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Improved Steam Plow.

The great obstacle in the way of plowing with steam is the weight of the steam engine. The weight of a locomotive is not objectionable when it runs upon hard iron rails, but it is very objectionable when the locomotive is designed to run upon arable land, and especially upon plowed ground. The first thing to be considered then for machinery for steam plowing is the construction of a light engine and carriage. This has been the aim in designing the plow here illustrated, which is thus described by the inventor:—

"The object of my invention is the construction of a steam plow sufficiently light to be adapted to practical use both on grass land and on plowed ground. This I have effected by the combination of three essential features:—1st, By the adoption of the lightest form of boiler known for the generation of a given quantity of steam; 2d, By constructing the carriage of plate and angle iron, by which the necessary strength and stiffness is obtained with less weight than by the employment of any other material; and 3d, By making the supporting wheels of sufficient width to cover the ground throughout the whole width of the carriage; the wheels at the same time, being so arranged that the plow may be turned in a space the radius of which is equal to its own width.

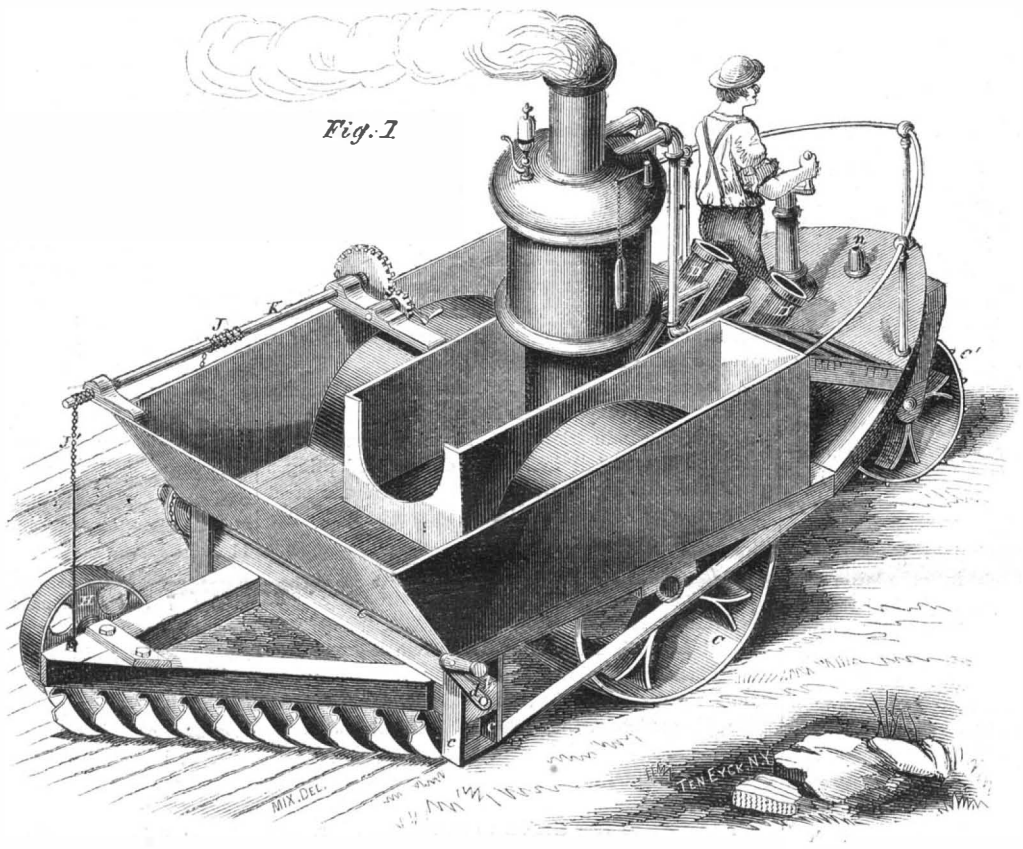
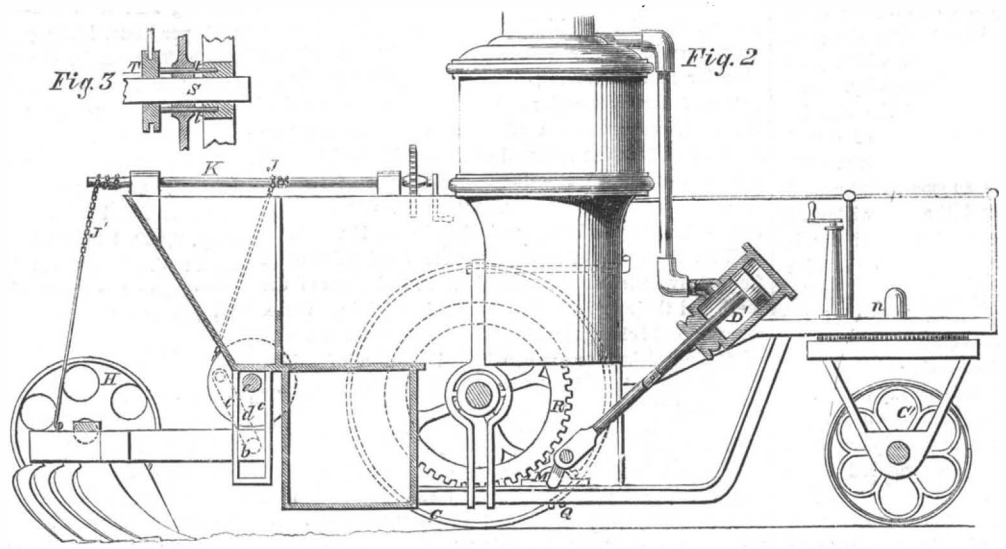


Fig. 1

REYNOLDS' IMPROVED STEAM PLOW.

"The construction of the plow will be readily understood by inspecting the engravings, of which Fig. 1 is a perspective view, and Fig. 2 a longitudinal vertical section. The whole width of the machine is 8 feet, the two driving wheels, C C, are each 2½ feet in width, and the guide wheels, C', are 1½ feet each, running close together, and thus covering the space which is not trodden by the driving wheels. The piston rods of the steam cylinders, D' D', are joined by connecting rods to the cranks, M, upon the pinions, Q, which pinions mesh into the gear wheels, R, that are fastened firmly upon the axle of the driving wheels, C. Thus several strokes of the engine are required to effect one revolution of the driving wheels. The driving wheels, C, fit loosely upon the axle, S, but they may be secured to the spur wheels, K, at the will of the operator, by means of a clutch represented in Fig. 3. To the collar, T, fitting loosely around the axle, S, are secured the pins, *t t*, which pass through the hub of the gear wheel, R, and which may be pressed into holes in the hub of the driving wheel, C, or withdrawn from the same by moving the lever which communicates with the collar, T, and thus the axle, S, may be secured rigidly to either or both of the driving wheels, or may be allowed to turn loosely in their boxes at the will of the operator. The guide wheels, C', run upon a short axle which is secured to the front part of the carriage by the king bolt, *n*. Around this king bolt is a spur wheel, into which meshes a pinion upon the lower end of the steering shaft, so that the direction of the guide wheels may be changed at the pleasure of the steersman. The rods that actuate the clutches by which the driving wheels are connected with the engine, are carried forward within easy reach of the steersman, and when he desires to turn the carriage round he throws one wheel out of action, upon which wheel the carriage turns as upon a pivot.



"The plows, A' A' A', are secured to a triangular frame at the rear of the carriage, which frame is so arranged as to be raised perpendicularly upwards clear of the ground, whenever it is desired to pass over the ground without plowing, or in order to avoid any obstruction that may be encountered. The arrangement by which the frame may be thus raised is plainly shown in the cuts. The front bar, *b*, of the frame is supported at each side between two vertical hangers, *c c*, and it is suspended in the space between these hangers by the chains, J and J', and by the link, *d*, upon the end of the shaft, *e*, in such a manner that it may be raised or lowered by turning the shaft, K, around which the upper ends of the chains are wound. A crank is arranged within convenient reach of the fireman to enable him to raise or lower the plow frame at will. The rear angle of the plow frame is supported by a wheel, H, the axle of which is placed eccentric to the shaft of which it is a continuation, so that, by turning the shaft over in its bearings, the rear end of the plow frame may be raised or lowered to adjust the plows to run at any depth desired.

"This also makes one of the most convenient portable engines for threshing grain and other purposes. In this case the power is transferred to any other machine by coupling a shaft upon the end of the main driving shaft of the plow, the shaft to be coupled passing through one of the wheels between the spokes."

The patent for this invention was granted Dec. 18, 1860, and for the purchase of rights, or for any further information in relation to the matter, inquiries may be addressed to the inventor, John Reynolds, at No. 211 Dupont-street, Greenpoint, N. Y.

In the year 1841, during the brief existence of the Lone Star Republic of Texas, a letter sent from Arkansas to Brazoria, paid the following postage: $1.56! Fifty-two letters can now be sent over the same route for that amount.

FOREIGN SCIENTIFIC INTELLIGENCE.

IRON PYRITES CONTAINING SILVER.

A patent has been taken out in England by J. Longmaid for treating pyrites and other ores as follows:—The ores are first ground so as to pass through a sieve having about 100 holes to the square inch. They are then introduced into a furnace where two processes are constantly being carried on with the same heat. The first part of the process consists in the calcining of the pyrites, so as to reduce the sulphur in them to about five per cent; and secondly, the decomposing of these calcined ores by common salt. The ground ores, when first placed in a chamber of the furnace, evolve sulphurous acid, which passes off into another chamber, where it is converted into sulphuric acid by being brought in contact with a proper quantity of oxygen. These calcined ores are now withdrawn, mixed with about five per cent of common salt, then placed in another chamber of the furnace, where they are reduced. After this they are smelted to obtain either the iron, copper, silver or tin which may be in them. This process would be very useful for California pyrites, if fuel were cheap in that State.

CARTRIDGES FOR BREECH LOADERS.

A patent for a cartridge made with gun cotton, covered with a skin of collodion, has been obtained by J. Macintosh, London, England. It is stated to be impervious to moisture; it readily ignites with a percussion cap and leaves no residue after firing. Gun cotton ignites so rapidly that it is very liable to burst a rifle or cannon. Were this not the case, it would be preferable to gunpowder for firearms.

PURIFYING COAL OILS.

A patent has recently been taken out in England by W. R. Bowdich, of Wakefield, for a peculiar method of purifying coal oil. In a proper vessel—called a purifier—he arranges it with a tray on its upper part, which can be heated to a proper temperature. On this tray is placed sifted lime (hydrated peroxyd of iron may be used, but clay is preferred) and pounded clay, and these are slightly raised above the boiling point of the oil. When the purifying material is at the proper temperature, the oils are to be sent into the lower part of, and allowed to pass upwards through the hot purifier, after which they are to be condensed in the usual way. Care must be taken not to send in the oils too rapidly. Care is also required to prevent the tar liberated by this process from passing over with, and becoming absorbed in, the purified oils. The tar will not pass with the purified oils, if the purifying material be not saturated with oil; but it will pass if the purifying material is saturated. It is requisite, therefore, to supply the hot purifier with the coal oil slowly, so that the purifying material may not become saturated. The purified oil will then be of good color. The oil passing from the purifier and through the condenser should be received into a glass vessel at intervals and examined; and, if found colored, the quantity passing through the hot purifier should be lessened. If with a slow current the distilled oil be colored, the hot purifier should be charged with fresh purifying material. The purified oils absorb some part of the gases produced in the process of purification, which gases evolve more odor than the oils have naturally. Such gas may be removed, and the smell of the oils improved by washing them with a solution of caustic soda or potash, and subsequently with water. The quantity of removable matter is so small that a weak solution of alkali is sufficient, and the oils without it are so good that probably the washing will not be thought necessary, except where smell is of great importance. Experience shows that a quantity of heated purifying material, equal to about a fourth of the weight of oil to be purified, gives an excellent result. The claim is for the passing of coal oils through slacked lime, or pounded clay, or hydrated peroxyd of iron, heated above the distilling point of the oils, as described, by which treatment tar and sulphur compounds are removed, and the oils are rendered whiter and free from disagreeable smell.

STEAM NAVIGATION ON ENGLISH CANALS.

It is rather singular that steam navigation on American canals should have been unsuccessful, as described on page 39 of the present volume of the SCIENTIFIC AMERICAN, while in England it has become so successful as to reduce the cost of conveying freight no less than 25 per cent. The Grand Junction Canal Company, which formerly used to tow their boats with horses, have dispensed with animal power, and now use steam alone. There are 5,000 miles of canal in Great Britain, representing a capital of about $200,000,000, and since the adoption of steam as the propelling agent, the traffic increased last year 25,000 tuns. The most peculiar feature in the steamboats which are now employed by the Grand Junction Company plying between London and Birmingham or Manchester, is an improved form of screw propeller, called the "waggle tail," which has the advantage of keeping all the disturbance of the water immediately behind the stern of the boat, instead of spreading it right and left. The effect of this improvement is at once to secure the canal banks from being damaged by the wash and to economize the motive power.

FRENCH RAILROADS.

The French government is reported to be contemplating the purchase of all the railroads in that country. An article in the *Revue des deux Mondes*, in opposition to this centralizing project, points out that the Russian, Austrian and Belgian governments, which all began by constructing railroads, have found it advantageous to get rid of most of them and encourage private enterprise. Already the French government monopolizes "the manufacture of arms, gunpowder, naval architecture, public works, tobacco, salt, the conveyance of private messages by telegraph, the conveyance of small parcels, and controls the management of forests." It is the conservative or rather distrustful system which has caused France to be surpassed in railway extension, not only by England, but by Germany and Belgium. France is in the third rank, as regards the mileage of railroads executed or authorized by decree; in the seventh rank in respect to the amount of her population served by railroads; and in every point inferior as compared with England and Belgium.

As regards commercial facilities and the general industry of the people, Louis Napoleon has been a great patron of the industrial arts. He must beware, however, and not curtail individual effort by adopting a grand centralizing system. The great advancement and prosperity of the United States are principally due to intelligent and general individual effort.

Supposed Cancer Speedily Cured.

The *Dental Cosmos* contains an account of a case by J. L. Suesserot, M.D., relating to an aged lady who had suffered for such a length of time from a large ulcer on the inside of the lower lip that it was at last held to be malignant cancer. The exciting cause of this was the protruding apices of the roots of the central lower incisors which had escaped the notice of the attending physician (a gentleman of acknowledged ability in his profession), because of the coating of tartar, which rendered their appearance very similar to that of the ulcer. Dr. Suesserot says respecting it:—"Prompted by a desire to benefit the patient, and at the same time demonstrate the advantage of a dental education, I was induced to commit the unprofessional act of operating before the invitation was extended. No regular instrument being at hand, I called for a table fork, and, in a much shorter time than the writing of this has consumed, I relieved the greatly distressed patient of a disease which she had expected would very soon terminate her existence. Nearly all of the alveolar margin having been absorbed, by placing a prong of the fork under the protruding lower end of the root, the operation of evulsion was readily performed; and by the removal of that which had become a foreign substance, the diseased condition of the lip, as well as all the surrounding parts, was speedily removed. As this is not an isolated case, it would be well for the cause of humanity were the dentist more frequently called in consultation; the diseases of the teeth and their surroundings being his special province, many morbid changes which too often escape the notice of the physician, or are considered by him of minor importance, might be detected, and disastrous results prevented."

SUBMISSION TO IMPROVEMENTS.—In our time when science and art are making such rapid strides that almost every day startles us with the announcement of a new discovery calculated to annihilate time, or increase the productiveness of labor, mechanics often find themselves encroached upon in their occupation, and instinctively take a stand against the revolution intended. Nothing can be more natural, or, on calm reflection, more completely hopeless. The consequence is inevitable. The mechanic must submit, and expect to receive his reward indirectly and in the course of time.—*Shoe and Leather Reporter.*

AMERICAN NAVAL ARCHITECTURE.

[Reported for the Scientific American.]

THE IRON STEAMSHIP "WM. G. HEWES."

This is one of the largest iron steamships ever built in this country. She was launched on the 15th of December, in the presence of 5,000 people. Her hull was built by Messrs. Harlan, Hollingsworth & Co., of Wilmington, Del. Her machinery was constructed by the Morgan Iron Works, of New York City. The route of her intended service is from New Orleans to Galveston. For strength and beauty of model, this steamer cannot be surpassed. We append full and correct particulars of her hull and machinery:—

Length on deck, 239 feet 4 inches; length at load line, 239 feet; breadth of beam (molded), 33 feet; depth of hold, 10 feet; depth of hold to spar deck, 18 feet; draft of water at load line, 9 feet; area of immersed section at the above draft, 270 square feet; displacement at load line, 1253 tuns; tunnage, $1477\frac{45}{100}$ tuns.

Her frame is of wrought iron bars, 4 inches by 1 inch and 4 inches by $\frac{7}{8}$ of an inch in thickness, which are fastened with keepers $3\frac{1}{2}$ inches by $\frac{3}{8}$ of an inch thick, every 12 inches, together with rivets $\frac{3}{4}$ of an inch in diameter. Distance of frame apart from centers, 16 inches; they are molded 4 inches and sided 1 inch. Number of strakes of plate, from keel to gunwale, 16; thickness of plates, $\frac{1}{2}$ to $\frac{11}{16}$ of an inch. There are 14 cross floors, shaped T; depth of these, 18 inches; thickness, $\frac{9}{16}$ and $\frac{1}{2}$ of an inch, forming belts with angle iron on top, six of them continuing up to guard deck clamp, and the balance to main deck lodger. Shape of keel, U; constructed of double plates, $\frac{5}{8}$ and $\frac{1}{2}$ of an inch in thickness; depth of same, 6 inches. There are 10 fore-and-aft keelsons, 18 inches high and shaped, T; these are capped with angle iron, continuing from end to end.

The *Wm. G. Hewes* is fitted with one vertical beam condensing engine; number of cylinders, one; diameter of same, 50 inches; length of stroke of piston, 11 feet; length of engine room, 76 feet; diameter of water wheels over boards, 30 feet; length of wheel blades, 7 feet 6 inches; width of blades, 7 feet 6 inches; depth of blades, 1 foot 8 inches; number, 26; material, iron; dip of wheels at load line, 6 feet.

She is also supplied with one return tubular boiler, made of steel plates, which is the only one of any size ever constructed in this country. Length of boiler, 21 feet; breadth, 17 feet; hight, exclusive of steam chimney, 9 feet; location, in hold, forward of engine; it has a water bottom. Number of furnaces, 4; breadth of same, 3 feet 6 inches; length of grate bars, 6 feet 8 inches; number of tubes, above, in boiler, 92; number of flues below, 8; internal diameter of tubes above, 5 inches; internal diameter of flues below, 1 foot 7 inches; length of tubes above, 15 feet; length of flues below, 11 feet 4 inches. Diameter of smoke pipe, 68 inches; hight, above grates, 50 feet. The boiler possesses a grate surface of 93 square feet, and a heating surface of 2,600 square feet; consumption of coal, per hour, 1,680 pounds; maximum pressure of steam, 30 pounds, cut-off at one-half stroke; maximum revolutions at this pressure, 18; weight of engines, 190,000 pounds; weight of boiler, with water, 102,690 pounds.

In addition to these essential features, the following deserve attention:—Bunkers are of wood and iron; the vessel is fitted with three anchors, weight, respectively, 2,000, 1,300 and 400 pounds; water ways are of wood; she has three bulkheads, iron braced with angle iron; the water wheels have gunwale bearings; she has one independent steam fire and bilge pump, two bilge pumps, two fire pumps, one bilge injection, and five bottom valves or cocks, arranged as follows:—Two for fire pumps, two for injection pump, and one for steam pump. Ample protection against communication from fire has been made, in the shape of iron, tin, &c., &c.

This steamer is named in honor of the President of the New Orleans, Ohio and Great Western Railroad Company, of New Orleans; she will be commanded by Capt. James Lawless, formerly of the steamship *Orizaba*.

In the furnishing of the steamer, expense has been a secondary consideration; the saloons are of hard wood finish, and fitted up in the most gorgeous style. Credit is justly due to Messrs. Harlan, Hollingsworth & Co. for such a successful and splendid production.

India-Rubber Manufactures.

[Concluded from page 59.]

To return, however, for a time to our own country. The application of india-rubber to waterproof garments by Charles Macintosh was the first practical adaptation on a large scale either here or abroad ; and the immense number which were sold proved fully their appreciation by the public. In 1830, the first attempt at overshoes in this country was made by Thomas Hancock, who took out a patent in that year for a composition for coating linen or cloth, or moulding into shoes. These, however, were a failure for the same reason that all manufactured india-rubber goods had hitherto been found deficient—they would not withstand the action of the atmosphere. There was evidently a goal not yet reached—a grand secret which must be discovered ere success should fully attend the manufacture, or the value of the material be fully proved. Its application, however, to various useful purposes was constantly going on, and both in France and this country, as well as in America, large sums were expended in perfecting machinery for masticating, spreading, and otherwise preparing the gum. One singular application was made, in 1840, by pressing it into blocks combined with sawdust and finely-broken stone, for paving roads. This patent—for it was made the subject of one—we fear did not prove remunerative to the inventor, as it does not seem to have ever been turned to practical account. Several patents were also taken out for cutting india-rubber thread, and applying it woven with silk and cotton to various purposes where elasticity was required—a branch of manufacture which still exists as one of the most successful of its applications.

The year 1843 saw the introduction, however, of the long-sought-for "change," by which the gum was rendered inadhesive and elastic alike under the influence of heat or cold.

The merit of this invention, about which there has been much litigation, is unquestionably due to Charles Goodyear, although a patent was taken out in this country by Thomas Hancock prior to Goodyear's, which bears date two months later. Reasons for this are, however, given in the case of the American, which are fully borne out by facts.

Vulcanization, produced, as is now well known, by the action of sulphur under the influence of heat, ranks amongst the most important discoveries of the present century, and the discoverers have each, in their respective countries, reaped the reward of their labors by large returns received under patents granted to them for the process.

The establishment of the india-rubber manufacture in America, though dating later than that of England, has reached greater perfection, and is more thoroughly understood than in this country. The first manufactory of any consequence was started there in 1832, and was called the Roxbury India-rubber Company, whilst here the first, we believe, was that of Mr. Charles Macintosh, who commenced in the year 1821, more than ten years previous.

Charles Goodyear was born in New Haven, United States, in December, 1800, and for upwards of thirty years was engaged with his father and brothers in the hardware and clock business at Connecticut and Philadelphia. During this time, indeed in his early days, commenced the development of that inquiring and inventive genius which afterwards led to such great results when his attention was turned to india-rubber. Many ingenious and useful inventions in connection with his trade added to the celebrity of the firm, which then held a position as one of the first hardware concerns in the United States. From extended credit and heavy losses, however, the firm were obliged to succumb, and young Goodyear, who had charge of a retail store at Philadelphia in connection with his father's factory, was left, after repeated imprisonments for debt, with no very bright prospects for the future. It was at this time that accident drew his attention to the decomposition of india-rubber goods, and he was told that if any means could be discovered to prevent it, a very large sum of money might be realized by the invention ; the numerous manufactories then existing, and the large sums of money invested, being placed in jeopardy by the goods being thus rendered unsaleable. He immediately turned his attention to this point, and from that time to the day of his recent death, through good and evil report, in wealth and in poverty, in prison or palace, the sick bed or the traveling carriage, he never ceased to give the one point of rendering india-rubber a perfect material his whole attention. The perseverance which induced this deserved success, and in 1839 he was rewarded by the discovery of vulcanization.

His first attempts were commenced in his own cottage, where, with the assistance of a New England wife, who was his only friend through many struggles and depressions, he succeeded in making a few pair of overshoes, as he thought of a superior kind to those made by the companies then in existence ; but, alas ! they proved like the rest, and were destroyed after a short exposure to the air, indeed sooner than those without his "improvement." On looking at his stores, when about to take them into the market, he found them "one mass of melted gum." This was a sad failure, and the furniture of the cottage had to go for the sustenance of his family. Cast down, but not undaunted, he put his family in a boarding-house, and set off for New York to continue his experiments. Here he met with a friend to give him lodging and a chemist who found him his drugs. He went to work again with magnesia and lime, and produced some inadhesive materials, which, though apparently at the time perfection, turned out, like the rest, failures ; though he exhibited and obtained a medal for the improvement at the fair of the American Institute. While experimenting with lime he washed his material with nitric acid to remove the lime from the surface, and discovered what is known as the acid-gas process, which he patented and found of great value. During the winter of 1836–37 he entered into partnership with a Mr. Ballard to make goods on this plan, and they took steam-power in Bank-street, at the same time making arrangements for occupying a large factory on Staten Island that had been already tenanted by a corporation in New York for the manufacture of india-rubber goods, but which, from their inability to surmount the difficulties of the business, had been closed for some time. The mercantile disasters, however, of 1837 included the friend who was to find the capital, and he was left without the means of carrying forward his plans. Again was the little home broken up, and he had to seek the assistance of a brother almost as poorly off as himself. Located on Staten Island, he was allowed admission to the machinery of the closed factory, and there made a few goods to obtain his daily bread. These, though the general lot of inventors, were hard trials to be borne.

The heavy losses which had been incurred by all who had invested in india-rubber "stock" made it utterly impossible to induce any one to assist him. He found the same state of things at Boston, and, taking some of his specimens to Roxbury, Mass., he found no better encouragement there, that company having entirely abandoned the manufacture. He here, however, also obtained access to the machinery, and still went on struggling for success. In 1838 his attention was first drawn to the use of sulphur by Mr. Hayward, a gentleman connected with one of the india-rubber companies, who was using his solvent impregnated with it as a dryer. Goodyear's notice being thus drawn to it, and seeing a value in it which Hayward did not, he purchased the patent which had been taken out at his suggestion, and which simply claimed the using of sulphur as described, neither party having any idea of vulcanization afterward discovered by Goodyear.

During this time he issued several licenses for working under his acid-gas and solarizing process, which was thought a great improvement, and which brought him in a few thousand dollars. His fortunes seemed in the ascendant, and he manufactured large quantities of fancy articles, and obtained an order from the government for a number of mail-bags. With all the goods he was now making he mixed large quantities of pigments—chromes, white lead, and vermilion—but without chemical knowledge, he was ignorant of the effect of these metallic colors on the india-rubber after undergoing his acid-gas process, and the result was, that the whole proved a ruinous failure, all the goods decomposing within a short time after their completion. Everything he possessed was again brought to the hammer, and his aged parents, whom he had been for some time supporting, together with his own family and two younger brothers, were left penniless. Four years had been spent in experiments, all of which had proved fruitless, and it was generally agreed by those who had hitherto assisted him "that the man who could proceed further in a course of this sort was fairly deserving of all the distress brought upon himself." No hope could be looked for in that quarter. The only advice he got was to return to the hardware business ; even his licensees, discouraged by their failures, would not grant him any assistance. The india-rubber trade in the United States was at its lowest ebb, the ruinous losses which had fallen upon those who had invested their money in it making it a public calamity. He had, however, made it his leading star, and no persuasions could make him give it up. Reduced to poverty and the pawn-shop, he is described as being recognizable "as a man who has on an india-rubber cap, stock, coat, vest, and shoes, with an india-rubber purse without a cent of money in it"—an encouraging picture for those to whom he applies for help. But fortune was in store for him. One day accidentally bringing a portion of rubber mixed with sulphur, which he had in his hand, in contact with a hot stove, he found that it had undergone a change such as he had not before noticed, and following up the experiment for some months alone in the factory at Woburn, he discovered the process which makes it proof against cold, and the usual solvents, and, as he himself says, he felt amply repaid for the past, and quite indifferent as to the trials of the future. Perseverance had met with its reward, and the future, though not bright at first, and often clouded over by trouble, eventually bore out his hopes to their fullest extent. Not to follow too closely his chequered career, we may here state that although he at once patented his invention, two years elapsed before he could get any one to assist him in bringing it before the public, such was the general aversion to any more experiments with what had hitherto proved so disastrous a failure—a state of things so unfavorable to the promulgation of the discovery as can well be imagined. The interval was occupied by making various improvements, life being sustained by means of diverse loans of five and ten dollars, presents of barrels of flour from sympathizing friends, pawning even his children's school-books, and other shifts with which poverty is familiar. He felt he had now, however, grounds of assurance which had never existed with regard to previous improvements. The discovery was made in winter, and the specimens did not harden. Summer returned and they did not soften by heat.

Swallowing Indigestible Substances.

Dr. Read exhibited at the Boston Society for Medical Improvement, a quantity of stones varying in size from that of a pea to that of a cherry, which had passed through the intestinal canal of a boy seven years old. Having seen one of the performers at a circus swallow, or pretend to swallow stones, he resolved to follow his example, and in the course of one afternoon he swallowed *sixty-four*, the united weight of which was a little more than nine ounces, and which filled an eight ounce bottle.

On the next day the stones could be felt through the walls of the abdomen, and, upon percussion, could be heard to rattle, but produced no inconvenience. Castor oil was administered, and they were readily expelled.

At the same meeting, the proceedings of which are reported in the *Boston Medical and Surgical Journal*, Dr. Tyler said that it was a common thing for patients at the McLean Insane Asylum, to swallow small objects, such as pieces of glass, coal, stone, thimbles, &c. Recently a woman swallowed a crochet needle which was voided without inconvenience. Among some of the patients was a curious propensity to swallow toads, and there is now in the Asylum a man who has swallowed half a dozen live toads without injury.

Dr. Adams stated, that in a case of obstruction of the bowel, which followed the eating of a large quantity of cherries and swallowing the stones, the nurse collected and counted *one thousand and seventy-seven* cherry stones which were evacuated.

Dr. Agnew, of this city, has in his private collection a preparation of the stomach and intestines from an insane patient, in which are accumulated an extraordinary variety of foreign materials, among which we recollect having seen long strips of bandage, suspenders, portions of clothing, buttons, &c.

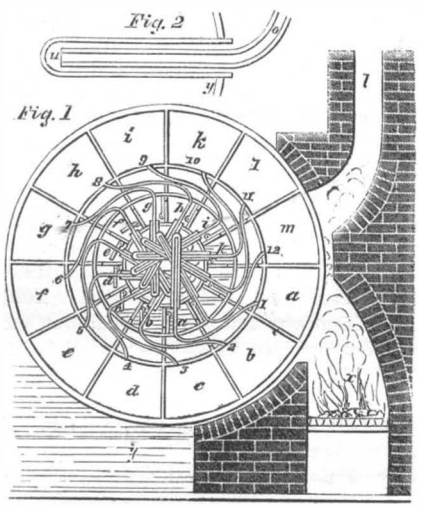
A SOLID cake of gold, worth nearly $50,000, has been sold to the Bank of New South Wales, and the quartz reef from which it was obtained will produce $150,000 a year for many years to come.

ROMANCE OF THE STEAM ENGINE.

ARTICLE VIII.

AMONTONS—FIRE WHEEL.

After Savery, the next inventor who produced a peculiar caloric motor was Guillaume Amontons, of Paris, who was so deaf that he was thereby deprived of the sweets of social intercourse except with his own family. He early exhibited a taste for mechanics and, as is mostly the case with young enthusiasts in this line, his first efforts were directed to invent a perpetual motion. His experience soon taught him that he was in search of an impossibility, and he then devoted his attention to other projects, among the rest a hot air engine entirely different from any that had preceded him. This machine was called a fire wheel by Amontons, and is described as being operated by the action of heated air forcing a quantity of water up one side of a wheel and producing a rotary motion by its differing weight from the other side. Amontons appears to have been partial to expansive air as the motive agent of his engine, represented in section by the annexed Figs. 1 and 2. This fire wheel, as described by its inventor, consists of two concentric rings connected and communicating with small pipes, 1, 2, 3, 4, &c. The outer ring of the wheel is divided into several compartments, *a*, *b*, *c*, *d*, *e*, *f*, &c. These



were closed so as to have no connection with one another. The inner ring is divided into the same number of compartments, *a*, *b*, *c*, *d*, *e*, *f*, &c.; each of these communicates with the adjoining chamber by a hinged valve opening only in one direction—upwards. Although the two rings and their series of compartments are placed at a distance, each compartment of the one communicates with a corresponding division of the other by small pipes, 1, 2, 3, 4, &c. The wheel is so placed as to have one side of its periphery exposed to the action of a fire, and the other side is immersed in a cistern, *y*, of cold water. Four or five of the lower chambers of the inner series are filled with water. A fire is made in the furnace, *x;* this heats the air in the chamber, *a*, of the outer series, the air of which, becoming rarefied, flows through the pipe, 1, into the chamber, *a*, of the inner series, and presses upon the water which it contains and forces it upwards into the divisions on the side of the wheel nearest the furnace, which gives it a preponderance and causes it to descend. The cell, *a*, is now in the position at first occupied by *b*, and *c* is in that where it begins to enter the cistern; the air which is contained in the divisions which had been heated now being brought into contact with the water, it is condensed, and continues so until, by the revolution of the wheel, it is again brought, in its turn, into contact with the fire of the furnace.

Nothing can be simpler than the hypothetical action of this mechanism; its effect was, as usual, not underrated. The wheel was 12 feet in diameter, and the cells were calculated to contain 750 cubic feet of water, and an entire revolution to be made in about thirty-five seconds. This great weight, applied tangentially to one side of the wheel, was to give it a continuous preponderance, which was calculated, very minutely, to equal in effect the power of thirty-four horses, or two hundred and thirty-four men.

Throwing the practical merit of this mechanism totally out of the question, the combination is exceedingly meritorious; and looking to the time of its invention, and the perfect novelty of the idea, it has many claims to a more favorable consideration as a first thought, than has usually been awarded to it. That it presents glaring defects cannot be denied; but had length of years been alloted by Providence to its amiable projector, the same ingenuity which first traced the outline might have effectively supplied its deficiences. A negative proof of its merit is, that it has been the type of several attempts at the construction of steam wheels among later mechanics.

While Amontons, in France, was engaged in his steam wheel, and Savery, in England, had achieved so brilliant a triumph, Papin was again exerting himself at Marpurg, in Germany, to bend the same powerful agent to the use of man; "as if the three nations of Europe, which had made," says Belidor, "the greatest advances in science, were each anxious to furnish a learned man to participate in the glory of so fine a discovery."

ELECTRICITY AND SOME OF ITS PRACTICAL APPLICATIONS.

ARTICLE V.

When two electrodes of carbon are brought into contact with each other, or an electrode of carbon is lowered upon mercury, there is produced the well-known electric light. This light, which, for power and beauty, excels all other artificial luminaries, and is equalled only by the sun, is produced by a stream of small particles of carbon, which are transported from the positive to the negative electrode, where a portion of them is found piled in an irregular heap, and sometimes crystallized. These particles are kept at a white heat by the battery, and while in that state give an intense light.

Some idea may be formed of the brilliancy of this light, from the fact that two chemists, while experimenting with it, brought it too near their organs of vision, and, as a consequence, were confined to a dark room for several days, and barely escaped with their eyesight. Any such occurrence may be avoided by wearing green spectacles, which, although they prevent injury to the eyes, allow all the motions of the light to be studied, as well as its general characteristics. The flame takes the form of an arc when the electrodes are separated, which separation may be effected in a greater or less degree, according to the power of the battery. When the electrodes are separated nearly to their farthest limit, more light is given off than in almost any other position; and to effect and maintain this separation continuously is a subject to which much attention has been and is being given in Europe, although it has attracted but little attention in this country. The positive electrode wastes away with a rapidity controlled by various circumstances, the worst varying from one-third of an inch and upward per hour. If the exact waste can be obtained, one of the electrodes can be fed forward by means of clockwork, and the interval between the two kept of an uniform length. Another device is to have the current itself regulate the motion of the positive electrode; and such an arrangement is, if well constructed, much the best, as it will accommodate itself to a current of any power, while, if simple clockwork is used, a new adjustment must be made for every important change in the battery. One device is like the old fashioned steam engine, opening a port of the same size for each stroke; the other like the modern engine with its self-adjusting cut-off, varying the use of its port according to the pressure and the amount of work to be done. The current required for the production of the electric light may be either one of great quantity or of great intensity. A current of quantity will produce a wide and short arc of flame, E E, while a current of intensity will produce a long and narrow

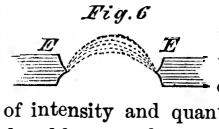


Fig. 6

arc. From this, it is evident that the battery best suited for the production of this light is one which gives a current both of intensity and quantity, and such a current is produced by a number of alternations of large cells. One of the best batteries for experimenting with this light is Daniells', twenty cells of which (the zinc being seven inches in hight and two in diameter) give a current sufficiently powerful to exhibit the light upon a small scale; but with from 50 to 100 cells, a magnificent light will be produced. Bunsen's battery is chiefly used for this purpose, and when well managed it is, for the same number of cells, far superior to Daniells', although very expensive and troublesome in its working, and liable to the objections before given. A series of 40 cells of this battery, recently exhibited in Paris, produced a light equal in power to 3,500 wax tapers! The battery, though very convenient for producing the light, has been superseded, to some extent, by a machine in which no acids or liquids of any kind are used, the current being induced by permanent magnetism.

Before proceeding to a description of this important piece of apparatus, it will be necessary to mention a few of the principles of induction. The subject of induction should properly be considered by itself, but it is so intimately connected with that of the electric light that we shall consider it in this place.

Fig. 7

A number of years since, it was observed that if a current of electricity was made to traverse one of two parallel wires, a wave of electricity was produced in the secondary wire, and in the opposite direction to that in the primary wire; and that when the current was broken, another current was produced in the same direction that the primary current had flowed. In the cut, S represents the secondary wire, and P the primary.

In 1831, it was observed by Faraday that an electro-magnet possessed the same power. The cut represents a sectional elevation of such an arrangement.

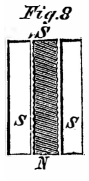


Fig. 8

N S is a bar of soft iron, around which is wound the primary or battery wire; S S is the secondary coil. In this case, both the primary and secondary currents flow in the same direction, because the secondary current is induced, not by the primary one but by the electro-magnet. The moment that the current ceases, there is induced another current, opposite in direction to the first.

About the same time that he made this discovery, Faraday also found that permanent magnets possessed the same power of induction. The cut represents a device by which a spark may be obtained by the use of a common horse-shoe magnet, of moderate power. S N represent the poles of the magnet, and N′ S′ the extremities of its armature. Around this, several feet of insulated wire are coiled, and its two ends brought as near as possible to each other without their touching. This being done, a faint spark will be seen whenever the armature is separated from, or brought in contact with the magnet.

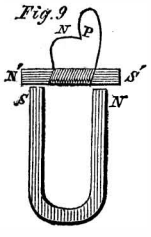


Fig. 9

Salt and its Offices.

Some modern agricultural writers have doubted the necessity of giving animals salt. The following remarks as to the effect of salt upon health, by Professor Johnston, may be relished by those who still put salt in their own puddings, and allow their cattle a little now and then:—

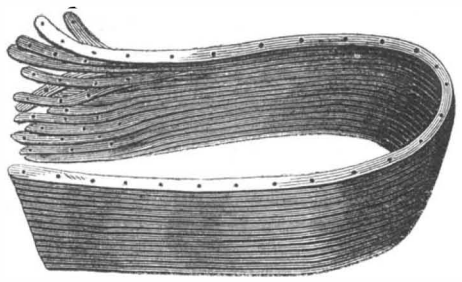
The wild buffalo frequents the salt licks of Northwestern America; the wild animals in the central parts of South Africa are a sure prey to the hunter who conceals himself behind a salt spring; and our domestic cattle run peacefully to the hand that offers them a taste of this delicious luxury. From time immemorial, it has been known that, without salt, man would miserably perish; and among horrible punishments, entailing certain death, that of feeding culprits on saltless food is said to have prevailed in barbarous times. Maggots and corruption are spoken of by ancient writers as the distressing symptoms which saltless food engenders; but no ancient or unchemical modern could explain how such sufferings arose. Now we know why the animal craves salt—why it suffers discomfort, and why it ultimately falls into disease if salt is for a time withheld. Upward of half the saline matter of the blood (57 per cent) consists of common salt, and as this is partially discharged every day through the skin and the kidneys, the necessity of continued supplies of it to the healthy body becomes sufficiently obvious. The bile also contains soda as a special and indispensable constituent, and so do all the cartilages of the body. Stint the supply of salt, therefore, and neither will the bile be able properly to assist the digestion, nor allow the cartilages to be built up again as fast as they naturally waste.

DIMINISHED SLAUGHTER.—The number of hogs slaughtered this season at Louisville, Ky., and in its vicinity is 194,797, or about 40,000 less than at this time last year. The receipts of hogs at Cincinnati, Ohio, thus far this season, are 263,363, a decrease of 111,000, as compared with last year to this time.

HAINE'S IMPROVED LEATHER DRIVING STRAP.

[From the London Engineer.]

This invention of Mr. M. J. Haine, of Strood (patented August 14, 1860), has for its object improvements in the manufacture of driving straps. For these purposes, the material (generally leather or hides) is cut into narrow strips or fillets, each strip or fillet being of the thickness of the intended driving strap, and these are placed side by side with the cut edges of the leather or material coming to the upper and under surfaces of the intended driving strap, until the desired width of strap is obtained. In arranging the strips side by side, care is taken that the ends of the several strips or fillets come at a distance from each other, so that the strips or fillets break joint, in order that the strap may not be weaker in one part than in



another. In order to connect together the several strips thus laid side by side, the several strips are pressed together and holes are bored through them at intervals from edge to edge of the driving strap; the strips may then be fastened together by introducing lengths of iron, copper or other wire, having a head formed at one end through the holes, and then turning over, clinching or riveting the other ends of the wires. Or the several strips may be united together by screws screwing through the holes in the several strips, the screws being screwed into the holes alternately, first from one edge of the strap and then from the other, so that the heads of half of the screws will be on one edge, and the heads of the other half will be on the other edge. The several strips may also be connected together after the holes have been made through them, as above described, by means of copper or other wires, two wires being employed for this purpose, and both wires being passed in opposite directions through each hole, and each wire, after it has passed through one hole, being bent round and passed through the next hole, and so on; or, in place of wire being employed, the several strips may be sewed together, as described, by means of twine or any other material. In place of the holes being made in the several strips of leather after they have been placed side by side, each strip of leather may separately have holes made through it at regular intervals, so that when the strips are placed side by side the holes may correspond, and then be fastened by any of the beforementioned means.

These bands may be made of any required length, without laps or cross joints; their thickness being uniform from end to end, there are no weak places; and all unequal strain being avoided, they work smoothly and perfectly straight. The inventor states that these bands can be made of any thickness or strength required, without sewing or riveting, thus avoiding the liability to ripping which so frequently occurs in the common straps. By this mode of working the strap on the edge of the leather instead of on the flat, all chance of cracking the grain of the leather, and thereby weakening the strap, and ultimately breaking it, is avoided. It is also claimed as an advantage that they may also be used much slacker than the common strap, as the result of placing the edges of the leather in contact with the surface of the drum or pulley insures a much larger amount of adhesion (or hugging, as it is technically termed) than is produced by the ordinary method.

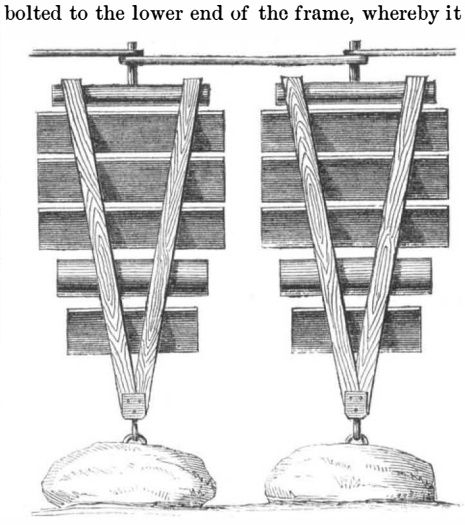
The importation of dry goods for the week ending Jan. 12, were over $2,500,000, of which one and a half millions have gone at once to market. In the same week last season only $300,000 were marketed out of $1,500,000 entered at the port. The figures indicate that importers in New York are to have ample assortments of goods, and that so far as supplying merchandise to the country is concerned, the political troubles have not been allowed to diminish the preparations thus far.

GRANT'S IMPROVEMENTS IN BREAKWATERS.

We find in the London *Mechanics' Magazine*, the description of a newly-invented breakwater, which appears to be so remarkably cheap in its construction, that we transfer the description and illustration to our columns :—

Mr. J. Grant, of Glen Grant, Moray county, Scotland, has patented certain improvements in floating breakwaters. His invention consists in forming a breakwater of any required number of apparatuses constructed as hereafter described. Each apparatus is formed of a frame made to carry a number of louvre boards or plates; the main part of the frame is composed of two beams brought close together at that part which is to become the bottom of the apparatus. As the beams are carried upward they diverge and make a conical-shaped frame; the louvre boards or plates are fitted at an angle into and across the beams. The beams have fixed on them buoys to increase or insure their buoyancy. Each separate apparatus is moored to a screw-pile, a block of stone, or other mooring by its lower end; the upper end carries one or more projecting pins or studs, and iron rods, formed at both ends with eyes, are passed over the studs, to connect the apparatuses to each other, prevent their coming in contact, and unite any desired number of the apparatuses into a complete breakwater. Each apparatus floats vertically, or at a greater or lesser angle to the horizontal line, and is partially submerged. Each of the apparatuses is capable of independent play, and the waves, striking against the louvre plates, are broken, and the water becomes comparatively still inside of the breakwater.

In the accompanying engraving two of these apparatuses, connected together in the manner just described, are shown. The beams, forming the frame of each apparatus, meet and are fixed together at their lower part. Across them are louvre boards, inserted in the beams, one above the other, as shown. The buoys are secured to the frame, one at or near its upper part, and the other near the bottom thereof. A ring is bolted to the lower end of the frame, whereby it may



be connected to a mooring or anchor. At the top are connecting rods; they are made with eyes which pass over studs on the upper part of the frame, where they are secured by bolts, pins, or otherwise. Any number of these apparatuses may be connected together, and moored in a straight line, in a curve, or in any other figure according to the part to be protected or the extent of water to be made smooth. In some cases the connecting rods may be dispensed with.

Leaves of Plants.—Autumn leaves by millions rot in heaps unheeded, and yet each one a microscopic wonder of contrivance. And this snow wreath that half envelopes them, made up of myriads of crystals, melting while I look at them. What an utter waste it seems! Wisdom and beauty thrown wholesale into a pit of corruption. Until the day of the resurrection we shall never comprehend this melancholy mystery. Then shall atoms all be portioned out, and every organized particle of the earth's crust be found to be a part of some soul's tabernacle. Then shall we understand how Cæsar's dust has also lived in the leaf, and his moisture effloresced in the snow, duly to be restored and produced when time and its use are no longer; but meanwhile used everywhere, and nothing lost, mislaid, wasted or forgotten.—*Dublin University Magazine.*

THE SCIENCE OF COMMON THINGS.

Number V.

BONES AND ROCKS.

"In our examination of the beefsteak last week, we omitted all mention of the bit of bone in it. I wish to call your attention to this, as it contains a sample of the only remaining class of the simple elements. You remember that there are 62 elements at present known, 47 of which are metals. With most of the metals which occur in any considerable quantity you are familiar; the four principal organic elements I have described; and now there remains a small class of other substances which are worthy of our attention. One of these is sulphur or brimstone, and another is phosphorus. It is the latter which is contained in bones. A considerable portion of bones, as they exist in living bodies, consists of animal matter, but after this is removed, the remaining part—dry bones—are the phosphate of lime. They are composed of phosphoric acid and lime. If they were composed of simple phosphorus and lime they would be called the phosphuret of lime, but combinations of phosphoric acid are called phosphates. Phosphorus is extracted from bones and used, among other purposes, in the manufacture of friction matches. When warm it is soft like wax, but brittle when cold. If perfectly pure, it is colorless and transparent, but generally appears yellowish and translucent merely."

"Do you say that the phosphorus which is used for making matches is obtained from bones?"

"It can be procured from other sources, but it is principally obtained from bones. There is one other element that exists in large quantity, which you never see separated from its compounds except in chemical laboratories, but with the oxyd of which you are very familiar. This is silicon, and its oxyd is silex. You see it as flint and as quartz rock. It also forms a part of many other rocks, and is believed to constitute a larger portion of the solid crust of the earth than any other element, with the single exception of oxygen. Excepting silex, almost all rocks are oxyds of metals; indeed, some chemists call silicon a metal, but it has none of the properties of metals. It is a dark brown powder."

"And are these all of the simple elements besides the metals?"

"No; there are two more which I will mention to you in this connection, and that will complete our examination of the simple elements. One of these is iodine, which, from its changes under the action of light, is used extensively in photography; indeed, it may be regarded as the corner stone of photography. The other element is the great bleaching substance—chlorine. Table salt is composed of chlorine and a metal—sodium—and is therefore known to chemists as the chloride of sodium. And this brief account will give you a pretty good general idea of the simple elements of which all the substances that constitute the earth, the air and the water of our globe are composed. We will examine some of these more in detail hereafter; there are, especially, some facts in relation to the metals which I think you will find interesting."

Locomotive Explosion.

A serious boiler explosion took place on the Hudson and Boston Railroad on the 29th of December last. The locomotive *Henry Gray*, while standing at Claverack station, exploded her boiler with tremendous force, throwing the smoke stack upright in the air, and scattering the fragments of the boiler far and near in every direction. One piece unroofed a barn; another damaged a building in the vicinity; a third was thrown a quarter of a mile upon a high hill, through the window of a seminary. The cylinder part of the boiler was blown open for the whole length, and the flues and machinery under it were twisted and bent in every conceivable direction by the force of the steam. Even the rails of the track were bent almost double, but, strange to say, the engineer and fireman were unhurt, though they were both on the engine at the time. The boiler was built by Chapin & Bemis, of Springfield, Mass., and had been in use about four years. On examination, it was found to have been of good iron, but the plate much thinner than usual in locomotives. The engineer states that there was about 90 lbs. pressure on at the time. The report was distinctly heard a distance of four miles.

The London "Times"—A Glance at its Machinery.

The London *Times* is the recognized organ of British public opinion, and is beyond all question the most ably edited and influential journal in the world. Its editorials are essays upon the great political, literary and social topics of the day, and so powerfully written that they have been collected into books; while its correspondence from all parts of the world is an inexhaustible source of information. A complete set of the London *Times* from its commencement forms the most voluminous history of the world in print. All details, therefore, connected with this powerful journal will be read with interest by our readers. A correspondent of the French journal, *Courrier de l'Eure*, after visiting that establishment, furnishes the following particulars:—

I have visited in London the printing-office of the *Times*. It is truly something great and wonderful; there is nowhere in France anything of the kind to equal it. At the starting of the paper in 1791, the *Times* consisted of only a single page, and was printed by a hand-press, which struck off one side of two hundred sheets per hour. In 1814, Kœnig made a press which struck off 1,800 sheets. In 1827, Applegarth, aided by Courier, constructed a new one, on which 4,000 to 5,000 copies could be printed. In 1828, the same Applegarth established his famous vertical machine, which I examined, and on which 10,000 copies per hour are struck off. Since 1828 the managers of the *Times* have erected another machine, with horizontal cylinders, which strikes off eight copies at once or about 12,500 per hour. These two presses, which make while at work a deafening noise, and which can be stopped at a moment's notice, are moved by a steam engine of 45-horse power. Adjoining the room in which is the boiler is a closet containing white marble bathing tubs intended for the workmen in the establishment. They cost ninety guineas.

A compositor on the *Times* must have passed an examination showing that he can set at least 40 lines of 56 letters or about 2,240 letters per hour. The price paid for type-setting is 11d. per thousand letters, at which rate the compositor can make from 25 to 30 francs in an ordinary day's work. This amounts to about five dollars per day. There are 124 compositors employed, 50 of whom are occupied solely in setting up advertisements. Five or six stenographers take notes of Parliamentary proceedings, at Westminster, and return every quarter of an hour to the newspaper office, to put their copy in shape and let the compositors have it without delay. In this way it often happens that a speech delivered at two o'clock in the morning appears in the journal which is struck off at six o'clock and distributed at seven.

The editorial room is large and well lighted. In the center is a huge oak table, and around the room are little desks finished with every convenience for writing. Adjoining, is a dining-room for the editors, and the archive room, where are stored all the files of the *Times* since its foundation. Next to the archive chamber, I saw the proof-readers' rooms, where are hundreds of dictionaries and encyclopædias, in all languages and relating to all subjects. A dozen proof-readers are employed during the day and another dozen during the night. They have an eating-room adjoining that where they work, and their meals are provided at the expense of the establishment.

On another story is a small room where are printed the registers and envelopes for the mail papers. Every one of the editors living in London carries with him a number of envelopes addressed to the *Times*, so that in any place where he may happen to be, at the theatre, the races, or elsewhere, he can send by a special messenger his copy to the office. The foreign correspondents have envelopes of red paper, which are sent immediately on their arrival from the Post Office to the *Times* office. Supplies of paper and ink are constantly kept in readiness. Four thousand pounds of ink are used each week. The paper is weighed in the establishment by a very ingenious machine. It is also postmarked on the spot. The journal appears every morning and evening. But sometimes during the day special editions are issued when important news demands. This extra edition can be prepared in two hours. When I visited the establishment it was one o'clock in the day, and the news had just arrived of the death, at half-past twelve, of Albert Smith. At half-past two the *Times* appeared with his obituary.

The administration of the *Times* has nothing to do with the subscriptions to the paper. Smith, of the Strand, attends to the mailing of the papers for England, Europe, and, indeed, the entire world. Mr. Smith takes thirty thousand copies a day, sixteen thousand of which he receives at five o'clock in the morning, and despatches them by carriers at six o'clock. The other numbers of the *Times* are bought by one hundred and seventy news-dealers, who pay in advance. They order each day the number of copies they will need for the day following. They pay 30 centimes for each copy, retailing it at 50 centimes. The management of the paper lose something on each sheet by selling it at such a price, but look to the advertisements for their profits. The charges for these advertisements are, of course, very large, and the amount must be considerable, as the revenue of the *Times* reaches to nearly five million francs. I was told that one of the proprietors of the *Times* had given as a dowry to his daughter the money accruing from one advertising page of the paper for one year.

The wear and tear produced by the perpetual motion which reigns in this immense establishment is so great that it is necessary to rebuild and strengthen once every two years the lower stories of the building. In the museum I was shown the arms with which some ten years ago the workmen of the establishment, to the number of three hundred and fifty, repressed a disorderly mob.

Insect Powder.

A vegetable powder, under the name of "Persian Insect Powder," has lately been introduced into the drug market, for the extermination of insects, vegetable parasites, &c. Until recently, the botanical source of this powder has not been known. For a number of years it was erroneously considered to be a native of Persia, but it has been traced beyond question by Dr. Koch, as having its origin in the Caucasian provinces, and to be the contused blossoms and flowers of Pyrethrum Roseum and Pyrethrum Carneum. It is of a yellowish, gray color, perfectly odorless, yet slightly irritating the nostrils; at first almost tasteless, but afterwards leaving a burning sensation upon the tongue. The high price obtained for it, taken in connection with the scarcity of the article, has induced dealers to adulterate it with plants of similar characteristics, such as chamomile flowers, fleabane, &c.; but the presence of these extraneous substances can, without difficulty, be detected by their peculiar odor, and from the fact that, in proportion as these substances are introduced, the efficacy of the powder is impaired.

From experiments lately made in Europe, it has been sufficiently demonstrated that the plant can be propagated from the seed, and that it will thrive well in a climate similar to that of our Northern States.

I have recently been informed by a gentleman who obtained some of the seeds of this plant from the Agricultural Bureau at Washington, that the plants therefrom are in a flourishing and prosperous condition.

As its effects for the destruction of bugs, roaches, parasites on delicate plants, &c., have been fully established, and it being otherwise harmless, its introduction into general use would be of great importance to families and horticulturists, from the fact that it would exclude the use of poisonous articles, now resorted to for such purposes, which are often the cause of serious accidents.—*Correspondent American Journal of Pharmacy.*

Ponderous Iron Beams.—The machinery of the Phœnix Iron Company is now so powerful that they can roll the largest beams ever made in the United States. They have already rolled a number for the West Point Foundry Company, each beam being twelve inches deep, four inches wide on the top and bottom flanges, weighing 120 pounds to the yard, and being 21 feet long. Lengths of 40 feet may, however, be made with the same facility.

A Novel Stove.—The old adage that "Necessity is the mother of Invention" has received a new illustration in the shape of a stove which was lately brought to Denver City, Pike's Peak, by a gentleman from Fort Laramie. It consists of a stove pipe, the whole made entirely from oyster and fruit cans that had served their original purpose and become obsolete. It is a very good article of household furniture, and was the work of a soldier at Fort Bridger.

American Railway Review.

With the new year, this excellent journal enters upon the commencement of its fourth volume. From the issue of Jan. 3, we extract the following article, which will give a good idea of the scope and objects of the publication:—

Information for Capitalists.—It is worthy of note, among the many eccentricities of foreign holders of our stocks, that a French capitalist, who holds 1,000 shares of the stock of one of the Ohio railroads, comes to this country every year and a half or two years and goes into a thorough investigation of the condition of the road. We venture to say that this foreigner is better informed in regard to the working condition of the line than some directors who profess to look after the interests of stockholders. It is the misfortune of the proprietary of large corporations that the agents whom they elect to protect their property are too deep in private schemes of aggrandizement to faithfully perform their duties.—*Evening Post.*

Foreseeing the importance of a properly organized, impartial and independent system of acquiring and communicating authentic information of the state of any railroad in the country, our Railway Bureau was organized and put in operation more than two years ago. It has accumulated the most valuable fund of railway knowledge, as to business, finance, manner and expense of operating, condition and prospects, which was ever comprised in a single department, out of which fund the *Review* was enabled, some time since, to take its rank at the head of the railway literature of the day.

The executive, statistical and editorial departments of the Bureau are under the control of gentlemen who, as business men, in the most active capacity, are best qualified for the analysis and comprehension of the salient points of our railway system, and who have spared no pains to acquire the information most valuable to capitalists at home or abroad, and most important to effective and economical operation. Having no personal connection with any of the railways which interest the financial operators of the market, their conclusions, based upon competent testimony, are precisely of the character which capitalists require, and cannot themselves as certainly obtain. For European financiers, particularly, such an institution is destined to prove of great importance.

Captain Michael Baker.

The Boston *Commercial Bulletin* says that Capt. M. Baker, of South Dartmouth, Mass., who died Dec. 31, will long be remembered by the commercial and agricultural world as the discoverer of guano on "New Nantucket," now called Baker's Island. The discovery was in this wise. On board of the ship commanded by Capt. Baker in the years 1841, there was an orphan named Warren Wilbur. This young man was fatally injured by falling from the look-out aloft, and his dying request of Capt. B., who watched over and cared for him as if he had been his own son, was to bury him on land. Capt. B. promised to do so if possible, and being in the vicinity of Baker's Island, interred him there. In digging the grave, he discovered what he then thought to be a most remarkable kind of soil, the dust of which so enveloped and choked the men, that they were compelled to abandon the place first attempted, and chose another nearer the shore where it was not so dry. Thus while engaged in performing an act of kindness, which always characterized his life, he gave origin to a business for thousands of ships, and the basis of food for millions.

The Coal Trade.—The coal trade of Pennsylvania for 1860 amounted to 9,528,024 tons, of which 8,131,234 tons were anthracite, 1,156,093 semi-anthracite and bituminous, and 240,697 imported. The increase in anthracite this year is 613,717 tons, and the other kinds gave an increase of only 24,519 tons, making the increase for the year 638,232 tons, against 1,115,399 tons, the increase in 1859, over the supply of 1858. Of the whole supply of hard anthracites sent to market in 1860, Schuylkill county furnished 3,292,828; the other regions 4,838,578. Balance against Schuylkill county, 1,545,578. In 1856 Schuylkill county furnished more than one-half the anthracite coal sent to market—this year, she falls short of half the supply 1,545,578 tons.

Earthquake in South Carolina.—The Charleston *Courier* states that the shock of an earthquake was distinctly felt at Spartanburg, S. C., on the afternoon of the 3d ult., at 4½ o'clock. The motion was East and West, and was so severe as to cause persons to run out in the street to see if the houses were not falling. The shock was also felt in Atlanta, Ga.

Our Correspondence.

Sulphur Water—Softening Hard Water.

MESSRS. EDITORS:—I will endeavor to give some information on this subject, suggested by reading the article on page 386, Vol. III. (new series), of the SCIENTIFIC AMERICAN. Sulphur is found in hard waters under different combinations, such as sulphuric acid, sulphurous acid, sulphate of lime, sulphate of iron, and sulphate of alumina. The first is a powerful solvent of iron, and so is the second, under certain circumstances. The sulphates of lime, iron and alumina, together with the carbonates of lime and iron, in waters, form incrustations in steam boilers. The following recipe will be found useful for softening such water and removing the sulphates, by treating the water before it is pumped into the boiler.

Dissolve 1 lb. of salsoda in 1 gallen of boiling water, and to this add ¾ lb. of fresh burned and slacked lime; agitate these together and allow the water to rest for the sediment to settle. The clear liquor is next poured off and forms a caustic ley. A little of this ley is now placed in a glass tumbler, and a few drops of hydrochloric (muriatic) acid are added. If the liquor effervesces, a little more lime must be added. The acid is a test, and when the ley ceases to effervesce by adding a few drops of the acid, it is a sign that it is fit for use. This caustic ley will precipitate sulphates and carbonates in hard water, and render the latter soft and fit for feeding into boilers or for washing purposes. A certain quantity of this ley is requisite to treat a certain quantity of hard water, and the way to determine this is as follows:—Take a gallon of the hard water to be softened; add one ounce of the prepared ley to it, and allow the sediment to settle for ten minutes; now add another ounce of the ley, and if no flocculent matter, or precipitate, appears, it is a sign that one ounce of the ley will purify one gallon of the hard water. The ley must be added until all the earthy impurities in the water are thrown down. From these data, a calculation can be made for thousands of gallons. Thus, for a 10-horse power boiler, 600 gallons of water will be required in 10 hours, and 3¾ gallons of this ley will be sufficient to purify it. This should be done in a settling tank, and the purified water run off into a supply cistern for feeding the boiler. The water must not be rendered caustic, or it will act on the metal.

J. J. J.

Shanesville, Ohio, January 5, 1861.

Manufacture of American Steel.

MESSRS. EDITORS:—Being a careful and constant reader of the SCIENTIFIC AMERICAN, my attention has been directed to the manufacture of cast steel in the United States; and I have felt the necessity of giving some information respecting the real progress which has been made toward developing this very important branch of manufacture among us.

There is a very general opinion entertained by the people of our country that the finer grades of cast steel suitable for edge tools and saws are beyond the skill of our home manufacturers to produce, and this erroneous impression has been very generally circulated. But, fortunately for the success of this enterprize in the "Iron City," the business is in the hands of men capable of disregarding all such notions. In a national point of view, every American must feel an honest pride while contemplating the success of so important an undertaking. That American fine steel is now a perfect success, there is not a shadow of doubt, as it has been tested with the most celebrated brands of English manufacturers.

Messrs. Hussey, Wells & Co., of this city, confining their attention particularly to tool steel of the finer grades—also, mill and circular saw plate steel—have succeeded perfectly in giving us an A1 article in every respect. Their edge tool steel, especially, is of very superior quality, having every requisite necessary in point of uniformity characteristic of the most celebrated English brands, and possessing some peculiar advantages. It has been subjected, without injury, to heats that would render the English steel totally unfit for any purpose. It has been tested with foreign brands, whose reputation for superior quality stands in the front ranks; it has not only vied with them successfully in every particular as to strength, toughness and firmness, but, in the opinion of those who made the tests, it excelled in these qualities. The parties who made these tests have been practical workers in the finer grades of steel suitable for edge tools for the last twenty-five years. It is a well-known fact that England is dependant upon Sweden for irons suitable for making the finer grades of steel, having none native to her soil that can be considered an A1 article for this purpose. There is, of course, various grades of irons made in Sweden, but the very best are in very limited quantities, and these command exorbitant prices, in comparison with our native irons adapted to making steel of a like quality. Steel made exclusively from any one or a mixture of the highest-priced Swedish irons is never exported to this country, on account of its price.

In the case of our American steel, the test bars were taken indiscriminately from the daily product of their work, and manufactured exclusively from native iron. This company also manufacture the steel plates out of which is made the larger descriptions of circular saws, rising five feet in diameter, which are now coming into universal use for sawing lumber. Until this house demonstrated the practicability of making them, they were never before attempted in this country. Their plates gage equally as well as the most approved English make, and, in point of quality, their merits are equally as apparent. We cannot only manufacture as good steel in this country as that which comes from abroad, but the comparative tests made with them warrant me in saying that we make better; and should any manufactories at home or abroad call into question this broad assertion, if they feel any interest in contrasting the relative merits of the steel made by this house with their own, the invitation is open to all to come forward with the best article that it is possible for them to produce, and every facility will be afforded them to settle the question to their perfect satisfaction.

A CONSUMER.

Pittsburgh, Pa., Jan. 12, 1861.

The Aquarium.

MESSRS. EDITORS:—As there are a great many who are ignorant of the manner of making and stocking an aquarium, I will try and state in a few words my experience in the matter.

First, the right time to make a tank is in the winter, for then you will have plenty of time to construct it, and the tank will be well seasoned, which is of great importance. The best material that can be used for the bottom is marble, which may be had at a small price; it should be grooved to the depth of three-eighths of an inch, and holes cut for the posts a little deeper than the groove, with a small hole in the center to admit of its being fastened securely to the post. I have cherry posts in my tank; they are two inches in diameter, and one foot high; two grooves run at right angles to each other the entire length of the posts, and of the same size as to correspond with those in the marble.

Now for the way of putting it together. In the bottom of each post I set in a two-inch stove bolt, so that I could fasten it with ease to the marble; then slipping in the glass (which should be double thickness), press it between the wood and marble with small scraps of india-rubber, and then crowd in common putty. When the glass is all set, put small slips of wood around the top to protect the glass and keep the posts from spreading. Now let it stand ten or twelve days, and next give the inside woodwork four good coats of white zinc paint. You may varnish or oil the outside, just as you like best.

If the above directions are carried out in a workmanlike manner, I will warrant a good tight tank, and one in which there is nothing that can hurt the fish.

In the stocking of the tank, first put in one inch of clean sand (planting in it a kala or two, with a sprig of water weed, hornwort, or some other weed, found in almost any pond); next put in an inch of white gravel, then whatever stonework you may choose; but not too much, as it is apt to taint the water with lime. Now pour in very slowly pure soft water that has not been touched by wood, letting it fall on the rockwork, so that it may be filled with as much air as possible, to the depth of six or eight inches; let it stand three or four days so that the water may become impregnated with the oxygen from the plants, and, in the meanwhile, you may look out for fish, &c. For a tank two feet long and fifteen inches wide, three small goldfish, four minnows, two crayfish, one small turtle, and ten or twelve snails, are quite enough.

Rochester, N. Y., Jan. 12, 1861. T. D. A.

Column of Varieties.

The quantity of carbonic acid gas locked up in every cubic yard of limestone has been estimated at 10,000 cubic feet.

On one farm at Monterey, Cal., there are 50,000 grape vines arranged on the slope of the mountain, from which 1,500 gallons of wine were obtained in 1860.

Every year France imports between 11,000 and 12,000 horses, at an expense of somewhere about 18,000,000 francs, and still the supply falls short of the demand.

Kelley's Island, in Lake Erie, is all a vineyard. The principal grape is the Catawba, which yields admirable wine. An acre in full bearing will produce 7,000 lbs. of grapes, worth $455, at 6½ cents per pound.

Gutta-percha, or a substance very closely resembling it, has been found in Berbice, British Guiana. It can be vulcanized and molded, and, in short, possesses all the qualities of gutta-percha. This discovery is due to Dr. Van Holst, of Berbice.

Pig iron which contains copper cannot be puddled so as to make wrought iron. In Germany, when one puddler wishes to annoy another, he stealthly throws a small piece of copper into his furnace, and this prevents his iron from boiling and becoming purified.

The condensed air of a crowded room gives a deposit, which, if allowed to remain a few days, forms a solid, thick, glutinous mass, having a strong odor of animal matter. If examined by a microscope, it is seen to undergo a remarkable change. First of all, it is converted into a vegetable growth, and this is followed by the production of multitudes of animalcula; a decisive proof that it must contain organic matter, otherwise it could not nourish organic beings.

Two French chemists suggest, in the *Cosmos*, a new method of obtaining gases in their liquid state, which consists in hastening the evaporation of certain liquids by the introduction of a minutely divided current of air. They also prove that, at very low temperatures, chemical combinations do not take place. The Abbé Moigno recommends the authors to ascertain at once whether or not carbon is soluble in carbonic acid as sulphur is in sulphide of carbon. A German philosopher has said that it is, and is occupying himself with the search for diamonds in that direction.

There has recently been presented to the museum of the Medical College, Mobile, a beautiful specimen of the lace-wood tree. The peculiarity of it is in the fibrous nature of the bark, which is about the eighth of an inch thick. From this bark has been dissected more than twenty coats of apparently real crape or lace—most of them large enough to serve as a small handkerchief. It can be washed and ironed like ordinary muslin. The tree is a native of the West Indies, and is very rare.

As a curious evidence of the fury of the storm, and the force with which the waves were dashed against the base of the cliffs on the exposed coast of Northern Scotland, it is mentioned in the *John o' Groat Journal* that a person whose kitchen garden is situated about 100 yards from the brink of the cliffs at Iresgoe, which are there upwards of 100 feet high, found a conger-eel among his cabbages, which had been thrown up with the spray to such a hight above the cliff that the wind had carried it over 100 yards intervening between the garden and the cliff head, and landed it in the yard "quite convenient."

The cars for the streets in New York and Brooklyn are mostly made by two companies, namely, Eaton & Gilbert, of Troy, and Gould & Co., of Albany, N. Y. In Philadelphia the manufacture of street cars is principally confined to two companies in that city, namely, Messrs. Murphy & Allison and Messrs. Kimball & Gorton. The first of the Philadelphia firms has manufactured 400 of such cars; the latter 300. The average value is $750 each.

Dr. Lawrence Smith has communicated a long article to Silliman's *Journal* on the meteoric shower which fell in Ohio last Spring, and described in our last volume. He asserts they are not fragments but small and distinct aerolites that have entered our atmosphere in groups, and that the light which they emit does not arise from incandescence, but from electricity, or some other cause. He also states that the noise which they produce is not caused by an explosion, but by concussion of the atmosphere. This is interesting information.

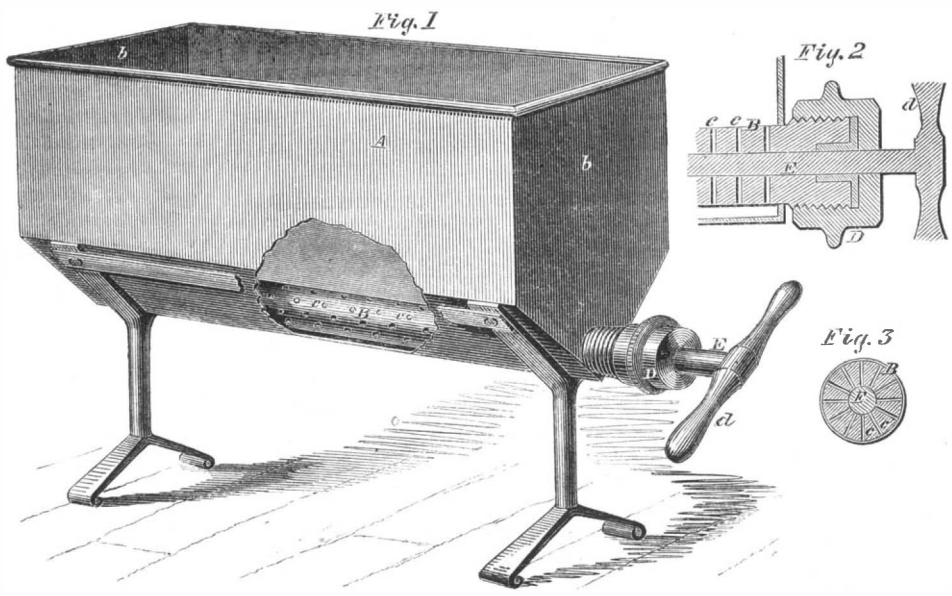
Improved Tanks for Crystallizing Sugar.

The tank here illustrated is for use in the manufacture and refining of sugar, in the treatment of the after or secondary products, *i. e.*, in the extraction of the still remaining crystalline sugar from the mother liquor or green sirup obtained from the drainings of the ordinary sugar molds which served to produce the primary loaf su gar.

In the refining of sugar, the sirup which drains from the molds contains a considerable quantity of sugar in small crystals, and as these, if they could be separated, would be worth more per pound than the sirup, a large aggregate value is wasted by selling them with the sirup. Much effort has been expended in reducing this waste to the lowest point, and there are now two methods which are principally employed for this purpose. One of these is founded on the fact that if sirup is cooled slowly, the crystals are generally larger than those which are formed in sirup cooling too rapidly. Taking advantage of this property of sirup, it is poured into bastard molds of larger size than ordinary molds, and as this larger bulk of sirup cools more slowly, it forms fewer of those fine crystals which drain off with the molasses. By the second method, the molasses is expelled from the mass of crystals by placing the mass in revolving drums covered at their peripheries with wire gauze, which retains the crystals while the molasses is thrown out by the centrifugal force between its meshes. Both of these methods are seriously defective. Though the bastard molds employed in the former are larger than the ordinary molds, they are not sufficiently large to prevent the formation of considerable quantities of fine crystals, or granulated sugar, which drains off with the molasses. By the second method, only a small quantity of crystals are obtained, a great mass of fine crystals being thrown out with the molasses. This plan is also objectionable from the expenditure of power required.

The improvement here illustrated consists in a peculiar construction and arrangement of crystallizing tanks, by which they may be made of so large a size as to hold a sufficient quantity of the liquid to secure slow cooling, and consequently the formation of large crystals. This tank, too, is of such form as to drain the molasses perfectly from the crystallized sugar. The construction is very simple and will be readily understood by a glance at the engravings, of which Fig. 1 is a perspective view, with a part broken away to show the interior. The tank, A, is of rectangular form, with its two sides bent and meeting in the middle of the bottom, as shown. Extending through the tank at the bottom is the stationary tube, B, which is pierced with numerous small holes, *c c*, for draining the molasses from the tank into the inside of the tube. The inner end of this tube is tightly closed, but the outer end extends through the end, J, of the tank, to lead off the molasses as it drains through into the tube. To close the holes, *c c*, while the sugar in the sirup is crystallizing, a solid wooden cylinder, E, made to fit the bore of the tube, B, is pushed into this tube throughout its whole length, thus closing all the holes, *c c*, and preventing the escape of the sirup. The outer end of the tube, B, is fitted with a packing box and tightening nut, D, in order to close it water-tight and prevent any leakage of sirup. When the crystallization of the sugar is completed, the cylinder, E, is withdrawn, and the molasses allowed to drain out through the tube, B. The handle, *b*, of the cylinder, E, is to facilitate the withdrawal of the cylinder, and also its occasional turning, to prevent its becoming fastened by the crystallization of the sugar.

The patent for this invention was granted on the 18th of December, 1860, to the inventor, Charles E. Bertrand, manager of Stuart's extensive sugar establishment in this city, who has assigned it to A. Theurkauf, to whom inquiries for further information in relation to it may be addressed at No. 80 Beaver-street, this city.



BERTRAND'S IMPROVED TANKS FOR CRYSTALLIZING SUGAR.

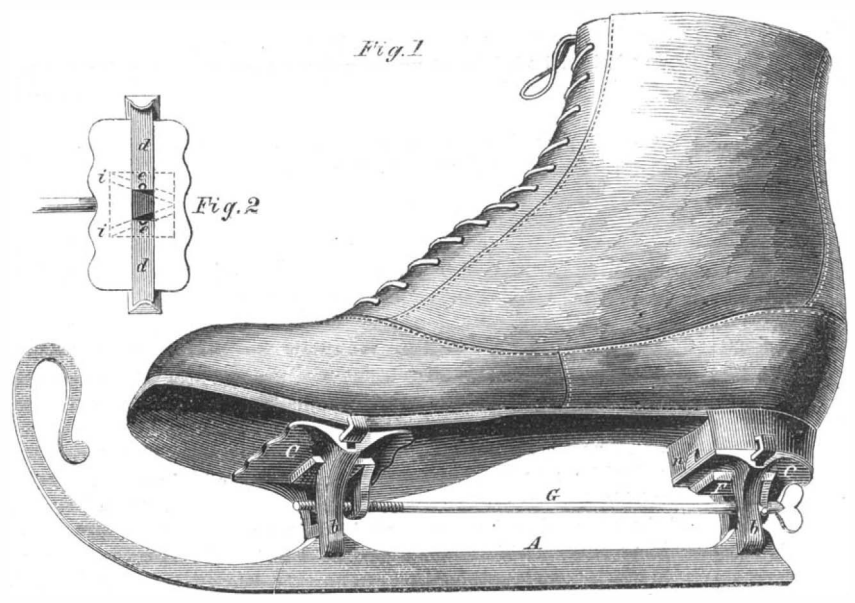
Improved Clamps for Fastening on Skates.

This is certainly one of the best, if not the very best, of all plans yet devised for fastening skates to the feet. It is simple and effectual, and the operation of putting on or taking off the skates is very quickly performed.

To the skate iron, A A (see cut, Fig. 1), are firmly welded, or otherwise secured, the diverging or Y-shaped standards, *b b*, which support the flat plates, C C. Sliding loosely in dovetail grooves in the upper side of each of these plates, are two clamps, *d d*, Fig. 2, bent up and turned slightly over at their ends, in proper form to grasp the sole and heel of the boot, as shown in Fig. 1. Each of these clamps, *d d*, has projecting downward from near its inner end, a pin, *e e*, which passes through a transverse slot in the plate, C, and enters a groove in one of the slides, F F. These slides, F F, are fitted in dovetail grooves between the standards, *b b*, and have a motion back and forth in the line of the runner, A. This motion is imparted to the slides by the screw rod, G. The grooves, *i i*, in the slides, F F, which are entered by the pins, *e e*, converge towards the two ends of the skate, so that as the slides, F F, are drawn together by turning the screw rod, G, the pins, and with them the clasps, *d d*, to which they are secured, are drawn towards each other, thus grasping the sole and heel of the boot or shoe with great force, and fastening the skate in the most secure ane rigid manner. The stud, *n*, on the heel plate is merely to keep the foot from slipping forward.

One of the attachés of this office has tried these skates thoroughly, and he considers this the best plan devised for fastening on the skates.

The patent for this invention was granted, through the Scientific American Patent Agency, on the 29th of May, 1860, and further information in relation to it may be obtained by addressing the inventor, John Lovatt, at 179 Bank-street, Newark, N. J.



LOVATT'S IMPROVED CLAMP FOR FASTENING SKATES.

Frozen Fish Coming to Life.

It is well known that several species of fish may be frozen quite stiff, carried several miles, and when put into cold water, will revive. Several artificial ponds have been stocked with fish carried from a distance in a frozen state ; and yet it is stated that the celebrated Dr. John Hunter, having tried several experiments to restore frozen fish, always failed to do so. A recent French experimenter in this line states that he has discovered the reason of this. He asserts that the tissues of fish and frogs may be frozen and the creatures may be restored to activity, but if their *hearts* become ice-chilled, they never can be reanimated. Perhaps the hearts of fish are surrounded with fat containing a great amount of glycerine—a substance which is not frozen at quite low temperatures. Some of our readers living in the northern sections of our country can easily settle this question during the present winter. This is a topic of no small interest to students of natural history. It is well known that some fish can be kept longer than others while frozen, and then be revived ; the above may account for the phenomenon.

VALUABLE SWEEPINGS. — The New York correspondent of the Philadelphia *Press* narrates the following incident : "Happening in at the publishing house of Harper & Brothers this morning, I was not a little surprised at a fact that transpired during my chat with one of the firm. The foreman of their bindery, Mr. Rosenquest, who has for some *thirty years* filled that position, came in with a bar of gold valued at $307.44, accompanied with the assayer's certificate. This amount was the proceeds of gold dust swept up from the floor and wiped off on the rags used by binders during three months. I was so much surprised at this bit of economy, that I asked what the value of their picked-up things amounted to in the course of a year, and was told that the gold sweepings were worth about $1,500, shavings from paper, $5,000 ; shavings from pasteboard, $700 ; and scraps from leather $150—making an aggregate from these four sources of $7,850 per annum.

THE city of Mobile, Ala., now boasts of a well-constructed street passenger railway, which was formally inaugurated and opened to public traffic, on Christmas day. It extends from Royal-street to Lafayette, a distance of about three miles.

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VOL. IV. NO. 5.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, FEBRUARY 2, 1861.

BREECH-LOADING GUNS AND PROJECTILES.

It may seem strange to many persons that the name of the present Emperor of France should have been so often mentioned in articles which have appeared in our columns on implements of war. The reason of this will be told in a few words. Napoleon III. is the ruling spirit who has effected the entire revolution that has recently taken place in the equipment of soldiers, in all armies, with the rifle instead of the musket; and he has given more attention to this subject, perhaps, than any other person living. About six years ago, he published a treatise on the "Past and Future of Artillery," and laid down, as a fundamental guide to all those who sought improvements in gunnery, that "such implements, to be really serviceable, must be simple." "Whatever is complicated," he said, "will fail in producing conclusive results in warfare." He condemned routine as tending to retard improvements, and stigmatized those persons as *stupid* who were "too much enamored of old ways and practices."

The idea of simplicity in implements of war has been adhered to by Napoleon with great tenacity. The Whitworth and several other breech-loading cannon, famous in story, were offered to him, but it is stated that he rejected them all; and we think he was right. It appears to us that it is much easier to load a heavy gun at the muzzle than at the breech, because a movable breech piece for a cannon is so very unwieldy that it cannot be so easily handled as the charge and ramrod at the muzzle. Such guns are also liable to get out of order by their breech screws expanding with heat and *stripping* by the recoil of the discharge. They have one advantage, however, and but only one: that is, they are well adapted for washing out, as they can be rapidly sponged by thrusting the swab through them from end to end. But this does not afford sufficient compensation for their many defects.

Common breech-loading hand rifles are liable to leakage by the frequent opening and shutting of the breech. To avoid this in Sharpe's rifles, they can be loaded at the muzzle and the leakage prevented. When one requires to be "wiped out," the opening of the breech affords a most convenient arrangement for this purpose. Small arms may be more complicated than large guns, without being subject to the same objections, as the light breech piece of the former may be very easily moved, while this can never be the case with the latter.

Captain J. Norton, a retired British officer, who has been an active and scientific experimenter for several years with firearms and projectiles, has recently sent us a little volume containing notices of his military inventions; and in it we find the description of a curious projectile, which may render iron war ships more dangerous than wooden ones. He says: "Observing that cannon shot, on passing through a ship's side, left a perforation that was easily plugged up, I tried an experiment with a hollow punch, and fired it from a rifle into a plank of wood, when I found it cut a hole like a wad cutter." It would appear reasonable that, by forming large projectiles for rifled cannon in the form of hollow punches, having steel lips, that they would bore their way through a six-inch plate of iron, every shot cutting out a clean hole. These holes could be plugged more easily than those formed with cannon balls, because the latter are always shattered around the edge; still, it does not appear unreasonable that, with such punch projectiles sent spinning from cannon into the sides of such a ship as the *Warrior*, that a hole might soon be made in her iron hull sufficiently large for a whale to pass through.

Another war missile which Captain Norton has invented is a frictional hand grenade. It consists of an explosive shell to be suspended over the wall of a fort by a cord, so that when a storming party makes an attack, the grenade can be exploded to scatter destruction around, by simply drawing the cord which ignites a friction match communicating with the charge in the shell. With such grenades (any number may be used) a fort may be effectually defended against a strong storming party by a very few men. Another destructive missile described by Captain Norton consists of a conical shell bullet for rifles, and a few years since he forwarded to us some samples of these explosive agents. They are cast with a chamber inside, which is charged with percussion powder, and each is furnished with a small pin situated at the point. When fired from a rifle, the charge explodes when the point strikes; and it will then set fire to any combustible material around it. With such rifle shells, Colonel Jacob set fire to ammunition wagons at a thousand yards distance in India. He used short carbine rifles, about two feet in length, and bullets about one ounce in weight. Such missiles would be terribly destructive when used by skilled infantry, or light cavalry.

GOOD TOOLS PROMOTERS OF CIVILIZATION.

One of the greatest writers on political economy that ever lived, defined man, in a somewhat humorous manner, as "a bargain-making animal." Viewing man in a commercial light, the definition is certainly correct; and it may be further extended, with as much justice of application, to a mechanic, by calling him "a tool-making animal." The strongest practical fact which can be adduced against the absurd theories of Chambers, Darwin, and others, that man may have been developed from a lower species of animated nature, is his peculiar faculty for making tools. For about six thousand years, it is a well known fact that man alone has progressed; all the lower animals, without a single exception, having remained unchanged in their habits since the hour of their creation; but man has originated new agencies to supply all the new wants that have arisen, and these have been as numerous as the days of his existence on this globe.

Improvements in tools are sure marks of advancing civilization: they afford evidence of the progress of mind in subduing matter to man's purposes, and they are proofs of the triumphs of cultivated intellect. By such agencies the powers of civilized man are so increased, that one can exert a greater influence and accomplish more labor than a thousand ignorant barbarians. The nation which possesses the best tools produces the most perfect manufactures, and is essentially the most powerful and wealthy in proportion to its population. Tools are generally held to be those machines which are used in workshops to fabricate the parts of implements, apparatus and machinery used in agriculture, manufacturing operations and commerce; but this is a very restricted application of the term. Any machine is a tool when it abridges labor, because it is an implement—either simple or complex—by which man either secures new results or produces well known results in a superior manner. When the late Viceroy of Egypt, upon one occasion, determined to open up one of the old canals of that country, he made a conscription of ten thousand peasants without providing a single shovel or barrow for them. The most of these labor serfs had no other tools but those which nature furnished, and numbers of them had actually to scoop up the mud with their hands. Their labor was of the most aggravating character, and it is stated that one-half of the poor beings perished from overwork and malaria sickness. A single steam excavator has done more work in one day than the whole of these ten thousand Egyptian serfs did in a week. This case affords us some idea of the advantages which tools confer upon civilized man, and a thousand other cases, equally as applicable, could be adduced had we space for the purpose.

With respect to those tools, such as lathes, drillers, planers, &c., it is a well known fact that the machine shops in which the best description are found, the most superior work is always "turned out." In a recent number of the SCIENTIFIC AMERICAN, we directed attention to the minute parts of tool-making, and pointed out the advantages of correct practical knowledge in this department; we again urge upon our mechanics a closer study and more careful observation of the construction and operation of every single tool that is employed in the arts, as perfection is far from being attained yet in this department of mechanism.

In tools and machinery for working in wood, we are in advance of all the world; and when we remember the clumsy and inefficient tools that were in general use in our machine shops twenty-five years ago, and contrast them with those which are now made and generally employed, we feel highly gratified with the advancement that has been made. Our minor tools, such as chisels, augers, saws, axes, drills, &c., are unrivaled, and we are fully convinced that, in a few years, we may obtain such an advantage from superior tools as will enable our manufacturers to surpass those of all nations in every branch of mechanical and manufacturing business. We positively assert, without fear of satisfactory contradiction, that this can be done.

THE ORIGIN OF MONEY.

The writer of these papers once had pass under his own observation an incident which showed the manner in which the metals came into use as currency. In the winter of 1842, when the Western banks were suspended, and the currency was in perfect confusion, there were two St. Louis merchants going up the Ohio river, on their way to New York. One of them had closed up his business at St. Louis, and was taking his property to the East. His friend, in speaking of the proper mode of transmitting it, remarked:—

"You did not want to speculate?"

"No," was the reply, "I merely wanted to get the property which I had, to New York."

"Then," said his friend, "you invested in lead."

"Yes," he responded, "I bought what silver I could—I found about $2,000 in silver—and the rest I put into lead."

The student of political economy, who listened to this conversation, saw in it additional and convincing proof, that it was owing to the natural properties of the metals that they were adopted as instruments for effecting the exchange of values, in other words, that they passed into use as money.

In early times, at the fairs and marts of trade, where each took the surplus of his products, which he did not need, to exchange for other articles which he desired; if a man had a quantity of fur which he wished to exchange for a horse, and did not succeed in meeting a man with a horse who wanted fur, he soon found that his most judicious course was to exchange his fur first for a quantity of some valuable metal, and this he would find more readily exchangeable for a horse. Reasoning beforehand, it might seem as if some article of universal and prime necessity, like wheat, would be more readily exchangeable for all other commodities than any metal; but on a full examination we find that this is not the case. When our St. Louis merchant desired to transfer certain values to New York, he found a large number of commodities in regular course of export from the West to the East. Among these were wheat, corn, rye, barley, whisky, beef, pork, butter, cheese, bacon, eggs and furs. But against all of these there were two objections which did not apply to lead; they were liable to be damaged on the passage, and they were more subject to fluctuation in price. If he bought fur, he might possibly make a profit on it; but, on the other hand, he was very liable to be obliged to sell it for three-fourths or one-half of what it cost him. In buying lead, he was more certain of being able to sell it promptly in New York for what it cost him, than was the case with any other commodity whatever, excepting silver or some other metal more valuable than lead.

Human nature has always been the same that it is now, and the properties of substances have been the same; therefore, there was always the same reason why men should seek the metals as deposits of value which they did not require for immediate use, that there is at the present day. If a man invested $100 in wheat, and laid it away, his property was exposed to two dangers—the wheat might rot, in which case he would lose all of his investment; or it might decline in price, in which case he would lose a portion. But if he bought a quantity of one of the more valua-

ble metals, like gold or silver, he was sure that it would not decay, and it was in danger of but very slight fluctuation in price. He might lay it away for weeks, or months, or years, and whenever he had occasion to exchange it for any article to gratify any of his wants, he would find it to possess the whole, or nearly the whole, of the value which it originally cost him. It is this power of *preserving* values so perfectly, that seems to have given the precious metals their great exchangeability.

When it was found that these metals were more readily exchangeable than other commodities, this fact made them more eagarly sought for, and still more readily exchangeable, so that they acquired the new use of instruments for effecting the exchange of other commodities. At first, the amount of metal given in exchange for any commodity was ascertained by weighing, and this is practiced to a considerable extent yet. In China, notwithstanding the old and complicated civilization of that empire, a large portion of the metal which is used for currency is weighed as it passes from one person to another. The writer of this has sold many thousand dollars' worth of merchandise for gold dust, the several amounts of which he carefully weighed in delicate balances, as he received them. But when the precious metals had passed into use as currency, various governments had portions of them formed into pieces of equal size, and the weight stamped upon them, to save the people the great inconvenience and labor of weighing the little quantities whenever they passed from hand to hand. And thus Money introduced itself into human affairs, and commenced the exertion of its great and all-pervading influence.

It will be observed that it is the property of exchangeability alone which causes money to be universally sought after. When men are struggling to obtain money, what they really desire is food, or clothing, or fuel, or houses, or horses, or carriages, or books, or some other of the thousand articles which contribute to the gratification of human wants. As the obtaining of money is, in civilized communities, the most suitable means of procuring any of these articles, it is not strange that it should be an object of intense and universal desire. When a business man hires money, the money is not the ultimate object of his wants, but some other form of property. If a farmer hires it, he exchanges it presently for plows, or horses, or cattle, or manure, or seed, or something else which will aid him in the cultivation of his land. If a manufacturer hires money, it is with the intention of exchanging it for machinery, or raw material, or labor, or some kind of capital which will facilitate his operations. If a merchant procures a loan, he exchanges the money for merchandise, which he may sell for more than its cost, and thus increase his possessions. Wide spread and intense as is the desire for money, it is only desired because it can be exchanged for other kinds of property.

THE SAFETY OF THE FEDERAL CITY.

It cannot have escaped the attention of our readers that the political newspapers at the present time are made the channel of many very ridiculous, as well as injurious rumors, tending to increase the alarm of our people in reference to the present state of things. One of the rumors which have been industriously propagated is that an attempt would be made to seize the Federal City by an armed force, and thus close up all access to the city from the Northern and Western States.

Inventors are writing to us daily, in reference to this matter, fearing the possibility of such a scheme, which, if successful, would prevent them from obtaining their patents. We feel bound by a sense of duty to our readers to state our convictions that no such project need be feared. We believe that many of the rumors in regard to it are mere inventions, set in motion to influence the public mind. No such contingency can possibly arise unless the authorities of Maryland and Delaware sanction it, and we do not believe there are any considerable number of our people in any section of the country, however much they may differ on other matters, who would approve such a scheme. We indulge a hope that, before the 4th of March next, some peaceable solution of our present political troubles will be reached. We have faith in the conviction that the crisis will be fully reached by the 1st of February, and that no blood will be shed.

How to Treat Horses.

We have already announced the fact that the celebrated horse-tamer, Mr. Rarey, has been giving a course of lectures in this city, upon the proper methods of treating horses and other dumb beasts, such as are adapted to the service of man. These lectures, accompanied as they have been by practical demonstration, have met with extraordinary success, and have convinced the public that pounding, punching, kicking and otherwise maltreating this noble animal will never cure him of vice. Rarey assumes that when the horse has been brought to realize his master's supremacy, he will cheerfully obey his slightest command as soon as he fairly understands what is required of him. And he never can be made to understand his master's wishes if maddened by cruel treatment, or frightened out of his wits by angrily-shouted orders. We must allow time for impressions to be made on his intelligence, and never confuse him by giving fresh orders before the preceding one is thoroughly comprehended and obeyed.

It is a peculiarity of the horse to examine all suspicious objects by touching them with his nose, as man touches them with his hands. Show him a drum, saddle, buffalo-robe, a string of bells, a wagon, or any other thing, and let him touch and smell it until he is satisfied it will not harm him, and he loses all fear of it. But suddenly thrust at him a strange object, without giving him time to examine it, and he flies away from it as naturally as we would under like circumstances. Hence if a horse is very nervous, and difficult to saddle, harness, or hitch, it only requires a little forbearance on our part, and a little time, to overcome his restiveness, and make him willing to be saddled, harnessed, or hitched. Show him saddle, harness, and wagon, instead of hiding them from him ; let him touch, smell, and even taste them if he will until he understands that they will do him no harm, repeat the lesson a few times, and your victory is certain. But fling a saddle or harness suddenly on his back, and he will make a wild jump to save himself from his imaginary foe, as naturally as a man would if even so harmless a thing as a twig should fall on him when traveling at night in a dense forest in a strange land. You may club the poor horse for jumping until you smash his skull or break his legs, and he will only jump the more in the increased agony of his fear. Rarey's system is thus correctly epitomized by the *Tribune:* "Obedience to man is the ruling principle of the horse; disobedience the penalty of bad teaching. To make him obey, it is only necessary to make him fully comprehend what is required of him. He has originally no conception of his strength as compared with his master's, and never will have until they are foolishly matched in a struggle. It is the part of wisdom to keep him ignorant in this respect, by mastering him by gentle but thorough treatment at an early age. In the horse, as in man, fear is the result of ignorance ; hence he may be accustomed to a locomotive or any other frightful object, by giving him time and opportunity to examine it in his own way. All these fundamental laws which underlie the Rarey system are very simple to understand, although very little understood at present by the public. Simple as they are, they have required years of experience and observation on his part to develop and define them. When they are once generally recognized, the trouble and danger of horse-training will be at an end."

Cow Bells.—It is said that a good cow bell of rolled sheet iron, well made, 10 inches deep, with a mouth 3 by 6 inches, can be distinctly heard at a distance of from three to five miles. An exchange says that a farmer in England provides all his cows with bells tuned to different notes of the scale, and the whole running through several octaves. A visitor to this farm is charmed by the music, as well as by the sleek sides of the cattle. Sometimes he hears several notes in unison, then a slight discord, and then a sweet harmony, and all varied by distance and by rising and falling of the breeze.

Money.—We have not altered our mind in reference to the practice we announced a few weeks ago, namely, to take the bills of all such banks, North, South, East and West as are considered solvent at home for subscriptions, patent fees, &c. The finances of the country are gradually improving. Let every citizen adopt for his motto "Peace, be still!"

Recent American Inventions.

HOISTING APPARATUS.

The object of this invention is to obtain a hoisting apparatus which may have its weight or load readily stopped at any desired point, and a brake automatically and simultaneously applied with the stopping of the weight or load. The invention also has for its object the sustaining of the load or weight in case of the breaking of the lifting rope, in such a way as to insure a certain effectual action or operation of the load-sustaining mechanism. The invention has further for its object the counterpoising of the platform in such a way that, in case of the breaking of the lifting rope, the connection of the counterpoise will not interfere in the least with the load-sustaining mechanism. The inventor of this device is E. G. Otis, of Yonkers, N. Y.

RAILROAD CAR STARTER AND STOPPER.

This invention consists in the arrangement of two toothed racks placed in different vertical planes ,and one above and the other below the axle of a railroad car, in combination with suitable springs and with a sliding pinion, in such a manner that, by throwing said pinion in gear with one or with the other of the racks (according to the direction in which the car is moving) the springs are compressed, and if the pinion is now shifted so that it gears into both racks, the car is stopped. If it is now desired to start the car in either direction, the pinion is shifted so as to gear into one or the other rack, and the force of the springs, which has a tendency to bring the racks back to their original position, is exerted so as to turn the axle and the wheels in the desired direction. In order to prevent danger, should the momentum of the car be so great as to drive the racks clear back to the last tooth, the last tooth of each rack is so made as to yield, being kept in the required position by springs applied in such a manner that the pinion, on coming in contact with each tooth, may revolve without injury to its own cogs or to those of the racks. The inner teeth of the racks are cut half-way, so as to allow the pinion to rotate freely between said racks; and the clutches or dogs which retain the pinion on the axle and cause it to rotate with the same, are placed in such a position that the cogs of the pinion are allowed to enter the teeth of the racks before said clutches take effect, whereby the danger of breaking the [illegible] is obviated. B. Morohan, of Brooklyn, is the inventor of this apparatus.

Sharks About—Beware of Them.

The moment a patent is publicly issued to any of our ingenious fellow-citizens, the recipient's name and post-office address become the target for scores of circulars through the mail from greedy adventurers of every name and condition. A sends a circular, printed like a private letter, confidentially advising the patentee to expend a few dollars in lottery tickets, for which the writer is the agent. B is a dealer in patent rights, and coolly solicits a small *advance*, for which he will almost warrant a sale of the patent for ever so many thousand dollars, and, perhaps, inclosing with the circular a blank power of attorney or assignment, which he requests the patentee to sign. C is an obscure patent agent, whose clients are few and far between, his only resource being to send a long yarn to the newly fledged patentee, informing him that his patent will be good for nothing, unless said poor patent agent is allowed to patch or doctor it up—of course, the mode of treatment is *to bleed the patentee.* We warn our readers to beware of all these greedy parasites, and to employ only such attorneys as are known to be trustworthy, and never to remit money to persons of whom they know nothing. Money expended in lottery tickets is the poorest investment we know of, and we would not advise any one to risk a single cent in so hopeless an enterprise.

The safe-key of the Revere Bank, Boston, with a million combinations, became disarranged recently, and the mechanical skill of the maker could not open it. Business was at a stand-still. A gang of workmen were at last set to work to batter down the masonry.

There were 1,040 gallons of wine made at Fort Madison, Iowa, during the past season; and as the business is only in its infancy all over the State, Iowa may be set down for a large yield next season, should the weather prove favorable.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association was held, at its room in the Cooper Institute, this city, on Thursday evening, Jan. 17, 1860. The President, Professor Mason, in the chair.

ZINC IN NEW JERSEY.

The PRESIDENT stated that, in pursuing the veins of the red oxyd of zinc in New Jersey northward, the workmen had fallen upon a bronze carbonate of zinc, which, although no better for making zinc paint, is of high value for obtaining the zinc metal.

ELECTRIC IGNITION.

Dr. VANDERWEYDE read a paper upon the different methods of producing and using electricity to ignite inflammable substances, which he illustrated by exhibiting and explaining apparatus used for that purpose, and by experiments. He enumerated the following methods:—

1. The spark of a common electric machine has been used for a century in igniting all kinds of inflammable substances—solid, liquid or gaseous.

2. The small spark of the electrophorus will ignite hydrogen gas or the common coal gas. Dr. V. lighted gas by a spark from an electrophorus, Mr. Stetson receiving the spark, through the current of escaping gas, into his finger.

3. Platina wire, heated by a galvanic current, has been extensively used for igniting gas, and also for blasting. This was the method employed by Maillefert in removing rocks from New York harbor and from Hurlgate. Many gas burners have been lighted at the same time by this method.

4. It is a common experiment at present, that the rubbing of the feet on the carpet in a very dry room will produce electricity enough to charge the person with it, so that, by touching the gas burner with his finger, the experimenter may produce a small spark, which will ignite the gas.

5. The galvano-electric induction apparatus invented by Ruhmkorf, in Paris, may be used to produce a spark at each of several hundred burners at the same time. Wilson's patented method has been applied at the Cooper Institute, where the 300 gas burners in the large hall in the basement are lighted by sparks obtained from a Ruhmkorf induction coil conveyed from the laboratory, five stories above, the current passing through isolated wires over a distance of about 1,000 feet. The Ruhmkorf apparatus is based upon the same principle as the well-known galvano-electric batteries in use for medical purposes. Although the burners are, in fact, lighted consecutively, yet the velocity of the current is such that they are apparently lighted at the same instant.

6. A common glass disk electric machine, hermetically inclosed in a glass case and kept perfectly dry with chloride of calcium, has been used to produce sparks for the same purpose.

7. Very recently, a patent was taken out by Mr. Batchelder for the connection of a vulcanized india-rubber disk, of three inches diameter, with the chandelier in which it is hidden, so that, by turning a knob at the lowest part of the chandelier, it produces by friction some electricity, which is conducted by isolated burners to the six or eight burners lighting the gas.

8. Still later, a patent has been applied for for a similar india-rubber disk, which, by turning, lights a small alcohol lamp, and thus allows one to dispense with the use of matches. India-rubber and gutta-percha are much more certain in their effects than glass, being less apt to condense moisture from the atmosphere upon their surface.

9. Instead of the large battery used in No. 3, Dr. V. had used the magneto-electric apparatus, in which a soft iron core is wound with a coil and revolves in front of a bundle of seven powerful steel magnets of horseshoe form, of two feet length. The magneto-electric apparatus has also been used for medical purposes. Dr. V. exhibited an arrangement of the apparatus devised by him, which may be placed within a box three inches each way, and yet be as powerful as those in large boxes.

10. As it requires a less quantity of electricity to produce sparks than to heat wire, Dr. V. exhibited a drawing of a magneto-electro apparatus, to produce sparks for igniting gas, &c. It consists of a coil of soft iron wire, similar to that in the Ruhmkorf coil, but wound only with the carefully isolated fine wire of several thousand feet in length, the large wire for galvanic current being omitted, as the iron coil is magnetized by the poles of powerful steel magnets rapidly moved along its extremities.

11. Another form of magneto-electric apparatus, invented a few years ago in France, consists of a bundle of horseshoe steel magnets, powerfully charged, with their poles rounded off, and the steel itself wound with the usual coil. If, now, in front of these magnets, a soft iron, in the shape of a common keeper, is revolved, the rapid changes in the free magnetism of the steel produces electric currents in the coil more powerful than if the coil is wound around the revolving piece or pieces of soft iron, as in the arrangements Nos. 9 and 10.

Dr. V. has projected and made provisional experiments with two very different applications of this principle. The permanent magnet has the advantages of being less expensive, more convenient, and more reliable than the galvanic battery. Magnets well made, if kept in operation by the "keeper," or otherwise, are always the same, and never lose their power; while the galvanic battery will sometimes be out of order, and refuse to produce the usual results. The first construction is this:

12. Two straight cylindrical steel bars, of about one foot long, and composed of three, five or seven flat bars, secured parallel together with screws and afterwards turned cylindrical, are magnetised as strongly as possible, and inclosed in a glass tube of the same length, and open at both ends. Around this a coil is wound for the whole length, in such a way as to be thickest toward the poles, where the greatest magnetic intensity resides. These magnets are then secured in a horizontal and parallel position on a wooden basis, one at each side, equidistant and parallel to a horizontal axis which is a little longer than the bars. At each extremity of this axis is attached a keeper, at right angles thereto, and at such a distance that, by turning the axis, the keepers pass with their ends very closely along the extremities of the steel magnets, which, of course, lie with opposite poles toward the same keepers. This arrangement works like the double of that last described, and has the advantage that all the magnetic surface of the steel magnets is made available by the coil.

13. The second construction consists of two strong horse-shoe magnets of polished steel, with cylindrical extremities, lying on a horizontal base, and touching each other with their opposite poles, which are situated in a coil of fine, well-isolated copper wire, immovably fixed to the said base. The magnets may slide in and out of the two coils. If, now, by means of a lever, the poles of the two horseshoe magnets are suddenly separated inside the coils, to the distance of from a half to three-quarters of an inch, their magnetism, made latent by the contact, is suddenly set free, and they induce an electric current in the coils. By joining the magnets again, a current will be developed in the opposite direction. If desired, those two currents may be led in the same direction by a commutator attached to the same lever.

Former experimenters have sought to increase the power by increasing the number of coils and magnets; Dr. V., on the contrary, by increasing the size of the coils and magnets. He proposes to make a magneto-electric machine similar to the galvano-electric machine of Ruhmkorf.

The magneto-electric apparatus may be used with perfect safety for blasting purposes, which is not the case with the galvanic batteries used exclusively hitherto; because, with the galvanic battery, an accidental connection of the wires sometimes produces a premature discharge; but with the magneto-electric apparatus, the wires may all be connected and no discharge can take place until the apparatus is set in motion with a certain velocity, which may be absolutely prevented by placing some obstruction upon the rotary wheels, or taking off the handle, or by locking up the apparatus in a small box.

Dr. V. exhibited the magic wafers, which may be exploded by an almost invisible spark, and ignited one of them by receiving the spark which passed through the wafer upon the end of his tongue. Yet these wafers, which are composed of very thin paper covered by a mixture of two parts of sulphuret of antimonium with one part of chlorate of potash, will not ignite by friction.

Dr. V. concluded by reserving for himself the right to take out a patent for the improvement of the magneto-electric apparatus, as mentioned under No. 10, and for the invention of the apparatus under Nos. 12 and 13; also for igniting gas, gunpowder, &c., by means of heated wire or sparks produced by the said purely magnetic apparatus, requiring no galvanic batteries.

TELEGRAPHING—FEED WATER INJECTOR.

On motion of Mr. Johnson, a committee was appointed to consider and report upon the two improvements in telegraphing recently exhibited before the association.

Mr. FISHER exhibited a specimen of Giffard's feed water injector for steam boilers, previously noticed by him. It will force water into a boiler against a pressure twice as great as that of the steam operating it.

The further consideration of this question was postponed until the next meeting.

POTTERY AND GLASS

Mr. SEELY made some remarks upon the antiquity of the art of pottery, and upon the chemistry of the art. Pure clay is a silicate of alumina, which is an oxyd of aluminum. The common clay used in the arts is usually derived from felspar. In all clays there is a surplus of silicic acid. A piece of porcelain examined through the microscope, is found to consist of particles of pure clay, which is infusible, surrounded by the fused silex. If too much silex is added, the material will not be sufficiently fusible. If there is too much alkali, it will be too fusible. It would seem that we might determine, from chemistry, what proportions are required. The porcelain of Sevres has been analyzed, but a combination of the same ingredients, as pure as possible, fails to produce the required results. The analysis of a clay does not show its value; we must also examine its mechanical structure. The colors given to pottery are derived from metallic oxyds only. The common clays contain iron, which is the cause of the red color of bricks and common earthenware.

The PRESIDENT remarked that pressed bricks are not so durable as common bricks, and inquired the reason.

Mr. JOHNSON attributed it to the want of time for the escape of the air.

Mr. GARVEY attributed it to the greater difficulty of properly baking pressed brick, so that they should be homogeneous.

Mr. DIBBEN attributed it to the pressed bricks being formed dry. Manipulation with water is required to produce the proper arrangement of the particles.

The PRESIDENT made some remarks upon the importance of some practical mode of covering the outside of our dwellings with an indestructible material. Mortar is now so constructed that the lime merely binds together the imperishable sand, and only becomes harder by time. If the force of the bricks can be protected, so as to be impervious to moisture, it is a great desideratum.

Mr. GARVEY thought that any new device would be useless without a higher degree of practical skill among mechanics. A face of mortar, properly prepared and properly applied, will last forever.

Dr. KNIGHT exhibited specimens of silican marble, produced from Keene's cement, which is a secret preparation.

Mr. GARVEY said that it was merely lime, combined with alum—a refined form of the Roman cement.

Dr. VANDERWEYDE said that, even after mortar is dry, a continual action is going on between the silica and the lime. It is sometimes supposed that we have not such good mortar as the ancients; but it is nothing but the age.

PROJECTILES FOR RIFLES.

The subject selected for discussion upon the next evening, offered by Mr. Stetson, is "Projectiles for Rifles and Rifled Cannons."

The PRESIDENT—Perhaps there is no better way for us to keep the peace than by being prepared to kill 500,000 men in a day.

On motion the association adjourned.

THERE are 9 English, 2 French, 1 Spanish, and 4 German daily papers in San Francisco, Cal. There are 22 weeklies, whereof 18 are English, 3 French, and 1 Italian. There are 7 monthlies, one of which is medical, and another religious.

AMERICAN ENGINEERS' ASSOCIATION.

[Reported for the Scientific American.]

On Wednesday evening, January 9th, the regular weekly meeting of this association was held at its room, No. 24 Cooper Institute, this city—Thomas B. Stillman, Esq., President; Benj. Garvey, Esq., Secretary.

NEW INVENTIONS.

Merrick's Propeller Engine.—The President introduced to the association Mr. B. E. Merrick, of Buffalo, who, by aid of drawings, explained to the several members present the plan and general operation of a propeller engine invented by himself, and which is now in successful operation in the steamer *Northern Light*, running upon one of the Western lakes. Mr. Merrick presents several important modifications and alterations in his engine, as compared with others now in use, and strongly advocates their entire practicability. His propeller wheel or screw is very similar to George Hibsch's, of Albany, but was wholly an invention of his own. When the report from the appropriate committee upon this engine comes before the association, we shall refer to it at greater length.

McNeill's Low Water Detector.—Mr. J. McNeill, of Marion, Iowa, submitted to the society (by letter) the drawings of an entirely new low water alarm, an invention of his own, and one which he thought might be very successful in its operation. He had sent it to them for their opinion thereon, which the association will give at an early day. Mr. McNeill expressed it as his opinion that the different investigations entered into by the American Engineers' Association in relation to low water detectors were of the highest value, and would, without doubt, result in the greatest good to those directly interested.

Vanderweyde's Barometer.—Dr. Vanderweyde, Instructor in Physics and Chemistry, Cooper Union, New York city, presented to the association an improved barometer. He had experienced much difficulty in experimenting with the ones generally used; they were, in fact, insufficient for the important work intended to be performed by them, which induced him to attempt to produce a better; the instrument submitted was the result of his labors: It consists of a pipe six feet in length and three-fourths of an inch in diameter attached to a small dial-faced cap, which was graduated to 1,000° C., equal to nearly 2,000° Fah. The construction of this barometer partook, in a great measure, of that of the "Compensation Pendulum," its operation being the expansion of different metals, platina and iron, the iron being covered with copper to prevent corrosion or blistering. These metals were within the pipe or tube, and directly attached to a ratchet wheel within the cap, which caused the operation of it to be exceedingly simple but very effective. During the explanation of the parts of his instrument, Dr. Vanderweyde entered into details in relation to the other barometers in use, and made thereon many interesting and instructive suggestions.

The above inventions were duly referred to the Committee on Science and New Inventions, who will speedily report thereon.

At this juncture, the Special Committee appointed to re-examine Messrs. Warren & Banks' "Alarm Gage or Low Water Detector" (Warren's patent), submitted the annexed report:—

The Special Committee appointed, &c., &c., would report that the principles upon which this instrument is constructed are as follows:—

1. When a tube is connected with a steam boiler, so that one end opens into the steam space and the other end into the water space, the water will stand at the same level in both boiler and tube, unless the boiler foams; and, in such a case, the water will stand at a level in the tube due to the real quantity of water in the boiler, and not to the hight to which the water foams.

2. A metallic tube filled with water or steam will quickly attain the same, or nearly the same, temperature, as its contents.

3. Such a tube, when heated, expands with a force equal to that with which it would resist a crushing pressure, and, when cooled, contracts with a force equal to that with which it would resist a tension strain.

4. A spring having the form of an arc of a circle, with small rise, will receive considerable motion at the crown of the arc when the ends of the spring are imperceptibly moved toward or from one another; in the same manner and for the same reasons as in the joggle joint, when nearly straight, a very small motion of the ends gives a considerable motion at the joint.

5. When the tube is connected with the boiler, as mentioned, the temperature of the water in it remains constantly much below the boiling point, unless there be too high water, when a circulation takes place, and the water becomes hot enough to expand the tube and give an alarm.

The first four of these principles are well recognized, and are acted upon daily in every engineering establishment; and all the committee had to do was to see if they were judiciously embodied in the instrument under consideration, and, after careful examinations, they are unanimously of opinion that they are so embodied.

The fifth principle enumerated, is the most difficult for your committee to pronounce upon, for if there be a rapid condensation of steam in the tube leading from the boiler, the condensed water would have the temperature of boiling water at the moment of condensation, and, being specifically lighter, would remain in the tube and displace the colder water. To have this occur, however, would require so great a condensation of steam that the instrument is not very likely to be so placed as to have a sufficient length of tube filled with steam, and so exposed to cooling agents as to produce this circulation to a serious extent.

To ascertain the practical working of this instrument, the majority of the committee visited several places in the city where it is in use, and in all cases it was found to operate speedily and well.

Your committee, therefore, report that, in their opinion, this is a reliable low water detector, high water detector and sight gage, and that it is not liable to get out of repair.

But, in making this report, they would not be understood to say that this or any other instrument can be used with safety by any person but a skillful, sober engineer, who will see that everything about his boiler and engine is always in good order, for the most accurate instruments produced by man are liable to derangements from a thousand causes, and nothing but intelligence can again put them in order. All of which is respectfully submitted.

[Signed.] C. F. Holden, John C. Merriam, Benj. Garvey. } *Committee.*

After the reading of this report, it was, on motion of Mr. Louis Koch, laid upon the table for one week, for consideration by the members.

A letter in relation to steam boiler inspections was received from an "Engineer of the Metropolis." It was referred to the Committee on Accidents.

The meeting then adjourned.

Annual Statement of the Whale Fishery for 1860.

[From the Whalemen's Shipping List.]

We lay before the readers of the *Shipping List*, the Seventeenth Annual Statement of the result of the whale fishery for 1860. The year commenced with no flattering prospects, nor has its success exceeded the moderate anticipations which were entertained. The whole number of vessels employed in the American whale fishery on the first of January, 1861, is five hundred and fourteen, against five hundred and sixty-nine on the first of January, 1860, showing a diminution of fifty-five vessels, and an aggregate of 18,803 tuns.

The imports of sperm oil amount to 73,708 bbls.; of whale oil 140,005 bbls., and of whalebone 1,337,650 lbs.

Six ships have been fitted from this port the last year for Davis' Straits—three from New Bedford and three from Fairhaven, whose success remains to be proved.

Of the Northern fleet only two ships have been lost—the *George & Mary*, of New London, wrecked in Ochotsk Sea, June 7, and the *Paulina*, of this port, lost in a gale of wind off Lahaina, Nov. 15.

We cannot now estimate the imports of oil for the current year; but, while we think sperm oil will come fully up to that of the past year, whale must fall short.

The number of vessels employed in the right whaling business will be considerably diminished this year. Many of the largest will be withdrawn and put into the freighting business, while others, which need heavy repairs, will be sold and broken up.

The imports of 1859 were, sperm oil 91,400 bbls.; whale oil 190,421 bbls., and of whalebone 1,923,850 lbs., showing a falling off the past year of 17,700 bbls. sperm, 50,406 bbls. whale oil, and 536,200 lbs. bone.

The average prices during the past year have been, for sperm oil 1.41½ cents; whale oil 49½ cents per gallon, whalebone—Northern 80 1-5th cents, and South Sea 73¾ cents per lb.

The exports of oil and bone for the year have been as follows:—Sperm oil 32,792 bbls.; whale oil 13,097 bbls., and of whalebone 911,226 lbs.; showing a falling off in the export of sperm from 1859, 19,415 bbls., and in whalebone 796,703 lbs., and an excess in whale oil of 4,828 bbls.

The news from the Northern whaling fleet the last season is very discouraging. During the season of 1860 about 140 American ships cruised North, including Kodiak, Arctic and Ochotsk Seas. From the information received it does not appear that their average catch will reach 600 bbls.—the lowest average since the whaling business was pursued in these seas, according to the number of ships.

Estimating the amount of blood in the human body at twenty-four pounds, twelve pounds pass through the heart every minute.

Steamboat Disasters on Western Rivers.

The St. Louis *Bulletin* has published a long list of accidents and disasters to steamboats, barges, canal and coal boats, and other river craft, on the Western rivers during the year 1860. The number is unusually large, and the loss of life attending the disasters is also above the average of former years. The following is a synopsis of the statement:—

Number of steamboats destroy and damaged	299
Number of canal boats and barges	48
Coal and flat boats	208
Steamboats totally destroyed	120
Total loss of life	254

The disasters are attributed to the following causes:—

Sunk	111
Burned	31
Explosion	19
Collision	24
Snagged and damaged	44
Damaged by storm	39
Breaking machinery	21
Collisions with river bank	8

The total loss in steamboat property, including canal boats, coal boats and barges, exceeds $2,000,000. The loss on cargo cannot be ascertained.

Chicago and its Exports.

The Chicago *Tribune* publishes a tabular statement of the exports of that city in flour, grain and provisions, and other leading country products, during 1860. We append the table:—

	Amount.	Rate.	Value.
Flour, bbls	713,339	$4.50	$3,210,025.5
Wheat, bush	12,487,684	0.87	10,864,285.08
Corn, bush	13,743,172	0.45	6,184,427.40
Oats, bush	1,039,779	0.26	270,341.54
Rye, bush	129,156	0.64	82,659.84
Barley, bush	290,211	0.52	150,909.72
Seeds, bush	117,838	2.80	330,845.40
Broom corn, tuns	2,585	85.00	219,725.00
Highwines, bbls	57,617	7.25	417.723.25
Alcohol, bbls	3,883	16.38	63,703.54
Live hogs, No	133,612	12.00	1,603,344.00
Dressed hogs, No	22,672	12.00	272,084.00
Beef cattle, No	104,122	30.00	3,123,660.00
Pork, bbls	80,095	17.00	1,361,676.00
Beef, bbs	84,414	9.00	579,726.00
Cut meats, lbs	19,074,377	0.07	1,335,206.39
Provisions (not classified) bbls	2,025	13.00	26,325.00
Lard, lbs	9,150,899	0.11	1,006,598.89
Tallow, lbs	2,858,944	0.09¾	295,424.21
Butter, lbs	1,697,311	0.12	203,677.32
Hides, lbs	11,609,345	0.10	1,160,934.50
Wool, lb	733,755	0.40	303,502.00
Mill stuffs, tuns	906	10.00	9,060.00
Lead, lbs	12,114,268	0.05	605,708.40
Hay, tuns	1,312	10.00	13,120.00
Eggs, bbls	4,750	5.75	28,312.50
Poultry, game, lbs	94,844	0.10	9,484.40
Total value in 1860			$33,737,489.88
Total value in 1859			24,280,890.47
Total value in 1858			19,928,495.83

The same paper states that a considerable export trade, under the general head of "merchandise," is not included in the foregoing exhibit. The excessively high rates of freight, also, are said to have reduced the aggregate about one-sixth.

Management of Cream in Cold Weather.—For some reason not yet known, cream skimmed from milk in cold weather does not come to butter, when churned, so quickly as that from the same cow in warm weather. Perhaps the pelicles, which form the little sacs of butter in the cream, are thicker and tougher. There are two methods of obviating this trouble in a great degree. One is to set the pan of milk on the stove, or in some warm place, as soon as strained, and let it remain until quite warm—some say until a bubble or two rises, or until a skim of cream begins to form on the surface. Another mode recommended, is to add a table spoonful of salt to a quart of cream then it is skimmed. Cream thus prepared will generally come to butter in a few minutes when churned. It is thought the salt acts upon the coating of the butter globules and makes them tender, so that they break readily when beaten by churning.—*Maine Farmer.*

[We believe, upon good authority and practice, that the best temperature for churning milk is about 62° Fah. It should never much exceed, or be allowed to fall below this. If churned at a lower temperature, the butter will not separate freely; and if churned at a higher temperature, a considerable portion of the casein is always found combined with the butter. This gives it a lard-like appearance and taste. By the addition of hot or cold water, as may be required, and the use of the thermometer to test the temperature, there is but little trouble experienced in churning it.—Eds.

Another Course of Lectures by Faraday.—Professor Faraday is now delivering a course of lectures before the Royal Institution of Great Britain, on the "Chemical History of a Candle." The publication of these lectures, profusely illustrated, will be commenced immediately in the Scientific American.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JANUARY 15, 1861.

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.

95.—S. C. Abbott, of Zanesville, Ohio, for an Improvement in Projectiles for Ordnance:

I claim, first, So constructing the shell that it charges itself or the interstices between the grains of powder with which it is loaded, with atmospheric under pressure, as it flies through the air, and at the moment of contact with a resisting object confines said compacted or compressed air, substantially as and for the purposes set forth.

Second, The spiral planes, C, on the conical front portion of the shot or shell in the described combination with the cylindrical rear portion for the purposes explained.

Third, Constructing the screw plug which conducts the fire of the cap to the interior of the shell in two parts, and fitting one part over the air nipple of the other part, substantially as and for the purposes set forth.

Fourth, The employment between the shell and the inner circumference of the gun of a self-detaching wedge-shaped spring packing strip bent into the form of a ring, said strip being formed of leather, gutta-percha, or other similar flexible substance which is softer than the metal of the gun, and rendered solid by means of soft metal plugs or rivets driven through its thickest edge, substantially as and for the purposes set forth.

96.—James Adams, of New York City, for an Improvement in Hydrometers:

I claim the construction of a hydrometer or other instrument for ascertaining the specific gravity of liquids, substantially as described, by combining with its bulb and lower part made of hard vulcanized india-rubber or gutta-percha a graduated upper stem made of metal.

97.—J. T. D. Alexander, of Maryenna, Texas, for an Improvement in Cultivators:

I claim the arrangement of the beams, A A, the bars, B B, and H H, as constructed, the shanks, F F, the wheels, D D, and the slotted crank axles, E E, the whole being arranged and connected in the manner and for the purpose specified.

98.—T. F. Allen, of Dyersville, Iowa, for an Improvement in Springs for Railroad Cars:

I claim so arranging the plates and crossbars above each other, and holding the same together that the plates are sprung, when the spring is in action, from the base to the top of the pile over and under the central crossbars, and while being thus sprung, the ends of the plates approximate each other, both vertically and latterally, without touching any object or coming in contact with bolts, passing through the pile or a frame confining them, substantially as and for the purpose set forth.

99.—Ambrose E. Barnard, of Paterson, N. J., for an Improved Hose Coupling:

I claim, first, The india-rubber ring, C, made in the manner described which constitutes an automatic or self-acting washer.

Second, In combination with the same, the butt, A, cap, B, spring catches, D D, and clamp ring, E, arranged and operated as set forth and for the purpose described.

100.—D. S. Bartlett, of Roxbury, Mass., for an Improved Weight and Hitch Strap for Fastening Horses:

I claim the combination of the weight, A B, with the hitch strap, D, barrel, C, and spring, E, the whole arranged and operating substantially as described for the purpose set forth.

101.—J. H. Bean, of Forreston, Ill., for an Improvement in Seed Drills:

I claim the arrangement of the independently pivoted frame, A, and rollers, B, with the frame, E, and apparatus, F G H J K, tubes, f, and curved bars, g, as and for the purpose shown and described.

In combination with the above, I also claim the employment of the curved V-shaped scrapers, D, upon the rollers, B, as and for the purpose shown and described.

[This invention relates to an improved arrangement of seed hoppers, and their connection with furrow shares, whereby a very compact and convenient device is obtained for sowing both grain and grass seeds simultaneously. The invention also consists in a peculiar form of scraper applied to the rollers of the machine for keeping the same free from dirt as the implement is drawn along.]

102.—M. C. Brelsford, of Girard, Ill., for an Improvement in Rakes for Reapers:

I claim the combination, substantially as shown and described, of the rake bar, F, with a pitman rod, E, that has one end attached to a driving crank, while the other end slides through a strap or eye upon the frame or equivalent support, so that when the driving crank is revolved the said rod, E, will be caused alternately to rise and fall, and also to move back and forth, and impart a corresponding movement to the rake bar, whereby the rake is made to sweep across the surface of the platform, then rise, then move forward, then descend to the platform, and then sweep as before.

[This invention relates to an improvement in that class of raking devices in which a vibrating rake is employed, the same being so operated as to pass over the platform in the arc of a circle, and rake the grain therefrom, the rake rising at the termination of its backward stroke above the platform, and proceeding to the front end thereof to again descend and perform its work.]

103.—L. B. Brown, of Scriven county, Ga., for an Improvement in Cotton Seed Planters:

I claim the sliding rack, F F, with inclined pins, i i, in combination with the distributing wheel, R, and driving wheels, 3 3, the whole constructed and arranged substantially as and for the purposes set forth.

104.—J. F. Cameron, of Livingston county, Mo., for an Improvement in Sub-soil Plows:

I claim beam, A, clevis, x and y, rotary coulter, B, standard, F, cutter D, with its clevis, T, wedge, z, brace, c, hook k and moldboard E, when these several devices are constructed and arranged in the manner and for the purpose set forth.

105.—J. F. Cameron, of Bedford, Mo., for an Improvement in Devices for Securing Shields to Plows:

I claim the arrangement of the revolving shield, B, adjustable head, a, bars, C J and D, constructed and adjustable in relation to each other in the manner described for the purpose specified.

106.—J. A. Crandall, of New York City, for an Improvement in Perambulators or Children's Carriages:

I claim, first, The general form and arrangement of the handle frame with its wheel, substantially as described, whereby the same vehicle can be converted into a gig or a perambulator at pleasure.

Second, The special mode of clamping the handle frame in whatever position it is set, as described.

Third, The method described of increasing the adhesion between the sides of the handle frame and the face of the collar on the spindle.

107.—T. B. De Forest, of Birmingham, Conn., for an Improved Instrument for Cleaning Lamp Chimneys:

I claim a wiping instrument for lamp chimneys, formed by the combination with a laterally expanding frame of a removable fibrous envelope, operating substantially as set forth.

108.—W. A. Dryden, of Monmouth, Ill., for an Improvement in Cultivators:

I claim the arrangement of the lever, G, with the dog, f, in combination with the stop, g, on the upper surface of the beam, A, and with the plate, e, at the under surface of the draught pole, constructed and operating as and for the purpose specified.

I also claim the arrangement of the pin, j, projecting from the beam, A, in combination with a hole, k, in the lever, G, substantially as and for the purpose described.

[The object of this invention is to arrange a cultivator which allows of conveniently adjusting the shares to any desired depth and width, and which enables the operator to throw the shares out of the ground and to keep them elevated when it is desired to turn the machine to move it from one field to another.]

109.—George Esterly, of Whitewater, Wis., for an Improvement in Hand Rakes for Reaping Machines:

I claim, first, The arrangement of the handle, G, obliquely to the stale, F, for the purpose of adapting the rake to use by the attendant standing inclined centrally over the platform and grain thereon, substantially as set forth.

Second, Graduating the length of the teeth, F, of the rake head, so that they correspond with the gradually increased thickness of the grain as it is deposited upon the platform, and cause the rake head to compress the grain equally from end to end, substantially as and for the purpose described.

110.—A. Fanckboner, of Schoolcraft, Mich., for an Improvement in Grain Separators:

I claim the arrangement of the screen, 2, screen, 3, receptacle, 4, receptacle, 7, spout, 5, pipe, 8, box, 6, and drawer, 9, in combination with the vibrating frame containing the screens of a common fan mill, as set forth and described.

111.—C. C. French, of West Stockbridge, Mass., for an Improvement in Corn-shellers:

I claim, first, The rotating cylinder, G, arranged on a yielding frame, H, in combination with the disk wheel, B′, and shelling wheel, E, all constructed, arranged and operating as set forth.

Second, I claim hanging the longitudinal bars of frame, H, on the tubular bearing blocks, a and h, so that the action of the ears of corn against the cylinder, G, will not cause any friction on the mainshaft, B, substantially as set forth.

[This invention consists in the arrangement of a rotating disk wheel having toothed or picking surfaces, between two large rotating shelling wheels having sharp teeth projecting from their peripheries, in combination with two toothed cylinders, arranged on an inclined plane in yielding frames on each side of the single disk wheel. It also consists in hanging each cylinder carrying frame in such a manner that the pressure of the corn cobs against the cylinders in the operation of shelling the corn from the cob, will operate on bearings partially independent of the shaft of the toothed disk wheel, thereby removing to some extent the friction of the cylinder frames from said disk shaft.]

112.—G. W. Furman, of Brooklyn, N. Y., for an Improved Mode of Relieving Steam Cylinders of the Water of Condensation:

I claim the combination of the steam cylinder, A, with the pipes, B B C and D, valves, E & E′, and steam trap, F, when the same shall be combined and operated as described and for the purpose set forth.

113.—Homer Gillet, of Lyndon, Ill., for an Improvement in Mole Plows:

I claim the spring, K, or its equivalent, when used in combination with the beams, G and B, and adjusting screw, J, as set forth, for the purpose described.

[An engraving and description of this invention will be found on another page.]

114.—J. Goodman and Samuel Rote, of Lancaster, Pa., for an Improvement in Seeding Cultivators:

We claim the combination and arrangement of the doubly adjustable scrapers, S, with their slotted supports, T, and the seeding roller, B, hopper, A, and appliances, when made and operated substantially as specified, for the purpose mentioned.

115.—Thomas Hegarty, of St. Louis, Mo., for an Improvement in the Manufacture of Baskets:

I claim the use of broom corn and wire in combination with willow or ratan, substantially in the manner described, for the purpose of making a cheaper and more durable basket than can be made of willow or ratan.

116.—Daniel Herlong, of Sandy Ridge, Ala., for an Improvement in Cotton Seed Planters:

I claim the combination of the pins, c, on wheel, D, the springs, F F, pawls, G G, ratchets, H H, and toothed shaft, I, the latter placed within the hopper, B, and all arranged for joint operation as and for the purpose set forth.

[This invention consists in a novel and improved means for distributing the seed, or discharging it from the hopper, whereby a uniform discharge of the seed is insured and the seed-distributing device made to operate very evenly or regularly, and not be capable of being impeded or at all affected by the cotton seed, which, in consequence of the lint with which they are more or less covered, are liable to compact in a quite solid mass, and have consequently interrupted the action, in a greater or less degree, of the seeding devices hitherto employed.]

117.—Willis Holmes, of Macomb, Ill., for an Improvement in Windmills:

I claim the arrangement of the self-acting fan, K, and valves, H H, with the flume, A, bar, G, rods, J J, spring box, L, and wheel, E, in the manner and for the purposes shown and described.

[The nature of this invention consists in arranging on the inside of a flume or cylindrical casing having one flaring end, and mounted in such a manner that it can rotate horizontally and always present its broad end to receive the current of air, a stationary and a rotating wheel—the former to regulate and direct the currents of air to the latter; and it consists in combining with the flaring end of the flume two sliding shutters, which will entirely or partially close the end of the flume; and the invention further consists in arranging two perpendicular wings or shutters in the back of the flume, and in combining them with a fan and spring in such a manner that the wings will spread out when the wheel revolves too fast and check the current of air, and thus serve to govern the motion of the wheel.]

118.—J. D. Houston, of Pope's Depot, Miss., for an Improvement in Cotton Scrapers:

I claim the arrangement of the scollop-edged driver, B′, pinion, C, rotary shaft, H, and adjustable rotary hoes, G G′, with the adjustable scrapers, D′ D′, frame, A, wheels, B B, and governing handles, D D, as shown and described for the purposes set forth.

[This invention consists in combining in one frame two rotary hoes and a double scraper, or two scraping wings of a peculiar construction, in such a manner, and in operating them in such a way, that the cotton plants will be left in hills of a few stalks, the scrapers will thin out the sides of the hills while the hoes will thin off the tops of the hills.]

119.—G. W. Lee and A. R. Reese, of Phillipsburgh, N. J., for an Improvement in Seeding Machines:

We claim the arrangement of the devices consisting of a wave wheel, c, skeleton plate, D, draw plate, E, provided with a stud, f, rods, R and g, and feed bars, I I′, substantially as described, when employed with a lifting board, M, operating in the manner and for the purposes as set forth.

120.—Bernard Morohan, of Brooklyn, N. Y., for an Improvement in Stopping and Starting Railroad Cars:

I claim the arrangement of the racks, G G′, with each other and with the sliding pinion, H, in the manner shown and described, so that the teeth of the pinion, before fully leaving one rack, will necessarily engage with the teeth of the other.

I also claim the arrangement of the spring teeth, p p, with the racks, G G′, in the manner shown and described.

I also claim the arrangement of the lip, o, and levers, g h i, with the slide, E, pinion, H, and racks, G G′, in the manner and for the purposes shown and described.

121.—J. W. Nystrom, of St. Petersburg, Russia, for an Improved Apparatus for Docking Ships, &c.:

I claim, first, The construction of pontoons with communicating towers and corridors, arranged and operating substantially as and for the purpose specified.

Second, The combination with such pontoons of pumping and propelling machinery capable of operating together or independently, substantially as described.

[This improved apparatus consists principally of one or more pontoons of novel character and construction, which are navigable, self-propelling and having within themselves the power of sinking and floating again under the control of persons on board. A full and illustrated description of this invention was published on page 1, Vol. I. (new series), of the SCIENTIFIC AMERICAN.]

122.—E. G. Oldfield, of Bordentown, N. J., for an Improvement in Machines for Making Brick Tiles, &c.:

I claim, first, The propellers, i i, traveling in the tapering duct, m, in the manner specified, to compress and consolidate the clay, as set forth.

Second, I claim the safety plate, n, applied to the duct, m, in the manner and for the purposes specified.

Third, I claim the arrangement of the air vessel, t, rollers, u u, and casing, v, in combination with the die, s, in the manner and for the purposes specified.

123.—J. H. Osgood, Jr., and F. B. Shaw, of Boston, Mass., for an Improvement in Railroad Car Couplings:

We claim the combined arrangement of the V-shaped bar, D, cross bar, C, and spiral springs, n n, the whole constructed and operating as specified, and in connection with the eyes, p and r, for freight cars, as described.

We also claim making the cross bar, C, detachable or removable, to be employed in connection with the hole, S, when it is necessary to couple into a car having the ordinary coupling.

124.—E. G. Otis, of Yonkers, N. Y., for an Improvement in Hoisting Apparatuses:

I claim, first, Having the pawls, f f, and the teeth of the racks, C C, hook formed essentially as shown, so that the weight of the platform will, in case of the breaking of the rope, G, cause the pawls and teeth to lock together and prevent the contingency of a separation of the same, as set forth.

Second, The arrangement of the ropes, T U and V, combined and operating substantially as and for the purpose set forth.

Third, The arrangement of the slide or belt-shipper, S, with the shoe or brake, Z, and rope, T, substantially as shown, to admit of the simultaneous application of the brake and the shifting of the belts, O P, on the idle pulleys, J K, as set forth.

Fourth, Attaching the rope, Q, of the counterpoise, R, to the drum, H, on the opposite side form the lifting rope, G, substantially as shown, so as to counterpoise the platform, D, without preventing or interfering with the action of the safety mechanism, E e f.

125.—W. P. Penn, of Belleville, Ill., for an Improvement in Seeding Plows:

I claim the described arrangement of wheels, J and H, hopper box, B, and spring, M, behind the mold board, A, and against the landside of the plow, for the purpose of sowing broadcast or drilling the seed in the bottom of the furrow; the whole to be made, operated and arranged substantially in the manner described.

126.—Washington Roberts, of Rocheport, Mo., for an Improvement in Covering Plows:

I claim the arrangement of the inwardly flaring shares, A, attached by means of the arm, C, to the inclined standard, B, in combination with the pressing roller, F, supported by pendants, e; the whole being constructed and operated as and for the purpose set forth.

[The object of this invention is to provide simple and effective means to cover the seed and to press down the ground upon it by one operation; and it consists in the combination of two inwardly flaring shares, attached in an inclined position to the standard of a plow, with a pressing roller arranged close behind the shares and supported by pendants, which, at the same time, form braces for the shares.]

127.—B. C. Smith, of Burlington, N. J., for an Improved Pavement and Railway Combined:

I claim a cast iron pavement composed of solid plates, each plate having a longitudinal rib or ribs, A, forming a rail for car wheels, and transverse ribs, B and C, or their equivalents, when the upper surface of the rail is level with that of the said transverse ribs, and when the latter are cut away near the rails, as set forth, for the purposes specified.

128.—W. H. Smith, of Wyanet, Ill., for an Improvement in Cultivators:

I claim the brace rods, g g, pivoted pieces, h h, notched plates, k k, and arms, m m, in combination with the pivoted shovel stocks, E E, and handles, G G; all arranged and operating substantially as and for the purposes set forth.

129.—D. S. Stafford, of Decatur, Ill., for Improvement in Cultivators:

I claim, in combination with the driver's seat and a tongue pivoted to the main frame, the arc, d, with its projections or braces, e e, so that the driver may, from his seat, cramp the main frame on the tongue to cause it to follow the crooks in the row of plants, substantially as described.

I also claim, in combination with the seat and the main frame, the construction and arrangement of the bent axle, for the purpose of allowing the driver to use the axle itself as a lever to raise or lower the frame upon itself, substantially as described.

I also claim the long bent share blades or cutters, H, for the purpose of cutting under and throwing the loosened soil toword the plants, when combined and arranged with a frame such as described and represented.

130.—C. C. Stringfellow and D. W. Surles, of Lumpkin, Ga., for an Improved Mode of Hanging Carriage Bodies:

We claim the transverse ties, G G, arranged and operating substantially as and for the purposes specified.

[This invention is a novel improvement in hanging carriage bodies on springs and from C-shaped jacks, whereby the body is allowed a free and easy vibration longitudinally; and it is relieved from sudden and disagreeable jolts and jerks in traveling on rough roads, or from the sudden starting of the horse. The parts are also so braced and strengthened that all liability to twist the carriage body is effectually prevented. The invention consists in the combination of transverse tie rods with the side springs, which are hung by shackle bars or joint links from C-shaped supports.]

131.—John Wilkinson, of Baltimore, Md., for an Improved Dumping Wagon:

I claim supporting the body, a, upon arched railway guides, b, as set forth, and, in combination therewith, I claim the triangular anti-friction yoke, e, as set forth.

I also claim the self-locking catch, h, arranged and operated as set forth.

132.—Lorenz Wolfe, of Hamburg, Mo., for an Improvement in Plows:

I claim the arrangement of the standard, H, the plate, D, the lug, I, and screw, C, in connection with the plow beam and the plow, substantially in the manner described, for the purpose specified.

133.—W. C. Wright, of New York City, for an Improvement in Car Brakes:

I claim the spring, M, rod, N, pinion, D, and the two racks, P G, when the latter are arranged or used in connection with the cams, E E′, bars, F G I J, and levers, H K, or other equivalent devices for operating them, as and for the purposes set forth.

[This invention relates to an improved brake for city railroad cars, or those which are drawn by horses, the brake being of that class which

applies the power used to stop the car in starting them again. The object of the invention is to obtain a simple device which will effect the desired end, and one which may be used in all cases; that is to say, with or without a starting power.]

134.—N. S. Bean (assignor to the Amoskeag Manufacturing Company), of Manchester, N. H., for an Improvement in Steam Engines:

I claim the bifurcated arrangement of the tubular metallic perch hole or fore body, whether the same is divided into compartments or not.

135.—William Braidwood, of Mount Vernon, N. Y., and James Whiting, of Brooklyn, N. Y., assignors to Thos. Holmes, of said Brooklyn, for an Improvement in Operating Slide Valves of Engines and Pumps:

We claim the combination of the direct acting levers, f or f′, with the slide valve, h or h′, the parts being constructed as specified, so that the valve covers the openings through which the levers pass, and renders separate packings or stuffing boxes unnecessary, as set forth.

136.—Peter Louis, of New York City, assignor to himself and Hiram Wandel, of Castleton, N. Y., for an Improvement in Stopping and Starting Railroad Cars:

I claim the combination of the pivoted slotted rack, E′, and the pivoted rack, D′, with each other and with the dog, f, ratchet wheels, D E, axle, C, clutch, F, and spring, G, in the manner and for the purpose shown and described.

[This invention consists in the arrangement of two ratchet wheels which have their teeth pointing in opposite directions, and one of which is fast on the axle of a railroad car, while the other turns loosely on the same, in combination with two serrated bars or racks, one of which is above and the other below the axle, and with a spring, in such a manner that, on fastening the loose ratchet wheel by means of a suitable clutch, the momentum of the car strains the spring, and the resistance of the spring causes the car to stop; and if now the clutch is withdrawn from the loose ratchet wheel, the force of the spring is exerted on the fast ratchet wheel, and the axle is turned in that direction in which it is desired to start the car.]

137.—G. H. Reister (assignor to himself, F. Cadwalader and L. S. Butterfield), of Washington, Iowa, for an Improvement in Wind Mills:

I claim the series of movable curved guides and fixed curved guides, as they are arranged and operated in relation to each other and to the wheel, as set forth.

138.—H. B. Weaver, of South Windham, Conn., assignor to himself and W. H. Strong, of Norwich, Conn., for an Improvement in Machines for Dressing Millstones:

I claim the arrangement of the feed screws, V B′, with the disks, Y A′, arms, W C′, pawls, X D′, and sliding blocks, M N—all arranged essentially as and for the purpose specified.

[The object of this invention is to obtain a machine for dressing mill and other stones, over which the operator may have perfect control both for guiding or moving the pick and the regulating of the force of the blow thereof. The invention also has for its object the ready adaptation of the machine to the stone, and to so arrange and combine the several parts that they may be readily manipulated and the pick driven by power or operated manually, as may be desired.]

139.—J. S. Mackay, of Brooklyn, N. Y., assignor to himself and Hugh Mackay, of Norwich, Conn., for an Improvement in Mending Fire Engine House:

I claim stopping rents or holes in hose and other elastic tubes or pipes substantially as set forth.

RE-ISSUES.

19.—George Lindsay and William Cameron (assignees to William Cameron), of Petersburg, Va., for an Improvement in Tobacco Presses. Patented September 13, 1859:

I claim the combination of a portable hydraulic press or jack with a stationary retaining press or series or tier of retaining presses, when operating together for the purpose and substantially in the manner represented.

20.—Robert H. Long, of Philadelphia, Pa., for an Improved Arrangement of Steam Engines for Propelling Street Passenger Cars. Patented January 24, 1860:

I claim, first, Placing a steam engine and boiler constructed and arranged as described, on the platform of a railway car, in the manner substantially as specified.

Second, Placing the pinion, F, upon the frame of the engine, thus permitting the engine to be brought close to its work, and the whole to be used in combination with a railway car, for the purposes set forth.

21.—A. H. Allen, of Boston, Mass., for an Improvement in Seats for Public Buildings. Patented December 5, 1854:

I claim a swinging or lever seat set and moving upon a cross shaft or hinges, and sustained, when in use, by a stop or stops so disposed as that the rear portion of the seat comes in contact with said stop or stops when the seat is turned down, substantially as set forth, and, whether combined or not with weights or strings whereby the said seat may assume and retain a vertical or raised position automatically, as herein specified.

22.—William Cameron, of Petersburg, Va., for an Improvement in Tobacco Presses. Patented November 9, 1858:

I claim the making of a hydraulic press available in the pressing, and retaining under pressure, of tobacco, by combining and using in connection with it a retaining press or stand that will receive and hold the pressure imparted to it by the said hydraulic press, substantially as described.

23.—William Cameron, of Petersburg, Va., for an Improvement in Tobacco Presses. Patented November 9, 1858:

I claim combining with a retaining press or stand that is to be used in connection with and receive its pressure from a hydraulic press a series of boxes into which the tobacco is pressed by the greater press, but retained by a minor press, substantially as described.

24.—John Gore, of Brattleboro', Vt., for an Improvement in Harvesters. Patented December 27, 1859:

I claim, first, The use of the lever, M′, constructed as described, in combination with the tapering draw bar, D, for elevating the cutting apparatus of harvesters, in the manner described.

Second, The adjustable box, J, constructed as described, in combination with the connecting rod, a, and cutting apparatus, and operating as set forth.

ADDITIONAL IMPROVEMENTS.

310.—Wm. M. Baker, of Walpole, Ind., for an Improved Refrigerator. Patented April 3, 1860:

I claim the arrangement of the sliding standards, H, and windlass, K, in combination with the case, A, constructed and operating in the manner and for the purpose described.

[This invention consists in the arrangement of a windlass in combination with the case that serves as the provision chamber of the refrigerator in such a manner that said case can easily be raised from and lowered to the table supporting the same.]

311.—J. V. Dinsmore, of Auburn, Maine, for an Improvement in Metallic Heels for Boots and Shoes. Patented April 3, 1860:

I claim the use of a steel plate so attached to the metallic heel as to be capable of being readily changed from one boot to the other, in the manner and for the purpose specified.

Notes and Queries

W. C. T., of Tenn.—All clay requires to be tempered before it is placed in the press for molding bricks. A pug mill is used to work and mix the clay for the molding and pressing machine.

R. B. C., of Pa.—Watches are now made and sold in this city with a winding attachment combined with the watch precisely like your plan.

J. C. B., of Mass.—Your plan for protecting forts from the action of shells is not new. A steam floating battery has been in process of construction for a number of years at Hoboken, opposite this city, in which the same plan you propose is to be used for obviating the effect of shot or shells.

J. A. H., of N. Y.—If you clean the wrought iron shafts perfectly, and heat them well before you place them into the molds, the cast iron will readily adhere to the same and you will obtain sound castings.

F. L. A., of Conn.—It is not incumbent upon a patentee or his assignees to put his invention into use in order to sustain his rights against infringers. Your rights are not forfeited by your not working the patent.

J. H. G., of Fla.—Orange peel contains both water and oil, and after the water is evaporated the oil will burn very freely. By squeezing the peel near a lamp drops of oil will fly separately into the flame, producing the little explosions of which you speak.

G. W. D., of Pa.—Your apparatus is received, but we do not consider it worth a notice.

J. H. K., of Mass.—Arsenic forms alloys with potassium, sodium, aluminum and glucinum, and it combines with nearly all the metals in combination with either sulphuric acid or oxygen. You will find directions for forming these various compounds in Booth's "Encyclopædia of Chemistry."

J. D., of Ohio.—Paraffine is a product of coal oils and distilled peat. When heavy coal oil is subjected to a very low temperature, by placing ice in it, solid paraffine is deposited. This is placed in bags and subjected to severe pressure, so as to obtain it in cakes.

G. H., of N. Y.—We are not acquainted with any method of recovering the tin of tinsmiths' clippings, which would not cost more than the pure metal sold in the market.

J. M., of Del.—Two cubic feet of resin gas affords as much light as five cubic feet of coal gas.

H. M., of Ill.—You can color light furs black by repeated immersions in warm liquors of copperas and logwood. White or light hair may be dyed black by boiling it in logwood liquor, containing a minute quantity of copperas. First boil it in a weak liquor, so as to make it a slate color, then take it out, air it, and boil it in a strong logwood liquor, and it will become black.

L. B. L., of Vt.—We believe that the belt saw is not well adapted for cutting out fellies, &c.

J. O. F., of Mass.—You inquire "When was the act relating to designs, on page 24 of your pamphlet on 'Patent Laws' passed?" If you had looked at the end of the Act in the pamphlet you would have ascertained the date.

H. S., of Va., and J. G., of Ohio.—Dr. Gesner's work on petroleum oils, published by Bailliere Brothers, No. 440 Broadway, this city, contains the information which you want.

M. B. K., of N. Y.—Our charge for binding the Scientific American is 50 cents per volume. We should want to examine your premises thoroughly before giving an opinion in regard to the cause of the water running back from your trough through the siphon into your well (which is four feet higher than the trough) whenever the wind is east.

S. W., of Mo.—You will find many articles on firearms in the early numbers of the current volume of the Scientific American, and there will doubtless be many more in this volume. The Enfield rifle is precisely similar to the United States army rifle.

J. McC., of Locust Grove.—You can subscribe for *Presse Scientifique des Deux Mondes* through Messrs Bailliere, Brothers, No. 440 Broadway, this city. The fact of there being so very few people interested in the construction of reflecting telescopes is the reason why we do not publish your novel suggestions on the subject. Probably Professor Mitchell would be pleased to examine them.

E. G., of Mass.—Babbitt's anti-attrition metal is composed of copper, 24 parts (by weight); tin, 24; and antimony, 8: melt the copper first, then add the tin and antimony. When all are melted run the alloy into ingots, and it is fit for being cast into journal boxes when wanted. We cannot give you the information wanted regarding dentists vulcanite.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Jan. 19, 1861:—

A. G. T., of N. Y., $35; C. W. T., of Pa., $30; J. I. H., of Ky., $40; T. C., of N. Y., $10; J. B., of N. Y., $35; S. L. A., of N. Y., $30; L. A. B., of N. Y., $25; J. G., of N. H., $25; A. N., of Pa., $30; L. Y., of N. Y., $30; J. H. K., of Mass., $25; J. C. T., of Ill., $25; G. L., of Iowa, $30; D. C. W., of N. Y., $30; A. C., of Mich., $30; C. H. D., of Ill., $25; H. N. De G., of N. Y., $25; E. H., of Vt., $30; J. T. S., of Wis., $30; W. M., of N. Y., $25; E. T. C., of Mass., $30; J. A., of Maine, $30; B. M., of N. Y., $25; S. & J., of Ill., $30; A. V. R., of Iowa, $35; C. H. R., of N. Y., $58; R. S., of N. J., $55; E. A. D., of Mass., $32; R. B., of Iowa, $25; J. McC., of Ala., $55; A. D. B., of Mass., $30; B. T., of Mass., $30; A. H. C., of Wis., $10; G. I., of Mich., $30; J. W. N., of Pa., $25; M. C. B., of Ill., $25.

Specifications, drawings and models belonging to parties

with the following initials have been forwarded to the Patent Office during the week ending Jan. 19, 1861:—

T. R. B., of R. I.; H. N. D. G., of N. Y.; J. R. R., of Mass. (2 cases); J. T. S., of Wis.; W. R., of Conn.; J. C. T., of Ill.; A. G. T., of N. Y.; J. G., of N. H.; C. H. D., of Ill.; S. & A., of Iowa; W. M., of N. Y.; J. B., of N. Y.; R. B., of Iowa; C. H. R., of N. Y.; L. A. B., of N. Y.

Improved Mole Plow.

It seems that underground draining still calls for improvements in mole plows. The object of the one which we here illustrate is to so adjust the mole as to make a straight channel, vertically as well as horizontally, so that the water may flow freely down this uniform grade. To accomplish this, the mole is pivoted at its rear end to the bottom of the coulter, so that its point may be turned up or down, and a sight tube is arranged upon the top of the beam, in such connection with the mole that the two will be always parallel with each other, so that by pointing the tube at a target, the mole will be directed at a point directly below the target, corresponding in distance with the distance of the tube from the mole.

The mole, A (Fig. 2 of the annexed cuts), is made of the usual form, with the enlargement at its rear end made in a separate piece. The mole is pivoted at *e*, to the coulter, B, which enters a slot in the middle of the mole, and a rod, *f*, connected by a pivot to the forward part of the mole, passes up through a hole in the coulter and is furnished with a screw and hand wheel at its upper end, by means of which the point of the mole may be turned either up or down. Upon the top of the beam, with one end directly over the hand wheel, is placed the level block, G, Fig. 3, with the sight tube, *h*, upon its side. One end of the block, G, rests upon the bearing, *i*, which is directly over the pivot, *e*, at the rear end of the mole, and the other end of the block, G, rests upon the top of the rod, *f*, hence, as this rod is moved up or down, to vary the vertical direction of the mole, the end of the block, G, is carried up or down with it, and thus the sight tube, *h*, is kept always parallel with the mole. After the mole is placed in the ground, for the commencement of the ditch at one end, the hand wheel is turned to carry the rod, *f*, up or down, until the sight tube, *h*, points to a target placed at the opposite end of the ditch, at a distance above the level at which it is desired the ditch shall terminate, corresponding to the distance of the sight tube from the mole. This, of course, causes the mole to point exactly to the desired level at the end of the ditch.

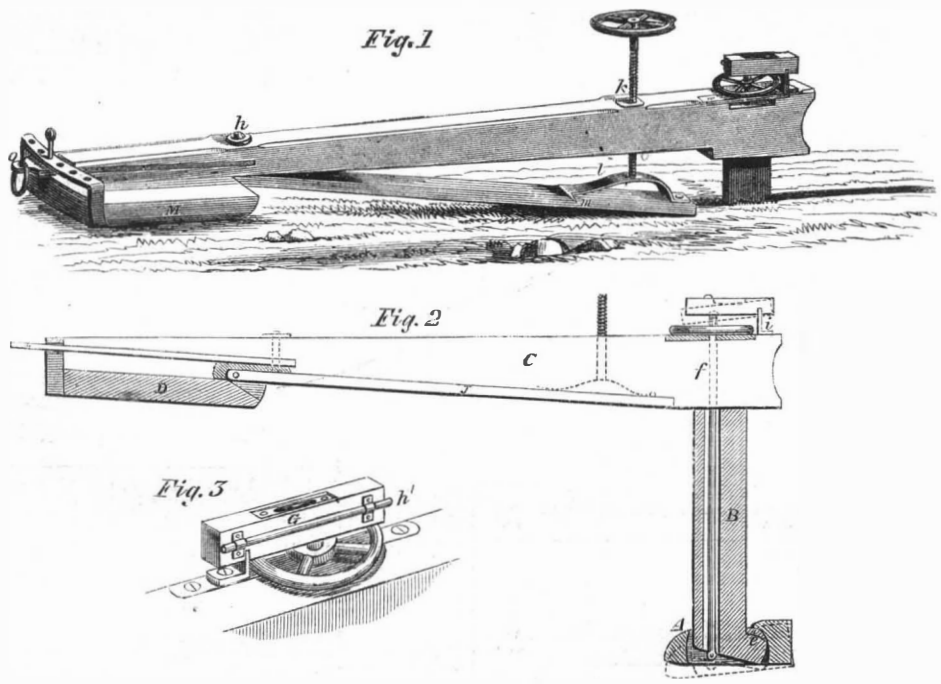
To ascertain whether the mole is running in the desired grade during every portion of its passage from one end of the ditch to the other, a spirit glass is fitted into the block, G, in a manner so as to be adjustable vertically, and after the position of the mole is fixed at the commencement of the ditch, the glass is brought to a level. Any departure, now, of the mole from the line of the established grade, will be indicated by the tipping of the glass from its level position.

For the purpose of keeping the mole at the desired grade, in the passage of the beam over slight inequalities in the surface of the ground, the supplementary beam, J, is provided. This beam is pivoted at its forward end to the main beam, while the rear ends of the two are held apart by the stiff screw, *k*. An attendant watches the level in the block, G, and whenever any deviation of the mole from the grade is indicated, he brings it back to position by turning the screw, *k*.

Another office is also performed by this supplementary beam. A stiff elliptic spring, *l*, being interposed between the end of the screw and the beam, J, with an indicator point, *m*, on the free end of the spring, the pressure of the beam downward on the top of the sod, and the corresponding pressure upward of the top of the mole, are constantly indicated. As there is a certain pressure upward of the mole, which it is desirable to exert, in order to close the top of the channel perfectly, the attendant is able constantly to adjust this pressure by turning the screw, *k*, so as to keep the indicator, *m*, in the same position. When the serew, *k*, is turned, however, for the purpose of bringing the mole to grade, the position of the indicator, *m*, will be altered.

The beam of this plow, like other mole plows, is provided at its forward end with the broad sled, N, to facilitate its sliding over the ground, but a modification of the mode of connecting with the draft line is introduced into this plow. A metal rod, *o*, is pivoted to the main frame at *p*, and is made adjustable at its forward end, in order to permit the line of draft to be varied horizontally.

The patent for this invention was granted, through the Scientific American Patent Agency, on the 15th of January, 1861 (the claims will be found on another page); and further information in relation to it may be obtained by addressing the inventor, Homer Gillet, at Lyndon, Ill.



GILLET'S IMPROVED MOLE PLOW.

Spiking Cannon.

The Pittsburg *Despatch* contains the following interesting information:—There is no method of spiking a cannon which will forever prevent its use. If the spike is made of iron or unhardened steel, it may be removed by the drill. If it is loosely inserted, or without much force, it may be blown out by firing a charge of gunpowder placed in the bottom of the bore. But if the spike is made of hardened steel, to fit the vent closely, and is driven in with great force, and if its lower end is made soft and riveted within the bore, then neither the drill nor gunpowder can remove it; the vent remains permanently closed. The remedy, in such cases, is to drill a new vent, which may be done without impairing the serviceableness of the gun. A new vent may be drilled in any cannon by a skillful machinist in two or three hours.

In experimental firing, when a vent becomes too much worn and enlarged, we drill a new one, and sometimes as many as three or four vents are made in the same gun, and many hundred fires are made afterwards.

During the recent Crimean war, an article relative to spiking cannon was published in the London *Times*, in which it was asserted that the use of a new patent spike would destroy the serviceableness of the gun. The spike was described as a piece of finely tempered steel, turned to fit the vent, but to move freely in it, and turning out in a forked spring in the bore. This spike, it was alleged, could not be removed, as it would turn readily with the drill; but it seems that the possibility of cutting or breaking off the tongs or forks of the spring inside the barrel was not considered. The communication given above, from high authority, may be looked upon as conclusive that the worst effect of spiking would be a few hours' delay in the use of the guns—often an important matter.

INVENTIVE GENIUS OF NORTH SAN JUAN, CAL.—The *Hydraulic Press* of the above place says:—"Our little town has produced its full proportion of inventive genius. The following comprises the list, viz: Messrs. Frank Smith and J. B. Low are the inventors of a distributor or water box, to attach to the lower end of hydraulic pipes; Mr. R. H. Dunning is the inventor of a valuable undercurrent; Mr. A. M. Winham has applied for a patent for an ingenious, though perfectly simple, process of hose coupling; Messrs. Holden and Amsbury claim that they have improved upon the same invention; Frank Smith has also introduced an improved half screw coupler, for which he claims a patent; Messrs. L. F. Cushman and J. S. French are engaged in perfecting an improved rock drill, for which they have secured a patent. These gentlemen are all at the present time residents of the town."

FROM THE STEAM PRESS OF JOHN A. GRAY.