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THOMAS HENRY HUXLEY.

We publish this week a spirited and excellent likeness of the eminent naturalist, Thomas Henry Huxley, F.R.S., LL.D.

Professor Huxley was born in the year 1825. Many writers, no doubt, looking at the enormous amount of work he has done, have *inferred* his age to be much greater, but we have our information from an intimate personal friend, and cannot be mistaken. He studied medicine, and entered the naval service as surgeon, and accompanied Captain Stanley's expedition to the Eastern Archipelago, and during the voyage made observations on the natural history of the sea, devoting especial attention to the medusæ.

On his return to England he was appointed to succeed Dr. Edward Forbes, as Professor of Paleontology at the Government School of Mines, in London; he has also been Professor of Anatomy in the Royal School of Surgery, and of Physiology in the Royal Institution of Great Britain.

Our distinguished American author, Dr. E. L. Youmans, defines Professor Huxley's position in the world of science as that of "a philosophical biologist," and as such he ranks among the very first in England or in the world. Although Dr. Huxley is profoundly learned in natural history, he has also found time for general literary culture, and is fond of poetry, fiction, and fine writing. It is this wide culture that gives him such power in his controversial writings. He seems to like nothing better than a regular set-to with some members of the old-school scientists, and he has sometimes been accused of exhibiting a pugnacious and acrimonious spirit. At one of the meetings of the British Association he had a famous tilt with Professor Owen, and on another occasion Samuel Wilberforce, Bishop of Oxford, blandly asked him in the presence of a large audience: "Is the learned gentleman really willing to have it go forth to the world that he believes himself to be descended from a monkey?" Professor Huxley rose and replied in his quiet manner, "It seems to me that the learned bishop hardly appreciates our position and duty as men of science. We are not here to inquire what we would prefer, but what is true. The progress of science from the beginning has been a conflict with old prejudices. The true origin of man is not a question of likes or dislikes, to be settled by consulting the feelings, but it is a question of evidence, to be settled by strict scientific investigation. But, as the learned bishop is curious to know my state of feeling upon the subject, I have no hesitation in saying that, were it a matter of choice with me (which clearly it is not) whether I should be descended from a respectable monkey, or from a bishop of the English church, who can put his brains to no better use than to ridicule science and misrepresent its cultivators, *I would certainly choose the monkey!*" The reply was received with a storm of applause, and Huxley was afterwards known as "the man who had extinguished 'Soapy Sam,'" as the English sometimes irreverently called the Bishop of Oxford.

Professor Huxley is a very industrious man. In addition to the writing of valuable books, such as "Man's place in Nature," "The Origin of Species," and the like, he delivers

elaborate lectures to the students of the School of Mines, and special courses of evening lectures for working men. Some of his popular lectures have been published under the title of "Lay Sermons, Addresses, and Reviews," and they are models of what such discourses should be—clear, concise, and scientifically accurate.

Professor Huxley is married to an accomplished woman, whom he met on one of his journeys to Australia. Around his own hearth and in the bosom of his family he is said to be full of humor and cheerful fun. His little boy remarked one day in the presence of a visitor who was staying with the family, "I always know when papa is chaffing by the curl of his nose."

Mrs. Huxley is musical and translates German fairy tales for her children, of whom there are seven, and Professor Huxley amuses the home circle by reading something from Wendell Holmes' poems, of whose works he is very fond, or by relating droll stories. A happier domestic circle could not easily be found.

It is to be hoped that the learned Professor will some day visit this country, and afford us an opportunity of hearing him lecture upon the value of scientific education, and upon other topics around which he has thrown such a charm by the elegance of his language, and the accuracy of his knowledge.

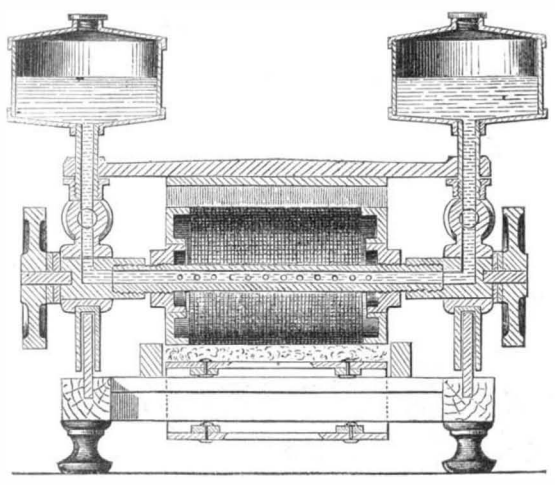
MACHINE FOR OILING WOOL.

The object of this invention, illustrated herewith, is to form a self-regulating apparatus that will not only insure a perfect and uniform distribution of oil upon wool, but press it into the same, so that the wool becomes thoroughly saturated thereby, and can be used immediately.

By thus preparing the wool for instant use, an inferior quality of oil, or composition of oil and other materials, can be used to better advantage than has heretofore been possible, as there is no time for the oil to become gummy, or particles of the composition to evaporate, as has been the case where the wool was spread out and obliged to remain some time after being sprinkled, or otherwise prepared with oil. Moreover, the wool can be more easily and better carded and spun when thus freshly oiled.

The improvements heretofore made in wool-oiling machines have many of them possessed disadvantages arising from their complicated construction, the numerous parts occupying too much room, and interfering with the operative; the constant attendance required in operating them; the imperfect manner in which the oil is distributed over the wool—one portion of the wool receiving a large quantity of oil, and another little or none; and from various other causes that need not be stated further herein.

The most essential advantages of this wool-oiling apparatus are the time, labor, and expense saved by its self-regulating action; the simplicity of its construction and operation, requiring no pulleys, gearing, or complicated connection with the carding machine; regulating the flow and the equal distribution and pressure of the oil on the wool; the cleanliness with which the oil is kept, and the prevention of its congelation; the immediate use of the wool after being freshly oiled, and the better working of the same in consequence.



Attached to one end of the frame are standards. Fitted over these standards, so as to be raised or lowered thereon, are tubes attached to the bottoms of sockets, through which are made to revolve hollow plug-shafts. In the top of the circumference of the plug-shafts, in the centers of the sockets, apertures are formed to serve as cocks, so that by turning the shafts the oil or composition used is admitted to or excluded from them, according to the direction in which they are turned. Screwed into or otherwise connected with the ends of the plug-shafts opposite to those to which the wheels are attached, is a hollow shaft, having a slot or a series of apertures so formed in its circumference as to be at such an angle with the cocks, when they are opened, as to allow the oil to drip from the apertures and not to steadily flow from them. Connected with the hollow shaft by bearings and made to turn with or independently of the shaft, is a gauze cylinder. Stop-cocks operated by thumb-screws—which also operate indicators attached to the opposite ends of the stop-cocks and which revolve in front of dial plates not shown—control the flow of oil from reservoirs at the tops of the standards.

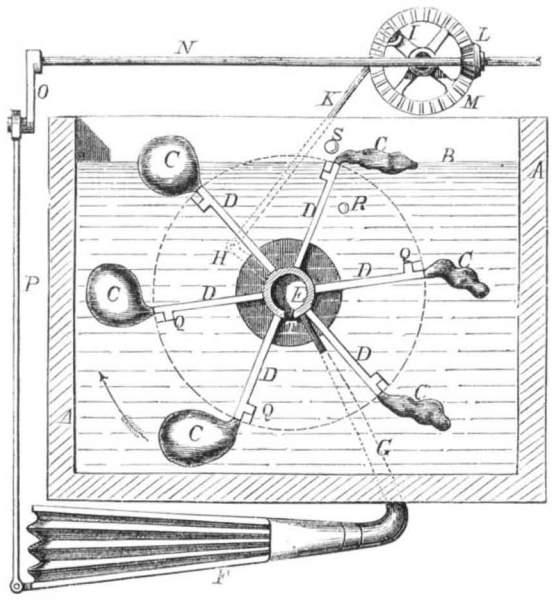
The reservoirs being filled with oil, or other material used in preparing wool, the oil, etc., is forced by the pressure of its own weight down through the tubes, the flow therein being regulated by the stop-cocks, so that a large or small quantity of oil can be admitted. The plug-shafts are turned in proper position by means of the wheels attached, which are connected with the main belt of the carding machine. The oil flows from the tubes through the apertures or cocks into the hollow shaft, from which it is distributed through the slot or apertures formed in the circumference thereof, upon the inside of the perforated or gauze cylinder, which is made to revolve around the shaft by the wool pressing against it as it is fed along by the feeding-apron. The distributing-shaft is so arranged in regard to the cocks that, when the cocks are opened, the apertures are placed at such an angle as to produce a regular and constant dripping of the oil upon the cylinder, and not to allow its flowing in a steady stream, which would be the case if the shaft were so operated as to bring its apertures directly on the under side thereof. The flow of the oil into the shaft is regulated, or entirely shut off therefrom, according to the extent to which the shafts are turned. This machine was patented by Miles Mayall, of Roxbury, Mass., Jan. 28, 1868.

PERPETUAL MOTION.

NUMBER V.

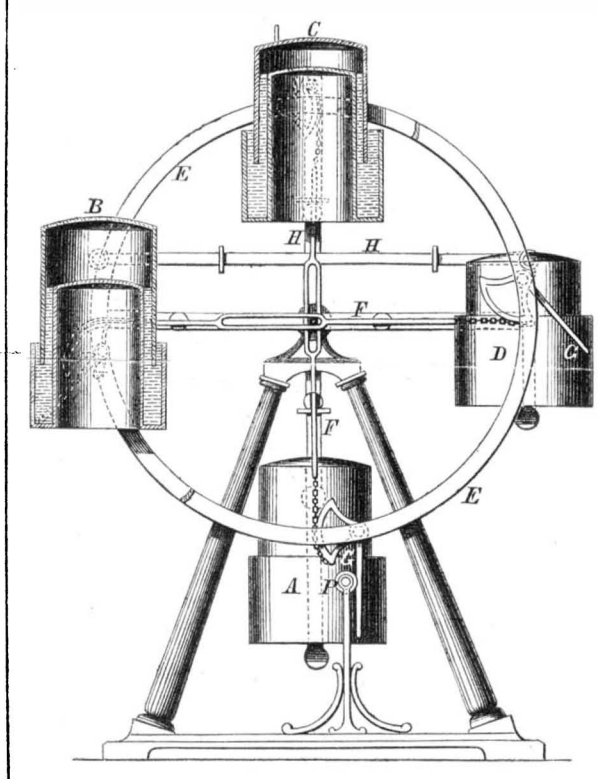
The force of gravity applied directly to the dropping arms of wheels, or to balls which roll out in troughs, fails to make such machines operate as self-movers. Inventors have sought often to utilize the buoyancy of floats in a similar way. The accompanying diagram illustrates this principle.

FIG. 11.



A is a cistern of water, filled as high as line B; C are six bladders, communicating by the tubes, D, with the hollow axle, E, which axle is connected with the bellows, F, by the pipe, G. H is a crank, connected with the crank, I, by the rod, K. L is a bevel wheel, M a pinion, N its shaft. O is a crank, attached to the bellows, F, by the rod, P. Q are valves with projecting levers. R and S are two projecting knobs. T is a hole in the axle, E, forming a communication with it and the lowermost bladder. The axle, E, being put in motion, is expected to carry round the bladders and tables, and by the cranks, H and I, and the connecting rod, K, cause the wheel, L, to revolve, which communicating a similar but accelerated motion to the pinion, M, shaft, N, and crank, O, works or blows the bellows, F, by the rod, P, from which the air enters the axle, E, by the tube, G, and passing through the hole in it at T, enters the lower bladder, C, by the tube, D; this bladder being thus rendered lighter than the space it occupies, ascends, bringing the

FIG. 12.



bladder behind it over the hole in the axle, T, in like manner, and which is thereby expected to gain an ascending power, producing a similar effect on the one behind it. When one of the bladders arrives at the knob, S, the lever of the valve, Q, strikes against it, and opens the valve when the bladder arrives at U and begins to descend, its pressure on the water drives out the air, and gives it a descending power; the knob, R, then closes the valve, Q, and prevents the entrance of any water into the bladder; by this contrivance, three of the bladders were expected to be alternately full and empty, according as they passed over the hole, T, or the knob, S.

The reason assigned for the failure of this machine was the friction, the old invincible enemy of perpetual-motion seekers.

Amid all the fruitless attempts which have appeared, there was still one avenue to the object of pursuit, to which the common and well-known principles of hydrostatics seemed to direct the way; this was the principle that any body specifically, or bulk for bulk, lighter than common air, will rise and swim in it. Consequently, if a certain quantity of vessels are attached at equal distances, round the circumference or rim of a wheel, so contrived as that one half of the vessels shall be exhausted on one side of the wheel, and the other half filled with air on the opposite side, in this case the exhausted vessels will attain the highest part of the wheel, and the full ones the lowest. But to render the matter more explicit, we must refer to the annexed engraving, Fig. 12.

A B C D are four vessels connected to the wheels, E, by round pins which project from the vessels on each side, and enter into corresponding holes in the wheels, E. The wheels, E, are intended to revolve by the space under the vessel, B, being a vacuum, and therefore lighter than the same portion of air; a little before the vessel, B, reaches the highest point of the wheels, it begins to close, and opens the opposite vessel, D, in the same manner as the vessel, C, opens A, because the pressure of the atmosphere on the vessel, C, is equal to the pressure on A. Instead of common packing to make the vessels air-tight, mercury is substituted, which has less friction, and is never out of order. The particles of mercury not being entirely free from friction, a little power is requisite to open and shut the vessels; this is expected to be effected by the rods, F, connected to the lever, G, by chains. The rods, F, give motion to other rods, H, by the rollers acting against collars on the rods, H, not shown.

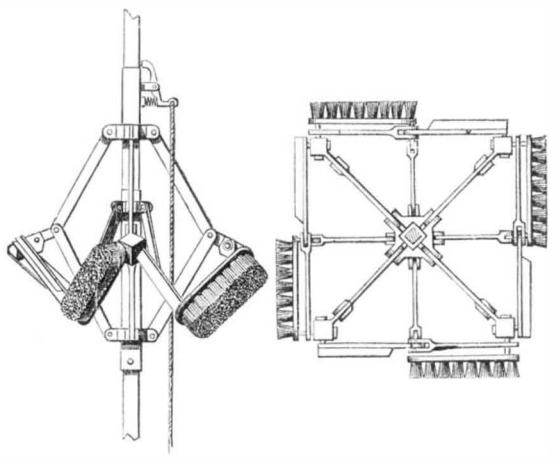
The levers, G, are successively worked by sliding over the roller, P. The connecting rods, H, are so adjusted as not to draw the vessels out of their upright position, which would let the mercury escape; also, the lower vessels, A and D, are made rather larger in diameter than B C, so that the pressure of the atmosphere may counterpoise the weight of the vessels, A C and B D, with their connecting rods.

The inventor of this contrivance says:

"I doubt not in the least, that if a pneumatic machine like this were accurately executed, it would continue in perpetual motion: yet I still think the power might be greatly increased by placing the whole engine under a receiver of condensed air, say from ten to twelve atmospheres, which would weigh, if it were ten atmospheres, about twelve ounces per cubic foot."

IMPROVED CHIMNEY CLEANER.

Many flue-sweeping devices are not effective in clearing the angles of a square or rectangular flue, as they consist mainly



of a circular head with radial bristles of whalebone, cane, or other like material, which, if of proper diameter to operate effectively on the sides of the flue, will not reach the angles, and if of sufficient length to reach the angles, are so much curved where they come in contact with its sides as to have but little if any effect in removing the soot therefrom. To remedy these difficulties is the object of the invention illustrated by our engraving. It consists in the construction of a brush or scraper frame supported on a central shaft, the several parts of which are so hinged or jointed together as that they may be distended or contracted at pleasure to suit flues of different dimensions, or to pass readily any contractions or irregularity in the formation of such flues.

The stem or staff of the apparatus, which is constructed in sections of convenient length to be passed up the flue successively, and connected each with the preceding one by a bayonet lock or other suitable coupling. To the upper section of this staff, at a suitable distance from its top, is attached a collar, to which are jointed, at its four opposite sides, in a hinge-like manner, arms extending upwardly. Above this, on the staff, is a sliding collar, to the lower end of which are jointed, in a similar manner, arms which extend downwardly, and are connected with the other set of arms, as shown. On the lower end of each of the arms is an enlargement, to which are attached bars, which form, when extended, a rectangular frame supported by arms or braces around the staff. The

bars are jointed or hinged together midway between angle blocks, at which point they are again supported by braces hinged thereto, and at their opposite ends to another sliding collar, on the staff between the fixed and sliding collars. The sliding collar carries a spring-borne pawl which locks into apertures or notches in the side of the staff, and thus secures it in any desired position thereon. To the lower end of this pawl is attached a small cord, by which it may be disengaged from the staff when passed to the requisite distance up the chimney or flue. To each of the bars forming the rectangular frame is attached, on its outermost side, a brush or scraper, whichever it may be desired to operate with.

This ingenious device is the invention of Thomas H. Donohue, Washington, D. C., and was patented by him May 6, 1868.

Improved Gate.

Our engravings represent an improved form of gate of the class known as sliding gates, wherein, by an ingenious link motion and the use of a weighted balancing lever, the gate is made to move backwards or forwards in a nearly horizontal line without tilting and with very little friction.

The construction is simple and cheap, and the gate appears well adapted to general use.

Fig. 1 represents the gate as closed, and Fig. 2 the same as opened. A is the gate, B the panel of the fence along which the gate sldes or runs in opening and closing; C and D are vertical bars attached to the gate, one at the center and the other at the rear end, rising considerably above the top of the gate, and having vertical slots, E, in the upper parts. F represents pairs of bars, nearly as long as the bars, C and D, pivoted near the ground, one pair at the front end of the panel, B, of the fence, and the other as far back as the distance between the bars, C and D, and as near the path of the gate as may be, and let it pass between the bars of each pair. These bars carry rollers on studs at G, on the side next the gate, which rollers work in the slots, E.

H represents links about half the length of the bars, F, pivoted to the bars, C and D, at the bottom, as shown, and to the bars, F, at or about the center. J represents a pair of links pivoted to the bars, F, and also to the top of the weighted lever, K, at J. The weighted lever is also pivoted at L to a fixed support rising from the ground.

The gate is thus suspended on the bars, F, and is carried past their pivot centers at the bottom of the links, H, at each opening or closing of the gate, the weighted lever preventing the bars, F, from sagging, and consequently preventing the gate from tilting endwise.

The links describe equal arcs, the curvatures of which are reversed as to each other, and hence the resultant motion of the gate is nearly in a straight horizontal line.

Patented through the Scientific American Patent Agency, December 20, 1870, by Henry R. Hoskins, whom address for further information, Harlan Allen Co., Ind.

Fig. 1

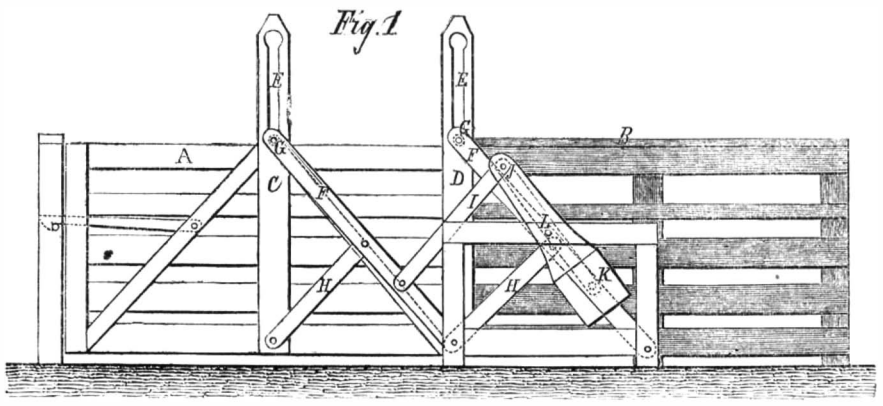
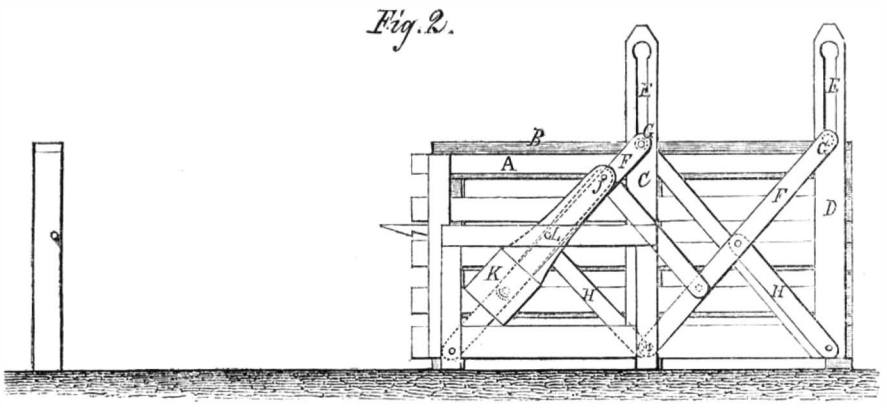


Fig. 2.



HOSKINS' IMPROVED GATE.

Newton's Process for Duplicating Negatives.

Mr. H. J. Newton, of this city, makes known the following process through the Philadelphia *Photographer*. We have seen some magnificent specimens of transparencies. The process is evidently one of value:

"Let photographers provide themselves with one or more positives of their valuable negatives, and they are insured, to a great extent, against loss from accidents that may happen to them. The first thing to be provided with is a suitable collodio-chloride. After repeated experiments I determined upon the following formula as the best for my purpose: alcohol and ether, equal parts; chloride of magnesium, 4 grains; citric acid, 4 grains; nitrate of silver, to the ounce, 12 grains. These proportions appeared to be the best, but there was always a variation in the working of this compound, depending upon the manner of its compounding. The best results were produced in the following way:

"Dissolve in one ounce of alcohol 24 grains chloride of magnesium, then add 36 grains of intense cotton; next pulverize in a mortar 24 grains citric acid with 72 grains nitrate of silver; pulverize to an impalpable powder, and then add 2 ounces alcohol; continue to agitate until the alcohol is completely saturated; now add to the solution of chloride 3 ounces ether, shake well for two or three minutes, and pour the whole slowly into the mortar, stirring briskly while doing so. As soon as the vial is empty pour the whole back into it. It can then be filtered, and is ready for use. When prepared in this way it is much more sensitive than when prepared otherwise, and prints with a deeper and richer color, giving, therefore, stronger and more vigorous prints. The glass is coated with albumen, prepared by dissolving the white of one egg in 6 ounces of water and 10 drops of ammonia, filtered, and flowed on when the glass is wet. When thoroughly dry flow with the collodio-chloride, and dry with artificial heat. When dry set it on one side, and warm the negative to about 120°, or to about the same temperature of the prepared collodio-chloride plate; put the negative in the printing frame, and, when cooled to about 100°, or to blood heat, put the prepared plate over the negative in the printing frame, and expose to sunlight from fifteen to twenty minutes for a thin negative. By opening one half the frame and looking through, you will be able to tell, with a little experience, when it is printed deep enough. The obstacle in the way which seemed the most insurmountable was pinholes in the deep shadows. To call them pinholes gives but a faint conception of the reality; they would, in long printing, literally form a sieve. I attributed the cause to vapor confined between the two glasses; they, having been put together cold, and placed in the sunlight, became in a short time very hot. I am far from sure that such a theory is correct, but I am sure that after heating the negative as described I had much less trouble. Yet care should be taken that the negative does not get very hot in the sunlight.

"When the print has become of sufficient intensity, remove from the frame, and wash for a short time under the tap, and fix in the old hypo and gold toning bath; this bath should be made at least twenty-four hours before using, and quite weak with hypo. The older this bath is the better it works.

"If you find, on removing the print from the frame, that it is not printed deep enough, it can be strengthened with pyrogallic acid and silver, the same as a negative. This treatment with pyrogallic acid will give you a much richer tone than you would otherwise get; it will require a much longer time, however, in the fixing and toning bath, and instead of diminishing in strength, will increase in intensity. When toned to suit your taste there only remains, to complete the positive, washing and drying. To make a negative from the positive so obtained, proceed in precisely the same manner as already described for a positive. The positive should be varnished before placing it in the sunlight in contact with a prepared collodio-chloride plate, or the positive will, in a short time, almost entirely disappear. This phenomenon, to me, was most extraordinary, and I am not yet satisfied what is the exa t cause. The coat of varnish, however, was an effectual preventive, which shows that the action was one of contact between the prepared surfaces caused by the action of sunlight, or rather, incited to action by the solar rays.

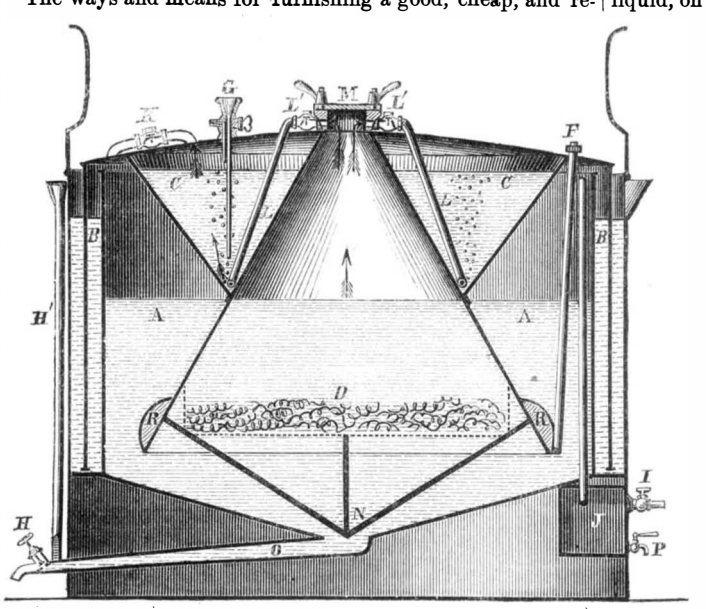
"Positives made in this way are of surpassing beauty, containing all the fine detail of the negative, soft and brilliant, and of a tone I have never seen equaled."

The best kind of printing frame for this purpose is one similar to, or the same as, those used for printing pictures on porcelain, for when using such, the printing may be watched in its progress without danger of displacing either glass.

CARBURETED HYDROGEN GAS.

The ways and means for furnishing a good, cheap, and reliable illuminating gas, have taxed the brains of chemists greatly, and since the discovery of the petroleum wells in this country, a few years since, the subject has received a new impetus. But it has been found that the adaptation of the volatile hydrocarbon oils distilled from petroleum to use in gas apparatus, especially portable ones, presents many difficulties. Some apparatuses designed to utilize these oils for lighting purposes have met with a limited degree of success. It has been found that the vapor of the volatile oils referred to is too rich to burn unmixed with some diluent, causing the precipitation of unburnt carbon in the apartment where burned; and the very numerous devices for mixing air therewith for producing illuminating gas have so far, on account of mechanical as well aa chemical reasons, failed to come up to the requirements of useful application as to be generally considered unreliable. The causes are too numerous to specify here, and are doubtless familiar to many if not most of our readers.

A trial of apparatuses and devices for generating illuminating gas in a portable manner was undertaken by the chemists of the American Institute, last fall, after the close of the exhibition, and the opinion arrived at by the judges in their report was decidedly adverse to the "carbureted air" principle, as the following quotation from their report will show: "Hydrogen gas as a basis, rendered luminous by a hydrocarbon oil, vapor, or otherwise, is the light of the immediate future for all portable gas apparatuses, and will fulfill all the requirements demanded of them by the public, viz., luminosity, safety, reliability, and economy. In points of durability and convenience it is perfectly practicable, while its safety is greater than that of kerosene oil or of air gasmachines."



The accompanying engraving shows a perpendicular sectional view of an apparatus for generating carbureted hydrogen gas, invented by C. F. Dunderdale, of this city, and covered by several patents dated from June 1, 1869. The following brief description and reference to the various parts will suffice to show its arrangement and manner of operation:

A is a mixture of water and oil of vitriol; B the water seal for floating gasometer, which, rising and falling, regulates the generation of the gas automatically; C shows the hydrocarbon liquid in its chamber; D the iron shavings resting in a wire-cloth basket, the immersion of which into the acidulated water generates the hydrogen gas. The arrows show the course of the gas as it rises from the metal turnings, down pipes, L', and bubbling up through the hydrocarbon liquid, becoming thereby carbureted, and passing through pipe and valve, K, into the holder, where it is stored until used.

The various other devices are for the efficient and simple handling and management of the apparatus when in operation.

The gas generated by this method is of high illuminating power, and, we are informed by the inventor, costs per thousand cubic feet less than gas furnished by ths gas companies and is burnt in the smallest size coal-gas burners that consume from one and a half to two cubic feet per hour, and which are claimed to give an illuminating power greater than coal gas burnt in a burner that consumes six cubic feet per hour. It is said this claim has been confirmed by photometric test. This apparatus, we are informed, received the highest and only medal, a diploma and honorable mention at the Exhibition of the American Institute, last fall, after a competitive trial of different apparatuses.

Particulars relating to this apparatus, and rights, etc., to manufacture and sell under the patents, can be had from the patentee, C. F. Dunderdale, 90 Wall street, New York.

Sensitive Tests for Hyposulphite of Soda.

According to the *Journal fur Chemie*, the most delicate test for hyposulphite of soda is permanganate of potash. Its application is simple and easy, and well adapted, therefore, to the wants of the working photographer. One decigramme of pure permanganate of potash and one gramme of chemically pure carbonate of soda are dissolved in half a liter of water, yielding a transparent rosy-colored solution. This liquid, on coming in contact with the most minute trace of hyposulphite, loses its red color, and assumes at once a greenish hue. A finer test than this, probably does not exist.

Licht enumerates other tests for hyposulphite, which are more or less practical in their nature, but are, nevertheless, well worthy of record.

1. The test based upon the blackening of sugar of lead paper by means of hydrogen, produced by the action of pure sulphuric acid upon pure zinc, when the fluid in the gas-generating vessel contains hyposulphite of soda.

2. The galvanic test, in which pure silver foil, under the influence of an electric current, becomes of a yellow or brownish color in the presence of hyposulphite of soda.

3. Grune's test, where a collodion film, rendered of a whitish color by the application of chloride of mercury, fulfills the duty of reagent, and assumes a grayish tone when affected by hyposulphite of soda.

4. The very precise test afforded by the use of blue iodide of starch, which bleaches readily when hyposulphite in minute quantity is mixed therewith. It is probably only the first and last of these tests that will be found practical in photographic operations; they are

both very trustworthy ones, and require but little knowledge or skill in their application.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Wickham's Perpetual Motion Patent.

MESSRS. EDITORS:—I have noticed in the SCIENTIFIC AMERICAN of the 17th December, an article headed "Perpetual Motion," in which it speaks, on page 386, of a perpetual motion machine invented by Horace Wickham, Jr., of Chicago, and on which a patent was obtained July 26th, 1870.

As this statement may mislead the public as to the nature of the patent granted, I deem it proper to state that no patent was issued for a perpetual motion.

Letters patent No. 105,870, 26th July, 1870, were issued to Horace Wickham, Jr., for an "Improvement in Motive Power," in which the specification states, under the head of "Nature and object of my invention: "My invention relates to a machine for transmitting motion," etc. The original specification was for a self-sustaining motive power, which was rejected.

The patent was granted for a machine for transmitting motion. It possessed novelty, since no reference could be found anticipating the devices. It possessed utility, as defined in paragraph 449; Curtis on Patents.

By applying any power at either end or alternately to the ends of the rocking beam, it may serve the purpose of transmitting motion to the operative devices and thence to the material to be acted upon.

The letter of the first rejection, dated July 11, 1870, was as follows:

"The application above referred to has been examined. The applicant claims a "self-sustaining motive power;" in other words, a machine that renews its motive power from itself without the intervention of external causes. It is admitted by all the authorities on mechanics that the various resistances to motion, viz.: friction, gravity stiffness of machinery, etc., necessarily retard, and finally stop the machine. Now, a machine is a simple or complex structure of inanimate material, and inanimate bodies cannot give themselves motion, nor can they change the motion they may have received.

"But the applicant's invention is stated to be a 'self-sustaining motive power,' that is, this machine is said to give to itself renewed motive power in order to make up for its constant loss of power due to the various resistances which are constantly retarding its movement. As this cannot be effected, the machine is not a self-sustaining motive power. It must stop. It will not effect the result claimed for it. It is then deficient in result, and must be rejected as deficient in this essential quality of patentable invention."

Washington, D. C. J. W. ABERT.

Automatic Telegraphy.

MESSRS. EDITORS:—In your issue of December 17th, is a reply (by that eminent electrician, Moses G. Farmer, Esq., of Boston) to an article upon the subject of "Automatic Tel egraphy," by George B. Prescott, Esq., the talented electrician of the Western Union Telegraph Company.

With your permission, I would like to call the learned Professor's attention to an inadvertant omission on his part, of a fact now well known to experts in the exact science of telegraphy, namely: it being possible under certain conditions to transmit telegrams over a line composed of No. 8 iron wire, 250 miles long, at almost any rate of speed up to 2,000 or more words per minute.

Yet, notwithstanding the fact here stated, I should, under all circumstances, prefer and also recommend the use of the (to me) beautiful compound wire, composed of steel and copper, on account of its superior strength and great conductivity, requiring at the same time only one half the number of poles per mile; and requiring also a less amount of electro-motive force to operate the machinery used in connection therewith.

Rutherford Park, N. J. GEORGE LITTLE.

Effect of Explosions on Weather.—The Nitro-Glycerin Explosion at Fairport, Ohio.

MESSRS. EDITORS:—I notice an inquiry in your last issue concerning rain after the Fairport nitro-glycerin explosion. I was at Canfield, Ohio, during the week in which it occurred. The explosion occurring on Tuesday evening was followed on Friday night by a rain beginning at 9·30 P.M.; amount of rain, 0·42 inches. The weather for the week preceding was unusually fine, and on Saturday at 11·30 A. M., the sky became clear, and remained so for several days. Wind at time of rain, N.N.E. The rain was not preceded by the usual rise in the dew point of the air; barometer fell suddenly, and as quickly rose again to its normal hight. These are the facts relative to the only rain which followed the explosion for some ten days.

W. R. SMILEY, Observor for Smithsonian Institute.

New Lisbon, Ohio.

WE regret to learn from *Nature* that Sir R. I. Murchison has been stricken with an attack of paralysis; at last accounts he had somewhat improved, but in a disease of this character we fear the attack is the beginning of the end. The same journal also announces that Professor Balfour Stewart, the eminent physicist of Owen's College, Manchester, was among the sufferers by the recent collision on the London and Northwestern Railway—one thigh was broken and a terrible shock given to the nervous system. He is doing as well as could be expected under the circumstances.

[For the Scientific American.]

AUTOMATIC TELEGRAPHY.

BY D. H. CRAIG.

I have read with attention the speculations of Professor Farmer and Mr. Prescott, in recent numbers of the SCIENTIFIC AMERICAN, upon the subject of automatic or "fast" telegraphy, but regarding the conclusions of those gentlemen in the light of our practical experience, during the past two years, I cannot help saying, with all respect for their distinguished reputations, that they appear to me very blind and unreliable teachers.

It is undoubtedly true that Mr. Little and his friends have not a particle of "science" (as electricity is taught in the books, or as it has been taught by those who have assumed to be its exponents, in a practical way) to stand upon, when they claim to telegraph over long lines one thousand words per minute! and yet they know this rate of speed is entirely practicable, and is thus even more easily and satisfactorily accomplished than it can be on a short line.

All who have preceded Mr. Little (including Prof. Farmer, Prof. Wheatstone, and Mr. Prescott) have assumed, and even proven, at least to their own satisfaction, that about sixty words per minute over a No. 9 iron wire, 250 miles long, was the maximum of attainable speed; and I have now before me a recent private letter from the manager of the Government lines in England, where the Wheatstone automatic system has been in use for many years, who says that sixty words per minute, in a circuit of 200 miles, over a No. 6 iron wire, is there regarded as the highest attainable speed of practical telegraphy.

Mr. Prescott's statement, assented to by Prof. Farmer, that "the speed of automatic transmission varies inversely as the square of the length of the line," is, doubtless, good "science," as they understand it, but viewed in the light of our experience, it is arrant nonsense, as all our tests go unerringly to prove that with the Little system of automatic or "fast" telegraphy, *the longer the circuit, the better the work*, provided always, of course, that the wire in use carries a steady flow of current when in contact with the battery; and as we have had equally good results over the most ordinary No. 9 iron Morse wires, as over the compound (steel and copper) wire, the assertions of Mr. Prescott that our success in writing 250 words per minute between Washington and New York, is owing to the great superiority of our wire, is wholly erroneous. With our system (which, let me say is *not* Mr. Prescott's or Prof. Farmer's) we can work just as rapidly and as correctly over the poorest iron Morse wire, as we can work over the best steel and copper compound wire, in any length of circuit where it is possible to deliver a steady flow of even one twentieth part of the necessary current to work a Morse machine or a Hughes-Phelps printer! but of course a compound wire, such as we use on the Washington line, though it adds nothing to the average cost of lines, considering the less number of posts and insulators that are required, really adds nearly three times to the conducting power and tensible strength as compared with the iron wire in general use by the Morse lines. While, therefore, our wire would enable us to telegraph over a circuit two or three times greater than we could do with a common iron Morse wire, the latter would answer our purpose precisely as well as the former in any length of circuit where the iron wire could deliver a steady flow (however slight) of current.

The difficulty with Mr. Prescott and all other parties who have striven so vigorously to write down automatic telegraphy, is, that through ignorance or design, they have utterly ignored the important fact that Mr. Little uses electricity under entirely different conditions from what it was ever before used by any person who has experimented in fast telegraphy; and it is to this fact, and not at all to the fact that we have a superior line that we transmit and record correctly 1,000 words per minute, or 60,000 words per hour, over a single wire, equal to the average speed of 100 wires by the Morse system.

Prof. Farmer's suggestions to me to print instead of writing our messages with a pen, was successfully and advantageously practiced by the old American Telegraph Co. as long ago as 1856, and we have, so far, improved upon that idea as to have devised a printer which is worked with keys, and prints in note form, and in plain Roman characters, at the rate of three to four thousand words per hour, and manifolds at pleasure, from 10 to 20 copies at one writing.

With this rapid printer, and with a perforator which may be worked with nearly the same speed, there would seem to be no good reason why the public should not have 20-word messages telegraphed from one end of the country to the other, for ten cents each, provided they will furnish enough of such messages to keep one or two wires constantly employed, ten hours per day, between leading cities of the Union.

The Little system of fast telegraphy, having been satisfactorily tested, in an experimental way, is now about be placed before the public of Washington and New York and intermediate cities for the transaction of public business, and it is not doubted by any one who understands the principles which govern the new system, that it is destined to effect a complete revolution in the whole telegraph and postal business of the country.

VOCALISES.—We are indebted to the author, Miss Anna Ballard, the accomplished teacher of vocal music at Vassar College, for a series of musical exercises for the voice having the above title. These exercises appear to be well adapted for the development and cultivation of the vocal organs, giving facility of execution and equality of delivery. The system here presented has been adopted at Vassar College with the most gratifying practical results. Published by Oliver Ditson, New York and Boston.

The Antiquity of Invention.

The most ancient invention is that of the needle; whether the credit of this invention is due to Adam or to Eve, we know not, but we do know that the Bible says "they sewed fig leaves together and made themselves aprons." To sew without a needle would be an impossibility, therefore they must have invented one; whether from a thorn, shay stick, or fish-bone, is also a matter of doubt. How ancient, then, is the trade of dressmaking; and when we look at the fashionably dressed woman of to-day and reflect that all her dress, finery, etc., is the result of the combined thought, industry, and perseverance of dress-makers for nearly 6,000 years, is it to be wondered at that she is "fearfully and wonderfully made?"

To Noah is attributed the invention of wine, 2347 B. C. Ale was known at least 404 B. C., and beer is mentioned by Xenophon 401 B. C. Backgammon, the most ancient of our games, was invented by Palamedes, of Greece, 1224 B. C. Chess is of later date, and originated 680 years before the Christian Era. The first circus was built by Tarquin, 605 B. C., and theatrical representations took place as long ago as 562 B. C.; the first tragedy represented was written by Thespis, 536 B. C. So it seems that the ancients were not as destitute of amusements as one would suppose. Is it not possible that the great philosopher, Socrates, delighted in chess; that Sophocles amused his little friends by taking them to see the gladiators and the tragedians, and that even immortal Homer could play a fair game of backgammon?

As for musical instruments, they possessed the psaltry, harp, lute, and that most ancient instrument, the cymbal, which is spoken of as long ago as 1580 B. C. The flute was the invention of Hyaginus, 1506 B. C.; organs were invented by Archimides, 220 B. C.; and Nero played upon the melodious bagpipe 51 A. D.

In household furniture, glass was used by the Egyptians; crockery was known to the Egyptians and Greeks 1490 B. C.; carpets were in use 800 B. C.; clocks which measured time by the falling of water were invented 158 B. C.; sun-dials, which had been in use previous to the invention of the water-clock, date from 550 B. C.

Bricks were made 2247 B. C.; the lathe was invented by Talus 1240 B. C. The compass was used by the Chinese 1115 B. C. Bellows are the invention of Anarcharsis, 569 B. C.

But when we think that bread made from wheat was known to the Chinese 3860 years ago, we must confess that it is rather stale; we can imagine the young "heathen Chinee" of that date, crying lustily for bread and honey. These Chinese are a wonderful people, and no mistake, for even as far back as 1100 B. C. Mr. Pa-out-she wrote a dictionary containing 40,000 characters representing words.

When we read that the arts and sciences of astronomy, 2234 B. C.; sculpture and painting, 2100 B. C.; geometry, 2095 B. C.; husbandry, 1998 B. C.; poetry; philosophy; mathematics; mechanics; hydrostatics; geography; mensuration geology; metallurgy; chemistry, called alchemy; and surgery, were all known to the ancients, we almost exclaim with Solomon, "there is no new thing under the sun."

"WARREN."

Chemists who have Died in 1870.

Some of the most renowned and useful chemists of Europe have passed away during the year 1870. It is well to call them once more to mind before we close the volume for the year.

Professor F. T. Otto died at Brunswick, January 13, 1870. To him we are indebted for some of our best tests for poisons and for one of the most thorough works on chemistry extant.

Professor Gustavus Henry Magnus died at Berlin, April 4, 1870. He was in early life a chemist, but of late years had devoted himself exclusively to physics.

Professor Palmstedt died in Stockholm, April 6, 1870. He was one of the benefactors of Sweden, the friend and cotemporary of Berzelius and lived to the ripe old age of 85.

Niepce de St. Victor died in Paris, April 7, 1870. To him the world owes a debt of gratitude for the brilliant discoveries made by him in photography.

Professor Alexander P. Bolley, died August 3, 1870. In the field of technology he never had a superior, and we fear it will be long before we shall find his equal.

Professor Wm. Allen Miller, died Sept. 30, 1870. The well known author of Miller's Chemistry, and one of the most zealous investigators in the department of celestial photography.

Augustus Matthiessen, died by his own hand, in October, 1870. A conscientious, sensitive worker in electricity, and the discoverer of laws of telegraphy that are of the utmost value to the world.

Thus have passed away seven of the most active workers in the field of chemistry, whose places it will be difficult to fill.

BROWN HEMATITE.—Prof. Osborn, of the Miami University, writes us as follows: "It may be interesting to state that I have lately met with large deposits of an aluminous brown hematite ore, laid down, not in beds, as this ore generally occurs, but in vast masses of horizontal layers, closely resembling a light-colored heavy shale. Outwardly none would suspect the ore, but an approximate analysis gives 37· metallic iron, with traces of phosphoric acid, considerable alumina, some silica, and lime. Large masses or hills of this ore occur in Coshocton and Licking counties, Ohio; and though formerly no notice was taken of it, many tuns have lately been used to great satisfaction in the charcoal furnaces along and not far off the line of the Pittsburgh and St. Louis (Pan Handle route.

DR. DOREMUS ON THE TRIUMPHS OF SCIENCE.

The third lecture of the course of lectures by Dr. Doremus before the Young Men's Christian Association first recapitulated the various principles in regard to the combination of the elements explained in his last lecture. The Professor then said the metals were rarely found in a native state; they had "loves" or affinities with many other substances. As an illustration he would cite gold, silver, and iron, which were scarcely ever found pure. When iron ores were mingled with carbon and lime in a furnace, and a blast of pure air applied below, the iron associated with a little carbon, and ran out in a stream, which supplied molds made in the sand floor of the furnace, called pigs. Such iron is consequently known as pig iron. No one subject now commanded more attention from chemists than the production and manufacture of iron.

An analysis of the crust of the earth showed how largely oxygen had entered into its combination. Chemists announced that the basis of clay was a beautiful white metal called aluminum. The Professor then showed how a slight difference in the proportions in which other elements were mingled with alumina resulted in the numerous forms of clay, some of which were suited for the manufacture of the most beautiful kinds of porcelain, while others were used for making coarse tiles and pottery of all kinds. In the Bible it was stated that men were made of clay; but it might be said in passing that the metal which formed the basis of that substance was almost the only one not found by chemists in the human frame. Doubtless the Biblical reading ought to be earth.

The Professor next again returned to the discoveries brought to light by spectrum analysis. By this means several new metals had already been discovered. Then, as another proof of its value, it might be stated that metallic poisons could now be detected with sufficient precision for the purposes of a court of justice. Only a few years ago he had obtained proof of the presence of arsenic in a body after it had been interred twelve months. These modern refinements were due mainly to the spectroscope.

Sulphur in a pure and crystallized state was found at the mouth of volcanoes, and also in combination with many metals. It was very useful, especially as from it was manufactured sulphuric acid, or the king of acids. The mode of manufacturing this acid was then illustrated. Oil of vitriol applied to common salt resulted in hydrochloric acid, with a residue of soda. So important was sulphur that when the people who obtained it from volcanoes endeavored to get a higher price for their wares, no less than fifteen new patents for its manufacture were taken out. From hydrochloric acid we get chlorine, which, if mingled with coloring matter, like indigo and lime, had the power of removing the color. This discovery was one of the most important ever discovered. Chlorine was also the most powerful disinfectant known. A few years ago a cabin in one of the Cunard steamers, which had been infected with small-pox, had been effectually cleansed by this wonderful gas. It was a rather shameful fact that nearly all the caustic soda now used in this country was imported, a fact which showed the necessity, among other things, of providing higher means of scientific education among us. Sulphur also combined with India-rubber, and formed a singularly beautiful substance, out of which the well-known India-rubber trotting wagon was made. He believed this substance would at no distant date be employed more generally than at present.

The Professor then alluded to M. Tessier's method of obtaining oxygen gas—a method involving scarcely any expense. This was of the last importance, as oxygen was the essential element of heat and life. He then referred to the production of phosphorus, which was now procured from bones. Compounds of phosphorus were especially important to the human system as they seemed essential to intellectual effort. Butter, among other articles, contained a palpable quantity of this important substance.

Probably the sun produced its heat by chemical combustion. Some physicists maintained that a slight condensation of its surface would enable it to maintain this heat-giving power for thousands and millions of years, and others believed that the loss it thus sustained was made up by the occasional attraction of foreign bodies. Attempts have been made to find out the quantity of heat thrown out by the sun, and it had been calculated that our earth absorbed only the three hundred thousand millionth part of the total amount. As our earth is but a rusted mass of molten metal, so, perhaps, is the sun undergoing the same process from which the earth had emerged. But the sun was not the only source of the heat absorbed by our earth. Twelve millions of suns were constantly diffusing light upon its surface. Then we had internal sources of heat, such as volcanoes; and artificial heat, such as that caused by all movement or by chemical action—the latter source being, perhaps, the more important of the two.

In the fourth and last lecture the lecturer confined himself principally to the subject of electricity. Thales, by the friction of amber, had first observed this class of phenomena; but from that time—nearly two thousand years ago—until about two centuries since, the whole question slumbered. Then it was noticed that the property of attraction was not confined to amber, but was shared by many other objects also, for instance, sulphur and paper.

Passing from the discoveries of Mr. Gray, who had first begun to trace out the difference between conductors and non-conductors, to the investigations of M. Dufait, and of the Hollander philosophers, who first made what is called the Leyden jar, the Professor at last reached the discoveries of Dr. Franklin. It seemed strange, he said, that the latter, in spite of his wonderful genius, should only have brought to light a very few facts and principles in relation to electrical phenomena. But these were of the greatest importance, interest, and value. Electricity was capable of the most wonderful influences upon human health. Many of the most marvelous effects and cures were possible under the use of this power, and some physicians in this city were now investigating its influence in cases of pulmonary disease. The patients breathed electrified air, and the most beneficial results had already been experienced. The voltaic battery, and the wonderful phenomena which it made possible, were so remarkable that on first watching the experiments made with it the Emperor Napoleon I. exclaimed, "Behold the principle of life." Sir H. Davy was the next great discoverer in electrical science, and he had succeeded in reducing the metallic bases of many of the salts and thus obtained some new metals, such as sodium and potassium. Next came the discovery of the relationship between electricity and the magnet, after which the history of this science became a series of the most dazzling and beautiful discoveries, under the auspices of M. Arago, Professor Henry, and others, while the practical applications of the principles thus brought to light were extremely interesting, the electric telegraph and the Atlantic cable especially claiming notice. Ere long the earth would be completely girdled with an electric wire. This was as certain as that we breathed. The galvanic effects of the electric current were also very extraordinary, and electricity was capable of producing the most intense heat known. The Professor then made some interesting experiments, and briefly referred to the phenomena of animal electricity.

AMERICAN INSTITUTE LECTURES.—THE STRUGGLES OF SCIENCE.

The first of the course of the American Institute lectures for the season was delivered on the evening of Dec. 20, by Geo. B. Loring, M. D., of Salem, Mass.

On such a theme as the "Struggles of Science" there is great scope for eloquent dissertation, and the speaker availed himself fully of the opportunity. His remarks were listened to with evident satisfaction, and the lecture formed a most appropriate inaugural to the course.

The lecturer commenced by an allusion to the appropriateness of the place for scientific lectures. New York is more cosmopolitan in the character of its population, business interests, and trades, than metropolitan. While every other locality brings forth its specific fruit, and sends out its representatives marked with characteristics easily recognized everywhere, and under all circumstances, New York seems to absorb everything and send forth everything, attaching all her family to herself by that mysterious influence which power and greatness always exert, and developing faculties adapted to every locality—a Parisian for Paris, an Englishman for London, a Bostonian for Boston, a Puritan for Plymouth; and always a New Yorker still. Twenty cities, twenty nationalities, twenty civil organizations, as it were, all in one, what theory is not explored, what thought is not investigated, what science is not applied to vitalize and develop this wonderful aggregation of human forces?

The last 200 years have done more to advance science than the 2000 which preceded them. Turn your eyes in any direction, and you will find the most powerful human intellect engaged in this labor. The scientific period has arrived. The profound and masterly minds of the age, Humboldt, just now gone, Agassiz, resting for an hour only, as we trust, to return with renewed vigor to his imperial career in the realms of science, and their great investigating fraternity on both continents, have placed science at last in the divine regions of human genius, once occupied by the poets, and historians, and orators, and philosophers, who so long enjoyed undisputed sway as masters of human thought.

Religious persecution has done much to retard science, but this struggle was small in comparison to the contest which emancipated science from the tyranny of intellectual arrogance and pride. The great struggle commenced with the Baconian Era.

And now the great struggle commenced. Men still believed with Plato that science was a mere intellectual exercise and amusement; that the study of arithmetic was not intended for any practical service in life, but to habituate the mind to the contemplation of pure truth; that mathematics, applied to any purpose of vulgar utility, became a low craft, as he called it, fit only for carpenters and wheelwrights—and was no longer a noble science, leading men to the knowledge of abstract, essential, eternal truth; that the use of astronomy is not to add to the vulgar comforts of life, but to assist in raising the mind to the contemplation of things which are to be perceived by the pure intellect alone; that the science of medicine should be applied only to those whose constitutions are good, and not to those who by inheritance, or excess, or exposure, or accident, have become so permanently enfeebled that their heads grow giddy and full when exerted in the studious contemplation of divine philosophy—the remedy for feeble constitutions being death. That the science of legislation was based upon abstract virtue, and not upon that practical wisdom which would prevent and reform crime, and build up a state upon the principles of patriotism, and honesty, and courage, and honor, and furnish the highest faculties of man an opportunity to exert themselves "without being molested or insulted for it."

But this was not enough to satisfy the mind of Francis Bacon, who now assumed the leadership of the great scientific revolutions begun by him and carried out in our day by the devotees of science everywhere. Entertaining profound respect and admiration for the great thinkers of ancient times, and moving by his own natural forces along the same high plane of thought which they occupied, he stooped down and lifted into their august presence that useful, and manly, and homely attribute known as common sense. To be a philosopher meant, with him, to be the most useful man in the world; and so to him belongs the praise of having invented, methodized, and in a considerable degree perfected, the general plan for the improvement of natural science by the only sure method of experiment.

Instead of hypotheses he asked for facts, gathered laboriously from the watch of nature's silent revolutions, or extorted skillfully by instruments and trials, and carried forward by careful generalizations from the world of the known to the unknown. He reasoned always from causes to effects, and so impatient was his mind of mere abstractions that he never rested until he had brought his conclusions to some practical benefit. He clearly, for instance, conceived of a thermometer; he instituted ingenious experiments on the compressibility of bodies, and of the density and weight of air; he suggested chemical processes; he suspected the law of universal attraction, afterwards demonstrated by Newton; he foresaw the true application of the tides, and the cause of colors, which he ascribed to the manner in which bodies, owing to their different texture, reflect the rays of light." Ask a follower of Bacon, we are told, what the new philosophy as it was called in the time of Charles II., has effected for mankind, and his answer is ready: It has lengthened life; it has mitigated pain; it has extinguished diseases; it has increased the fertility of the soil; it has given new securities to the mariner; it has furnished new arms to the warrior; it has spanned great rivers and estuaries with bridges of form unknown to our fathers; it has guided the thunderbolt innocuously from heaven to earth; it has lighted up the night with the splendor of the day; it has extended the range of human vision; it has multiplied the power of the human muscle; it has accelerated motion; it has annihilated distance; it has facilitated intercourse, correspondence, all friendly offices, all dispatch of business; it has enabled man to descend to the depths of the sea, to soar into the air, to penetrate securely into the noxious recesses of the earth, to traverse the land in cars which whirl along without horses, and the ocean in ships which sail against the wind. These are but a part of its fruits, and of its first fruits. For it is a philosophy which never rests, which has never attained it, which is never perfect.

And what an era of emancipation was that in which Bacon wrought. Everywhere the bonds which had bound man's soul seemed to be breaking. Between the birth and death of Bacon, America opened her arms to receive the oppressed and persecuted. The Huguenots brought their protesting faith to our southern shores. The Puritans, who had kindled and preserved the "precious spark of liberty" in England, having sought shelter in vain in the Old World, braved the dangers of an almost unknown sea, defying with their fervid hearts the freezing storms of winter and the still more freezing storms of man's bigotry and persecution, and planted popular right and independent Christian worship in the New World—making sacred this very night on which we have assembled—the 215th anniversary of the last solemn hour spent by that weary band before they landed at Plymouth and gave an immortal soul to the empire of human equality on this continent.

In the world of thought, Shakespeare performed his divine and undying work. In the world of science, Harvey discovered the circulation of the blood; Drebel invented the thermometer; Torricelli invented the barometer; and Kepler erected as a monument to his genius the *Astronomia nova celestis*. It was the era of mental and moral protests and assertions, from which our own great privileges and opportunities have sprung.

From that period, the struggle which science had so long carried on against bigotry and intellectual arrogance has been conducted with a spirit of "audacity and sobriety" worthy of its great master, against the natural obstacles which lie in the way of finite man, in his endeavors to comprehend and employ the works of Infinite Wisdom. Once free, Science has not been disheartened in her career of usefulness and honor.

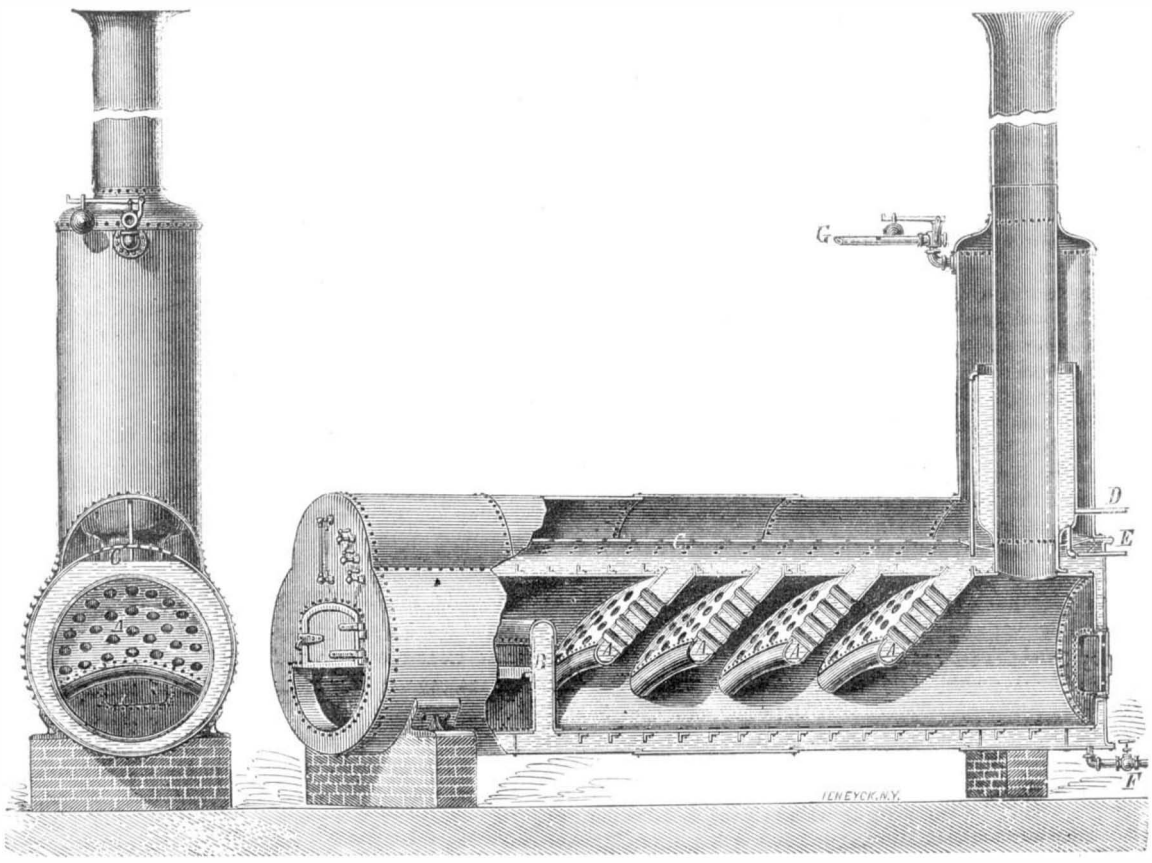
The speaker then discussed the usefulness of science in the discovery of the causes, prevention, and cure of disease, and the perfection of agriculture, and then passed to the subject of Social Science in America. He regarded with the deepest interest and the most profound respect that struggle which science is making to enter the great domain of social and civil economy, and to establish fixed laws by which society and the State may be guided and elevated. Met, as she is, on the very boundary of this domain by every variety of human taste and necessity, by a great diversity of social and civil organization, by all the various opportunities and obligations which attend the geographical divisions, the mountains and plains, and sea coasts and islands, by a thousand industries new and old, and by all the established systems of society and State, every one of which virtue irradiates and vice deforms, her task becomes at once difficult, her temptations great, her danger imminent. If there is any field in which she is to exercise the soberest judgment, it is here. If there is any investigation in which facts are to be collected, arranged, and weighed, it is where the prosperity, and happiness, and elevation of the human race are concerned. The soundest political philosopher is he who, gathering together all those causes of prosperity, general, diffused, and attended by popular virtue, which history provides, accepts the lesson which they teach, and promulgates the laws which they indicate; not he who starts with his theories and lends to them his facts.

IT is reported that the Central Pacific Railroad Company have purchased the Central Utah Railroad, and intend to push it through to connect with the Kansas Pacific Railroad

Improved Steam Boiler.

The well known want of economy in steam boilers in general, whereby much less than the total heat generated by the combustibles used is utilized in the generation of steam, is constantly stimulating invention in this important branch of engineering. One device follows closely upon the heels of another, and still it would seem the end is not reached. Our engraving represents another claimant to public favor, which, in a test made personally by us, on a recent occasion, gave very good results under quite unfavorable circumstances.

The boiler was set up on wooden supports, entirely unclothed, exposing a large amount of radiating surface to a mean temperature in the boiler house of 55° Fah., which temperature was maintained at a much higher point than could have been the case were it not for the radiation from the boiler itself. The stoking was done very imperfectly, by an inexperienced person, yet, with these drawbacks, in an experiment of four hours' duration, the evaporation made was 11·37 lbs. of water at 212° per pound of coal consumed. Great care was taken to avoid error in the estimation of the coal in the grate at the commencement and close of the experiment. As the experiment was too short to be satisfactory, there might have been some error in this particular; but, allowing ten per cent of the total evaporation as possible error, there would still remain 10·24 lbs. of water evaporated per pound of coal consumed, which is a very good result.



IMPROVED STEAM BOILER.

The dimensions of this boiler were: length, 15 ft.; diameter, 3 ft; heating surface, counting two thirds of inner shell, 68,995 square inches; grate surface, 962 square inches. The tube sheets—of which there may be any number—are placed at an angle of 45°, bringing every tube at the same angle to the flame. The cylindrical form of the outer shell continues, being perforated beneath the domes, which extend the length of the boiler and up around the smoke-pipe. Around the lower part of this is what may be called the feed-water heater, D, being the feed pipe. As the water is continuously pumped into the boiler, it is claimed that all the greater impurities of the water are deposited in this chamber, and blown off through the blow-off pipe, E.

Above this there is a small superheating space, which it is claimed more than overbalances any slight condensation which might be caused by feed water. F is a blow-off pipe from the bottom of the boiler.

This boiler has been constructed with the object of retaining all the advantages of the multitubular system, and rejecting many of its defects.

In the locomotive tubular boiler it has been found that the flame, in passing through the long tubes, is generally completely extinguished when it has passed through the first half of the tubes, and hence Chas. Wye Williams found that the first tube sheet, with the first foot or two of the tubes did fifty per cent of the work, and that the gases, in passing through a horizontal tube, never strike the face of the tube, but pass through what may be called a tube of air lining the iron, and, heating this column of air, thus heat the water.

In the boiler here illustrated, both sheets and tubes set at an angle to the flame, which, to progress, must strike the face of every tube; and the tubes being only six inches long, the flame, after passing through them, instead of being cut up and extinguished, as in long tubes, here comes together and gathers body as it rushes against the next sheet and tubes.

The first two series of tubes are two inches in diameter, and the last two one and a half in diameter—the object of thus graduating them being apparent. The inclination of the tubes (45°) does away with the necessity of scraping, and the ash falling to the bottom is easily withdrawn through the man-hole.

The shortness of the tubes gives a minimum of expansion and contraction. Should repairs be necessary, easy access may be had through the man-hole and up between the sheets, the bottoms of which are curved for this purpose, and also to afford the most perfect circulation of the water; and by cutting the end rivets the whole inner shell may be withdrawn.

Aprons are placed beneath the second and fourth series, compelling the gases to take the proper course. In the marine boiler of this construction, the flame passes back to the front of the boiler, through a series of tubes placed at the opposite angles, thus exposing the same surfaces and with the same effect; and when the water is at the proper water-line, the tubes cannot be exposed by rolling of the vessel.

A patent on this invention was issued Nov. 29, 1870, by mense assignment, to C. D. Tyler, of New York. The whole or an interest in the patent is now for sale. Particulars obtained by addressing the owner, C. D. Tyler, 359 Broadway, New York city. P. O. box 2865.

Holdredge's Patent Rectangular Cheese.

Our engravings represent a unique method of pressing, curing and packing cheese, for which the following advantages appear to be justly claimed: The cakes may be turned only a quarter of the way around instead of entirely over, as in the old form, so that the whey, instead of running directly back into the center of the cheese, will remain near the surface and evaporate more quickly. The cakes, being entirely covered by the bandages, may be cured without greasing. They are also more easily handled than round cheeses. They are packed for shipping in boxes of thin stuff, which any farmer may make himself, and the boxes have no loose covers to come off in handling. The cleats on the outside of the boxes prevent their being packed too closely, and also make them more convenient to handle. The form of the cheeses is more convenient for retailers, as well as for family use. For exportation this form is claimed to greatly excel the ordinary shape, as it can be packed closer. Shipments of cheeses of this form have been already made to England, with great success.

In the engraving, A represents one of the rectangular cheeses, partly wrapped in its bandage. B is the packing box, showing the manner of placing the cheeses therein. C represents the form of hoop used to increase the capacity of the hoop on the press, when necessary. It is provided with lugs, D, which fit into corresponding recesses, E, in the main hoop, which keep the supplementary hoop in its place.

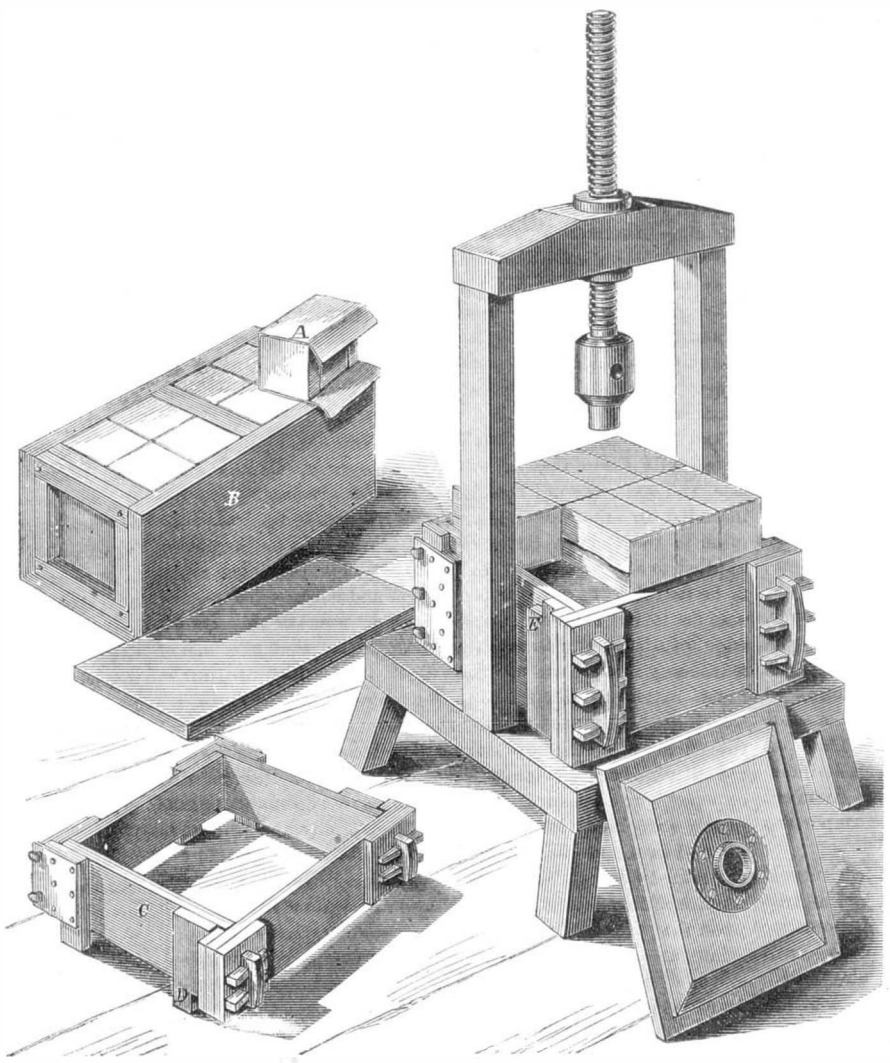
When the curd is ready for pressing it is placed in the hoop—of rectangular form, as shown—and having one side arranged to swing open on hinges, for the removal of the cakes after they are pressed. The curd is then pressed into a broad, flat cake. This is cut vertically into blocks, as shown, and bandaged as shown at A, with muslin. The bandaged cakes are then placed in the hoop in layers, as shown, with thin boards between, and again pressed, by which the whey is still further removed, especially at the freshly cut sides of the cakes.

After they are sufficiently pressed they are turned a quarter round vertically and again pressed, and so on till all the sides are pressed.

When the pressing is completed the cakes are placed on shelves, for the evaporation of the remaining whey, and this, it is claimed, is greatly facilitated by the form of the cakes, as above specified.

Patented through the SCIENTIFIC AMERICAN Patent Agency, Dec. 28, 1869, by Artemas Holdredge.

For information, address A. Holdredge & Co., West Burlington, N. Y.



HOLDREDGE'S METHOD OF PRESSING, CURING, AND PACKING CHEESE.

Cooper Institute Telegraph School.

We had the opportunity, a few days ago, of witnessing the Cooper Telegraph School in operation. Twenty-three young girls, averaging sixteen years of age, sat at the various desks endeavoring to send messages to each other. It was interesting to notice the progress each had made, and it was comparatively easy to tell which would succeed. The easy touch of the key, the depression of it without excitement of the head or body, the sharp introduction of the dot after a dash, as in the letter n, or d, or j, all indicated the operator. We cannot suppress the thought, however, that it is a mistake to teach an operator without the use of the register. An operator should be compelled to make letters exact; and to do this, they must be seen. Such, at least, is our conviction. Once thoroughly drilled in the formation of letters, they are never afterwards forgotten. And yet we confess to the excellence attained at this school, and the correct manipulation manifested by its graduates.

Over fifty graduates have now left the Cooper Institute, and have the management of offices or serve in them. The classes are now doubled from their original size, and over fifty may now graduate annually. Whether the demand will increase with the capacity of the school, remains to be seen. Pupils are dismissed who, after four months' practice, display a want of aptitude in transmitting or receiving. Of the present class only two are regarded as doubtful. All we saw seemed intelligent and diligent.

The room occupied for the school is comfortable, well lighted and aired. Every duty connected with a telegraph office is carefully taught, such as book-keeping, care of batteries, counting of words, preparing reports, etc., so that to graduate from the school is to be eligible for appointment. We think that in the very nature of the business the service of women in connection with the telegraph must be largely increased, and that, too, without reducing the service of men.

BLASTING EXTRAORDINARY.—At Tregarden Quarry, Luxulion, Cornwall, England, the property of the South Cornwall Granite Company, situated on the lands of Mrs. Foster, of Castle, probably the largest block on record ever blasted and entirely removed from its bed at one time, was separated on Nov. 26, by one charge of powder weighing 20 lbs., supplied by the Cornwall Blasting Powder Company. The rock thus removed consists of a splendid quality of granite, measuring 41 ft. 6 in. in length by 34 ft. in breadth, and 8 ft. 6 in. in hight.

Scientific American,

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Contents:

(Illustrated articles are marked with an asterisk.)

SIX MONTHS OF PROGRESS IN ENGINEERING.

One of the most notable engineering works of modern times, the East River Bridge at New York, has made considerable progress during the six months that are past. No accidents of importance have occurred. All difficulties seem to be foreseen and provision made to meet them as they arise. It is extremely interesting to see a work of this magnitude progressing with such ease and certainty, and the fact demonstrates the great advances which modern engineering can boast. The particulars of construction and the present stage of the work have been so recently placed before our readers that we need not dwell at any length on its details.

The caisson on the Brooklyn side has, since our former notices of the work, been sunk to its final resting place, and the work of filling up the cavity will soon be commenced. The caisson was commenced in November of last year, and the work of sinking it began in March last. The foundation now rests forty-five feet below low-water mark, thus placing all the timber completely beyond the reach of the water. The entire structure weighs about 30,000 tuns, to support which fourteen stone piers have been erected throughout the different chambers into which it is divided. The stone tower to be erected, for which the caisson will constitute the foundation, is to be 270 feet high, while the floor of the bridge will be 118 feet above the water. The caisson for this side of the river is being now constructed, and will be launched some time early in January. In its erection several improvements suggested by experience with the one just completed, have been made.

The great bridge at St. Louis is also familiar to our readers, and through Capt. Ead's report, extracts of which have appeared in this journal, they have been put in possession of facts relative to its present status. These bridges each presents peculiar difficulties, which it has been the triumph of modern engineering to overcome. When completed they will stand among the most notable structures of their kind ever erected.

The Hoosac tunnel, we are happy to say, under able direction is now making steady and, considering the nature of the work and the extraordinary difficulties attending it, even rapid progress. The facts connected with this great work are too familiar to our readers to be referred to in detail here, as the progress made, with interesting and minute details, are laid before them as fast as new facts are developed.

The Mont Cenis tunnel was announced to be completed in December, 1870, and as we have received no advices that indicate possible disappointment, that work is, at the time we go to press, probably completed.

The Darien Canal Survey, under the direction of Com. Selfredge, has resulted in a favorable report as regards the San Blas route from Mandinga Bay, on the Atlantic, to Chepo, at the southern end of Panama Bay on the Pacific. Further investigations are in progress.

The treatment of sewage has been studied with great earnestness during the entire year. It has now become a mixed mechanical and chemical problem, the importance of which is second to no other in modern engineering. It is attracting the attention of the ablest minds and must soon reach a satisfactory solution.

Street paving is another problem which is receiving much attention. Inventions multiply, and innumerable experiments are tried, most of which fail to give satisfactory results. The difficulties to be overcome are numerous, but the reward to him, who shall finally so far succeed as to place himself beyond the reach of competition, will be very great.

The loss of the British iron-clad, *Captain*, has elicited much discussion calculated to throw some doubt upon the sea-going qualities of very heavily-clad vessels, and is likely to modify in an important manner the construction of future vessels of the same class.

Many minor civil engineering works of greater or less importance have been begun or completed during the publication of the present volume, which we cannot enumerate at this time.

The system of propelling boats by cables laid in the beds of rivers and canals, is making great headway in Germany. Such cables are now successfully working in the Danube, the Rhine, and several other smaller rivers as well as canals. It is claimed for the system that it saves one third the expense for power attending the use of paddle wheels.

In steam engineering there has been no marked progress. Numerous minor devices, many of which have been described and illustrated in our columns, have been originated, but these inventions pertain mostly to safety appliances, rather than to the more economical generation and application of steam to the performance of work. The sectional tube system in boilers has received a great impulse from the many disastrous explosions which occur of late with shocking frequency, and is daily growing in popularity with a certain class of steam users.

The use of steam on common roads is also growing in favor, and daily extending. Steam plowing also is gaining ground, and has undoubtedly a brilliant future in store.

The direct application of solar heat to the generation of steam has been again prominently brought before the public, through the published experiments of Capt. Ericsson.

In mechanical engineering there is little of note to record, although the past six months have been prolific of new and useful minor inventions. Those who complain of the rate of progress made, must remember that great discoveries do not generally follow each other in quick succession, and possess their souls in patience. Man is slowly but surely subduing the brute forces of nature and bringing them under subjection to his never-satisfied will and desire.

PROGRESS OF CHEMICAL SCIENCE.

Professor Roscoe has sent us a copy of his address to the Chemical Section of the British Association at Liverpool, September 15, 1870, from which we gather some interesting information on the recent progress of chemistry.

With regard to the position of chemical science at the present time, the learned Professor says that it will not take a careful observer long to see that in spite of numerous important and brilliant discoveries, of which every year has to boast, we are really but very imperfectly acquainted with the fundamental laws which regulate chemical actions, and that our knowledge of the ultimate constitution of matter upon which these laws are based is but of the most elementary nature. Take for example the Atomic Theory. This has been freely used by chemists to enable them to explain chemical phenomena, and some authors regard the existence of atoms as the very life of chemistry. Dr. Frankland, on the other hand, cannot understand action at a distance, nor the discontinuity of matter, an idea lying at the base of the notion of atoms. Professor Brodie thinks that the science of chemistry neither requires nor proves the atomic theory, while Sir William Thomson attempts to form an idea of the size of atoms and molecules, and states that in any ordinary liquid, the mean distance between the centers of contiguous molecules is less than the hundred-millionth and greater than the two thousand-millionth of a centimeter.

In this connection the labors of the late Professor Graham are gratefully remembered. This philosopher paid special attention to the molecular properties of gases. "What do you think," he writes to Hofmann, "of metallic hydrogen, a white magnetic metal?" The condensation of hydrogen in palladium, and the discovery of the occlusion of hydrogen in meteoric iron, confirmed the conclusion to which spectrum analysis had previously conducted us, that the meteorites came from an atmosphere of incandescent hydrogen existing under very considerable pressure. Graham's fame as one of England's greatest chemists justly rests upon this important discovery. In addition to the blow given to our preconceived notions of atoms, Professor Roscoe refers to the researches of Dr. Andrews on the continuity of the liquid and gaseous states of matter, thus overthrowing our cherished opinions on the existence of three separate states or conditions of matter, viz., the solid, liquid, and gaseous. Dr. Andrews believes that a large number of easily condensable gases or vapors possess a critical point of temperature, at and above which no increase of pressure can be made to effect a change into what we call the liquid state, the body remaining as a homogeneous fluid, whilst below this critical temperature certain increase of pressure always effects a separation into two layers of liquid and gaseous matter. The boldness of modern research is exemplified in the observations of Lockyer and Zollner on the pressure acting in the different layers of the solar atmosphere. The red flames, chiefly composed of hydrogen, which shoot forth from the sun, must have burst out from under great pressure, and Zollner arrives at the conclusion that the difference of pressure needed to produce an explosion capable of projecting a prominence to the hight of 80,000 English miles above the sun's surface (a hight not unfrequently noticed) is 4,070,000 atmospheres. In order to produce a tension capable of overcoming this gigantic pressure, the difference in temperature between the inclosed hydrogen and that existing in the solar atmosphere must be 74,910° C.! and in a similar way Zollner calculates the approximate absolute temperature of the sun's atmosphere to be 27,700° C. or eight times as high as that given by Bunsen for the oxyhydrogen flame, a temperature at which iron must exist in a permanently gaseous form. Professor Roscoe also alludes to a new galvanic battery invented by Bunsen. In this second battery only one liquid, a mixture of sulphuric and chromic acids, is employed. The plates of zinc and carbon can be lowered at once into the liquid and raised again at will. The electromotive force of this battery is to that of Grove's (the most powerful of known forms) as 25 to 18; it evolves no fumes in working and can be used for a very considerable length of time without serious diminution of the strength of the current.

A very important bleaching agent discovered by Schutzenberger, is called hydrosulphurous acid and has the formula of $H_2 SO_2$. The sodium salt of this new acid is obtained by the action of zinc on the bisulphite. The hydrosulphurous acid possesses powerful reducing properties and bleaches indigo rapidly. At a time when so much attention is bestowed upon disinfectants and antiseptics there ought to be experiments conducted with this new agent.

The interesting researches of Matthiessen and Wright on morphine and codeine have thrown a new light on the constitution or these opium alkaloids. Treated with hydrochloric acid morphine loses one molecule of water and gives rise to a new base, apomorphine, which differs in a remarkable manner from morphine, both in its chemical and physiological actions, being soluble in alcohol, ether, and chloroform, whereas morphine is nearly insoluble, and acting as the most powerful emetic known, $\frac{1}{10}$ of a grain producing vomiting in less than ten minutes.

The discovery of the sedative properties of chloral-hydrate by Liebreich marks an era in medical chemistry second only to the discovery of the anæsthetic properties of chloroform.

The discovery of the artificial production of alizarine, the coloring matter of madder, which was announced a year ago, now appears likely to be worked out on a practical scale; it is the artificial production of a natural vegetable coloring substance which has been used as a dye from time immemorial. One of the most important discoveries of recent times is a method proposed by Dr. Mond for the utilization of what has long been known as soda waste. The insoluble monosulphide of calcium is oxidized to the soluble hyposulphite, and by decomposing this salt by hydrochloric acid, all of the sulphur is deposited as a white powder. In this way the greater part of the sulphur used in the production of salt cake by Le Blanc's process is reclaimed and a great saving is thus effected to the alkali manufacturer.

Another discovery of almost equal magnitude relates to the recovery or regeneration of the black oxide of manganese used for the evolution of chlorine in the manufacture of bleaching-powder. This subject has long attracted the attention of chemists, and during last year a very simple and economical process, proposed by Mr. Weldon, has obtained recognition and is now worked by more than thirty-seven firms in Great Britain. The process depends upon the fact that although when alone the lower oxides of manganese cannot be oxidized by air at the ordinary temperature and under the ordinary pressure to the state of binoxide, yet this is possible when one molecule of lime is present to each molecule of the oxide of manganese. The oxide of manganese is precipitated from the still-liquors with the above excess of lime, and by the action of the air on this a black powder, consisting of a compound of the binoxide of manganese and lime, is formed, which is capable of again generating chlorine on addition of hydrochloric acid, and thus the chlorine process is made continuous, with a working loss of only $2\frac{1}{2}$ per cent of manganese.

The last important discovery alluded to by Professor Roscoe is a process for the direct production of chlorine from hydrochloric acid without the use of manganese at all. In the presence of oxygen and of certain metallic oxides, such as oxide of copper, hydrochloric acid gas parts at a red heat with all its hydrogen, water and chlorine being formed.

The mixture of air and hydrochloric acid gas is passed over red hot bricks impregnated with copper salt. The oxide of copper acts as by contact and remains unaltered, while the chlorine, watery vapor, and excess of air pass at once into the lime chamber. Some practical difficulties have been encountered in the working of this process, but there is every prospect of its ultimate success.

We have thus given an analysis of Professor Roscoe's admirable discourse, and have passed in review the prominent chemical discoveries of the year. It will be seen that some of the recent discoveries are of great practical value.

THE SOLAR ECLIPSE OF 22D DECEMBER, 1870.

The line of totality stretches from the North Atlantic across the south of Spain, passing over Cadiz, then over Algeria, thence over Syracuse, in Sicily, into Turkey, Greece, etc. The duration of the eclipse will not vary much from two minutes at any place, too short to make the eclipse a very important one, and still less so from the low altitude of the sun. Congress has appropriated nearly $30,000 to equip observers, and we believe, after a good deal of pressure, the British Government has provided a ship and $10,000 for a similar purpose.

The astronomical data derivable from a solar eclipse are of two kinds: one respecting the moon's motions, the other the physical constitution of the sun. The first is not important just now, but we may observe that the moon, coming against or in front of the sun, allows an observation of our satellite's place in the heavens to be made at a very central point in her orbit. This is of importance to mathematical astronomy, but can only be properly made at a fixed observatory, which need not be on the line of totality.

The expeditions above referred to must devote themselves to the acquirement of physical and cosmical knowledge, from appearances which are only shown when the disk of the moon

completely hides the disk of the sun, and permits the view of certain solar surroundings, otherwise too faint to be seen. These surroundings are of two-fold character. First, there is a silvery white glowing radiation of considerable breadth, which encircles the moon, apparently, but doubtless the sun really. This has been seen in eclipses from the earliest times, and is known as the "corona;" second, there is, close to the sun, a narrow rim of bright red excrescences, first seen during an eclipse in 1706, supposed to be an atmosphere round the moon. This phenomenon seems to have been forgotten, until observers of the eclipse of 1842 saw, at the instant of totality, flame-colored masses of light protruding from the lunar disk. From that time this light became the chief feature of a solar eclipse. In 1860, it was settled by aid of photography that this light came from the sun. In 1868, the spectroscope was used, and showed that these red excrescences are part of a shell of glowing gas surrounding the solar globe. Since then, this light has been seen without an eclipse, even in the dazzling rays of the sun, owing to properties of the spectroscope in dilating the heterogeneous light coming from the sun's general surface, while it allows to pass unaffected the homogeneous light emanating from gaseous bodies, such as these excrescences prove to be, which were seen by turning the spectroscope to the edge of the sun. The sun was virtually put out by spreading its light over such an area as to make the resulting brightness less than that of the prominences—the light of which will not spread itself—and then these were clearly seen. These prominences are but the higher parts of an irregular and tempestuous atmosphere of glowing gas, which cover the whole globe of the sun.

What are familiarly known as "Baily's beads" no longer attract the attention of eclipse observers. They seem due simply to the sun's light glancing between the mountains on the edge of the moon, just before totality. The "corona" will be the absorbing phenomenon, doubtless, in the present eclipse. Theories concerning it exist in plenty. Some call it a glare in our own atmosphere, but the whole of it cannot arise from this cause. Some regard it as an atmosphere of the moon, but this idea is quite untenable. It may be an atmosphere about the sun; it may be a dense portion of the zodiacal light; but these are hypotheses. For a fact, we only know that a bright part of the light near the sun seems to be tolerably persistent; and that fainter outlying parts, which shoot out two or three times the sun's diameter, seem to vary their form during an eclipse, and to present different appearances to different observers. To acquire more facts, we have photography, the spectroscope, and the polariscope. The former of these will probably determine whether the silvery light comes from a luminous gas, or from solid matter in a state of incandescence, or it will show if both qualities of light are present. The polariscope will determine whether the light is the corona's own self, generated luminosity, or reflected sunlight. To analyze the light of the corona, and attempt to decide its source, must be the main ends of the coming observations. Chiefly to solve this eclipse enigma have we sent some of our highest official philosophers to Europe, and the result of their labors will be awaited with much interest.

TESTING THE STRENGTH OF BOILERS BY STEAM PRESSURE.

We have seldom heard of a greater piece of stupidity than one, the details of which have been kindly forwarded to us by a correspondent from Knoxville, Mo.

It seems some mechanics had been repairing a steam boiler at Hamilton, near Knoxville, and endeavoring to test the strength of the boiler by steam pressure, succeeded in bursting it, and killing four persons, and injuring ten more.

The boiler was a locomotive boiler, tho flues of which had been in bad condition for some time.

A Knoxville paper states that, "after fixing them as well as they could, they built a fire and started up to test their work, after a short trial it was found that the flues were not in as good a condition as might be, they put out the fire for the purpose of letting the boiler cool down, and after making some further repairs they again fired for the purpose of starting up. It seems now that these machinists had determined *to find how much steam to the square inch it would bear*, they kept firing, and neglected the water until it was quite low. One of them remarked that the water in the boiler was getting low, and requested the other to turn on the water. It is thought that the boiler at this time must have been red hot, but whether this is true or not, we are unable to learn. As soon as water commenced running into the boiler, it went asunder, dealing death and destruction, and destroying everything before it."

What a sad expositton of the ignorance which prevails among those who use, and even are entrusted with repairs of, boilers. Surely our Boston correspondent who recently called attention to the prohibition of unsafe boilers, might now find a text for a sermon on the prohibition of ignorance and stupidity in those who are allowed to have anything to do with boilers or engines.

Steam, all powerful as a destructive agent, as well as in the performance of useful work, has no business to be in the hands of the ignorant, careless, or stupid. It is only to be safely intrusted to active intelligence and untiring vigilance. Now pass through the legion of boiler rooms in this country, and note the general average of these desirable qualities in the persons in charge. In a comparatively few you shall find all the required qualities for safe and efficient foremen. In the majority you will find men ill paid, because their services are worth little, employed by parsimonious proprietors because they can be hired cheaply.

How often we have shuddered at seeing a large establishment filled, perhaps with working women and children, whose lives were hourly in jeopardy from the ignorance of some block-head down in the boiler room.

Now let us make a practical suggestion. Let a law be passed empowering duly appointed and competent inspectors to examine not only boilers, but persons in charge of them, and invest the inspectors with authority to compel the discharge of persons incompetent because of want of knowledge, of intemperate habits, or any other cause. Let this be done, and we shall have less of boiler explosions, and destruction of life resulting therefrom.

STANDARD PUBLIC TIME.

In this busy age, when the forces of nature are hurling huge masses of matter with breathless swiftness in all directions over the surface of the civilized world, and when the exigencies of business require the utmost punctuality, it is becoming daily more important that some fixed public standard of time should be established.

In many cities there is a local standard. For instance, such a standard for London is supplied by a clock in the Greenwich Observatory, and communication by electric currents with other clocks in various parts of the city is made to regulate these subordinate time-keepers, and thus to regulate the general time of the city.

In Liverpool the standard time is controlled by the Liverpool Observatory.

In Edinburgh there are time-bells and time-guns governed by a control clock in the Observatory at that place.

The most complete system of regulation is, however, attributed to Glasgow, Scotland, in which ten public clocks are controlled at an average distance of three miles from the observatory.

At Madras, India, five time-guns are fired at noon of each day by a current sent from the Madras Observatory.

At St. Petersburg, Russia, the clock of the Public Library, one at the Admiralty Buildings, and one at the Central Telegraph Station, are controlled by one at the Imperial Observatory.

In Washington time-bells are rung from the Central Fire Alarm Station and at the various police stations, at noon of each day, these signals being controlled by the astronomer in charge at the Naval Observatory.

In Albany a time ball is dropped at noon of each day by a current sent from the standard clock of the Dudley Observatory.

Cleveland, Ohio, and Chicago, Ill., have also standard time furnished them from astronomical observations.

In New York we at present have no standard time. Fire bells were formerly rung by currents sent from Mr. L. M. Rutherford's observatory, and subsequently arrangements for obtaining time from the Dudley Observatory at Albany were commenced, but never brought to completion.

Boston, though within easy reach of five observatories, at present has no standard time. We have collected these facts in part from the report on Standard Public Time, of the committee appointed by the Common Council of Cincinnati to investigate the subject and report upon the same. At Cincinnati is located one of the most important of all the observatories in America, yet up to October, 1870, at which time the report referred to was made, it had no uniform time.

The report approves what is known as the "Jones" system of regulating clocks, as the most successful and useful. In this method the electric fluid is employed merely as a regulating agent, and not in any case as a motive power; the timepiece under control being an ordinary clock, connected by a regular succession of electric pulsations with the normal mean-time clock of the observatory. The application of the invention in Glasgow has been perfectly successful. It has been employed under various forms; but what Prof. Grant, of that city, considered to be the most suitable to the requirements of a large city, was the small clock with a second pendulum and a dial of about three feet in diameter, showing the time to hours, minutes, and seconds. Clocks of this construction have been set up in the public thoroughfares of Glasgow, and have been found to be exceedingly useful.

The estimated expense of supplying the city with uniform time, is given as $2,500 for the first establishment, and $1,060 per annum as the current expenses for repairs and attendance.

These figures show that the cost for standard time to New York would be small, while its benefits would be large in proportion to those of other improvements much more expensive in character.

There seems, moreover, little reason why uniform time could not be supplied with sufficient accuracy from the numerous American observatories to smaller towns lying along the principal railway and telegraph lines. In a scientific as well as a practical point of view, the supply of such standards is every way desirable.

THE USES OF DISSOCIATION.

The uses of association are known to all mankind. We have association for every conceivable object, but no one has ever discovered a use for dissociation until it occurred to a French chemist to adopt this word, and the principle involved in it, to many important technical applications. We suppose that very few of our readers ever heard of the word dissociation or have any idea of its meaning; and for the benefit of all such, we prefer to say something about it, as it bids fair to become an important agent in technology. The word was first proposed by Deville, in 1857, although some of the experiments mentioned by him had been performed by Priestley, Grove, and others, many years previously. The idea intended to be conveyed by the word is that of dis-association, or the rending asunder of compound bodies and their resolution into their elements by heat. When the elements are in a state of dissociation in which the laws of affinity no longer have any play, they are not attracted to each other until sufficiently cooled down to bring them within the action of affinity, and may be considered as lying about loose in space like the nebulæ under La Place's theory of creation, or the gases in the atmosphere of the sun. Grove showed that fused platinum could determine the decomposition of water into its elements the same as the galvanic battery, and Deville thinks that at the melting point of silver, water is dissociated and no longer exists as water. If this be true it goes to show that the opinion of many engineers that boiler explosions may sometimes be traced to the formation, at a very high temperature, of an explosive mixture of hydrogen and oxygen, may possibly be true. Deville met with a dangerous accident by the explosion of a quantity of the oxy-hydrogen gas produced by pouring considerable fused platinum into water. The gases came off violently, and were fired by the hot metal. To avoid further danger he modified his experiment in the following manner: In a furnace capable of producing a heat of 1100° to 1300° Cent., he placed two tubes, one within the other, and through the interior tube, made of porous clay, he caused to pass a gentle current of steam, and through the annular space of the outer tube a stream of carbonic acid gas. A part of the vapor of water was decomposed or dissociated—the hydrogen passed through to the outer space, and the carbonic acid joined the oxygen in the inner tube, and was separated from it by being passed through lime water. In this way water was dissociated without the danger of explosion. The experiment would seem to point to the feasibility of decomposing water in a furnace, and burning the products for the production of high temperatures. Debray subsequently discovered that solid bodies composed of fixed and volatile constituents obeyed the same laws, and that the volatile constituent could be dissociated by heat; for example, marble could be decomposed and the carbonic acid be expelled, but if there was no opportunity for the gas to escape it quietly recombined with the lime on cooling. Isambert has pursued the subject still further, and has constructed tables of the temperatures of dissociation of numerous bodies and of the co-efficient of expansion of their vapors, and Lamy has made a practical application of the whole subject in the construction of a pyrometer for the measurement of very high temperatures and a thermometer for low temperatures.

The pyrometer consists of a porcelain tube glazed on both sides, closed at one end, and on the other brought into connection with a quicksilver manometer. The portion of the tube to be exposed to the fire is filled with pulverized Iceland spar and pure calc spar, or white marble; dry carbonic acid is introduced by heating one end of the tube, and the instrument is then attached to the manometer, and on cooling indicates that there is a perfect vacuum, and that all of the carbonicacid has been re-absorbed by the lime on cooling.

As the tension of dissociation of the carbonic acid increases with the temperature, and is constant at fixed temperatures, the degree of heat from 800° Cent., upward, can be accurately read on the scale of the manometer.

The instrument is remarkably simple, not likely to get out of order, and can be attached to any furnace, and is said to be more accurate than any hitherto invented. The thermometer founded upon the same principle of dissociation is composed of a copper box of the diameter of a five-franc piece, and seven to eight millimeters in thickness, into which is screwed a copper tube four to five millimeters in diameter and fifteen centimeters long. The box is filled with ammonia and chloride of calcium, and the dissociation of the ammonia is employed as a measure for the heat. A leaden tube can be soldered to the copper, which may be fifty or even a hundred feet long, and on the end of such tube is placed the mercury manometer. The tubes are first filled with ammonia, and the scale of the manometer is then adjusted.

For temperatures between 0° Cent. and 46° Cent. (32° Fah. and 83° Fah.), this thermometer is said to be remarkably sensitive, and as its action is wholly dependent upon the temperature of the box containing the ammonia salt, and it makes no difference where the manometer is placed, it is the best possible contrivance for measuring the temperature of inaccessible places, such as artesian wells, caves, shafts, the bottom of the sea, and the upper regions of the air.

Once put in order and hermetically sealed, there would appear to be no difficulty in keeping this apparatus in constant working order.

We have thus already two most important applicatios of the law of dissociation, and we may safely predict further uses in the manufacture of gases, in the construction of blast furnaces, so as to employ the dissociated gases just at the right moment, in the decomposition of water, and in affecting the analysis of all the bodies upon the face of the earth. The subject is well worth the attention of our engineers and chemists.

FATAL EXPLOSION OF A GASOLINE RESERVOIR---A WARNING TO MECHANICS.

The recent explosion in 55th street, of a wrought-iron boiler in which gasoline had been stored, whereby a mechanic was instantly killed, ought to serve as a warning to all workers in the repairing of old cans, boilers, and gas holders. The occasion of the explosion in this instance was due to the mixture of atmospheric air with the vapor of naphtha contained in the vessel. On the day preceding the accident one of the workmen bored two holes through the iron, into which it was intended to insert two brass stop-cocks. Thus during the night there was an opportunity for the air to enter and the gasoline to escape, and a most explosive mixture was formed in the boiler.

The mechanic who was directed to insert the stop-cocks first heated a bar of iron red-hot and placed it over the holes, in order to warm them so that the solder would adhere. The

moment he did so the hydrocarbon of the gasoline vapor combined with the oxygen of the air that had been admitted over night, and there was a fearful explosion; as it is well known that red-hot iron, a glowing wire gage, hot platinum, and spongy platinum, or an electric spark, will at once explode a mixture of these gases.

Perhaps no foresight of a mechanic could have prevented the catastrophe, but a chemist who knew what had been in the boiler would never have touched it until all the gas had been expelled by previously filling it with water.

A somewhat similar accident occurred, a few months since, at Niblo's theater, where the oxygen receiver exploded in consequence of its having been previously used for storing naphtha, and a mixture of hydrocarbon gases and oxygen was contained in it. Hydrogen alone, or oxygen alone, do not explode, but mixed together, few things can equal the force of their explosion. At 55th street the boiler iron was torn as if it had been a piece of paper.

The lesson of the accident is that no mechanic should touch any can, lamp, boiler, or gas holder, until all explosive mixtures have been expelled by previously filling them water, or in some other way.

The person who sent the gasoline holder to be repaired was guilty of culpable negligence in not making known the uses to which it had been applied; but even if he had done so, it is doubtful if any workmen would have taken the precautions we have above indicated to prevent the explosion.

Never solder any suspicious vessel until you have filled it with water to expel any gas that may be in it, and you will be on the safe side.

HARVEY BROWN.

Among the recent obituary notices we observe with much regret the name of Harvey Brown, of Harlem, N. Y., who died December 15th, aged 78.

In the earlier years of his life he was a Methodist preacher, to which laborious vocation all his best energies were devoted. His ministrations extended over wide circuits, were generally acceptable, and productive of much benefit among the multitudes also who sat under his instructions. He possessed a decidedly scientific and mechanical turn of mind; and during the later years of his life, having been relieved from the cares of pastoral labors, he found pleasure as well as reward in developing some of his many inventions.

He was the patentee of numerous improvements. Among them was the metallic lamp chimney, the lower portion made of glass, the upper part of metal, a device which saves chimney breakages to a great extent. He was also the inventor of a method of propeling street cars by means of a wire rope, to be mounted and run on poles, arranged on the sides of the street. Each car had a grab, controled by the conductor, who could connect or disconnect the car from the rope, and thus stop or start the car at will.

His cooking stoves, sawing machines, lumber-dressing machines, barrel machines, and other improvements, are of well-known practical character, and have been frequently noticed in our columns.

Up to within a short time of his decease he enjoyed good health and the perfect possession of all his faculties. He visited our office only a little while ago, to inquire about a new invention, on which he thought of taking a patent. No one could have suspected from his appearance that his age exceeded sixty, so elastic and vigorous were all his movements. His uniform good health and unimpaired activity, he once told us, were due to his regularity of habits and moderation in all things. Gentle, kind-hearted, unassuming, genial, he leaves behind him the proudest of records—that of having been a good and useful man.

The Commissionership.

The report comes from Washington that Gen. M. D. Leggett, of Zanesville, Ohio, is likely to be appointed to fill the office of Commissioner of Patents, to fill the vacancy occasioned by the resignation of Hon. S. S. Fisher. For many years Gen. Leggett was superintendent of the public schools at Zanesville. He entered the military service as colonel of the Seventy-eighth Ohio Infantry, and by good service he rose to the several grades of brigade, division and corps commander in the campaigns at the West, under Grant and Sherman, serving with distinction from the beginning to the end of the war. He has been employed, since the war, as superintendent of manufacturing works at Zanesville.

SCIENTIFIC AMERICAN CLUBS.—In the formation of subscription clubs for the SCIENTIFIC AMERICAN some of our correspondents find that they can increase their lists by obtaining a portion of the names in one town and others in towns adjoining; they write asking if we will mail the SCIENTIFIC AMERICAN to the different postoffice addresses of subscribers to such club lists. In reply, we say, yes, certainly. We shall be happy to mail the papers to any address. We are in receipt of the most gratifying assurances from every part of the country, indicative of a large increase in the demand for the SCIENTIFIC AMERICAN for 1871.

PATENT OFFICE REPORTS.—Senator Anthony, from the Committee on Printing, has reported a resolution to print a condensed weekly report, and to send a hundred copies to the capital of each State, and to the Clerk's office for each judicial district. Provision is also made to enable every public library to possess itself of the books, simply upon the payment of the cost of binding.

NINE cars loaded with silver ore from Colorado passed over the Toleao, Wabash and Western Railway, a few days since, for Philadelphia.

SCIENTIFIC AMERICAN.

1871.

Special Club Premium.

A New Volume of this journal commences on the first of January. Any person sending us yearly clubs for ten or more copies will be entitled to receive, free of postage or express charge, one copy of the celebrated engraving, "MEN OF PROGRESS," for every ten names.

This large and splendid Steel Plate Engraving is one of the finest art works of the day, possessing a rare and peculiar value over ordinary pictures, by reason of the life-like accuracy of the personages it represents. The scene of the picture is laid in the great hall of the Patent Office, at Washington. The grouping is spirited and artistic. Among the persons represented are the following eminent inventors:

S. F. B. MORSE,.....Inventor of Electric Telegraph.
CYRUS H. McCORMICK,.....Inventor of Reaper.
THOS. BLANCHARD,.....Inventor of Lathe for Irregular Forms.
WILLIAM T. G. MORTON,.....Inventor of Chloroform.
SAMUEL COLT,.....Inventor of Revolving Fire-Arms.
CHARLES GOODYEAR,.....Inventor of Rubber Fabrics.
FREDERICK E. SICKLES,.....Inventor of Steam Cut-Off.
HENRY BURDEN,.....Inventor of Horse-Shoe Machine.
JOHN ERICSSON,.....Inventor of the first Monitor.
JAMES BOGARDUS,.....Inventor of Iron Buildings.
JOSEPH SAXTON,.....Inventor of Watch Machinery.
PETER COOPER,.....Inventor of Iron-Rolling Machinery.
JOSEPH HENRY,.....Inventor of Electro-Magnetic Machine.
ISAIAH JENNINGS,.....Inventor of Friction Matches.
RICHARD M. HOE,.....Inventor of Fast Printing-Presses

These noble men, by their own efforts, raised themselves from the depths of poverty, and by their wonderful discoveries, conferred incalculable benefits upon the human race, entitling them to rank among its greatest benefactors. It is but fitting that the remembrance of their achievements, and the honored forms of their persons, as they lived and walked among us, should be perpetuated by the highest skill of art. The picture, which is three feet long and two feet high, forms an enduring and desirable object for the adornment of the parlor. It was engraved by the celebrated JOHN SARTAIN, from a large painting by SCHUSSELE, and all the portraits were taken from life. Every lover of Science and Progress should enjoy its possession. Single copies of the Engraving $9; Three copies, $25.

One copy of the SCIENTIFIC AMERICAN for one year, and a copy of the Engraving, will be sent to any address on receipt of $10.

MUNN & CO.,
37 Park Row, New York City.

Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers, and hope to be able to make this column of inquiries and answers a popular and useful feature of the paper.]

1.—RECHARGING OLD CARTRIDGES.—Can old copper cartridges which have been fired be recharged? If so, how?—C. W. H.

2.—CHEAP FURNITURE VARNISH.—I wish to get a recipe for a very cheap furniture varnish. Will some brother workman furnish me with one?

3.—LIGHT IN COAL PITS.—What are the lights used in English coal pits? Are candles used outside of the lamps?—J. B.

4.—BRASS DIP.—I wish a recipe for the cheapest and best dip for brightening brass paper fasteners?

5.—DISINFECTING ROOMS—CHEAP BATTERY.—What is the best way to disinfect a sick room? Also how can I make in the simplest way a good galvanic battery? Is not a galvanic battery better than an electro-magnetic battery for the sick?

6.—GRINDING CORN.—I have ground on a run of 34-inch stones sixty bushels of corn per hour into good meal. Can this be beat? The stones are run by steam power.—C. K.

7.—BLUEING AND BRONZING STEEL.—How can small articles of steel be blued or bronzed?—J. W. K.

8.—GALVANIZING GRAY IRON CASTINGS.—Will some one who has had experience direct me how to galvanize gray iron castings, not in general terms merely, but give the practical details?

9.—FILTERING WATER.—I have a cistern already built, and want to make a good filter. Will some one tell me how to do it?

10.—REMOVING VARNISH FROM CARVED WORK.—How can dried varnish be removed from carved work without injuring the wood?

11.—COLORING GOLD.—What are the ingredients and the proportions thereof in the solution used by jewelers in coloring gold jewelry?

12.—RE-SILVERING LOOKING GLASSES.—How can I re-silver old looking glasses, and remove spots from the same?—J. F. S.

13.—FURNACE FOR HOT BLAST.—What is the best, cheapest, and most economical furnace or stove by which to produce a hot blast to 500 or 600 degrees? What pressure per inch of area will a twenty or twenty-five horse power engine maintain through two or three tweers? Is a fan blower or piston bellows the best for maintaining a hot or cold blast in a cupola or chamber where the air requires to be compressed?—J. R. G.

14.—BLUEING SHEET STEEL.—Can any of your readers inform me how to give sheet steel a uniform blue color? I mean sheet steel as it comes from the finishing rolls of an ordinary sheet train.—J. W. R.

15.—OUT-DOOR GILDING.—How can I prepare gold leaf so as to apply it without difficulty in currents of wind out of doors? I am greatly bothered by these currents in doing this kind of work.—N. M.

16.—SUN DIAL.—How can I make a good sun dial?—C. B.

17.—GILDING.—How can I restore the gilding worn off rom a sewing machine?—F. P. B.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at $1·00 a line, under the head of "Business and Personal.

All reference to back numbers should be by volume and page.

COLORLESS LACKER.—The following recipe for colorless lacker may answer "Indicator's" purpose: Dissolve 2½ ounces of shellac in 1 pint of rectified spirits of wine; boil for a few minutes with 5 ounces of well-burned and recently-heated animal charcoal. A small portion of the solution should then be filtered, and if not colorless, more charcoa must be added. When all color is removed, press the liquid through a piece of silk, and afterward filter through fine blotting paper.—J. E. W., of N. H.

BORATE OF IRON.—A correspondent asks if there is such a salt as borate of iron. Rose prepared this compound in 1853, by adding bi-borate of soda (borax) to ammonia iron alum. It yields a pure brown voluminous precipitate, which, after being thoroughly washed and dried, is found to be composed of the borate of the sesqui-oxide of iron, contained with some hydrated sesqui-oxide. It is not likely to be for sale by ordinary druggists, but our correspondent can easily prepare it for himself.

RANGE OF GUNS.—"G. R." asks this question: "All other conditions being equal, which has the greatest ultimate range, without regard to accuracy, a rifled or a smooth-bore gun? This would depend altogether on *what* the equal conditions were. If each was loaded with a round ball of the same weight, the smooth bore would have the greatest range; but if each was loaded with a conical ball of the same weight (point foremost) the range would be greatly in favor of the rifle.—F. S. C., of Mass.

STEP FOR TURBINE WHEEL.—Let G. B. L. saw off the butt of a rock-maple stump, quarter it, and make the step endwise of the grain. Let him cut a slot across the step, and boil the block in tallow. This will make a step which will last a lifetime provided the bearing is large enough in proportion to the weight of the wheel. The heating of steps is generally the result of concentrating the friction upon too small a bearing surface.

QUARTER TIWST BELT.—J. F. K.'s quarter twist belt will work all right if it is put up right, and if the 10-inch belt has to pull hard enough to draw one edge more than the other, he can remedy it by placing an "idler pulley" on the drawing side to keep the belt hugging alike on both edges of the driven pulley. I would not make the distance between centers any less than he proposes—14·5 feet, but more if possible.—J. H., of N. Y.

MILL SAW GEARING.—J. B. W.'s sawmill will certainly perform well, geared in the manner he mentions. There were many such mills on the upper Alleghany river in 1833 and 1834, the *best* in the country working under from four to six feet head of water.—M. B., of Pa. [Several other correspondents concur in this opinion.—EDS.

SPEED OF MILLSTONES.—In answer to J. Y., I will give what I consider the proper speed for a 4-foot stone to grind from 6 to 10 bushels an hour of different kinds of grain, 160 revolutions a minute to grind corn, 180 on wheat, 150 on buckwheat, 160 to 180 on mixed grains for food, 160 for rye.—N. H. E.

HARNESS BLACKING.—Let N. L. M. take three sticks of black sealing wax, and dissolve them in half a pint of alcohol, and apply with a sponge. This varnish has the luster he wishes to obtain and will not injure the leather.—E. W. R., of N. J.

J. H. M., of L. I.—You can test a spirit level quite accurately with a plumb line and square in the way you describe provided the square is true. Wherever the middle of the bubble stands in the bottle when the instrument is thus leveled, is the true indication of the level. To bring the bubble to the middle of the bottle, the lower edge of the wood may be dressed off carefully with the plane. If the bubble is found to move to one side of the middle when the instrument is leveled with the square the standing of the bubble to the same distance on the other side of the middle would be indication of double the original error in the instrument, the level being considered correct only when the bubble stands at the middle, while the lower edge of the wood is on a horizontal line.

J., of N. Y.—If glycerin be allowed to fall drop by drop into a mixture of equal measures of nitric acid and oil of vitriol, care being taken not to let the temperature get too high, a heavy oily-looking liquid collects at the bottom which is nitro-glycerin. The reaction is the substitution of nitrous acid for hydrogen in the glycerin, the hydrogen combining with oxygen from the decomposed nitric acid to form water.

C. H. S.—The Fomicilban vacuum found by inverting a tube closed at one end and filled with mercury in a cup of the same metal, is not perfect. It contains always some vapor of mercury. Good authorities maintain that no perfect vacuum can be produced.

J. S., of Pa.—The syphon acts on the same principle as the atmospheric pump, and will raise water no higher than the pump, 33 feet, in round numbers, at sea level. The atmospheric pressure being overcome by the weight of the fluid in the longer leg, the same pressure forces the fluid up along the shorter leg.

O. J. F., of Mich.—The temperature of steam under a pressure of 50 pounds is 298 Fah., much below the temperature of repulsion spoken of in our article on "Boiler Explosions."

C. G. E., of La.—We think your preventive of explosions in coal oil lamps would be patentable. Its efficiency could only be determined by practical test.

C. B. R., of N. B.—We advise you to use a flue boiler set in mason work for a stationary engine, in preference to a locomotive boiler, unset in brickwork.

A. G., of La.—We do not think the new antiseptic "chloralum" has been introduced into this country yet.

C. R. S., of Ohio.—The leverage of a crank varies with the direction in which the power is applied. Your question in its present form is unanswerable.

L. F., of N. J.—The colors on oil-cloth window shades are oil paints, applied either by a brush or printed on.

J. S., of R. I.—Siliceous silica is the flint of the chalk formations. We cannot tell you where it may be purchased.

Business and Personal

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

CUTTER FOR PLOWS.—G. F. Pykiet, Fairfield, Ill.—This invention has for its object to furnish an improved cutter for plows which shall be so constructed as to make the operation of plowing easier for man, team, and plow; which will ride over roots and rocks, and take the ground again as soon as the obstruction has been passed, and which, by running under and separating the trash that may be upon the ground, will keep the plow clean.

MEDICAL COMPOUND.—Michael O'Reilly.—New York city.—The object of this invention is to condense cod liver oil, and improve its taste, so that it would become palatable without having its therapeutic qualities in the least impaired. The invention consists in the production of a cod-liver-oil butter; that is to say, in combining the oil with concrete or buteraceous fat. Thereby the medical fat is brought into a form in which it can be conveniently prepared for the palate, either by using it as butter on bread or other substance, or by making it up into pills or otherwise.

SISAL GRASS MACHINE.—G. E. Hopkins and W. B. Shedd, Boston, Mass.—This invention has for its object to furnish a simple, convenient, and effective machine for crushing, scraping, and cleaning the leaves or stalks of the *Agave Americana*, or American aloe, better known as sisal grass or sisal hemp, and for cleaning the reah or China grass, and other fibrous leaves, and which shall be so constructed as to clean the fiber perfectly and lay it straight ready for baling.

COMBINED SHELF BRACKET AND CLOTHES HOOK.—H. E. Hutchinson, South Brooklyn, N. Y.—This invention has for its object to furnish an improved bracket for use in clothes closets and other places, which shall be so constructed as to support a shelf, and at the same time serve as hooks for hanging clothes, and which shall economise space by allowing a greater quantity of clothes to be hung upon them than can be hung in the same space when the ordinary clothes hooks are used.

AUTOMATIC BAND CUTTER, SPREADER, AND FEEDER.—W. H. H. Youngs, Waverly, Iowa.—This invention has for its object to furnish an improved band cutter and feeder for attachment to thrashing machines, which shall be so constructed as to receive the bundles, cut the bands, spread the grain evenly, and deliver it to the thrashing machine, thus saving labor and expense, and doing the work better than it could be done by hand.

CIGAR MACHINE.—Robert Neisch, Allentown, Pa.—This invention relates to a new machine for rolling cigars into the proper shape, applying the binders and wrappers, or the latter only, thereto, forming the points or heads, and cutting the wrappers. The invention consists chiefly in cutting the wrappers for the points or ends of the cigars while the same are being rolled. Heretofore cigar machines were so constructed as to require the wrappers ready cut for application. As the material from which wrappers are made is the most valuable portion of the cigar, and consequently cut as economically as possible, it will frequently happen that when the same is not applied with great exactness, the cut wrapper will fail to cover the entire cigar, and another piece will have to be used, thus converting intended economy into absolute waste. By cutting the wrapper by automatic machinery, after the same has already been partly applied to the cigar, the greatest exactness and most perfect fit will be obtained.

DOUBLETREE FASTENER.—Decatur Werst, South Bend, Ind.—This invention relates to a new casting for uniting whiffletrees to doubletrees to shears, and also for securing doubletrees to tongues. The invention consists in the use of a double ring-shaped casting, which is adapted to embrace both pieces to be united, and to secure the same by means of one single pin.

AUTOMATIC BARREL FILLER.—S. C. Catlin, Cleveland, Ohio.—The object of this invention is to provide ready and efficient means for automatically stopping the flow of the liquid into a barrel or vessel, when such vessel or barrel is filled or nearly filled, and it consists in certain mechanical devices arranged to operate as hereinafter more fully described, and also in a device in combination with the above for drawing liquids from the reservoir for testing or other purposes.

CAR SEAT BACK LOCKS.—Adam Leoffelholz and Anton Prier, Milwaukee, Wis.—This invention relates to improvements in car-seat back locks, and consists in a sliding spring catch bolt applied to the arm of the seat back and arranged in connection with the bracket on the end of the seat on which the arm rests, which bracket is provided with a notch below a projecting hook on one edge, so that when the arm goes down to its seat, the sliding bolt will be drawn back, by the projection, against the action of a spring which draws it round again under the projection as the arm moves in its seat, and holds the bolt until unlocked by a key inserted through a projecting case fitted on the bolt and spring. The invention also comprises the arrangement of the bolt and spring with the case and the cam spindle by which the said bolt is turned.

HOISTING APPARATUS.—H. H. Hunt, Saratoga Springs, N. Y.—This invention relates to improvements in a hoisting apparatus for hoisting building material to be used in the erection of new buildings, and it consists in a combination with endless chains hooking over octagonal rollers and provided with suitable driving gear for working them either by hand or steam power, of reversible holding bails adapted for holding the hods containing the material to be elevated either on the ascending or descending side. It also consists in a combination with the driving machinery for the chains, of a winding drum for operating a rope to hoist such heavy material as cannot be taken in the hods, the whole apparatus being arranged on a portable frame adapted to be placed on the outside of the building, and designed to be made extensible vertically.

CULTIVATOR.—P. E. Smith, Scotland Neck, N. C.—This invention has for its object to furnish a simple, convenient, and effective cultivator, which shall be so constructed that the wheels may be readily moved closer together or farther apart to adjust the machine to the different widths of cotton and corn rows; that the plows may be readily moved closer together or further apart, to adjust the machine to work closer to or further from the rows of plants; and that the plows may be readily raised from the ground, and held as long as may be desired.

FUSE FOR RIFLE SHELLS.—James Eggo, Jersey City, N. J.—This invention has for its object to furnish an improved fuse for rifle shells which shall be so constructed as to insure certainty of explosion and entire safety in transportation and handling, and which shall at the same time be simple in construction and manufacture.

FENCE POST.—R. M. Filson, Willsborough, N. Y.—This invention relates to a new fence post which is made with a view towards durability and cheapness. The post is made of stone, and provided with a U-shaped iron rod at one side by which the fence rails are held against it, they being supported by eye bolts projecting from the post.

FENCE.—William D. Hillis, Elgin, Ill.—This invention relates to an improvement on the fence patented to the same party in April, 1866, and consists mainly in the improved manner of securing the wires, and bracing or supporting them, whereby the fence is made stronger, cheaper, and more durable, and is more easily put up or taken down.

THERMOMETER.—John D. Ward, Baltimore, Md.—This invention consists of the combination of a thermometer with two plates, one inscribed with the ordinary Fahrenheit centigrade, or Reaumur scale, and the other inscribed with with a scale showing, in this instance, four different temperatures of water, and intended for use in baths, said plate also bearing a scale which shows the best temperature for fermenting and malting, also the degree of heat in cream best adapted to the production of butter, and the degree of heat in whey best adapted to the production of cheese.

PEW SHELF.—David Buchanan, Philadelphia, Pa.—This invention relates to the application to church pews and other seats of public assembly rooms of shelves for holding the hats, cloaks, and other articles of the occupants' and it consists in the arrangement on the rear side of the front support of the seat and under the latter of hinged or pivoted shelves so constructed that they may be readily thrown down into the horizontal position and maintained there, for use and be thrown up again and secured by a spring catch when not wanted for use, and to facilitate sweeping and cleaning the floor under them.

STEAM GENERATOR.—George W. Shields, Louisville, Ky.—This invention relates to certain improvements of construction and detail in that class of steam generators in which the feed water, prior or subsequent to entering the boiler, is conducted through pipes that traverse the furnace chamber where, when a fire is built, said pipes and the water therein are heated by caloric that would otherwise be wasted and a more speedy generation of steam ensues.

"CHAMBER."—Vernon Rhodes, Memphis, Tenn.—This invention relates to an improvement in chamber-pots for the sick room, and consists in dividing them into two separate compartments for the purpose of separating the urine from the feces in order that it may be inspected by physicians.

SELF-ACTING CAR COUPLING.—James C. Morris, Greenville, Tenn.—This invention consists of spring hooks pivoted at their extremities in a drawhead, in combination with a bolt triangular in cross section passing vertically through a complementary draw head, which retains the hooks after they have entered the drawhead in which is the triangular bolt, and have passed one to side of the same and closed together again at its rear, said bolt having a V-shaped groove running lengthwise of its rear side, which receives the points of the hooks, holds them, and prevents them from lapping.

REVOLVING CANNON.—Edward Brehm, Hudson, N. J.—This invention has for its object to construct a revolving fire-arm or cannon of such destructiveness and power, that by reason of its vast degree of effectiveness the danger of resort to armed conflicts will be materially reduced.

TABLES.—George G. Congle, Chippewa Falls, Wis.—This invention relates to improvement in mode of constructing tables, the object being to not only reduce expense of construction, but to enable them to be taken apart for transportation or storing away.

WATER FILTER.—J. W. Dougherty, Chicago, Ill.—This invention relates to improvements in that class of water filters which are designed for attachment to the water supply pipes to filter the water as it is drawn therefrom.

THIEF AND LIQUID MEASURE.—Seth C. Catlin, Cleveland, Ohio.—The object of this invention is to furnish an instrument for taking liquids from barrels, or other vessels, for samples and for measuring the same, so that much time and trouble may be saved, and it consists in a hollow globe or sphere provided with a valve chamber and valve, and with a graduated and adjustable induction tube and delivery cock.

COMBINED FOOT-REST AND BOOT-JACK.—D. K. James, Cincinnati, Ohio.—This invention consists in an adjustable stand with a hinged bracket for supporting the feet, with which is combined a boot-jack, the design being to afford convenient means for resting weary limbs.

HOOP-RACKING MACHINE.—R. M. Shaner, Genoa, Ohio.—This invention relates to improvements in machines for "racking" hoops, and consists in an arrangement with a channeled bench and a pushing apparatus for forcing the pieces of timber along the channel of an inclined plane, a fixed racking roller and a vertically movable roller arranged to be forced down upon the piece of timber to be racked as it is forced between the rollers and up the incline, so that it is subjected to an abrupt bending at all points from end to end by which the layers are racked apart.

SEWING MACHINE.—Lebeus W. Lathrop, Poughkeepsie, N. Y.—This invention consists in an improved combination and arrangement of means for passing the spool through the loop. The invention also consists in a combination with the needle and the said loop spreader, of a looper and operating devices therefor for forming a chain stitch with one thread (the lower one not being used), under such an arrangement that the said looper may also be used in conjunction with the devices for making a lock-stich, and hereby produce a compound lock and chain stich. The invention also consists in a novel arrangement of the driving gear for operating the lower spool and the looper, for shifting the same relatively to the needle driving gear, whereby the machine may be worked by turning the driving gear either way, and the feed changed to either direction by simply changing the direction of the motion of the drawing gear. The invention also consists in certain other improved combinations and arrangements of operating devices.

TABLE TOPS.—Isaac N. Swasey, Yonkers, N. Y.—The object of this invention is to secure the tops of billiard and other tables, and other wood surfaces, in such a manner that they shall be prevented from warping, winding, and twisting, from atmospheric changes of moisture or temperature, or from other causes.

CULTIVATOR.—Isaac B. Mahon, Dunkirk, Ohio.—This invention has for its object to furnish an improved cultivator, which shall be so constructed that the plow beams may have a free lateral movement for convenience in cultivating crooked rows, or avoiding irregular hills, and which shall at the same time be strong and durable.

VINEGAR APPARATUS.—Theodore Grundman, Cincinnati, Ohio.—The object of this invention is to avoid the use of braided straw or other fabric, and to permit the employment of plain straw cane, branches, or other simple material.

CLOTHES PIN.—William Miller, Boston, Mass.—This invention relates to a new and useful improvement in pins for holding clothes on lines for drying and consists in connecting two wooden jaws by a metallic coil spring.

LUBRICATOR.—J. L. Dickinson, Dubuque, Iowa.—The object of this invention is to provide suitable and convenient means for introducing oil or other lubricating material into steam cylinders and other places under pressure of steam or other flud.

HYDRAULIC MINING APPARATUS.—Frank H. Fisher, Nevada City, Cal.—This invention relates to a new apparatus for discharging water against hills and mountains for mining purposes, and has for its object to permit the directing of the discharge nozzle to any suitable hight or at any suitable angle, horizontally and vertically. The proper washing of the surface can thus be produced without great exertion or difficulty.

STEAM GENERATING AND DISTILLING APPARATUS.—Solomon Sowards and Morris Wood, Chillicothe, Ill.—This invention relates to a new and useful improvement in an apparatus for generating steam for cooking food or other purposes, where steam at low pressure only is required, and also for distilling purposes.

BALANCE FOR SHAFTING, CYLINDERS, ETC.—Henry Martinson, Hawksville, Ind.—This invention has for its object so to hang and balance shafting, drums, cylinders, and other rotary machinery, that the same may be properly tested while running, to ascertain whether the center of gravity is properly distributed along their axis. The chief difficulty hitherto experienced in balancing cylindrical rotary bodies, consists in the disproportionate inequality at the opposite ends of the cylinder, the balancing of one end, leaving the other end, and thereby the entire body is usually as inaccurate as though not at all balanced. This invention overcomes this difficulty by providing for the simultaneous balancing of both ends, and thereby the entire body of the cylinder.

VEHICLE.—Charles Daniel, Brownsville, Mo.—This invention has for its object to furnish an improved device for attachment to spring wagons, buggies, and other vehicles, to prevent the pitching forward of the vehicle and the consequent strain, jamming, or breakage of the springs or couplings.

COMBINED COTTON-PLANTER, GUANO-DISTRIBUTOR, CHOPPER, AND CULTIVATOR.—John E. Ross, Greensborough, Ga.—This invention has for its object to furnish an improved machine which may be easily adjusted for use as a cotton-seed planter, guano distributor, cotton chopper, and cultivator, and which will be reliable in use and effective in operation in either capacity.

RHEUMATIC LINIMENT.—Archibald A. Riddick, Franklin, Va.—This invention has for its object to furnish an improved liniment for the cure of rheumatism in all its forms, pains, sprains, bruises, neuralgia, paralysis, mumps, diphtheria, sore throat, corns, bunions, etc., and which will give instant relief in all cases.

COMBINED COTTON-SEED AND CORN PLANTER.—J. A. Towers, Quincy, Fla.—This invention has for its object to furnish an improved planter which shall be simple in construction and effective in operation, and which may be readily adjusted for planting the linty seeds of short staple cotton, or for planting black cotton seed, corn, peas, or other smooth seeds.

GRAIN SCOURER.—Austin Smith, Valmont, Col. Ter.—This invention has for its object to furnish a simple, convenient, inexpensive, and effective machine for cleaning and scouring wheat for grinding.

FANNING MILL.—Frank Sauers and John C. Coer[illegible]ater [illegible]loo, Ill.—This invention relates to improvements in fanning mills, and consists in an improved combination and arrangement of the several parts.

PLANTER AND CULTIVATOR.—Solomon Bacter, Edena, Mo.—This invention relates to improvements in machines for planting and cultivating, and consists in the application to a self dropping apparatus of drag covering devices, also of cultivators which are to be used in such ground that the drags will not cover the corn, the said cultivators being detachable. The invention also comprises improvements in the arrangement of the dropper slide, and the actuating devices therefor.

CULTIVATOR.—Isaac B. Mahon, Dunkirk, Ohio.—This invention has for its object to improve the construction of the improved cultivator patented by the same inventor Jan. 29, 1867, Sept. 17, 1867, and March 24, 1868, so as to make it more strong and durable, and at the same time more economical in construction.

SAND-HOLDER FOR CASTING HOOK-SHAPED STRAPS.—John Herald, Unadilla, N. Y.—The object of this invention is to provide a rigid or stable mold, which can be inserted between the spaces intended for the casting of the main body or shank of a strap or plate and the turned-over ear or hook of the same. The invention consists in the use for the stated purpose of a metallic case or sand-holder, in which the sand for the mold is contained.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,115.—MEANS FOR PREVENTING THE FRAUDULENT USE OF BONDS, RECEIPTS, CHECKS, TICKETS, AND OTHER LIKE ARTICLES.—T. R. Hayes and C. R. Peters, San Francisco, Cal. July 29, 1870.

2,829.—SPRINGS FOR RAILWAY CARRIAGES.—Richard Vose, New York city. October 27, 1870.

2,857.—SPIRAL PUMPS.—T. Schoenberger Blair, Pittsburgh, Pa. October 31, 1870.

2,859.—ORE-WASHING MACHINES.—Hezekiah Bradford, Reading, Pa. Oct. 31, 1870.

2,860.—PROTECTING TROOPS UNDER FIRE.—W. S. Wetmore, New York city. October 31, 1870.

2,863.—SILICIOUS COMPOUND, APPLICABLE FOR THE MANUFACTURE OF PIPES, TILES, BRICKS, AND OTHER ARTICLES FOR BUILDINGS, ALSO FOR PATHS, FLOORS, ROOFS, AND OTHER ANALOGOUS PURPOSES.—William Augustus Battersby, Brooklyn, Timothy Reed Crawford, New York city, and R. Brown, Brooklyn, N. Y. October 31, 1870.

2,879.—BOXES AND BEARINGS FOR AXLES AND OTHER SHAFTS, AND IN COMPOSITIONS TO BE APPLIED THERETO.—Eliza D. Murfey, New York city. November 1, 1870.

2,899.—MACHINERY FOR POINTING NAILS.—Lawrence Barnes, Burlington, N. J. November 3, 1870.

2,900.—CUTTING, BORING, GRINDING, AND PULVERIZING STONE AND OTHER HARD SUBSTANCES.—Benjamin Chew Tilghman, Philadelphia, Pa. November 3, 1870.

Official List of Patents.

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Patent Solicitors, 37 Park Row, New York.

110,187.—PLANTER AND CULTIVATOR.—Solomon Bacher, Edina, Mo.

110,188.—LAMP-WICK.—Philander Baker, Chicago, Ill.

110,189.—PACKING CAUSTIC ALKALIES.—William Henry Balmain, St. Helen's, Great Britain, assignor to the Greenbank Alkali Company, and said Company assignor to George T. Lewis, Philadelphia, Pa.

110,190.—APPARATUS FOR GENERATING CARBONIC ACID.—Wallace H. Bate, East Somerville, Mass.

110,191.—SMUT-MILL.—J. Adam Benzing, Jr., Oswego, N. Y.

110,192.—CANE-JUICE EVAPORATOR.—John S. Blymyer, Mansfield, Ohio. Antedated December 17, 1870.

110,193.—APPARATUS FOR PITCHING BARRELS.—James W. Brady, Baltimore, Md.

110,194.—REVOLVING CANNON.—Eduard Brehm, Jersey City, N. J.

110,195.—SEAL-LOCK.—Benjamin Briscoe, Detroit, Mich.

110,196.—FANNING-MILL.—Levi Bronson (assignor to James Braley), Buffalo, N. Y.

110,197.—PEW-SHELF.—David Buchanan, Philadelphia, Pa.

110,198.—VISE.—Isaiah Byrd and Turner Byrd, Jr., Calvin township, Mich.

110,199.—IMPLEMENT.—Joseph W. Calef (assignor to himself, Harvey King, and Augustus Peabody Hutchinson), Boston, Mass.

110,200.—CLEVIS.—David M. Castle, Constantine, Mich.

110,201.—BARREL-FILLER.—Seth C. Catlin, Cleveland, Ohio. Antedated December 17, 1870.

110,202.—LIQUOR-THIEF AND MEASURE.—Seth C. Catlin, Cleveland, Ohio. Antedated December 16, 1870.

110,203.—KITCHEN AND HOUSEHOLD SINK.—Ernest George Chormann and Edward McLaughlin, Philadelphia, Pa.

110,204.—CAR AND OTHER SPRINGS.—John W. Cochran, New York City.

110,205.—EJECTOR.—Hugh Coll, Millvale Borough, Pa.

110,206.—GALVANIC BATTERY.—Daniel McFarland Cook, Mansfield, Ohio.

110,207.—CORN-PLA TER.—Richard B. Corson and Henry Corson, Henry Co., Mo.

110,208.—STOPPING-MECHANISM FOR LOOMS.—James Cowngill, Philadelphia, Pa.

110,209.—VEHICLE.—Charles Daniel, Brownsville, Mo.

110,210.—POWDER-FLASK.—Franklin E. Darrow (assignor to Darrow Manufacturing Company), Bristol, Conn. Antedated December 17, 1870.

110,211.—TRANSPLANTING IMPLEMENT.—Asahel Davis, Lowell, Mass. Antedated December 14, 1870.

110,212.—MOTIVE-POWER APPARATUS.—Thomas Davis, Detroit Mich.

110,213.—SECTIONAL IMAGE.—Benjamin Day, West Hoboken, N. J.

110,214.—CAR-COUPLING.—John C. Dearborn, Candia, N. H.

110,215.—LUBRICATOR.—Joseph L. Dickinson, Dubuque, Iowa.

110,216.—PORTABLE LOADING AND DUMPING-MACHINE.—William D. Dorsey, Decatur, Ill.

110,217.—WATER-FILTER.—Joseph W. Dougherty, Chicago, Ill.

110,218.—MACHINE FOR BEAMING YARNS OR WARPS.—George Draper, Hopedale, Mass.

110,219.—SHELL-FUSE.—James Eggo, Jersey City, N. J.

110,220.—EXTENSION TABLE.—Thomas C. Ellison, Albany, N. Y.

110,221.—FENCE-POST.—Robert M. Filson, Willsborough, N. Y.

110,222.—HYDRAULIC MINING APPARATUS.—Frank H. Fisher, Nevada City, Cal.

110,223.—CUT-OFF VALVE-GEAR.—George W. Fisher and Hugh Reid (assignors to Gerard B. Allen & Co., and Hugh Reid), St. Louis, Mo.

110,224.—HAY-ELEVATOR.—Robert Furnas, Friendswood, Ind.

110,225.—WARPING-MACHINE.—Jacob Furrer, New York city. Antedated Dec. 9, 1870.

110,226.—HAMES-FASTENER.—Anthony Gale and Henry R. Johnson, Shelby county, Ky.

110,227.—STAMP-CANCELER.—John Goldsborough, Philadelphia, Pa.

110,228.—TOY GUN.—John Goodale, Boston, Mass. Antedated December 9, 1870.

110,229.—APPARATUS FOR THE MANUFACTURE OF VINEGAR.—Theodore Grundmann, Cincinnati, Ohio.

110,230.—COOKING-STOVE.—William Hailes, Albany, N. Y.

110,231.—TUMBLER-WASHER.—Albert Hallowell (assignor to Gustavus D. Dows, Calvin Dows, and George S. Cushing), Lowell, Mass.

110,232.—BARREL.—Thomas Hanvey, Elma, N. Y.

110,233.—REPEATING CANNON.—James H. Hedrick (assignor of one-third his right to J. B. Barrett), Wythe county, Va.

110,234.—FENCE.—William D. Hillis, Elgin, Ill.

110,235.—WASHING-MACHINE.—Alexander Hilton, Strathroy, Canada.

110,236.—SAW-MILL.—Jacob R. Hoffman, Fort Wayne, Ind.

110,237.—MACHINE FOR PREPARING FIBERS FROM SISAL-GRASS AND LIKE SUBSTANCES.—George E. Hopkins and William B. Shedd, Boston, Mass.

110,238.—HOISTING APPARATUS.—Henry H. Hunt, Saratoga, Springs, N. Y.

110,239.—SHELF BRACKET AND CLOTHES HOOK.—Henry E, Hutchinson, South Brooklyn, N. Y.

110,240.—FOOT REST AND BOOTJACK COMBINED.—David H. James, Cincinnati, Ohio.

110,241.—LAMP BURNER.—Walter Proctor Jenney and George Washington Taylor, Fairhaven, Mass. Antedated Dec. 15, 1870.

110,242.—HOODED GARMENTS.—Ambrose Keating (assignor to Benjamin T. Stephenson), Boston, Mass.

110,243.—TOOL FOR FORMING MOUTHS OF GLASS JARS.—Gov-eneur M. Keeffer (assignor to himself and William H. Barry), Birmingham, Pa.

110,244.—PRINTING PRESS.—John W. Kellberg, Philadelphia, Pa.

110,245.—BLOTTING PAD.—Augustus Burr Kellogg, Buffalo, N. Y.

110,246.—HARVESTER DROPPER.—Thomas W. S. Kidd, Springfield, Ill.

110,247.—MODE OF BALANCING CYLINDERS, PULLEYS, ETC.—William Kitson, Lowell, Mass.

110,248.—SASH HOLDER.—Andrew J. Kramer, Marion, Iowa.

110,249.—CLAY RETORT FOR THE MANUFACTURE OF GAS.—Frederick C. Krause (assignor to Samuel A. Walsh), New York city.

110,250.—SEWING MACHINE.—Lebbeus W. Lathrop, Poughkeepsie, N. Y.

110,251.—ADJUSTLABLE PLOW JOINTER.—John M. Leonard, Marshall City, Mich.

110,252.—MACHINE FOR FILLING OR STARCHING WOVEN FABRICS.—Thomas Lewis Livsey, Bury, Great Britain.

110,253.—HOSE COUPLING.—Conrad Locher (assignor to himself and George C. Perkins), Oroville, Cal.

110,254.—CAR SEAT LOCK.—Adam Lœffelholz and Anton Prier, Milwaukee, Wis.

110,255.—TIGHTENING STRAP FOR BARRELS.—Samuel Macferran, Philadelphia, Pa.

110,256.—CULTIVATOR.—Isaac B. Mahon, Dunkirk, Ohio.

110,257.—CULTIVATOR.—Isaac B. Mahon, Dunkirk, Ohio. Antedated Dec. 15, 1870.

110,258.—BASE-BURNING STOVE.—Henry C. March, Limerick Station, Pa.

110,259.—MODE OF BALANCING SHAFTS.—Henry Martinson, Hawksville, Canada.

110,260.—FLIER FOR SPINNING.—Thomas Mayor, Providence, R. I.

110,261.—PLATFORM WEIGHING SCALES.—Richard J. McKeone, Inverness, Mich.

110,262.—MACHINE FOR BENDING WOOD.—John McMichael (assignor to Wright Brothers & Co.), Philadelphia, Pa.

110,263.—CLOTHES PIN.—William Miller, Boston, Mass.

110,264.—CARTRIDGE.—Richard R. Moffatt, Brooklyn, N. Y.

110,265.—METALLIC CARTRIDGE.—Richard R. Moffat, Brooklyn, N. Y.

110,266.—PERCUSSION PRIMER FOR CARTRIDGES.—Richard R. Moffatt, Brooklyn, N. Y.

110,267.—BOBBIN-WINDING AND NEEDLE-SHARPENING ATTACHMENT FOR SEWING MACHINES.—Richard R. Moffatt, Brooklyn, N. Y.

110,268.—MODE OF APPLYING MOTIVE POWER TO MACHINERY.—Richard R. Moffatt, Brooklyn, N. Y.

110,269.—CAR COUPLING.—James C. Morris, Greeneville, Tenn.

110,270.—MACHINE FOR MAKING CIGARS.—Robert Neisch, Allentown, Pa.

110,271.—STAVE JOINTER.—John Newman, Cleveland, Ohio, administrator of the estate of Samuel Newman, deceased.

110,272.—MUSIC STAND.—James Newton, Hanover, N. H.

110,273.—CORSET CLASP AND SPRING.—Peter H. Niles, Boston, Mass. Antedated Dec. 9, 1870.

110,274.—FURNACE STOVE.—James Old, Pittsburgh, Pa.

110,275.—PREPARATION OF COD-LIVER OIL.—Michael O'Reilly, New York city.

110,276.—VAPOR BURNER.—Jason J. Palmer, Pittsburgh, Pa.

110,277.—MANUFACTURE OF COLORS AND THEIR APPLICATION TO FABRICS.—Alfred Paraf (assignor to Edward S. Renwick, trustee), New York city.

110,278.—COTTON PRESS.—Isaac N. Patten and Eli W. Long, Shelby county, Tenn.

110,279.—HARVESTER RAKE.—Henry Pease (assignor to himself and Henry W. Seymour), Brockport, N. Y.

110,280.—ROCK DRILL.—Charles Peck (assignor to himself and Milo Peck), New Haven, Conn.

110,281.—GANG PLOW.—Thomas Pepler, Hightstown, N. J.

110,282.—COOKING STOVE.—Joseph Pratt and James H. Wentworth, Boston, Mass.

110,283.—CUTTER FOR PLOWS.—G. F. Pykiet, Fairfield, Ill.

110,284.—SPRING BED BOTTOM.—James Henry Quackenbush, Luddington, Mich.

110,285.—BOOT-CRIMPING MACHINE.—John Rausch, Huntington, Ind. Antedated Dec. 9, 1870.

110,286.—CHAMBER VESSEL.—Vernon Rhoades, Memphis, Tenn.

110,287.—CONSTRUCTION OF ORNAMENTAL-HEADED PICTURE NAILS.—Thomas C. Richards, New York city.

110,288.—LINIMENT FOR THE CURE FOR RHEUMATISM.—Archibald A. Riddick, Franklin, Va.

110,289.—INJECTOR.—C. F. Root. West Springfield, Mass.

110,290.—COMBINED COTTON PLANTER AND GUANO DISTRIBUTER.—John E. Ross, Greensborough, Ga.

110,291.—FANNING MILL.—Frank Sauer and John Coerver, Waterloo, Ill.

110,292.—FAUCET.—Matthew Scrannage, Medfork, and W. H. Bate, East Somerville, Mass.

110,293.—SPRINGS FOR BEDS, SOFAS, ETC.—John Sears, Cortlandt, N. Y.

110,294.—VALVE FOR ENGINES.—William C. Selden, Brooklyn, N. Y., assignor to Adam Carr, Paterson, N. J.

110,295.—HOOP-RACKING MACHINE.—Russel M. Shaner, Genoa, Ohio.

110,296.—CHURN.—John Shappell, Lynnville, Pa.

110,297.—PUMP.—Nathaniel P. Sheldon, San Francisco, Cal. Antedated Dec. 16, 1870.

110,298.—STEAM GENERATOR.—George W. Shields, Louisville, Ky.

110,299.—PRESS FOR FORMING SOLES FOR PACKS.—Warren G. Slater, Hart, Mich.

110,300.—SLIDE VALVE.—James Smart, Stratford, England.

110,301.—GRAIN SCOURER.—Austin Smith, Valmont, Colorado Territory.

110,302.—CULTIVATOR.—Peter E. Smith, Scotland Neck, N. C

110,303.—TYPE-CASTING MACHINE.—William Spa[illegible], Philadelphia, Pa.

110,304.—COTTON PRESS.—Noah W. Speers, Memphis, Tenn. Antedated Dec. 8, 1870.

110,305.—COOKING STOVE.—David Stuart and Lewis Bridge (assignor to David Stuart and Richard Peterson), Philadelphia, Pa.

110,306.—BILLIARD TABLE.—Isaac N. Swasey, Yonkers, N. Y.

110,307.—MOLD FOR CASTING UNDER PRESSURE.—John Blake Tarr, Fairhaven, Mass.

110,308.—LAMP CHIMNEY.—George W. Taylor and Walter P. Jenney, Fairhaven, Mass. Antedated Dec. 8, 1870.

110,309.—CANT HOOK.—Waldy Tetro, Northampton, Mass., assignor to Union Nut Co., Unionville, Conn.

110,310.—PAD FOR CORSETS.—Mary P. R. Tilton, Trenton, N. J.

110,311.—COTTON SEED AND CORN PLANTER.—I. A. Towers, Quincy, Fla.

110,312.—HEATING STOVE.—Alvah Traver, Troy, N. Y.

110,313.—BOILER FURNACE.—Thomas Vickars, Sr., Thomas Jr., and James Smith, Liverpool, Eng.

110,314.—THERMOMETER.—John D. Ward, Baltimore, Md., assignor to himself and W. F. Jones.

110,315.—SPARK ARRESTER.—Jason Weidman, John Major, and John J. Sample, Pittsburgh, Pa.

110,316.—ADJUSTABLE SQUARE.—Samuel F. Wesner (assignor to himself and James Foster, Jr.), Camden, N. J.

110,317.—LEACHES FOR TANNING.—William T. H. Wharton Fayetteville, Tenn.

110,318.—FEEDING MECHANISM FOR COTTON OPENERS, ETC.—W. E. Whitehead, Miles Platting, England.

110,319.—PUMP BOX.—Anthony S. Whitehouse (assignor to himself and E. W. Southworth), Ashland, Mass.

110,320.—HORSE-POWER.—John W. Wilcox (assignor to himself and John S. Schofield), Macon, Ga.

110,321.—STEAM GENERATING APPARATUS.—Morris Wood, Chillicothe, Ill.

110,322.—FRUIT PARER.—L. S. Woodburn (assignor to himself and David F. Hunt), South Antrim, N. H.

110,323.—ANTI-FRICTION JOURNAL.—P. W. Yarrell, Littleton, N. C.

110,324.—AUTOMATIC BAND CUTTER, SPREADER, AND FEEDER.—W. H. H. Youngs, Waverly, Iowa.

110,325.—SOCKET FOR BROOM HANDLES.—Henry Achew, Cincinnati, Ohio.

110,326.—TWINE HOLDER.—John Adt, New Haven, Conn.

110,327.—COMBINED LINT ROOM AND COTTON PRESS.—I. H. Albertson, Bedias, Texas.

110,328.—REVOLVING REFRIGERATOR.—Frank Allen, Erie, Pa.

110,329.—GRAPNEL.—N. P. Allen and N. E. Allen, Salem, Mass. Antedated Dec. 7, 1870.

110,330.—ROTARY PUMP.—William D. Andrews, Brookhaven, N. Y.

110,331.—HOISTING APPARATUS.—W. D. Andrews, Brookhaven, N. Y.

110,332.—BEEHIVE.—Roberson Arnold, Suffolk, Va.

110,333.—COMBINED LAND ROLLER AND MARKER.—Henry F Baker, Centreville, Ind.

110,334.—DRAFT COCK.—Wallace H. Bate, East Somerville, Mass.

110,335.—SEWING MACHINE TABLE.—Joseph Bennor (assignor to himself, John N. McLean, and Samuel Crawford), Philadelphia, Pa.

110,336.—PLOW.—James O. Billing, Halcyon Dale, Ga.

110,337.—CORPSE-PRESERVING COFFIN.—James Y. Black, Cleveland, Ohio.

110,338.—FEEDER FOR REPEATING FIRE-ARMS.—Lewis Wells Broadwell, Carlsruhe, Grand Duchy of Baden.

110,339.—FARE REGISTERING APPARATUS.—Charles Alexander Calvert, Manchester, Kingdom of Great Britain.

110,340.—SAFETY CASE FOR FRUIT JARS.—Jane Carter, Towanda, Pa.

110,341.—CORN PLANTER.—J. T. Carter and M. B. Williamson, Xenia, Ill.

110,342.—PEN.—R. H. Chinn, Washington, D. C.

110,343.—ROOFING MATERIAL.—J. H. Cole, Chicago, Ill.

110,344.—HARROW.—D. B. Conover, New Bedford, N. J.

110,345.—COMPOUND FOR PURIFYING MINE WATER.—F. J. Delker, Ashland, Pa.

110,346.—HYDRAULIC PRESS.—J. A. Desgoffe, Paris, France. Antedated December 9, 1870.

110,347.—CLOTHES DRYER.—J. T. Elliott, Grand Rapids, Mich.

110,348.—MILK RECEPTACLE.—G. M. Fillmore, St. Paul, Minn.

110,349.—ROLL FOR FORMING HORSESHOE BLANKS.—C. L. Fitzhugh, Pittsburgh, Pa.

110,350.—ROTARY STEAM ENGINE.—G. S. Follensbee (assignor to himself and John Rosencrantz), Philadelphia, Pa.

110,351.—GRAIN SIEVE AND OAT EXTRACTOR.—Thomas Follett, Clermont, Iowa.

110,352.—OSCILLATING STEAM ENGINE.—I. N. Forrester, Bridgeport, Conn.

110,353.—BREECH-LOADING FIRE-ARM.—Stephen Gerngross, St. Louis, Mo.

110,354.—MACHINE FOR CUTTING SHEET METAL TO AN OVAL FORM.—W. D. Grimshaw, Newark, N. J.

110,355.—EXPLOSIVE COMPOUND.—Joseph Hafenegger, San Francisco, Cal.

110,356.—GANG PLOW.—James Harris, San Francisco, Cal.

110,357.—MOUSE TRAP.—H. C. Hart, Unionville, Conn.

110,358.—HANDLE FOR CUTLERY, TOOLS, ETC.—J. T. Haviland, San Francisco, Cal.

110,359.—PILE AND POST DRIVER.—Noah Havermale, Canton, Ill.

110,360.—GUN LOCK.—E. B. Hendee, San Francisco, Cal.

110,361.—LUBRICATING OIL.—D. R. P. Hill (assignor to himself, E. F. Weaver, and H. H. Weaver), Fredericktown, Pa.

110,362.—ELECTRO-MAGNETIC ENVELOPE FOR SAFES, VAULTS, ETC.—Edwin Holmes, New York city, and H. C. Roome, Jersey City N. J.

110,363.—GATE.—H. R. Hoskins, Harlan, Ind.

110,364.—PURIFYING OILS WHICH HAVE BEEN USED IN LUBRICATING MACHINERY.—Christopher Houlker, Frankford, Pa.

110,365.—SASH SUPPORTER.—R. B. Hugunin, New York city.

110,366.—UTILIZING SEWERAGE MATTER.—J. B. Hyde, New York city.

110,367.—THILL COUPLING.—F. A. Jewett, Grafton, Mass.

110,368.—MACHINE FOR OPENING COTTON.—W. C. Jillson and A. B. Palmer, Willimantic, Conn.

110,369.—ROLLING MILL.—J. H. Jones, Knoxville, Tenn.

110,370.—TRUSS AND SUPPORTER.—Nathaniel Jones, New York city.

110,371.—ROLLED BAR FOR PLOW-BEAM BLANKS.—G. W. Jope and William Bunton, Pittsburgh, Pa.

110,372.—MACHINE FOR MAKING POST-HOLES.—J. M. Kirkpatrick, Utica, Ohio. Antedated December 15, 1870.

110,373.—APPARATUS FOR PITCHING BARRELS.—A. A. C. Klaucke, Washington, D. C.

110,374.—BRAIDING GUIDE FOR SEWING MACHINES.—Albert Komp, New York city.

110,375.—STONE DRILLING AND CHANNELING MACHINE.—E. G. Lamson, Windsor, Vt.

110,376.—STONE-CHANNELING MACHINE.—E. G. Lamson, Windsor, Vt.

110,377.—BREAST COLLAR FOR HORSES.—W. E. Leonard, Boston, Mass.

110,378.—CASTING CHILLED ROLLS.—G. G. Lobdell and William Stuart, Wilmington, Del.

110,379.—CARTRIDGE BOX.—J. C. Ludlam, Brooklyn, N. Y.

110,380.—PUMP.—R. M. Marchant, London, England.

110,381.—TABLE FAN.—J. C. McEwen, Micanopy, Fla.

110,382.—ELEVATOR FOR MERCHANDISE.—William McNaughten, Utica, Ohio. Antedated Dec. 9, 1870.

110,383.—SHOT CARTRIDGE.—R. R. Moffatt, Brooklyn, N. Y.

110,384.—RAILWAY RAIL JOINT.—William Morehouse, Buffalo, N. Y.

110,385.—METHOD OF FORMING SHAFT IRON FOR CARRIAGES.—F. B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn.

110,386.—CLIP BAR FOR CARRIAGES.—F. B. Morse (assignor to himself and H. D. Smith & Co.), Plantsville, Conn.

110,387.—BASIN COCK.—C. A. Newton, Providence, R. I.

110,388.—LAWN MOWER.—A. J. Ohmer, Hamilton, Ohio

110,38... COMBINED PARLOR AND COOKING STOVE.—W. W. S. Orbeton, Bradford, Mass.
110,390.—SAW TOOTH SWAGE.—G. B. Pattee, Ottawa, Canada.
110,391.—STOP VALVE.—Robert Pilling, Waterford, N. Y.
110,392.—STUFFING BOX.—Andrew J. Prescott, Catawissa, Pa.
110,393.—COTTON PLANTER.—B. A. Ramsey, Trenton, Tenn. Antedated December 13, 1870.
110,394.—REFRIGERATING CAR.—T. L. Rankin, Granville, Ill.
110,395.—FOUNDATION FOR PAVEMENTS.—Selah Reeve, Chicago, Ill.
110,396.—VEHICLE.—J. D. Ross and M. K. Burke, Truckee, Cal.
110,397.—GRINDING MILL.—John H. Rusk, Philadelphia, Pa. Antedated December 9, 1870.
110,398.—MACHINE FOR TURNING LOGS.—E. H. Stearns, Erie, Pa.
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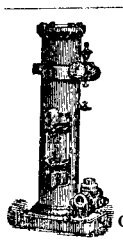

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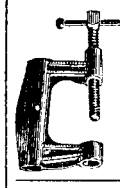

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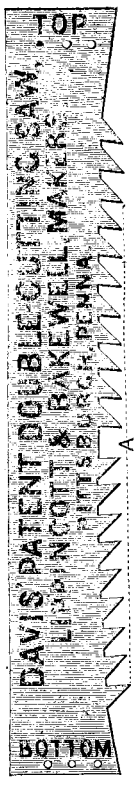

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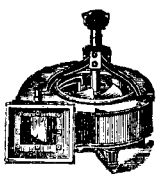

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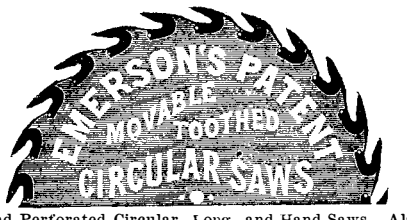

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