the cam fits. For the purpose of adjusting the distance of the cutters apart, a second joint is made in the frame, D, at *g g*, and the cutters are tipped towards each other or drawn apart by sliding the rods, *k k*, along the levers, *l l*. These rods, *k k*, are not connected with the shaft, *h*, as might be supposed from the diagram, but are suspended from parallel bars lying along the inner side of the frame, to which bars an equal motion is given by a pinion gearing into racks upon their edges. Upon the axle of this pinion is a crank or hand wheel, by turning which the bars are moved, and thus the distance apart of the cutters is instantly adjusted to staves of different widths. The position of the fulcra, *j j*, causes the cutters to be more inclined as they are drawn farther apart, and thus a correct bevel is given to the edges of all staves, while the more distant position of the fulcra, *f f*, about which the cutter frame oscillates to make each stave wider at the middle than at the ends, causes much less variation in the movement of the cutters, no more indeed, than is required to vary the bilge of each stave in the several portions of its length. It will be understood that the connection of the endless chain, C, with gears gives it that positive motion which enables the passage of the stave to be accurately adjusted to the oscillation of the cutters. The stops upon the hinged bar, *m*, are to hold the cams in place after they have been moved to cut a stave of any particular width.

When sawed staves are jointed, they may be also dressed on the outside at the same time by means of a revolving concave cutter which is removable from the machine when not required.

In making very stout casks, it is customary to make the staves thick at the ends to give strength to the chimes, and thinner in the middle in order that they may be bent by the cooper. The positive nature of the feed motions in this machine permits this cutting away of the middle of the stave to be done by a supplementary cutter, which is added for the purpose in finishing this class of staves.

Application for a patent for this novel, ingenious and exceedingly valuable invention has been made, and any further information in relation to it may be obtained by addressing the inventors, E. & B. Holmes, at Buffalo, N. Y.

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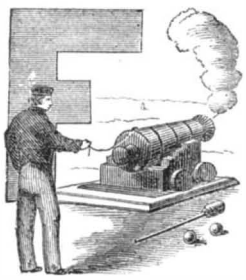
VOL. II., No. 15.....[NEW SERIES.]....*Fifteenth Year.*

NEW YORK, SATURDAY, APRIL 7, 1860.

GREAT GUNS.



FROM Europe there come notes of approaching war, and on our side of the water "the front of battle lowers" between the United States and Mexico. As a consequence of "smelling the battle from afar," there is considerable activity among inventors to furnish the most perfect and formidable engines of destruction; their attention has been intensely concentrated on this object, and breech-loading rifled cannon seem to be the objects of their special devotion. There can be no doubt that an army furnished with superior artillery has a vast advantage over another of equal numbers and in all other respects as well equipped. It is no wonder, therefore, that efforts are now making by all fighting countries to invent the best cannon. We have now before us a pamphlet by J. Webster Cochran, of this city, describing an improved cannon and projectiles, which are claimed to be very superior; and experiments have proved them to be of great value and importance. In Europe, the rifled cannon of the Emperor Louis Napoleon, of Sir William Armstrong, and of Mr. Joseph Whitworth are said to possess great range and accuracy, but their durability is held to be very limited; they are liable to burst, owing to the great pressure of the ignited charge in the chamber. The effect of successive discharges upon such guns is like concussions upon a locomotive without springs; such an engine would break down during the first trip. The Cochran (American) gun has a screw breech, and is provided with a plunger behind the charge chamber, and behind this there is a powerful volute spring which acts the part of an elastic cushion. There is also a light charge exploded in the chamber before the main one is ignited, so that the shot is started easily, and, when started, it receives the full force of the expansion. The pressure which the powder exerts when ignited—and before the shot moves—to burst the gun, is thus directed more immediately to propel the shot forward; and very perfect combustion of the powder is also effected, which greatly increases the range.

The Armstrong gun which is now being manufactured by the British government, is a breech-loading rifle of peculiar construction. Instead of being made of cast it is formed of wrought iron, in three separate hollow coils welded upon the top of one another, to constitute the barrel. Its breech end is open and has an inside screw thread cut upon it; behind this is a large hollow screw, through which the shot is introduced into the chamber, and just in front of this is a large vertical wedge or plug which forms the butt of the charge chamber. This wedge is drawn out when the gun is to be loaded; then when the shot is passed through the hollow screw, the butt is forced down behind it, and the screw turned with a lever which wedges the plug close behind the charge. This butt or breech-piece is faced with copper and is very strong. The grooves of this famous gun are angular, 40 in number, and very fine. Their pitch is 10½ feet, consequently the shot makes a revolution in that distance. These guns are fabricated from the finest bars of wrought iron, and are forged upon the same principle as the "stub and twist" barrels of fowling-pieces. Their range and accuracy are great, in comparison with the old smooth bores of cast iron; and 3,000 of them are to be finished this year.

A formidable competitor to the Armstrong gun has lately been tried by its inventor, Mr. Whitworth, the famous tool-maker in Manchester, who was appointed one of the commissioners to the American Crystal Palace Exhibition held in 1853. His cannon are said to surpass all those that have yet been tried in England, either for range, accuracy, or durability. The bore of his guns is hexagonal, with rounded spiral grooves of a very short pitch. The interior of the barrel is composed of rifling surfaces entirely, not a set of spiral grooves and non-effective *lands*, as in common rifles. On the 16th of February, quite a number of experiments were made with three of Whitworth's cannon, at Southport (England), in the presence of many military and naval officers. A 3-pounder, weighing 208 lbs., length 6 feet, bore 1½ inches, and pitch 3 feet 4 inches surpassed any cannon we ever heard of for range. With a charge of 8 ounces of powder, and an elevation of 35°, it carried to a distance of 9,688 yards—about 5½ miles—and it ranged very straight. An 80-pounder, with a 12-pound charge, elevated at 10°, carried 4,730 yards, with a deviation of only 6 yards. The London *Times* and the *Mechanics' Magazine* are in raptures over the performances of the Whitworth cannon. With the 3-pounder, pickets of cavalry may be "picked off" at a distance of six miles as easily as larks at 30 yards. They consider that "Old England" is now safe from the machinations and ambition of the ruler of France. Roast beef and plum pudding are safe; London porter will keep quiet as usual, and Uncle John may sleep secure in his "red nightcap," without dreaming of thunder. The Whitworth cannon is made of homogeneous cast iron. The breech consists of a cap with a double screw, and it is screwed off and on with two turns to load and discharge. No lead band is required on the shot; they are made to fit the grooves without expanding. The 3-pounder has been fired 3,000 times and exhibits no sign of wear; it is, therefore, "a great gun."

When we hear such thundering of cannon coming across the Atlantic, we ask the modest question: "What is *our* government doing to improve our artillery?" Here is Cochran's effective breech-loading rifled gun at our own door; and yet our arsenals and dockyards have only "old fogy" cast iron smooth-bored guns. These were good enough in the days when Santa Anna's wooden leg flourished against us on the field; but they are behind the present age. They should be melted down and converted into homogeneous, native breech-loading riflers, or rifled guns of any sort, rather than be behind the "great guns" of other navies and armies.

PATENT EXTENSIONS—CURIOUS PARAGRAPH—COMMISSIONER THOMAS.

The Morse patent machine, for telegraph operation, will soon come up for an extension of five or seven years. It will meet with strong opposition from several parties. The principal of patent extension is adverse to the policy of the government in that department.

We find the above paragraph among the items of news in a recent Washington letter to one of the daily papers of this city. It is easy enough to understand the first two sentences, but it would puzzle a Philadelphia lawyer to unravel the mystery which envelops the last one. We can only conjecture that the writer means to say that the *principal* of the Patent Office, who is no other than the Hon. Philip F. Thomas, is opposed to the extension of patents. We could not have ciphered out such an inference, even from the above paragraph, but for a statement which has been made in our hearing, to the effect that Mr. Thomas was understood to be constitutionally opposed to the extension of patents, regarding them in the light of oppressive monopolies. We do not believe that this is true, although we have had no opportunity to test the truth or falsity of the matter. He cannot, however, remain long in his present position without settling, in a definite manner, his *constitutional* views on this subject. Probably the most delicate and responsible of all the duties of the Commissioner of Patents is to decide upon the interests of patentees in extension cases; and no man would be fit to hold that office for a single day who carried in his breast a prejudice against their rights and interests, which are too vast and too important to be adjudicated upon, except by one who can bring to their consideration an unbiassed judgment. If there is to be any constitutional prejudice in the matter, it ought to lean rather towards the inventor; for, certainly, his lot is a sufficiently hard one, as a general rule, without encountering at the doors of the Patent Office a spirit of even partial hostility. We do not write thus because we cherish the belief that the rumor concerning Mr. Thomas is well founded. We believe it is not; but his acts will speak his mind better than the mere gossip of newspaper writers.

When Commissioner Mason found the Patent Office little else than "noise and confusion," and exceedingly unpopular with inventors in all parts of the country, he became to them a sort of *pater familias*, and soon restored the office to credit and usefulness. His successors followed in his footsteps, and we trust the lesson will not be unheeded by the new Commissioner, all rumors to the contrary notwithstanding.

AGRICULTURAL SCIENCE—TOP DRESSINGS—BLANCHING VEGETABLES.

Now is the season for the application of "top dressings" for pasture, meadow and other lands. The best substances for this purpose afford matter worthy of attention, and yet it is difficult to give any but general advice, as the nature of the soil must always be taken into consideration in providing suitable fertilizers. Gypsum (common plaster) is very extensively employed for top dressings; but many farmers question its advantages except for clover. Gypsum is composed of about equal parts of lime, water and sulphuric acid. It is a mineral which is found in the tertiary formation above the chalk and it is also an accompanying bed of the new red sandstone which covers the coal measures. On pasture land it produces good effects when applied on the clover as it is springing up in early Spring. Air-slacked lime has been of considerable benefit in some particular situations, when thinly sowed upon pasture lands. It has produced good effects on grass where there has been considerable sorrel and moss, by making fine grass spring up in the place of these. It is very good for coarse, thin pastures, situated on high grounds, but it is best to apply it mixed with half its weight of clay. In western Pennsylvania, Ohio, and all places where bituminous coal is employed for fuel, its soot is excellent for a top dressing for gardens and all lands. It contains some traces of potash ammoniacal salts and pungent coal oil. It is an excellent manure, and imparts a most healthy color to young plants, such as onions, and all kinds of grains and grasses. It never fails to invigorate young grain when applied in the Spring. It is, perhaps, the quickest and most powerful top dressing that can be used. About 40 bushels sown upon an acre of clover will about double the crop. The white fine ashes of coal contain considerable stimulants for grass as a top dressing. These consist of some lime, magnesia, aluminous earths and traces of potash. Applied to old pasture lands as a top dressing, at the rate of about 60 bushels to the acre, in April, it is very beneficial. It tends to destroy sorrel, rushes and mosses. As a compost of clay and lime is accessible to almost every farmer, its application is greatly to be recommended. It is a very durable top dressing for grass lands, and it also benefits almost any soil to which it may be applied. About 15 bushels of lime is a very good quantity to the acre, but 20 bushels may be safely used.

Vegetable gardeners blanch certain vegetables and make them very tender and palatable, while otherwise they would be hard and fibrous. This is done by excluding the light by burying them in the earth. A very subtile and intricate, but beautiful branch of science comes in here as an explanation of this phenomena.

The researches of Hunt, on the effects of light upon vegetation, have established the fact that the blue or actinic rays produce purely chemical changes; they promote the germination of the seed, but do not enable the plant to decompose carbonic acid. Very accurate experiments have proved that the growth of a plant is proportionate to the illuminating power of the solar rays. Hence those plants exposed to the action of yellow light grow more rapidly than under the influence of red or blue, because of the greater illuminating power of the yellow rays. Professor Draper, of this city, exposed leaves and grass, in tubes containing water saturated with carbonic acid, to the influence of the different rays of the sun, which were separated from each other by means of a glass prism. On examining the contents of the tubes after exposure for a sufficient period, it was found that the quantity of carbonic acid decomposed in the tube which had been placed in the yellow light was nearly double that decomposed in the tube which was

exposed to the red rays, and nine times greater than that decomposed in the blue light.

When plants are put into a dark place their colored parts become blanched, the green coloring matter is oxygenated and decomposed, the tissues become weak and distended by the quantity of matter which has been mechanically absorbed and which they are not able to give off by exhalation, and the plants actually die of starvation whilst surrounded by abundance of suitable nutriment; the stimulus of light, by which alone that nutriment could be appropriated, being wanting.

The green coloring matter of plants is called *chlorophylle*, and gardeners know that it cannot be formed without light. They take advantage of this in modifying the color of vegetables for the table by planting them in situations where the light is very limited, and the result is a change of their color and taste. By covering the lower portions of celery and some other plants, they are rendered tender and white; this is due to the exclusion of light, which is the great developing agent of the woody matter. Potatoes planted near the surface of the ground are always stringy and harsh; those who advocate very shallow planting do not know what they are talking about. The calorific rays which are absorbed by plants are retained in them, ready to be given out in the form of heat when burned as fuel.

INTERESTING PROCEEDINGS IN CONGRESS.

THE NEW PATENT BILL.

We notice, by recent proceedings in the Senate, that, on motion of Senator Bigler, chairman of the Senate Committee on Patents, the patent bill published on page 146 of the present volume of the SCIENTIFIC AMERICAN was made the special order for Wednesday of this week. There is, therefore, at the time of our going to press, a prospect that this important subject will be no longer permitted to sleep in the dusty pigeon-holes of the committee room. We hope, also, that when the subject is discussed, the Senators will show a proper appreciation of the rights and interests of a useful class of our citizens, whose claims upon the consideration of Congress have been heartily ignored for nearly a quarter of a century The bill, as re-printed by the committee, is crude and ill-shaped in some of its sections. At the time we published the bill, we endeavored to point out its defects; and we have no doubt that when it is discussed, section after section, the objectionable features will be lopped off.

LEGISLATION FOR HOGS.

A citizen of Kentucky—William Corbett—has applied to Congress for compensation for discovering a cure for hog cholera. Now, if Dr. Corbett has really made a useful discovery of this kind, Congress ought to buy the secret and give it to the world. This is one of the few cases where the patent laws cannot protect the discoverer from infringement; and unless he can get some compensation to reveal the secret, our hogs must either rely upon the personal skill of Dr. Corbett or give up the ghost. The utter impracticability of relying upon him in such an emergency is apparent; therefore, unless our legislative fathers have no fellow-feeling for swine, they will hurry up an appropriation in their behalf.

COLT'S REVOLVER.

Samuel Colt, the patentee of the famous six-shooter, has just made application (through Mr. Loomis, a representative in Congress from Connecticut) for a renewal of his patent, known as "Colt's Rotating Chamber Firearms." Colt has had pretty hard luck heretofore in attempting to get Congress to renew his patent; but he evidently thinks that, by steady perseverance, he may at some time accomplish his object. We recommend to Col. Colt the perusal of the first verse of the 11th chapter of Hebrews.

WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

PILED FABRICS.

This inventions relates to the manufacture of piled fabrics suitable for carpets or for other purposes by the introduction into a previously woven foundation of canvas or other fabric, of threads which after being passed through the said foundation in the form of rows of loops at regular or suitable intervals, are secured by a continuous filling thread which passes through the several rows of loops in succession. In this way a pile may be produced on either or both sides of the fonndation; the loops forming it on one side, and the portion of the thread between the loops forming it on the other side, and by cutting the thread between the loops a cut on velvet pile may be produced on one side. The invention consists in in the employment in this manufacture, of a series of needles arranged side by side at suitable distances apart for passing the threads through the foundation, in the form of loops, in rows extending the whole width of the fabric, and a long needle operating transversely to the first mentioned or loop needles, for carrying the filling thread through the loops. The invention also consists in a certain contrivance for holding the filling thread during the retreat of the needle which passes it through the loops, for the purpose of preventing the said thread being withdrawn wholly or partly from the loops by the retreat of its needle; also in a certain contrivance for feeding the foundation to the needles for the reception of the pile thread, and certain means for operating a set of rods or wires employed for the purpose of forming the pile. This machine somewhat resembles a sewing machine with a large number of needles ranged side by side and operating together. The credit of this contrivance is due to Charles Miller, an ingenious mechanic of this city. The patent is assigned to George Ricardo, 499 Third-avenue.

MANUFACTURE OF RESIN.

H. Napier, of Brooklyn, N. Y., is the inventor of a process of obtaining oil of turpentine and fine white resin by a continuous operation. The crude turpentine is put into a still and heated to a temperature of about 245° Fah., and steam at the same temperature, that is to say, at a pressure of about 10 pounds, admitted among it in such manner as to penetrate the whole of the mass. The steam carries over the oil of turpentine into the condensing worm and separation is effected by condensing in the usual way. When the oil of turpentine has all come over, the temperatnre of the still is raised to from 250° to 600° Fah., the steam being kept blowing through the mass at the same pressure above stated, the residual portion of the crude turpentine then rises in vapor, and passes over with the steam to a receiver which is kept as cool as possible by water, and in which the vapor is condensed and found to consist of resin of the purest quality obtainable, but slightly opaque from the presence of a little moisture which may be easily removed by remelting the mass and exposing it to a temperature of 213° Fah.

CAR SEAT.

This invention relates to an improvement in that class of car seats in which adjustable backs are employed for converting, when necessary, the seats into lounges or couches. The invention consists in having two backs to each seat and connected by gearing, and having the upholstery connected with certain automatic mechanism, all being so arranged that the backs may be more or less inclined and consequently increased in hight as desired, one being used as a support to the lower extremities of the occupants, and either used as a back as occasion may require; the upholstery in consequence of its connection with the mechanism above referred to, being allowed to conform automatically to the adjustment of the backs. This device has been patented to Samuel McGregor, of Logansport, Ind.

STEAM TRAP.

This invention relates to that kind of steam trap in which the operation of the water escape valve is controlled by a flexible diaphragm which is acted upon by the expansion and contraction of the liquid in a vessel heated by the water or steam in the escape pipe. The improvement consists in a novel arragement of the valve the diaphragm and the chamber, relatively to each other and to the escape pipe, whereby the valve is rendered more sensitive, and a freer escape for the water and sediment is provided than in other steam traps operating on the same principle. The inventor of this improvement is Levi Ferguson, of Lowell, Mass.

REVOLVER.

In this revolver the caps or primers are placed in the hollow stem in which the many-chambered cylinder revolves. The cocking of the pistol causes one cap to discharge from the stem, and a slide to take the same and place it in line with a cap nipple. The pulling of the trigger or falling of the hammer or cock causes the bulk of primers to pass into the stem beyond the influence of the explosion. This is certainly one of the simplest and most complete self-priming fire-arms ever patented. The credit of this invention is due to W. H. Bell, of Washington, D. C. The inventor has taken steps to apply for foreign patents. This patent was issued March 20, 1860.

QUARTZ-CRUSHER.

This invention consists in a concave trough suspended on an axis so as to swing back and forth. A grooved gravitating roller rests on the bottom of the concave. At each end of the concave a screw is arranged. The quartz are placed on the bottom of the trough and as the trough swings back and forth, the quartz are crushed between the grooved weighted rollers, and the toothed grooved bottom of the concave. Scoville and Fraser, of Chicago, Ill., are the patentees. This patent was issued March 20, 1860.

FOREIGN NEWS AND MARKETS.

Extraordinary Petition.—The following singular petition was lately presented to the British House of Commons:—"We the undersigned Poor Men of the parish of Winterslow, county of Wilts, do humbly solicit the attention of your honble. House to our humble petition. Being poor labouring men, mostly with families and aged, and living in a woody district of the country, wher there is a great may English truffles grow, which we cannot find without dogs, we do therefore keep and use a small pudle sort of dog, wholey and soley for that and no other purpose; and as it is in the winter season of the year when we gather them, when labourers is generally on the excess in our neighbourhood, we often are enabled by the aforesaid dogs to provide a subsistence for our families, otherwise we should often be a burden to the parish; and as it hath been carried on by our ancestors for generations past without paying any tax for the dogs; but as the tax is now levied upon us—viz. twelve shillings per year, and as we have to keep our dogs six months when we have no use for them, it presses so heavy upon us that without redress we shall in most cases be obliged to make a sacrifice of our dogs, and thereby become a burden to the parish, and in some cases paupers on the union; and, as it did please your honble. House in its wisdom to exempt dogs used purposely for cattle for the maintenance of shepherds, &c., from paying of tax, we do humbly beg that your honble. House will take our case into your consideration, and exempt us from paying tax on our truffle dogs, that we may be enabled to follow our avocation for ours and our families subsistence."

The truffle is a subterranean fungus, of a roundish, oblong form, and a blackish brown color, and it is much used in cooking. It is hunted both by dogs and pigs, trained for that purpose, in soil beneath trees, especially oaks and beeches, and is found in but few places. It has never yet been cultivated with success, although many attempts have been made for this purpose. French truffles are imported to some extent into the United States. They charge a most astounding price for a dish of them in French restaurants.

A Curious Surgical Case.—A rare instance of a perfect recovery from a desperate wound was recently brought under the notice of the Academy of Medicine (Paris), by Mr. Larrey, who at the same time presented to that body an American, M. Preterre, to whose mechanical skill the attainment of the full result was due. At the battle of Magenta, a sergeant of the 85th of the line was struck by a musket ball, which, after completely shattering the lower jaw, came out behind from under the skull, close to the cervical vertebræ, which had they been injured would have rendered the case hopeless. It is hardly credible that so extensive an injury, inflicted in such an important region of the human frame, could have admitted of cure; and it reflects high credit on the army surgeons who attended him. To restore the power of mastication by mechanical means, M. Preterre was called in, and succeeded in his task by an ingenious contrivance, which has been greatly admired by the first surgeons in Paris.

Indian River Navigation.—One of a number of vessels building by Messrs. John Laird & Sons, at Birkenhead, (England) was lately tried on the Mersey, and excited a great deal of interest and attention from its novel appearance. The hull is 260 feet long and 36 feet beam, and is constructed of steel plates, the vessel in general appearance much resembling the American river steamers. She drew about 16 inches of water at the bow, and

her hull appeared only about 3 feet above the water. The whole weight of the vessel and machinery is supported by arched girders The engines are 200 horse power. The steering apparatus is of a novel character, the stern being divided into two parts, resembling the ends of two canoes lashed together, from which depend two boards or rudders like leeboards in shape, which are raised alternately as the course is required to be changed from starboard to port, or *vice versa*.

Steam Plowing.—As Spring approaches, great prominence is given to steam culture in England, and a number of lectures have recently been delivered in various places, in which its economy over plowing by horse-power has been pointed out pretty clearly; but it is admitted that it will not pay for a farmer who has a small farm and a limited amount of capital. It requires a farm of about 300 acres in extent to maintain a steam plow in England, therefore, it can only be employed in America, with profit, on farms of about 1,000 acres, such as some of those on the prairies, because horse-power is much cheaper in the United States than in England.

Metals.—English rails are steady at £5 12s. 6d. per tun; Scotch pig iron is selling at £2 18s. 6d; spelter is selling at £21; and Banca tin at £140 per tun. As £1 is valued at $4.85, the price of pig iron in Scotland is only $13.08 per tun. The great strike which had taken place among the coal-miners in Glasgow has terminated; the operatives have returned to work at the old wages, but obtained come concessions regarding the hours of labor. The steel trade of Sheffield is very brisk at present, and there has been a great increase of raw unmanufactured steel, but a decrease in the manufacture of steel articles. A great deal of steel is imported into the United States, and manufactured into articles which formerly were manufactured exclusively at Sheffield. All the cutlery now made at Waterbury, Conn., and other places in America, has *cut* into the Sheffield trade.

INDUSTRY—MANUFACTURES—COMMERCE.

Indiana Coal.—At Cannelton, Ind., there is a tunnel cut 1,600 feet long from the mines, and a double railroad laid in it down to the river. The vein of coal worked is 4½ feet thick; 110 miners are employed, and 8,000 bushels of coal are raised per day. The railroad is on an incline from the mines to the river, and is operated entirely by gravitation. The loaded cars, going down on one track, carry up the empty cars by an endless rope on the second track. The coals drop through the bottom of the cars into boats below in the river, no expense is therefore incurred either for haulage, or loading the boats. The price of coal is about seven cents per bushel. It is used on Ohio and Mississippi steamboats.

Pennsylvania Coal.—On page 201, present volume of the SCIENTIFIC AMERICAN, we stated that many of our coal mines were insufficiently ventilated. This statement was painfully verified by an explosion, caused by "fire damp," which took place near Scranton, Pa., on the 25th ult. Several persons in the mine were severely injured, but none fatally, we believe. Great attention should be paid to the ventilation of our coal mines and the condition of the hardy miners who labor at such an unhealthy and dangerous business.

Coal in Chicago.—The large bituminous coal fields of the West are being rapidly developed. Last year 131,204 tuns were received in Chicago, and the best qualities of Pennsylvania and Ohio bituminous ranged in price, in that city, only from £3.50 to $4.00 per tun. The Illinois coal sold for $2.25 and £2.75 per tun. The lower veins of this field are much superior in quality to those of the upper series of veins. In a few years hence, therefore, the people of the West will be getting much better coal than they do at present.

Steam on Street Railroads.—Septimus Norris, the well-known engineer of Philadelphia, says he will guarantee to propel each car on the passenger railroads of that city, loaded with 36 passengers, over any road and up any grade, at a cost of 88 cents a day for coal. The saving in the operation of these roads would be very large by using steam. The advantages gained by the substitution of steam, he says, are as follows:—1st. The steam car can ascend any grade without assistance. 2d. The steam car can be be stopped much quicker, and propelled at a greater speed. 3d. The saving in the use of steam for 315 cars would be in a year, $189,675. 4th. The space occupied in the street would be lessened for each car the length of the horses.

The Maple Sugar Crop.—The Grand Haven (Mich.) *News* says:—"Large preparations are being made for a successful campaign in the sugar woods and, should the season prove a favorable one, an unusual amount of this table luxury will be manufactured within the limits of our country. Michigan is—size considered—one of the greatest States in the Union in amount of maple sugar produced in her forests, exceeding in the aggregate 2,500,000 pounds annually; value at 8 cents per pound, $200,000.

Adulteration of Articles.—Our merchants must keep a sharp look-out for the articles which they send to Canada. A chemist in Quebec has recently published the result of a chemical analysis of some of the articles of consumption sent to that city by New Yorkers. He found in pickles, which bear the label "no sulphate of copper," not this salt, but sulphate of iron instead. In sherry wine he discovered an immense quantity of salt. In the green tea he found copperas. The gin was nothing but whiskey and essence of juniper. In snuff he found peroxyd of iron and other chemicals, to the extent of *one-fifth of its bulk*. This will soon ruin our character, and trade, also, if persisted in. "Honesty is the best policy" in all things.

NEW YORK MARKETS.

BEESWAX.—American yellow, 36c. a 36½c. per lb.

BREAD.—Ship, 3¼c. a 4¼c. per lb.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 42c. a50c. wax, paraffine, 50c.; adamantine, city, 17c. a 19c.; stearic, 27c. a 28c.

COAL.—Anthracite, $4.75 a $5; Liverpool orrel, per chaldron, $9; cannel, $11.

COPPER.—Refined ingots, 23¼c. per lb.; sheathing, 27c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8c. a 8¼c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 8c. a 8¼c.; good ordinary, 9¼c. a 9¾c.; middling, 11⅛c. a 11⅜c.; good middling, 11⅞c. a 12¼c.; middling fair, 12¼c. a 13½c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8¼c.; sheetings, brown, 36 a 37-inch, per yard, 5¼c. a 8¾c.; sheetings, bleached, 36-inch, per yard, 7¼c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8¼c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 62c. a $1.37; cassimeres, 75c. a $1.50; satinets, 30c. a 60c.; flannels, 15c. a 30c.; Canton flannels, brown, 8¼c. a 15c.; Kentucky jeans, 8c. a 18c.

DYESTUFFS.—Barwood, per tun, $18 a $30; Camwood, $100 a $125; Fustic, Cuba, $38 a $39; Fustic, Tampico, $35; Fustic, Savanilla, $30 a $32; Fustic, Maracaibo, $19 a $20; Logwood, Laguana, $32 a $38; Logwood, Tabasco, $21; Logwood, St. Domingo, $14.50 a $15; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $13.50 a $14; Lima wood, $50 a $65; Sapan wood $15.; Cochineal, per lb., $1.08; Bichromate of potash, 20c. a 21c. per lb.; Cream of tartar, 38c. per lb.; Madder, 13c, per lb.; Lac dye, 10 c. a 50c. per lb.; Blue vitriol, 9¼c. per lb.; Catechu, 6¾c. a 7¼c. per lb.; Copperas, 1¾c. per lb.

FLOUR.—State, superfine brands, $5.15 a $5.25; State, extra brands $5.25 a $5.40; Michigan fancy bands, $5.25 a $5.45; Ohio, common brands, $5.35 a $5.45; Ohio, fancy brands, $5.60 a $5.70; Ohio, fair extra, $5.90 a $6.10; Ohio, good and choice extra brands, $6.25 a $7; Michigan, Indiana, Wisconsin, &c., $5.30 a $5.65; Genesee, fancy brands, $5.60 a $5.70; Genesee, extra brands, $5.75 a $7.56; Missouri, $5.75 a $7.75; Canada, $5.35 a $7; Virginia, $6.50 a $7.40; Rye flour, superfine, $3.90 a $4.44; corn meal, $4.10.

GUMS.—Per lb. Gamboge, 25c.; Arabic, picked, 12c. a 26c., sorts, 8c. a 9¾c.; Benzoin, 50¾c.; Copal, Cowrie, 4¾c. a 5¾c.; Damar, 9¾c. a 14c.; Myrrh, East India, 10c. a 25c.; Myrrh, Turkey, 25c. a 33c.; Senegal, 6c. a 10c.; Tragacanth, sorts, 17c. a 37½c.; Tragacanth, white flaky, 75c. a 80c.; Shellac, 50c. a 55c.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $100. Italian, $375. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5½c.

INDIA-RUBBER.—Para, fine, a 60c. per lb.; East India, 52c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60 c. a $1.10; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $35; bar, Swedes, ordinary sizes, $95 a $96; bar, English, common, $42.50 a $43.50; refined, $53 a $54; sheet, Russia, 1st quality, per lb., 11¼c. a 12c.; sheet, English, single, double and treble, 3¾c. a 3¾c; anthracite, pig, $24 per tun.

IVORY—Per lb., $1.25 a $1.30.

LATHS.—Eastern, per M., $1.50 a $1.75

LEAD.—Galena, $5.87 per 100 lbs.; German and English refined, $5.62 a $5.67; bar, sheet and pipe, 6¾c. a 7c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 19c. a 20c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 a $30; Patent enameled, 16c. a 17c. per foot; light Sheep, morocco finish, $7.50 a $8.50 per dozen; Calf-skins, oak, 55c. a 60c. per lb.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c.

LIME.—Rockland, 90c. per bbl.

LUMBER.—Timber, white pine, per M feet, $17.75; yellow pine, $35 a $40, oak, $25 a $30; Eastern pine and spruce, $16.25 a $17.50; White Pine, clear, $35 a $40; White Pine, select, $25 a $30, White Pine, box, $16 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $28; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $35; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 21c. a 22c; Spruce Boards, 14c. a 16c.; Hemlock Boards, 12½c. a 13c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W O. pipe, light, $55 a $58; Staves, white oak, pipe, heavy, $75 a $80, Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. hhd. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c. Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3¾c. per lb.; American clinch, 4¾c. a 5¼c. American horse-shoe, 14¼c. a 20c.

OILS.—Olive, Marseilles, baskets and boxes, $3.50 a $3.55; Olive, in casks, per gallon, $1.20 a $1.30; Palm, per pound, 8¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 59c.; whale, fair to prime, 46c. a 50c.; whale, bleached 59c. a 60c.; sperm, crude, $1.40 a $1.43; sperm, unbleached winter, $1.47; lard oil, No. 1, winter, 92c. a $1; red oil, city distilled, 57c.; Wadsworth's refined rosin, 25c. a 35c.; boiled oil for painting, 25c. a 35c.; tanner's improved and extra, 25c. a 30c.; camphene, 49c.; fluid, 47c;

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American. pure, in oil, 8c.; lead, white, American, pure, dry, 7¾c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9½c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c; a 90c. per 100 lbs.; vermillion, Chinese, $1 a $1.10; Venetian red, N. C., $1.75 a $2 per cwt.; chalk, $3.75 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Turpentine, soft, per 280 lbs., $3.50 a $3.55; common, 310 lbs., $1.65 a $1.67; strained and No. 2, $1.70 a $2.00; No. 1, per 280 lbs., $2 a $3; white, $3 a $4; pale, $4.50 a $6.

SALTPETER.—Refined, 12c. a 14c. per lb.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 9c. a 9¾c.; Olive, 7c. a 7¾c.

SPELTER plates, 5c. a 5¾c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5¾c.; American blister, 4¾c. a 5¼c.

SUGAR.—New Orleans, 6c. a 8¾c. per lb.; Porto Rico, 6¾c. a 8¾c.; Havana, brown and yellow, 7c. a 8¾c.; Havana, white, 8¾c. a 9¼c.; Brazil, white, 8c. a 8¾c.; Brazil, brown, 6¾c. a 7c.; Stuart's granulated, 9¾c.

SUMAC.—Sicily, $60 a $80 per tun.

TALLOW.—American prime, 10¾c. a 10¾c. per lb.

TIN.—Banca, 31c.; Straits, 30c.; plates, $6.50 a $9.25, per box.

WOOL.—American, Saxony fleece, per lb., 54c. a 58c.; American full blood merino, 42c. a 47c.: extra, pulled, 42c. a 47c.; superfine, pulled, 36c. a 38c.; California, fine, unwashed, 20c. a 28c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7¾c. per lb.

The foregoing rates indicate the state of the New York markets up to March 29th.

These tables are renewed for the past month and show the changes which have occurred in prices since we published the last table (on page 138), for February. There has been very little fluctuation in prices, indeed, the small number and very limited range of changes and prices will afford surprise to many persons who suppose there is a very irregular vibration of the price-pendulum day by day.

City-made adamantine candles have fallen one cent per lb; foreign coals $2 per tun; refined copper, is one-half a cent lower per lb; ordinary qualities of cotton one cent per lb. Sugar has lowered about one-half cent per pound, on the average; and fine wool two cents per lb. Camwood has fallen $5 per tun.

It is a better sign of the times to witness a rise rather than a fall of prices. The changes in the advance of prices are greater and more numerous than the declension changes. Linseed oil has advanced about two cents per gallon. Paints are very conservative—no change. Lime has gone up twenty cents per barrel, and yellow pine and spruce have advanced $2 and $5 per 1,000 feet—a good sign of activity in building. The metals have been stationary, and leather unaltered.

GREASE AN ANTIDOTE FOR ARSENIC.—M. Blondlot, of Nancy (France), has called attention to a very curious toxicological fact, namely, that greasy matters have the power of diminishing considerably the solubility of arsenious acid, either in pure water or in acid and alkaline liquors. Thus, in contact with grease, the poisonous properties of arsenious acid are very much decreased, and at the same time, it becomes more difficult to render its presence evident by chemical reactions. A very slight quantity of greasy matter, according to M. Blondlot's experiments, reduces the solubility of arsenious acid to 1-15th or 1-20th of what it is when in a pure state. This explains why arsenic, taken in the form of powder, remains sometimes for a considerable interval in the body without producing injury; it explains also how it is that, in cases of poisoning by arsenic, this substance has not been readily detected in such portions of the body or the aliments which contain much grease. It seems to teach us, also, that cream, for instance, is an excellent antidote for arsenious acid. Morgagni tells us, in his writings, that, in his time, the Italian boatmen used to astonish the bystanders by swallowing, without hurt, large pinches of arsenious acid, having taken the precaution beforehand of drinking a quantity of milk or eating some greasy matter. As soon as the public had retired they got rid of the poison by vomiting.—*London Photographic News.*

Patent Claims

ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING MARCH 27, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

27,606.—James Adair, of Mendota, Ill., for an Improvement in Mole Plows:

I claim the combination of two extensions above claimed, and a hinge-like connection, whereby the coulter and mole are flexible upon each other horizontally independently of one another and immovable upon each other perpendicularly, as and for the purposes set forth.

27,607.—J. W. Adams, of Pleasant Valley, Vt., for an Improved Stave Machine:

I claim the reciprocating bed, H, operated by the pinion, G, and a movable rack, K, and the supplemental yielding and rigid beds, Q T, in connection with the concave and convex knives, R S, and pressure rollers, N O P P, all being arranged for joint operation, as and for the purpose set forth.

[This invention consists in the employment or use of concave and convex stationary knives, pressure rollers, and a reciprocating bed operated in a novel way, and the whole arranged for joint operation, whereby staves may be dressed at both sides by a very simple, economical and compact machine.]

27,608.—T. F. Allen, of Dyersville, Iowa, for an Improvement in Brackets for Railroad Car Trucks:

I claim a suspension bracket, D, which is capable of changing its bearing point, and which acts by reason of changing its point of bearing, with a counteracting force against the lateral vibrations of the car body, substantially as and for the purposes set forth.

[This is a very ingenious, simple, and useful invention. as it checks to a considerable extent the preponderance of weight on either side of the truck frame while the car body is vibrating laterally—this checking the preponderance of weight prevents much of the injurious effect on the side springs of the truck. The result is produced by making the bearings of the brackets at their upper ends in the form of the rocker of a rocking chair, this form allowing them to change their point of contact on the truck frame to the same extent that the lower end swings outward, and consequently a leverage to act on the truck frame is obtained, said leverage counteracting the outward movement of the car body,]

27,609.—S. A. Bailey, of New London, Conn., for an Improvement in Wringing Machines:

I claim the combination of the rubber rollers, B B, with the oscillating guide-board, D, for the purpose of washing and wringing the clothes, and at the same time directing the course of the water, pressed from the clothes into either tub, substantially as set forth.

27,610.—J. S. Barden, of New Haven, Conn., for an Improvement in Steam Pumps:

I claim the arrangement and combination of a steam engine, a pump, two valve chests, and two slide valves, in manner and so as to operate substantially as described and represented.

I also claim the combination and arrangement of the secondary piston with the main pump piston, constructed tubular and having appliances substantially as described, by which it may be either attached to the main pump barrel, or to the secondary piston, substantially in manner and for the purpose as specified.

I also claim the improved balanced valve, and its chest, made substantially as described, in combination with the pressure chamber, t, furnished with an elastic bottom, u', and applied to the valve and chest, essentially in manner and to operate as explained.

I also claim, in combination with the steam cylinder piston, the pump piston and the sliding box of the crank of the driving shaft, the two separate crossheads (or guides for such box, and screws or equivalents so applied to such crossheads, as to enable them either to be drawn together, or forced apart, in manner and for the purpose specified.

27,611.—J. F. Beckwith, of South Alabama, N. Y., for an Improved Hub for Carriage Wheels:

I claim so constructing two metallic plates A A, which are provided provided with grooves, a a, that they will clamp and hold the spokes separate and distinct from each other on their edges while they are allowed to bear and press against each other on their faces, substantially as and for the purpose specified.

27,612.—Harkness Boyd, of New York City, for an Improved Trap for Water Closets:

I claim, as a new article of manufacture, the trap or bend for water closet and other pipes, cast in half sections, as specified, whereby the metal is formed of additional thickness at the joints and parts exposed to strain or wear, as set forth.

27,613.—Adolph Brown and Felix Brown, of New York City, for an Improved Sugar-crushing Apparatus:

We claim the arrangement of frames or plates provided with knives or cutters on their underside, and hinged on one end to the frame of the machine, to produce an action similar to the blades of shears, in combination with a movable bed or carriage, for the purpose of cutting loaf sugar in small pieces, substantially as described.

We further claim the arrangement of two or more cutter frames, with their corresponding movable tables combined together, and situated behind or below each other, and giving to the latter a quicker motion than to those situated before them, substantially in the manner and for the purpose set forth.

27,614.—Wm. Bushnell, of Easton, Pa., for an Improvement in Cultivators:

I claim the arrangement of the central beam, A, movable bars, B B, pivoted connecting bars, C C, adjustable chain wheel, D, chain, E, and plows, b, as and for the purpose shown and described.

[The object of this invention is to obtain an implement of exceedingly simple construction that will admit of a ready lateral adjustment of its shares, so that the implement as it is drawn along may operate on an area of ground of greater or less width as circumstances may require.]

27,615.—M. L. Byrn, of New York City, for an Improved Corkserew:

I claim the combined imlet screw and handle formed in the manner and for the purposes described, as a new article of manufacture.

[The object of this invention is to manufacture corkscrews posessing greater strength and durability, and which may be made and sold at a less cost than those of the present construction. This invention consists in combining with the gimlet screw a T-handle, and forming the handle and screw in one or in two pieces.]

27,616.—Cullen Casey, of Goldsboro', N. C., for an Improvement in Cotton Cultivators:

I claim the arrangement of the beam, A, scrapers, B, groove, B', and bolt, G, with stock, A', the whole constructed and operating as described for the purposes set forth.

27,617.—G. E. Chenoweth, of Baltimore, Md., for an Improvement in Harvesters:

I claim, first, The laterally adjustable arm, G, pivoted to the frame, as described, for the purpose of changing the position of the inner end of the finger bar laterally in relation to the main frame, to facilitate the folding of the bar to the outside of the wheel, as set forth.

Second, The combination of the trunnion piece, H, and hinge-piece, I, with the arm, G, pivoted as specified, for the purpose described.

Third, The adjustable side braces, J, hinged to the frame, and operating substantially in the manner described.

Fourth, The finger-bar, constructed of a tube or rod, in combination with the shanks or sockets of the fingers secured thereon, substantially in the manner described.

27,618.—Geo. Collyer and A. Hamilton Patterson, of Philadelphia, Pa., for an Improved Paddle Wheel:

We claim the sliding paddles, D, shaped and arranged so that each paddle enters the water with a point, and as it enters presents a surface which gradually widens until the full breadth of the paddle is presented to the water, in combination with an eccentric track, secured to the side of the vessel on the inside of the space occupied by the wheel, as and for the purpose shown and described.

27,619.—Baldwin Davis and J. M. Scroggins, of Lagrange, Ga., for an Improvement in Plows:

We claim the combination of the beam, I, plate, F, shank, C, notches, D, and wedge, E, with the adjustable brace, G, subsoil point I, and adjustable moldboard, J, the whole being constructed and arranged as and for the purpose described.

27,620.—James Davis, of Fayetteville, N. C., for an Improved Sewing Machine Stitch:

I claim the formation of the knot stitch, as represented in Fig. 3, substantially as described.

27,621.—Wm. Frank Dean, of Baltimore, Md., for an Improvement in Saddles:

I claim the side adjustable pummel, B, or its equivalent, in combination with a gentleman's saddle, for the purpose of converting the same into a ladies' saddle, substantially as set forth.

27,622.—J. H. Doolittle, of Ansonia, Conn., for an Improved Pipe Wrench:

I claim the combination of the rack, C, on the shank, A, the sliding bar or sleeve, D, fitted on the shank with tooth, b, and hook, E, attached, the latter having an eccentric, d, formed on its inner end, all being arranged to operate as and for the purpose set forth.

[The object of this invention is to obtain a wrench that may be adjusted with the greatest facility to suit different sized pipes, and grasp the same firmly, so that they may be turned or properly acted upon without being liable to slip on the pipe. The invention consists in the employment of a sliding box or sleeve placed on the shank of the implement, and provided with a tooth, in connection with a rack formed at one edge of the shank, and an eccentric formed at the end of a hook which is attached to the sliding box or sleeve.]

27,623.—Joseph L. Dutton, Senr., of Philadelphia, Pa., for an Improvement in Hoisting and Weighing Machines:

I claim, first, The hoisting and lowering apparatus composed of the barrel, D, the brake wheel, H, and brake strap, I, the latter being connected to one end of the hoisting rope, F, and to the lever, M, or its equivalent, in combination with the ratchet wheel, W, and spring pawl, x; the whole being arranged and operating substantially as set forth, so that the application of the brake for the retention of the weight in tht position to which it has been hoisted is independent of the weight itself, as specified.

Second, The bar, P, when connected to the hoisting rope, F, and to the graduated lever, V, substantially in the manner and for the purposes set forth.

Third, The sliding link, Q, operated by the lever, S, or its equivalent, and combined with the lever, P, hoisting rope, F, and brake strap, I, substantially as specified, so that the operating of the brake strap and throwing in and out of gear of the weighing apparatus may be accomplished simultaneously by raising or lowering the said link, Q, as specified.

27,624.—Deiderich Fehrman, of Liverpool, England, for an Improvement in the Manufacture of Resin:

I claim the combined process described, having for its object the manufacture of resin, as set forth.

27,625.—Levi Ferguson, of Lowell, Mass., for an Improved Steam Trap:

I claim the arrangement of the annular chamber, H h, in combination with the valve and diaphragm, substantially as described, for the purpose set forth.

27,626.—Ezekiel Gross, of Goshen Hill, S. C., for an Improvement in Sub-soil Plows:

I claim, in combination with the furrow plow and sub-soiler, the curved brace uniting the beam, the standards and the handles together, and when the sub-soiler is made adjustable on the brace and be m, substantially in the manner and for the purpose set forth and explained.

27,627.—Cyrus M. Hall and David E. Hall, of Uniontown, Ill., for an Improvement in Cultivators:

We claim the general arrangement and combination of the revolving coulter with knife-edged arms, the shovels, A, made with flukes or barbs, the beams, B B, the cross bar, X, straps, S, rollers, r r, treadles, P P, and the pin or pivot on which the beam, B, hangs; all connected as described and for the purpose set forth.

27,628.—R. K. Hawley, of Baltimore, Md., for an Improved Construction of Circular Saws:

I claim a circular saw consisting of segments and backing plates constructed and united as described, and attached to the central flange substantially in the manner set forth.

27,629.—Henry W. Herbert, of Herbertsville, Va., for an Improvement in Marine Propellers:

I claim, first, Adapting the outer form of the submerged portion of a vessel and the surface of the body of a propeller to each other, so that both together shall form a continuous outline, and, at the same time only a portion of the propeller be exposed to the water, the other portion being enclosed within the body of the vessel, substantially as and for the purposes set forth.

Second, Providing each side of the ship with a curved shield, H, in combination with a system of braces, E E D C, for the purpose of protecting the propeller blades and of bracing together the main body of the ship and that portion of it which is behind the propeller, substantially as and for the purposes set forth.

Third, The application, in a propeller such as described, of the removable blades, J, the tongues, O, of the blades fitting into dovetail grooves in the surface of the body of the propeller, substantially as and for the purposes set forth.

Fourth, Constructing the main side braces, P, of the ship so that they may be used as coal bunkers, substantially as and for the purposes set forth.

[This invention consists in arranging a rotary propeller in the hull of the ship. The ship and propeller are so modeled that the circular or submerged portion of the ship and that of the propeller conform; and when the blades of the propeller are removed the hull with the propeller appears one unbroken structure. The propeller sets across the keel, and the ship is strongly braced at the points where it is cut away to admit the propeller. The main braces are made hollow so as to serve as coal bunkers. The arrangement exhibits a great deal of ingenuity, and is, doubtless, a valuable improvement.]

27,630.—Jesse Hanon, Jr., of Taylorsville, Ill., for an Improvement in Drain Plows:

I claim the combination and arrangement of the rod, E, coulter, C, and slides, G G', with the beam, A, and rod, B, substantially as and for the purpose specified.

27,631.—N. Hoag and Wm. H. Tuppey, of Petersburgh, Va., for an Improvement in Tobacco Screws:

We claim the arrangement of the several parts combined as constituting the specific machine, for the purpose shown and set forth.

27,632.—Samuel Hoake, of Frederick, Md., for an Improvement in Cultivators. Ante-dated March 9, 1860:

I claim, first, The combination of the jointed shovel shaft, B, slotted shovels, T T', drag bars, D and d, shafts, S, straps, b, spring detent, e, and guides, g, substantially as described.

Second, In combination with the foregoing I claim the adjustment of wheels, W, on axle, A, by bolt, a, and pins, i, as specified.

27,633.—J. L. Hovey, of Lockport, N. Y., for an Improvement in Pulley Blocks:

I claim the peculiar method of having blocks, A D, both being suspended from one hook and kept in an upright position by a projection, H, of the collateral block, thus obviating the friction occasioned by the pulleys getting twisted out of an upright position, as above described.

[This invention consists in projecting up from the top of a fixed double pulley block, a hook having an eye in its end, into which is hooked a collateral block with one pulley and sheave, and over this sheave the draw or fall rope is passed, leading from the movable block, the fixed pulley blocks are hung up by a swivel hook which hooks under the fixed block hook; and in conjunction with these fixed blocks is a projecting lip and recess formed, which keeps the fixed blocks in a perpendicular position and the ropes always parallel. The blocks themselves are novel in their form and construction which renders them very strong, and gives great facility in their manufacture.]

27,634.—George W. Hunt, of Muscatine, Iowa, for an Improvement in Plows:

I claim, first, The arrangement of a vertical coupling and adjusting pin, I, which has that portion which passes through the beam round, and that portion which passes through the axle square, in combination with a diagonal adjusting bar, P, a connecting rod, N, and a vertical lever, O, substantially as and for the purpose set forth.

Second, The arrangement of a long slot, W, in the axle, with an upper and under slotted sliding plate, L L', and the coupling and adjusting pin, I, substantially as and for the purposes set forth.

Third, The arrangement of the beam, A, slotted axle, D, coupling pin, I, slotted plate, L L', diagonal connecting rod, V, adjusting bar, P, lever, O, driver's seat, C, treadle, M, plow, F, horizontal rotary land side wheel, G, and rotary coulter, H, in the manner and for the purposes set forth.

27,635.—A. B. Hutchins, of Quincy, Fla., for an Improvement in Seeding Machines:

I claim the vibrating hopper, G, in connection with the agitator, or clearer, H', attached to the front part of the spout, H, and passing within the hopper and clearer, being arranged relatively with the spout, H, substantially as and for the purpose set forth.

[This invention, although capable of being used for planting various kinds of seeds, is more especially designed for planting cotton seed. The object of the invention is to insure the proper discharge or distribution of the seed from the hopper, and thereby obviate the difficulty attending the adhesion or the sticking of the seed together, a result due in some cases to moisture and a glutinous exterior caused by giving the seed a fertilizing coat, and in other cases to natural causes, as, for instance, the lint coating on cotton seed.]

27,636.—Edwin Jones, of Chester Cross Roads, Ohio, for an Improvement in Harvesters:

I claim hinging the frame, E, to the inside of the main frame, within the periphery of the wheer, B', in combination with hinging the front to the main frame, by the coupling arm, M, substantially as and for the purposes set forth.

Second, The raker's seat, D', arranged in relation to and combined with the main frame, A A, and frame, E, substantially as and for the purposes set forth.

Third, The inclined plane, l, in combination with the heel of the cutter bar, substantially as set forth.

27,637.—Frank G. Johnson. of Bellwood, Sag Harbor, N. Y., for an Improved Composition to Prevent the Depredations of Insects:

I claim the composition and mode of attenuating coal tar or tar, with sand or sawdust, and afterwards the coating of the sand or saw dust so tarred with earth, ashes, slaked or ground lime, plaster or guano, substantially in the manner and for the purposes described.

27,638.—Samuel Johnston, of West Shelby, N. Y., for an Improvement in Corn-huskers:

I claim the corn-husker herein described, consisting of fingers, A B, crossbar, E, knife, D, and spring, S, constructed and arranged to operate in the manner and for the purposes specified.

27,639.—Albertus Larrowe, of Cohocton, N. Y., for an Improvement in Self-adjusting Carriage Brakes:

I claim the combination and relative arrangement of the rubber, Z, and swinging brake arm, C', with the end of the brake bar, V, whereby the strain upon the rubber, Z, is borne principally by the rigid end of the brake bar, directly in front of the periphery of the wheel, and not by the hinge of the rubber, substantially as shown and described.

27,640.—John B. Logan, of Blountville, Tenn., for an Improved Andiron:

I claim the arrangement of the bottom frame, A, or its equivalent, in combination with the angular bars, B, or their equivalents, constructed and united substantially as and for the purpose described.

[The object of this invention is to construct an andiron in such a manner that it stands firmly in its place even without the back log on, and that it allows a free circulation of the heat, and that it does not interfere with the removal of ashes or dust.]

27,641.—F. T. Lomont and John Grosjean, of Massillon, Ohio, for an Improvement in Reaping and Mowing Machines:

We claim the arrangement of the hinged frame, consisting of the braces, B B, and crosspiece, e, in combination with the segmental adjustable frame, C, levers, D and J, and chain, a; all the parts constructed and applied in the manner and for the purpose specified.

27,642.—Pells Manny, of Waddam's Grove, Ill., for an Improvement in Harvesters:

I claim the arrangement of the wrist pin, a, rod, D, slotted as shown, and connected with the lever, E, the friction roller or bearing, b, and connecting rod, G, arranged for joint operation as and for the purpose set forth.

27,643.—Robert McCain, of Rootstown, Ohio, for an Improved Washing Machine:

I claim, in a washing machine constructed substantially as described, the arrangement of levers and hand and foot bars of the pounding and of the rubbing parts of the machine, in their relation to the rubber and the pounder, and in their relation to each other, whereby the operator may move the pounder and the rubber by the foot and hands together, or by the hands alone, as set forth.

27,644.—Thomas B. McConaughey, of Newark, Del., for an Improvement in Seed Planters:

I claim the slide, f, provided with the opening, g, and the seed box, A, with the partition, i, arranged relatively with the slide and its opening, g, as shown, in connection with the opening, d, in the end piece, a, of the seed box, and the projection or scatterer, c, thereon, and the strip, m, on the seed box; all arranged for joint operation, substantially as set forth.

[The object of this invention is to obtain a simple device for dropping corn or other seeds in hills; the device being designed for manual operation, and to enable the operator to see the seed discharged, and also to cause the same to be properly distributed in the hills.]

27,645.—Samuel McGregor, of Logansport, Ind., for an Improvement in Car Seats:

I claim the backs, B B, attached to the seat, A, and connected by the gearing, E F, in connection with the stop, N, arms or levers, H, rods, I, and slides, J, connected to the bars, D, of the backs and provided with the rolers, K K', the seat and backs being provided with the continuous cushion, L, passing around the rollers, K K', with its ends attachedto the backs, B; all being arranged substantially as and for the purpose set forth.

27,646.—Henry Napier, of Brooklyn, N. Y., for an Improvement in the Manufacture of Resin:

I claim the within-described method of producing white resin at one continuous operation, substantially as set forth.

27,647.—A. S. Notestein (assignor to himself and L. I. Rogers), of Salem, Ohio, for an Improvement in Seeding Machines:

I claim the arrangement of the foot piece, a, the rocking standard, d, the lever, E, and the seed slide, F, with the rollers, B and C, and coverers, H H, when the several parts are connected and used substantially as and for the purpose specified.

27,648.—Jacob Nuessley, of Gowanda, N. Y., for an Improvement in Composition for Tanning Leather:

I claim the employment, for the purpose of tanning, of a composition consisting of the ingredients herein specified, and mixed together in about the proportions described.

[The object of this invention is to enable tanners to use all kinds of wood for the purpose of tanning, and at the same timethe leather is tanned much quicker than by the usual process, and by the use of this composition the disadvantages usually attending quick-tanned leather are entirely obviated.]

27,649.—E. T. Orne, of Boston, Mass., for an Improvement in Gas Regulators:

I claim the employment of sawdust or wood filings as a filtering medium for gas burners.

I also claim, in combination with the use of said material, the above-described burner, consisting essentially of thecylinder, A, and ring, f, operating substantially as set forth.

27,650.—E. H. Philo, of Half Moon, N. Y., assignor to Charles E. Pease, of Albany, N. Y., for an Improvement in Cider Mills:

I claim, first, The cylinder, C, operating with a liberating movement in connection with quadrants, F and G, and with its teeth arranged to co-operate with teeth, a a, affixed to partitions, H and J, substantially as described and for the purpose set forth.

Second, The slicing apparatus, S, operating as set forth, in combination with the cylinder, C, and its co-operative apparatus as described, in the above specification.

27,651.—William R. Sanders, of Buena Vista, Miss., for an Improvement in Plows.

I claim the combination and arrangement of the shares, F F, coulters, G G, and movable mold boards, H H, with beam, A, handles, B B, yoke, E, and oblique brace, K; the whole being constructed for operation as described.

27,652.—J. F. Schuffenecker, of Keokuk, Iowa, for an Improvement in Brick Molds:

I claim operating the bottoms of the molds by means of the lever, D, rod, F, wedges, J J o, cogs, I I o, slide, K, and lock bar, O, in the manner and for the purpose specified.

27,653.—Robert T. Smart, I. W. Smart and A. I. Smart, of Troy, N. Y., for an Improvement in the Manufacture of Straw Paper:

We claim the method specified of treating straw or similar vegetable fiber for making white paper by the successive operations of boiling, washing and separating or beating, and then applying the chemicals used for bleaching to the pulp, substantially as set forth.

27,654.—Geo. Smith, of Baltimore, Ohio, for an Improvement in Cultivators:

I claim the arrangement of the hinged teeth, F, shanks, G, ropes or chains, I, roller, J, and lever, K; the whole being arranged for joint operation as described for the purposes set forth.

27,655.—S. F. Van Choate, of Yreka, Cal., for an Improved Magnetic Printing Telegraph:

I claim, first, The employment, in combination with the escapement which controls the operation of the mechanism which drives the type wheel, of the two electro-magnets, E E, arranged in the same circuit, a permanent magnet, G, combined with one of such electro-magnets, as described, and two armatures, E' F', attached to a lever so applied, relatively to the said magnets and escapement, as to be operated substantially as described, to control the escapement by the opening and closing of the main or through current of a line of telegraph.

Second, I claim the employment, in combination with the electro-magnet, W, of the printing circuit and the permanent magnet, V, that is combined therewith, of a circuit-breaker composed of a ratchet toothed wheel, 42, and lever, 41, or their equivalents, applied and operating substantially as described, to cause the opening of the printing circuit while the type wheel is in motion, and the closing of the said circuit on the stoppage of the type wheel, substantially as described.

Third, I claim combining the lever which carries the armature of the printing magnet with the printing mechanism by means of a notched wheel, Y, sliding bolt, 52, cam, 56, and spring, 60, attached to said wheel, and a stop pawl, 50, or their equivalents; the whole applied and operating substantially as described, to cause the unlocking of the mechanism which brings the printing roller into operation on the stoppage of the type wheel, and the re-locking of the said mechanism after the printing operation.

Fourth, I claim the employment, in combination with each other, and with three separate branches of the same main circuit, of a key, O, an intermitting wheel, J, a check plate, K, and a system of magnets, E F G; the whole operating together substantially as described, for producing the synchronous operation of all the type wheels on a line of telegraph, and effecting the stoppage thereof in a position to present to their respective printing apparatus the letter corresponding with the depressed key.

Fifth, In combination, with the key, intermitting wheel, check plate and system of magnets, and the three separate branches of a main circuit, as described, I claim the printing circuit-breaker; and the branch circuit, longer than the printing circuit, formed by the coiled wire, 14, or its equivalent; the whole operating as and for the purpose specified.

[This invention consists in certain improvements in magnetic telegraph instruments, which improvements reduce very materially the amount of magnetic force necessary to effect the operation of the instruments, and enable them to be worked effectively with a battery of no great power, and without the use of relays or local batteries. Engravings would be necessary to explain the invention clearly.]

27,656.—Wm. Tallman, of Providence, R. I., for an Improvement in Horse-shoe Nail Machines:

I claim the top die, performing the two functions of discharging the nail and forming the top of the case, in combination with the stationary cutter, movable cutter and bottom die; the said bottom die having its face extended to a suitable distance and in proper form for the underside of the case, all arranged and operated substantially as described.

27,657.—James Teachout, of Waterford, N. Y., for an Improved Die Stock:

I claim the combination of the screw, e, and followers, f g g', with the dies, c c1 c2, and stock, D, constructed and arranged substantially as set forth.

27,658.—Samuel D. Tillman, of New York City, for an Improved Mode of Making Pavements:

I claim a pavement whose surface is composed of alternate elevations and depressions substantially equal in number and surface, and nearly rectangular; the depressions being only long enough easily to admit either cork of the horse-shoe, all their sides nearly vertical and the longest sides nearly crosswise of the street, thus giving sure foothold at the shortest possible intervals, while the wheel runs smoothly upon the elevations without falling into the depressions, as described.

27,659.—Mark Snow, of Auburn, Miss., for an Improvement in Cotton Cultivators:

I claim the combination of the scraping mold boards, d, hilling molds, e, and fenders, g, when arranged and operating substantially as described.

27,660.—C. W. Wailey, of Lexington, Ky., for an Improvement in Iron Ties for Cotton Bales·

I claim the lugs, a, in combination with the spaces, b, formed at the edges of the loop, and extending any required distance from the ends, so as to unite and form a tie, substantially as set forth.

27,661.—Edward Weakley, of Pana, Ill., for an Improvement in Seeding Machines:

I claim the swinging frame, G, provided with the seed-distributing devices, expanding and vertically-moving bars, k k, and shares, h' j', and attached to the mounted frame, A, by joints or hinges, h, at its front end, and by the chains or cords, r s, and bar, F, at its back; all being arranged as and for the purposes specified.

[This invention consists in the use of seed-distributing devices and share frames attached to a mounted frame, whereby seed may be planted in hills or drills and the ground also pulverized and freed from weeds; the machiue being used for either purpose, separately, as may be desired.]

27,662.—R. A. Wilder, of Schuylkill Haven, Pa., for an Improvement in Feed-water Apparatus for Locomotive Engines:

I claim the arrangement, substantially as shown and described, in connection with the feed and overflow pipes and pump of a two-way cock, so that while a constant circulation of water is maintained in said pipes, only such portion thereof as may be desired shall enter the boiler; all as set forth.

27,663.—Seth D. Woodbury, of Lynn, Mass., for an Improved Reclining Chair:

I claim the combination and arrangement of the arms, D and G, seat, B, slot, c, connecting rod, F, set screw, f, supporting arms, J, and leg rest, K, with the folding legs, A A', and jointed strips, H and I, substantially as set forth and for the objects specified.

27,664.—Joseph D. Billings, of Rutland, Vt., assignor to himself and E. A. Chapin, of Keene, N. H., for an Improved Speed Register:

I claim, first, The arrangement of the circular rack, D, actuated by any suitable governor, pinion, d, stem, e, and index heads, f g; the latter having a pin, h, projecting from it, by which it is moved over the surface of the dial plate, when the same are combined in the manner and operated as set forth.

Second, I claim, in combination with the striker, k, on the rack, D, the levers, 1 2 3 4, and pawls, l, ratchet wheels, 1' 2' 3' 4'(more or less, as may be desired), with their pins, U, rods, H, with their arms; the whole arranged and combined essentially as represented and described.

Third, I claim the wheel, N, with its lever and pawl receiving a direct motion from the spindle, A, arranged in such a relation to the point or needle, S'', that said needle will register every mile passed over by the train of cars, as described, and in combination therewith, I claim the spring rod, M, pawl, R, ratchet wheel, R', and spool, L', for moving the strip of paper upon which the speed and miles are registered at each revolution of the wheel, N; all arranged in the manner and for the purposes set forth.

[The invention consists in the use of a ball governor, of a peculiar construction, which is operated by the axle of the truck wheels through the medium of a vertical shaft, so as to rotate a circular rack to which is connected, by suitable gearing, index heads for registering the number of revolutions the governor is performing—or, rather, the rate of speed at which the train is traveling. Connected with the circular rack, and raising and lowering with it as the centrifugal action of the governor balls increases or diminishes, is a cam projection or striker, which actuates a certain arrangement of levers, and from these a rotary motion is imparted to a system of ratchet wheels, which, through the medium of spring points, arranged in a suitable manner, indicate upon a slip of paper, by perforations, the rate of speed attained in each mile throughout the entire route. A striker upon the governor shaft, fixed to and turning with it, also indicates the miles traveled by means of a lever and ratchet wheel, similar to those for registering the speed of the train during any given distance. The entire mechanism, excepting the governor shaft connecting with the axle of the car wheels, is enclosed in a tight box, with a glass face, so that the superintendent of the road can, at any time, know the rate of speed the train has traveled, either for any one mile in the route or for any number of miles. The engineer or the conductor may also know at any time, by this machine, how fast the train is running.]

27,665.—Philo Blake (assignor to Blake Brothers), of New Haven, Conn., for an Improved Corkscrew:

I claim my improved cork extractor, as made with a lever head, D, affixed to its lifting screw, C, and with a lever screw nut, E, applied to such screw, C, and to the cap of the neck stand, substantially as described and represented in the accompanying drawings.

27,666.—Thos. B. De Forest, of New York City, assignor to himself and Wallace & Sons, of Ansonia, Conn., for an Improvement in Lanterns:

I claim connecting the ends of the vertical guard wires to the top and bottom portions of the lantern by bending them into such form as to interlock with said top and bottom parts, and be secured thereto by encircling or keying bands, or their equivalents, substantially in the manner set forth.

I also claim so bending the vertical guard wires as to form in them eyes, as described, in combination with the encircling horizontal guard wire passing through the said eyes; the whole constructed and operating substantially as specified for the purposes set forth.

I also claim arranging the encircling guard wire, p, in such manner as to be capable of sliding circumferentially in its bearings in the vertical guards, in combination with the coupling nut, c', so connected with said guard, p, that, by turning it, the said guard wire may be distended or contracted, substantially as set forth for the purposes described.

I also claim, in combination with the top cap of the lantern and handle, the connecting link, o, so formed of a single piece of wire as to effectually connect or couple the lantern cap to the handle, and properly support the protector without the aid of any coupling pin or other auxiliary part, as hereinbefore explained.

I also claim forming in the handle, when made of flat metal, a loop, e, to operate in connection with the upper end of the link, o, as specified, for the purpose set forth.

27,667. Robert W. Geraghty (assignor to himself and Wm. M. Simpson), of Newark, N. J., for an Improved Ventilating Spring Mattress:

I claim the combination and arrangement of the frame, A, with the springs, b, and cords, c and d, sack, E, hair, K, and outer cover, m, substantially as and for the purposes specified.

27,668.—Henry Hewett, of San Francisco, Cal., assignor to W. A. Sanford, of Pottsdam, N. Y., for an Improvement in Seeding Harrows:

I claim the arrangement of the axle, A, bars, h h, shaft, g, cylinders, i i, bearing, j, arm, k, holes, l l, wheels, B B, pendants, d d, frame, C, caster wheel, D, seed boxes, E E, and slide, F, as and for the purpose shown and described.

[The object of this invention is to obtain a rotary harrow which may be used alone or with a seeding machine, and be adapted for operating a greater or less dept into the earth, as the nature of the earth may require; and also be adapted for operating as efficiently in hard clayey soils as in loose friable ones.]

27,669.—James Hotchkiss (assignor to himself and E. P. H. Capron), of Yellow Springs, Ohio, for an Improvement in Drain Tile Machines:

I claim the combination and arrangement of the spiral wings, h h, situated on the pug mill shaft, the wedge-shaped dividing step block, d, and inclined or obliquely situated die plates, D D, constructed as described substantially in the manner and for the purposes specified.

27,670.—Jacob F. Hunter (assignor to himself, H. A. Hunter and P. P. Keller), of New York City, for an Improvement in Hot Water Apparatus:

I claim the combination of the coils, F G, with the main pipe, J, fire back, A, return pipe, J', and casing, K, when the said coils are both connected with the main pipe, J, and back, A, and otherwise constructed as shown and described, for the purpose set forth.

[The nature of this invention consists in a novel arrangement of pipes with a water back; said pipes communicating with the radiators in the building from the top of the apparatus, and said radiators communicating with the water back by a return pipe, by which arrangement a large heating surface is obtained, with an economy of room, expense, and a proportionate saving in fuel.]

27,671.—Charles Miller (assignor to himself and George Ricardo), of New York City, for an Improvement in Machinery for Manufacture of Piled Fabrics:

I claim, first, The employment, in the manufacture of piled fabrics, of a series of needles, a a, for passing the pile threads through a previously woven foundation in rows of loops, and of a single needle, N, operating transversely to the said series of needles, for the purpose of carrying a continuous filling or locking thread through the successive rows of loops of the pile threads, substantially as specified.

Second, The employment, in combination with the series of pile thread needles, a a, and the filling or locking thread needle, of a tongue, u, applied and operating substantially as described, to catch and prevent the withdrawal of the filling or locking thread.

Third, The attachment of the nippers, 9, which draw the rods from the pile to the same slider, Q, or its equivalent, which carries the locking or filling thread needle, N, so that the same mechanism serves to operate the said nippers and the needle, substantially as described.

Fourth, The combination of the nippers, 11, and the stop, 12, with the nippers, 9, the whole operating together substantially as and for the purpose set forth.

Fifth, The combination with the two pairs of nippers, 9 and 11, of the stop, 12, the inclined plane, 13, the recess, 14, and the pusher, 15, the whole operating together substantially as and for the purpose specified.

Sixth, Feeding the foundation, i, to the needles, and carrying away the finished piled fabric from the needles by means of a plate, K, or its equivalent, pushing against the rods, 7 7, substantially as described.

27,672.—C. L. Nelson and Oscar Bostwick (assignors to themselves and N. B. Proctor), of Burlington, Vt., for an Improvement in Wood-bending Machines:

We claim the adjustable guide, marked C in the drawing, and adjustable roller, B.

27,673 —Robert Ross (assignor to himself and Geo. J. Stannard), of St. Albans, Vt., for an Improved Horizontal Water Wheel:

I claim the arrangement, in a center-vent water wheel, of the plates, D E, fitted respectively into the scroll and to the wheel, as described, and connected to the frame, G, to operate as and for the purpose set forth.

I also claim, in connection with the above, the projection, h, at the end of the plate, D, when fitted in the socket, i, to leave a space, j, between the projection and the back part of the socket, for the purpose specified.

[The object of this invention is to obtain a center-vent water wheel that may have its capacity readily varied according to the power required, and a uniform speed obtained with a varying power as occasion may require. An engraving and description of this wheel was published on page 136 of the present volume of the SCIENTIFIC AMERICAN.]

27,674.—H. D. Walcott (assignor to H. Williams), of Boston, Mass., for an Improvement in Eyelet Machines:

I claim the nippers, A B, having their jaws, b c, provided with both a punch or cutter and a closing or setting die, substantially as described.

Second, I claim the adjustable piece, g, operating substantially as specified.

RE-ISSUES.

Mary Jane Osborn, of Louisville, Ky., administratrix of William Osborn, deceased, late of said Louisville, for an Improvement in Machines for Pressing Bonnets, Bonnet Frames, &c. Patented Aug. 19, 1856; re-issued Feb. 17, 1857:

I claim, first, Pressing the whole of a bonnet frame or similar article at one operation by dies, substantially as specified, whether formed of one or of several pieces and irrespective of the particular size or shape.

I also claim forming the side crown and flaring face-piece of a bonnet frame in one piece or at one operation, as specified.

James W. Reed, of West Roxbury, Mass., assignee through mesne-assignments of Walter Bryent, of Boston, Mass., for an Improved Air-heating Furnace. Patented Oct. 24, 1854:

I claim the improved furnace constructed with its dome, F, closed at top and made to open into the radiator only, through a series of

columns, extending upward into the same, and with a radiator having its bottom plate to cover the entire dome, F, in manner substantially as described.

I also claim the improvement in the construction of the radiator, arranged over the dome of the fire-pot, the same consisting in making its bottom a concave-convex plate or arch, and with the concave side disposed downwards and directly over said dome, whereby the ascending heat from the top of the dome is retained in the concavity of said bottom, and not only made to warm, to great advantage, the air that rushes into the same, but to heat the radiator, so as to improve the draft through the fire-pot and supporting columns of the ra iator.

Pells Manny, of Waddam's Grove, Ill., for an Improvement in Harvesters. Patented April 7, 1857:

I claim, first, In a n automatic raking device, the combination of the bar, f, standing at an angle with the wing, C, the bar, S, and the rake, A, arranged in relation to the taper space, R, in the manner and for the purpose substantially as specified.

Second, The combination of the bar, S, and the rake, A, soarranged and operating that the rake, which at first moves longitudinally with the straw, shall afterwards change its relation thereto and compress it laterally against the bar, S, so as to hold it firmly in place until it is deposited at the opening, R, in a compact gavel, lying nearly parallel with the direction in which the machine moves, substantially as set forth.

Third, The combination of the elastic metal cap or sheath, c, connecting the divider, b, with the main wing, C, with the reversed hook or bent projecting end, d, of an automatic rake, when said parts are constructed and arranged for joint operation essentially in the manner and for the purposes set forth.

J. Milton Sanders, of Cincinnati, Ohio, for an Improvement in the Production of Illuminating Gas. Patented July 27, 1858:

I claim the production of an illuminating gas by passing the vapor of water and a hydro-carbon, or its equivalent, mixed previously to decomposition into a retort containing carbon at a high red heat, substantially in the manner set forth.

Selah Dustin, of Detroit, Mich., for an Improved Low Water Alarm for Steam Boilers. Patented April 26, 1859:

I claim, first, So combining a steam valve and chamber with a ball or float as that the pressure of the steam in the boiler, in conjunction with the weight of the ball or float, will, when the water falls so low in the boiler that the upward force of the float does not sustain said valve, open said valve and make a free escape of the steam, substantially as described.

Second, I claim, in combination with a valve that is opened by the pressure of the steam and the aid of the ball or float, another valve, e', of lesser area, that closes one end of the steam cylinder so long as the water in the boiler remains at the proper height therein and the pressure of the steam does not exceed a certain amount, substantially as described.

Third, I claim, in combination with a valve opened by the pressure of the steam and by the aid of the ball or float, and which are not resisted by a weight or weighted lever, a steam whistle, bell, or other means of giving an alarm by the escape of the steam, substantially as described.

Fourth, I claim the combination of the float and the differential valve with the steam chamber, for the purpose of opening said valves, by immersing the float deeper in the water to sound an alarm when there existed an excessive pressure of steam in the boiler, substantially as described.

ADDITIONAL IMPROVEMENT.

Joseph F. Pond, of Cleveland, Ohio, for an Improved Washing Machine. Patented Oct. 26, 1858:

I claim the brake bar with double-ridged upper surface, as described, in combination with hollowed bearings, a b, and annular slotted bearing pieces, C, lever and rod, arranged and operating with the roller, A, and apron, D, as set forth.

NOTE.—More than ONE-THIRD of all the patents granted last week, as reported above, were secured through the Scientific American Patent Agency—MUNN & CO., No. 37 Park-row, this city.

Notes & Queries

G. R., Jr., of Pa.—We belive that it would be a great improvement in the manufacture of glue to employ steam heat in stead of direct fire under the boilers. With steam you can regulate the heat properly, and you will never singe any of the skins. With steam heat, you could also use wooden tanks in place of metal boilers. You can run the steam-pipes back and forth in the bottom of the boiler, but you must use an open joint so as to take them out when desired.

R. C., of Texas.—You are mistaken in stating that Haswell gives the strength of boiler iron at from 30,000 to 25,000 lbs. on the square inch. He says: "The tensile strength of boiler iron is 50,000 to 60,000 lbs. per square inch of section; but at a temperature of 550°, it is reduced to 22,508 lbs." Any good American boiler iron will stand 42,000 lbs., but we do not believe you can get a boiler made of iron that will stand a pressure of 250 lbs. of air on the inch without leaking. For such a pressure, we advise boiler iron of no less than ⅞ of an inch thick. We have no doubt of electrical currents being generated in the earth by under currents of water, because electricity is developed more or less in every case of friction.

J. S., of Pa.—Your hydrostatic paradox is quite a neat puzzle; but as your vertical columns of mercury, are in fact, equal, there is in reality, no paradox in it.

O. S., of Vt.—We think you will find in Mr. Sprague's second article on "The Obstuction to the Navigation of Rivers caused by the Piers of Bridges," a full discussion of the points which yon raise.

L. B., of Mass.—A gang of steam boilers, unless they have independent steam connecting pipes to equalize the pressure cannot be safe. One pump is perfectly able to feed all the boilers, if it is of sufficient capacity. Each boiler should have a separate feed-pipe branching from the main pipe of the force pump. The middle boilers generally generate steam fastest, and require a little more feed than the side ones. A feed pump should be able to supply about four times the amount of evaporation. The size of the feed-pump pipe for high pressure engines is obtained by multiplying the diameter of the cylinder in inches by 141. The resultant is the diameter of the feed-pipe in inches.

Towers, of Pa.—An immense amount of labor has been expended by astronomers in searching for small satellites revolving about the earth, and it is thought that one at least has been discovered. It is supposed to be about half a mile in diameter and 5,000 miles distant, if we remember rightly.

S. R. H.—Your suggestion of a balloon to carry a line ashore from a vessel wrecked on a lee coast has been made before. It seems to us a most excellent plan.

J. M. R., of Ohio.—For a popular treatise on natural philosophy, Wells' is as good as any; but if you want a profound and thorough discussion of the principles of the science, we know of nothing superior to Newton's Principia.

W. B., of N. Y.—Your illustration of a perpetual motion that would not run is ingenious, but our artists are now so busy that we must forego the pleasure of having it engraved.

J. B., of Del.—A body shot into the air will fall with the same velocity as it rises, less, of course, the resistance of the air. When we copied the paragraph of which you spoke from a London paper, we thought of introducing the qualification, but as it is small with a lead or iron bullet, we let it go.

W. H., of Ill.—The crystals which you send us are quartz. There are tons of them scattered through all granite regions. They are valueless.

J. B., of N. C.—If a 25-horse power engine is sufficient to drive certain machinery, a 50-horse power engine attached to the same machinery would ordinarily require more wood; this, however, would depend on the circumstances of the case.

B. M. J., of Ark.—Your recommendation of a wash for young trees, composed of equal parts of tar, soft soap and hog's lard, we here present to our readers.

W. B. G., of N. Y.—Your communication on the model of ships is received. We have been waiting some time for a proper occasion to give our own views on this subject.

J. B., of Iowa.—We have never seen Garvey's gyrometer, and as you doubtless understand the general principle of these instruments, we shall not trouble you with any remarks upon them.

C. K., of Mich.—We do not believe your explanation of the light from loaf sugar is correct. Though phosphate of lime is used in clarifying sugar, the quantity of phosphorous left in the refined sugar must be infinitesimal, and not enough to produce visible light.

J. T. B., of N. Y.—Wells' Chemistry will be suitable for you. Seely & Garbanati, No. 424 Broadway, this city, keep eve thing pertaining to the photographic art.

S. D. T., of Mass.—The several rays of light separated by a prism can be brought together again, when they are found to produce the original white light. Nobody knows why light is refracted.

O. H. Y., of N. Y.—We do not know where you can obtain the oxy-calcium apparatus to be used with dissolving views.

A. A. S., of Va., writes:—"Are not the majority of newspaper advertisements headed '$1.200 a year, with $10 capital,—'$10 a day'—'$100 a month,' &c., all humbug, to 'peel the greenys'; or are they real plans by which an honest man can make money?" It is rather "green" even to ask the question.

B. & Co., of Cal.—Silver ores are not worked in the vicinity of New York, nor do we know a single melting company which imports silver ore to obtain the precious metal.

J. B. G., of Ga.—We do not think that glass coffins are made in this country. There are patents on such coffins.

W. L., of Pa.—We never doctored a heavy horse in our life, and have therefore no skill in prescribing for such diseases.

J. T., of N. B.—We are willing to pay for original contributions of merit, but we do not think the subject of the cause of the aurora borealis would be one of sufficient interest to our readers. You had better communicate with the editors of "Silliman's Journal," at New Haven, Conn.

W. F., of ——.—We think we could explain the gyroscope in fewer words than you employ, but the interest in the subject seems to have passed away.

J. A. F., of Ala.—The problem of calculating the force of the sun's attraction on the earth was attacked 170 years ago by the greatest intellect the world ever saw—Sir Isaac Newton. You will find the subject fully discussed in works on mathematical astronomy. For the other points in your letter see Bartlett's Mechanics.

P. M., of N. Y.—Our artists are now very busy, but if they get a little leisure we may give you a cut which would explain to your own and other youthful minds the principle of the steam engine. It is something which every boy ought to understand.

F. M. B., of Wis.—Your inquiry is not very clearly expressed. We presume you will be answered, however, when we say that if A has taken out a patent on a combination of parts exclusively for sewing wheat broadcast, B would not infringe by employing a similar combination to sprinkle the streets with water.

G. W. C., of Mich.—Nitrate of silver should be dissolved in ammonia for mixing with the printer's ink, so as to render it indelible for stencil work. The alkaline ammonia renders the nitrate salt capable of mixing with the oil of the ink.

J. S., of Ohio.—We really believe that the most simple and best way to introduce a reform in our measures would be to adopt the French system; but in the absence of any mere law, it would be better to use the centimeter system, with the foot and inch common terms.

G. A. C., of N. Y.—You have failed to comply with the rule of this office, which requires all letters to be properly signed with the writer's name—not for purposes of publication, but as an evidence of good faith.

L. M. P., of Mass.—Three elements are necessary in calculating horse-power, namely, time, pressure and speed. Nobody can tell "how many cubic inches of 50 lbs. pressure it takes for one horse-power."

H. D. P. & Co., of Miss.—There is no fixed depth at which to carry lightning conductors into the ground. They should be carried down to rest in moist soil, that is all. A rod is a conductor; and one that extends 10 feet above the roof and is 40 feet high, will protect an area of 5,026 square feet according to some authors and only 785 feet according to others. Reliable information on this point is much wanted.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, March 31, 1860:—

L. & W., of Ind., $30; H. G., of Mass., $30; S. S. G., of N. Y., $25; A. L., of Ga., $25; T. G. A., of N. Y., $30; A. J. G., of Mass., $30; G. W. R., of N. Y., $60; C. J. S., of S. C., $25; L. H., of N. Y., $35; P. B. W., of Ga., $30; L. B. H., of N. Y., $30; G. H. M., of Mass., $30; D. W. A., of Ill., $35; A. C., of N. Y., $55: W. P. F., of Conn., $25; W. J. J., of Ala., $30; C. F. B., of R. I., $500; S. B., Jr., of N. Y., $30; J. H., of Mass., $32; D. H., of N. Y., $30; M. W., of L. I., $30; C. & B., of Ill., $30; J. H. & A. T. G., of N. Y., $50; M. A. S., of Ill., $25; G. W. Van D., of N. Y., $10; T. G., of Ill., $25; J. F. H., of Ill., $15; T. M., of Conn., $30; J. B. W., of Tenn., $40; A. C. L., of Mich., $35; J. R. H., of Conn., $35; B. & S., of Ohio, $30; W. M., of Mass., $30; G. C., of Ill., $10; J. P., of N. J., $30; W. D., of N. Y., $20; A. B. P., of Cal., $30; S. A. C., of Mass., $25; B. J., of Ky., $20; J. J., of N. Y., $30; R. P. Van H., of Ohio, $30; C. D., of Mass., $30; J. B., of N. Y., $38; S. B. D., of N. Y., $250; C. C. L., of Pa., $30; B. I., of N. Y., $25; R. H. T., Jr., of S. C., $275; W. C. A., of Mo., $30; W. & D., of Mass., $25; A. H., of Conn., $25; J. C., of Conn., $40; S. F. B., of Mass., $60; J. B. McC., of Iowa, $30; F. S., of Ill., $30; R. & S., of Ala., $30; C. H. & Co., of N. J., $30; W. H. D., Jr., of Pa., $35; A. T. J., of Conn., $30; J. S., of N. Y., $30; B. B., of Ohio, $25; P. M., of Mass., $25; P. & F., of Ind., $30; J. J. H., of Md., $100; E. C., of N. Y., $30; C. T. B., of N. Y., $30; J. M., of N. Y., $30; J. C., of Vt., $30; J. W. M., of N. Y., $25; A. W. W., of Conn., $25; J. D. M., of N. Y., $25; L. & V., of N. Y., $55; J. W. T., of Ala., $55; C. A. B., of Vt., $25; W. A. H., of N. J., $380; G. S., of Mass., $35; E. F. R., of Mass., $55; D. A. W., of N. Y., $60; W. & T. S., of N. Y., $60; W. & T., of Ill., $25; W. B. G., of Pa., $30; A. W., of N. Y., $30; F. F. S., of Ill., $20; A. T. J., of Conn., $25; C. B., of N. Y., $58.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, March 31, 1860:—

J. F. H., of Ill.; W. & D., of Mass.; J. W. M., of N. Y.; A. J. G., of Mass.; J. F., of Mass.; L. H., of N. Y.; S. R. G., of N. Y.; P. M., of Mass.; J. D. M., of N. Y.; B. I., of N. Y.; P. J., of N. Y.; C. B., of N. Y.; A. H., of Conn.; S. S. G., of N. Y.; J. C., of Conn.; H. B., of N. J.; J. R. H., of Conn.; P. B. W., of Ga.; G. H. M., of Mass.; A. W. W., of N. Y.; J. H. & A. T. G., of N. Y. (two cases); W. P. F., of Conn.; C. S. I., of Ind.; L. & V., of N. Y.; A. L., of Ga.; T. G., of Ill.; M. A. S., of Ill.; T. M., of Conn.; A. C. L., of Mich.; C. O., of N. Y.; D. W. A., of Ill.; J. R. E., of La.; B. B., of Ohio; W. J. J., of Ala.; A. M. B., of Vt.; W. & T. S., of N. Y.; G. S., of Mass.; J. H. W., of N. J.; W. & T., of Ill.; E. F. R., of Mass.; A. S., of N. J.; A. T. J., of Conn.; E. R. R., of N. J.; P. & H., of Cal.; S. A. C., of Mass.

PORTER'S CENTRIFUGAL GOVERNOR.—THE attention of parties troubled with irregular or unsteady power is respectfully called to this Governor, now coming into general use. It may be used in connection with any valve or cut-off, and will regulate the motion of the engine so perfectly that its entire load may be thrown on or off at once, without sensibly affecting its speed. I will send a Governor to any responsible person for trial; and if its action is not perfect under the above test, it may be returned. Prices exceedingly moderate. All orders and communications will receive prompt attention. Send for a circular.

NEW YORK, March 7, 1859.

I have had occasion to examine the theory and operation of "Porter's Improved Governor," and am satisfied that it is a valuable adjunct to the steam engine, and almost an indispensable one wherever uniformity of motion is required. The almost instantaneous action of this Governor at every change of motion in the engine enables it to admit and shut off the steam exactly as the duty or load is imposed upon the engine, thus producing not only uniformity of motion, but also reducing the expenditure of steam, and consequently, of fuel, to its lowest practical limits. I recommend the trial of this Governor by all those whose mechanical operations require either of these conditions, viz.: uniformity of motion or economy in running.

[Signed.] WM. J. MCALPINE.

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A VALUABLE PATENT FOR SALE CHEAP—Stove manufacturers, look to your interests!—The undersigned are prepared to treat with stove manufacturers and dealers in patents for the sale and introduction of Gould's improved Stove Plate Cover, patented Sept. 13, 1859. For particulars, address GOULD & HARTSHORN, Alliance, Ohio. N. B.—Read the following certificate:—

This certifies that we have used, for the past year, eight of Gould's improved Stove Covers upon our cook stoves. They effect the object desired completely, dispensing with all the inconvenience, and saving three-fourths of the time and labor necessary to the use of the common lids and lifters. The wire handles may be grasped by the bare hands with perfect safety, whenever it is desirable to remove the lids; they in nowise inconvenience the use of the top plate of the stove when the lids are on. I cheerfully recommend them to the public. JOSEPH ARMSTRONG,

Superintendent Cook, Nixon Hotel, Alliance, Ohio.
March 5, 1860. 15 1*

RICKART'S PATENT HUB LATHE.—THE American Hub Company have now in operation at their factory in Schoharie, four of these Lathes, each machine turning daily from 40 to 50 sets of the large-sized hubs, from 10 by 12 up to 18 by 20 inches, and from 60 to 70 sets of buggy hubs. The block is put into the Lathe untrimmed, with bark on, and turned out complete; the ends cut perfectly true, and of uniform length—the smaller sizes in less than ONE MINUTE, and the largest sizes in from ONE to TWO MINUTES. The hubs turned by this Lathe are better than can be turned by hand, for the reason that they are turned perfectly smooth, and of an exact uniformity in style and size. The company are now prepared to sell territories by States for the use of these machines. The Lathes can be seen in operation at any time at the company's factory in Schoharie, N. Y. CHAS. GOODYEAR, President.
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STEAM BOILER EXPLOSIONS.—IT IS A WELL-established fact that three-fourths of all boiler explosions occur from low water; the remainder either from excessive pressure or defective construction. No boiler should be without a good Steam Gage and a Low Water Detector; 5,000 of the latter are already attached. An assortment of the best Steam and Water Gages constantly on hand; also, Indicators, Gage Cocks, Steam Whistles, &c.
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15 1* H. G. BULKLEY, Kalamazoo, Mich.

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15 2* F. J. MAY, Beverly, N. J.

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PATENT EXTENSIONS.—ALL PATENTS FOR Inventions, granted by the United States during the year 1846, will expire by their own limitations during the current year (1860) UNLESS EXTENDED ACCORDING TO LAW. The statute provides for the extension of Patents for an additional term of SEVEN YEARS, the grant being made to the inventor himself, or if deceased, to his heirs and administrators. The EXTENDED TERM inures solely to the benefit of the inventor or his heirs. Assignees or owners of rights under the first term of the Patent have no rights whatever in the extended term. The inventor or his heirs may, however, sell their interests in the Extension prior to the grant thereof, in which case the Extended Patent, when granted, becomes the exclusive property of such purchaser. Applications for Extensions must be made at the Patent Office at least 90 days prior to the extension of the Patent. The undersigned, having had great experience in Patent business, will promptly prepare the various documents and prosecute Extension cases on moderate terms. For further information address

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PECK'S PATENT DROP PRESS IS THE MOST perfect machine in use for the manufacture of copper, brass or tin-ware, jewelry, spoons, &c.; and for the purpose of forging (with dies), it is superior to any other machine yet invented. All sizes of the above machines on hand or made to order, on short notice, by the patentee, MILO PECK & CO., New Haven, Conn. 7 13*

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A MESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise, et qui préfereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un desain et une description concise pour notre examen. Toutes communications seront reçues en confidence.

MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

ANOTHER AWFUL CALAMITY—TEN PERSONS BURNED TO DEATH!

Never since the settlement of the city has there been such a succession of tragedies as have marked the last few months; besides the murder of the crews of two sloops, and some two or three fatal steam boiler explosions, we have had two of the most fatal fires recorded in our annals.

At half-past one o'clock on Wednesday morning (March 28th) a fire broke out in a row of four tenement houses situated in 45th-street a little west of Sixth-avenue. The houses were of wood, four stories high, and 25 feet deep, and were filled with families, mostly Irish. Two of these families—that of Thomas Bennett, and that of Andrew Wheeler—each consisting of a mother and four children, were burnt to death; the husbands of the women being absent at the time, engaged in their usual night-work at the stables of the Sixth-avenue Railroad. The fire took in No. 90, the westernmost part of the row, on or near the staircase of the lower story; thus cutting-off the escape of people from this house. Several, however, leaped from the windows, some without serious injury, though the bruises of one woman who jumped from a window in the fourth story will probably prove fatal. Hook and Ladder Company, No. 8, arrived early on the ground, and with alacrity, even for New York firemen, reared a ladder against the building, and crowded up to the rescue of the imprisoned women and children. But their very eagerness defeated its object; for so many got upon the ladder that it gave way! The shrieks of the doomed victims, when they thus saw their last hope of rescue destroyed, are described as heart-rending in the extreme.

The hundreds who witnessed this terrible fire unite in praising the effectiveness of the steam fire-engine, No. 46. This is the identical engine of which we give an illustrated description on the first page of this present number. We are confident that we express the universal opinion of our community in bearing testimony to the remarkable performance and great utility of these engines as exhibited at the numerous and severe fires which have visited us in the past season.

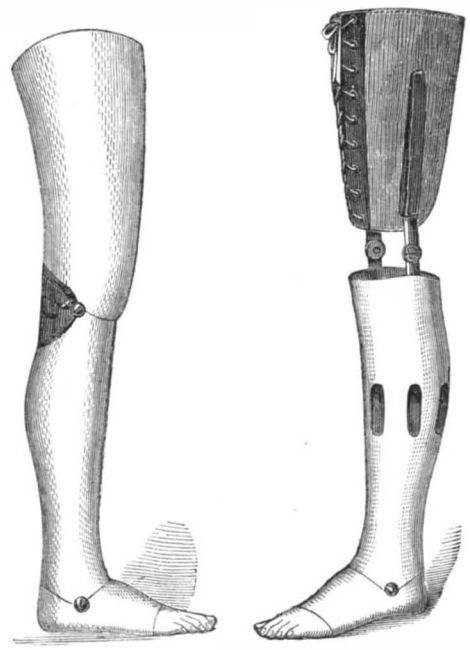
FIRE-ESCAPES—ENGLISH AND AMERICAN.

For several years past we have been publishing descriptions of improvements in fire-escapes, and commending them to the notice of our city authorities. But it has required the occurrence of two most sickening calamities to arouse their attention to the subject. Having decided on action, we are informed by the daily papers that it is the intention of the city government to send to London for a complete set of the fire-escape apparatus which has been found efficient in that city. Before this expensive step is taken, we would respectfully suggest that there is a far more economical and common-sense mode of proceeding. We shall next week give a clear and full description of the fire-escapes used in London, amply illustrated, so as to be intelligible to every mechanic, accompanied by a historical sketch (drawn from the files of the SCIENTIFIC AMERICAN) of the several improvements which have been made in it by our inventors. We would gently hint to our *foreign* Common Council that American mechanics are amply competent to construct an apparatus exactly after the model of that used in London, if it is decided to employ that; but we venture the opinion that a fair comparison of all the inventions will result in the selection of one of those which have originated in this country, many of which, in our opinion, are far preferable. The thing that we do need to adopt from London is the organization of the Fire-escape Brigade, and its thorough and efficient administration, which must, sooner or later, be adopted; and we would suggest that, while steam engines are taking the place of the cumbrous hand machines in all large cities, the firemen be employed in the Fire-escape Brigade.

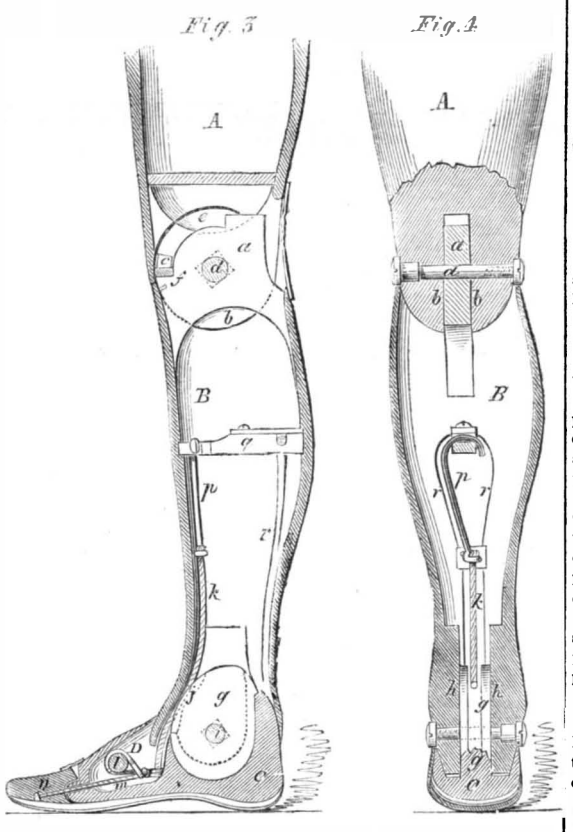
VERY extensive ruins of an ancient city have been discovered in New Mexico, ninety miles northeast of Fort Stanton. They are said to rival, in magnitude and architectural decoration, the ruins of Thebes.

IMPROVED ARTIFICIAL LEG.

We have heard it frequently remarked in conversation that one patent right for artificial legs was sold for the territory of New England alone for $75,000. Though we have never taken the trouble to verify this statement by application to the inventor, who is often in our office, we have no doubt of the general truth which it is cited to prove, that is, that the number of persons in the community who have lost a limb would surprise any one not familiar with the statistics. The aggregate amount of almost any article in use in a great nation is immensely larger than would be anticipated.



If any of our readers would like to obtain a clear idea of the objects sought to be accomplished in the construction of artificial legs, they could not have a better opportunity than is afforded by the illustrations of this invention, for while it takes cognizance of all these objects, it proceeds to their attainment by the very simplest means. It affords, indeed, a remarkable instance of the general tendency in the improvement of inventions, to lay aside the more complicated contrivances at first adopted, and to substitute those which are more simple. Both the knee and ankle joints of this leg are simple mortise and tenon joints, the material being willow wood. In the knee the mortise is formed in the thigh piece, A, and the tenon, *a*, on the leg piece, B, the two parts being secured together by the bolt, *d*. In order to prevent the leg from bending backward, the shoulder, *f*, is formed in the tenon, and a stop, *c*, is secured across the mortise, the shoulder being cushioned with india-rubber to prevent any shock when these parts are brought together by the straightening of the leg. To close the opening in the front side of the mortise when the knee is bent, the steel spring, *e*, of suitable width, is attached to the tenon, *a*, so that the mortise will roll along it. The opening in the backside of the wooden joint is closed by a leather covering, as clearly shown in Fig. 1.



DOUGLASS'S ARTIFICIAL LEG.

For the ankle joint the tenon is formed on the foot, and the mortise on the leg piece, B; this mortise not extending through the ankle, but a portion of solid wood being left both in front and rear. A groove is cut in the tenon for the passage of the cord, *k*, which is attached at one end to the hook, *p*, and at the other to the spring, D, which is thus made to raise the toe in walking. The cord, *r*, attached to the heel prevents the toe from being lifted too high. The spiral spring, D, which acts at one end upon the cord, *k*, has the cord, *m*, attached to ite opposite end to draw down the toe, *n*, after it has been turned upward by the step.

So few are the parts, and so simple are the arrangements of an artificial leg! But it is only through a long course of study and experiment, and an almost endless variety of complex contrivances that this simplicity has has been reached.

The advantages claimed for this leg are the avoidance of all improper pressure on the stump, perfect ventilation, great elasticity in the step, the absence of all noise or rubbing, and general ease of motion, and comfort to the wearer.

The patent for this invention was obtained through the Scientific American Patent Agency, January 10, 1860, and persons desiring further information in relation to it will please address the inventor, D. DeForrest Douglass, M.D., at Springfield, Mass.

AGRICULTURAL SOCIETIES.—According to the records of the Patent Office, there are now in this country not far from 1,000 boards and societies connected wholly or in part with agriculture. In the State of New York there are 97; in Illinois, 94; Indiana, 77; Pennsylvania, Ohio and Iowa each have about 70.