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Coal Gas.

The New York Gas-light Company have in operation three retort houses, containing 504 retorts, and over 160 furnaces. There are also purifying and condensing houses, together with the usual number of workshops and offices. They have two large chimneys over 150 feet high, with six telescope gasometers, exclusive of six distributing gasometers, at different parts of their district, which hold over 1,500,000 cubic feet of gas. The total cost of these works amounts to over \$500,000.

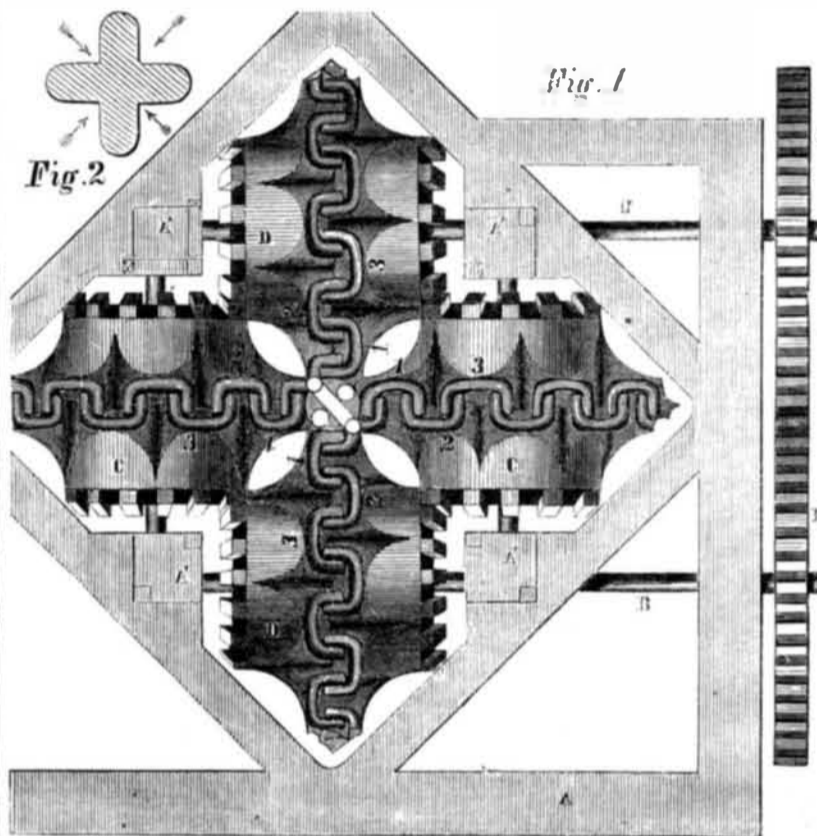
The company employs about 400 men, and manufactures 150,000,000 cubic feet of gas per year, consuming about 40,000 tons of coal, from which over 25,000 tons of coke are produced. Before 1849, the company manufactured their gas from oil and rosin, but now they use two-thirds of Cannel and one-third of Newcastle coal, and when the gasometers are not large enough to contain what is manufactured, the Cannel coal is exclusively used, as it is purer and makes more gas, although its market price is somewhat higher than Newcastle.

The process of manufacturing gas is as follows:—A panful of coal is put into an iron retort, under which is a furnace that heats the retort red hot, turning the coal partly into gas and partly into coke. The latter remains in the retort, while the gas passes out through a pipe half filled with water, called the hydraulic main, the force in the retort being sufficient to drive it through the water and over the surface; but it cannot pass back, as the water acts as a seal to secure it. Thence it is conducted into a condensing pipe to the condensing house, where its heat and volume are reduced. It is then transmitted to the purifying house, where it passes through three distinct beds of dry lime, which extract the sulphurous particles from it. There are test cocks attached to the purifiers, by which its purity is tested. The cock is turned to let gas out, and a piece of paper saturated in a solution of sugar of lead held over it, and if it stains the paper, it is impure. It is said that sugar of lead will detect one impure part in 40,000 cubic feet. The gas, when purified, is conveyed to the gasometer, from which it is distributed into the pipes throughout the city.

The company have over 125 miles of pipe laid, covering the whole of their district, which consists of all that part of the city south of Grand street.

The lecture hall of the Smithsonian Institution at Washington, D. C., is built in the form of a speaking trumpet; the lecturer stands, as it were, in the smaller end, and the slightest whisper can be heard all over the room. It was constructed under the direction of Professors Henry and Bache, and is a triumph of acoustical science applied to public buildings.

SLEPPY'S CHAIN-MAKING MACHINE.



Chain-making is an important manufacture, and on the strength and compactness of chains often depends a cargo of precious merchandize, the success of some great engineering undertaking, or, in fact, any of the thousand articles of worth that are daily being pulled, transported, or raised by this means. For all purposes where chains are employed, it is desirable to have them strong and cheap, therefore, wherever we can introduce machinery into their manufacture, we secure both. The ordinary process of forging a chain of any dimension is a tedious one. The bar of metal is heated to welding heat, and then the end bent in the form of a hook, which is cut off and welded into round or oval form; another piece of the bar is then taken and bent, cut and passed through the already formed link, and in its turn welded together, and so on to whatever length is desired.

The machine which is shown in our engraving is one which cuts a perfect chain out of a bar of metal. In Fig. 1, A is the frame. B B are the axles which are connected with the gearing wheels, B' B'. C C are two solid iron wheels, working in boxes, A', at right angles to D D. These four wheels, D D and C C, turn one another by means of cogs, and revolving the same way, meet in the center. On their edges are cut a series of grooves or dies, each forming one quarter of a link; thus when dies, 1 1 1 1, meet at the center, in turning round, any plastic material interposed would be cut by them into a link of a chain as would 2 2 2 2 or 3 3 3 3.

The operation is as follows:—A bar of iron or other metal heated to the welding heat, having the section shown in Fig. 2 is passed through the center of the wheels, D D and C C, which in revolving carry the bar downwards with them. In consequence of the dies or impressions on the periphery, however, it is cut; and, as each die is the quarter of a link when it is met by the four dies, the bar is cut into a perfect link, and this link cutting goes on as long as the bar is fed, thus turning out

a chain of any length that may be desired. It may be driven by any convenient power, either steam, water or horse. The arrows in Fig. 2 indicate the direction of the pressure in the cutting process.

For further information and particulars, address the inventor and patentee, Christian Sleppy, Wilkesbarre, Pa.

Bank Note Paper.

A Bank of England note has some peculiar and interesting characteristics of manufacture, the paper being distinguished by its color, which is a peculiar white, such as is neither sold in the shops nor used for any other purpose; by its thinness and transparency, qualities which prevent any of the printed part of the note being washed out by turpentine, or removed by the knife, unless a hole is made in the place thus practiced on; by its characteristic feel, a peculiar crispness and toughness, by which those accustomed to handle it distinguish the true notes instantly; the wire or water mark, which is produced on the paper when in the state of pulp, and which is easily distinguished from a mark stamped on after the paper is completed; the three "deckle" edges—the mold contains two notes placed lengthwise, which are separated by a knife at a future stage of the process, this deckle or wooden frame of the paper mold producing the peculiar effect seen on the edges of uncut paper, and this edging being caused when the paper is in a state of pulp, precludes any successful imitation after the paper is made; also by the strength of the paper, which is made from new linen and cotton. In its "water leaf," or unsized condition, a bank note will support thirty-six pounds; and when one grain of size has been diffused through it, it will lift half a hundred weight.

If a little more care was taken by our State governments in regard to what sort of paper should be used in the printing of bank notes, the people would suffer much less from the spurious stuff now in circulation. In some

respects we are a heedless people, and have yet something to learn from the old nations of Europe.

Brooklyn Water Works.

Water-works to supply the neighboring city of Brooklyn, Long Island, with water have been under contract for upwards of a year, but they appear at this date to be progressing very slowly. The plan is to obtain the water by collecting together several mill streams on the lower side of the island, and to lead them either in an open canal or closed conduit to a low point near the city, from which the water is to be forced up by steam pumping to the top of the highest ground in the vicinity, from whence pipes are to supply the city. The reservoir on this hill is partly finished, the canal partly excavated, and any quantity of designs and estimates have been received for the pumping apparatus, but nothing further has transpired, and we hear it reported that the extreme low level at which the canal will have to run has been found to involve such serious difficulties that it is contemplated to change the plan, and at an expense of a million dollars more, to substitute a canal running at a level higher than the streams, with a pumping engine at each stream, to elevate the water into it.

What is it?

One of the savans at the late convention of scientific men at Montreal insisted that coal was not of vegetable origin. All geologists at the present time say that it is, and we should like to know how he accounts for the gigantic ferns and monster pine trees which are found in nearly all coal formations, and seem to point directly to its vegetable origin. Soft coal is full of these, while anthracite contains comparatively few. This may be accounted for by the compact and hard nature of the latter, which would indicate that it has been subjected to greater pressure and changes in other ways sufficient to remove all traces of fossils either of animals or plants. There is, however, nothing like differing from the rest of the world, if you wish to be thought profound. We wish this wise one had given us his idea of what coal *did* originate from, for it is not good policy to pull down one system without you have another to build up in its place.

Science among the Japanese.

M. Von Siebold, the distinguished scientific author, states that the knowledge of the natural sciences amongst the Japanese is much more extensive and profound than is generally supposed. They possess a great many learned treatises thereupon, and an admirable geological map of their island by Buntsjo. They are well acquainted with the systems of European naturalists, and have translations of the more important of their works. They have also a botanical dictionary, in which an account is given of not fewer than 5,300 objects, and is embellished with numerous fine engravings.

Mr. J. R. Baird, of Vincennes, Ind., has sent us a specimen of his daughter's workwomanship—one of the most skillful and ingenious pieces of lady's work we have ever seen. It consists in four stockings, knitted at one operation, on only four needles. The stockings are one inside the other, and each distinct and separate. It is now on exhibition at the Crystal Palace.



Issued from the United States Patent Office
FOR THE WEEK ENDING SEPTEMBER 15, 1887.

[Reported officially for the Scientific American.]

HULLING RICE—Wilson Ager, of Rhorsburg, Pa. : I claim removing the rice husk by pressure in direction of the length of the grain effected by the action of a shell and burr, dressed and operating substantially as set forth.

CLEANING RICE—Wilson Ager, of Rhorsburg, Pa. : I claim the method of cleansing rice by submitting the mixture of grain and husk resulting from the hulling process, to an alternate packing and loosening action, produced by surfaces dressed and operating substantially as set forth.

GRINDING MILL—Aaron Arnold, of Troy, N. Y. : I claim the combination of the rotating disk or plate, I, and cut or sectional cone, J, with the interior of the concave, G, and flange, F, for the purpose of feeding in to the mill, and grinding large substances, such as corn on the cob, and as set forth.

I also claim securing the cone and disk, or plate, I, to the shaft, through the intervention of the face plate, H, substantially as set forth, so that said cone and disk may at any time be removed and replaced by others when they become dull or worn away.

FLOUR BOLT—N. Bauman, of Elmore, Ill. : I am aware that beaters placed both parallel and spirally with their shaft have been used for similar purposes. I therefore do not claim said beaters separately.

But I claim the shell or case, B, carved or formed as shown, in combination with the rotating beaters, K, and frame, G, with bolting cloth, F, attached, the whole being arranged as shown, for the purpose set forth.

[This invention consists in the employment of a stationary shell or case, which is formed of metal or wood, and of a peculiar shape. It has a frame covered with bolting cloth fastened to one side. Within the case a rotating shaft is placed, having beaters attached, and the whole so arranged that the beaters rotating in conjunction with the form of the shell, will cause the flour and bran to be thoroughly separated.]

KNEADING DOUGH—Hiram Berdan, of New York City : I claim the employment in a kneading machine of a flopper, E, applied and operated in any manner, substantially as set forth.

[A flopper or rigid bar is so arranged that it is made to rotate through the dough and to mix the flour, water, and yeast, or other ferment, thoroughly together; after which it cuts the dough up in strips, and then re-unites it, all the while working it up and down, so as to a ord a light and pleasant bread.]

HARDENING HAT BODIES—Joseph Booth, of Newark, N. J. : I claim a hardening machine operating substantially as set forth, and consisting substantially of a cradle and of a rapidly revolving spindle, upon which the cradle is supported eccentrically.

SUSTAINING WINDOW SASH—Edward T. Briggs, of Salem, Mass. : I claim furnishing the sash with the metal strip, G, in combination with the angular grooved support, B, and spring, C, in the manner and for the purpose set forth.

INDIA RUBBER PAINT—William & William A. Butcher, of Philadelphia, Pa. : I claim the composition prepared and composed of the materials as described, for the purpose of making water-proof paint.

GAS GENERATORS—John Butler, of Brooklyn, N. Y. : I am aware that a patent has been granted for the use of fused metals, by passing the products of the distillation of coal and other substances yielding carburetted hydrogen (gas) through said metals. I therefore disclaim the use of fused metals, fusible at a low state of temperature, for the purpose of passing the products of the destructive distillation of coal and other substances, through said metals.

Nor do I claim said metals for bringing distilled carbon-hydrogen vapors in immediate contact with the surface of the same.

Nor do I claim fused metal for the purpose of floating the carbonaceous matter usually deposited in retorts.

I claim generating illuminating gas in a retort over the surface of melted lead, or other fusible metal, in the manner set forth.

EXCAVATORS—Ze Butt, of Lincolnton, N. C. : I claim the attaching the posts, G G', in combination with the cross bar, P, resting upon the frame to the scoop itself by pivots or otherwise, for the purpose of bearing and supporting it whilst loading and regulating the depth it is to enter the ground, and for taking the strain of the chains and windlass.

Again, I claim as my invention the elevation of the loaded excavator by horse power, in the manner described, or any other method substantially the same.

I likewise claim the arrangement and combination of the gate catch rod and lever, so that the gate can be opened and closed by the driver without his leaving his seat, substantially as shown and described.

MASTIC ROOFING—Wm. H. Carver, of Covington, Ky., and J. Beckley, of Cincinnati, Ohio : We are aware that near all, if not all the ingredients, composing our cement have been used, and therefore do not wish to be understood as claiming any of them when taken separately, nor the whole of them when used together.

But we claim the precise manner employed of mixing and compounding the ingredients composing the cement, when combined with the proportions of ingredients, as specified by which process of mixing and compounding and combination of ingredients, and applying the cement to use, we are enabled to decompose or destroy the ammonia contained in the coal tar, to prevent it from destroying the cement and eating the canvas on which it is spread, and at the same time produce a cement that is not brittle and subject to cracking, but hard enough to resist forces that roofs are generally subject to, and at the same time elastic enough to expand and contract to suit all conditions of heat and cold, and make the cement water-proof.

MOWING MACHINES—A. H. Caryl, of Sandusky, Ohio : I claim the combination of the rear portion of the tongue or hounds, E E, with the main or wheel frame, A, and seat, G, said parts being arranged for joint operation, in the manner and for the purposes set forth.

RAKING ATTACHMENT FOR REAPERS—A. H. Caryl, of Sandusky, Ohio : I claim first, Raising the rake in the plane in which it is inclined by means of the devices described, for the purpose specified.

Second, I claim operating the raking attachment back and forth over the platform by means of the mechanism substantially as set forth.

Third, Inclining the rake from a vertical plane to correspond with the length of the grain being cut, by means of the devices described.

COOLERS FOR BREWERIES—Adolph Hammer, of Reading, Pa. : I claim the application thereto of the movable partitions, B B, rendered stationary in the manner substantially as described, and for the purpose set forth.

INVALID BEDS—George H. Clark, of Pontiac, Mich. : I claim the construction and arrangement of parts described, by which the head end of the foot portion of the bed is made capable of being lowered away from the patient, substantially as and for the purpose set forth.

I also claim combining with said arrangement the slide, M, attached to the frame to support the vessel, as set forth.

MAKING PAPER PULP FROM IVORY—William N. Clark, of Chester, Conn. : I claim the using of ivory as stock to make pulp for the manufacture of paper.

HANGING MILL STONES—Edwin Clark, of Lancaster, Pa. : I do not claim hanging the upper stone in a balanced rim or gimbal joint, as this has heretofore been done.

But I claim so uniting the rim which supports the upper stone to the frame of the mill by sliding blocks or followers as to allow an upward play or automatic adjustment of the upper stone, and at the same time admit the usual hand adjustment by set screws if desired, substantially as described.

SHIP'S PUMPS—Abraham Coates, of New York City, and Samuel M. Perry, of Brooklyn, N. Y. : We claim the peculiar mechanism by which we obtain reciprocating motion, between the pump and piston from each move of a lever, having a combined horizontal and longitudinal motion, the same consisting of the shaft, the cross, through which it passes, the universally moving lever attached by journals to the cross, at right angles to the shaft, and the two bevel gears or sections of gears—the one attached to the lever, the other to the shaft—or any other arrangement substantially the same and for the purpose specified.

SOCKET FOR BOLTS—H. W. Collender, of New York City : I claim having a disk or follower, d, placed within the socket, and connected with a spring, E, arranged in any proper way, so that as the bolt, A, is withdrawn from the socket, the spring will press the disk or follower against the upper or outer end of the socket, and close the orifice thereof, for the purpose specified.

[The sockets of bolts often become so choked up with sand or dust that the bolt cannot be pushed in. This may be hindered by the above device, which consists in a light spring and plate in the socket, so that when the bolt is withdrawn, the plate is pushed up, and closes the orifice of the socket, thereby keeping it clean.]

EXPANDING SPECTACLE BOWS—George N. Cummings, of Hartford, Conn. : I claim the spectacle eye-former, made in two parts, as described, the circumference of the two parts when closed being smaller than the eye, and being expanded by the double former to the required size, in the manner and for the purpose as herein set forth.

STREET-SWEEPING MACHINES—John Critcherson, of Boston, Mass. : I claim the improvement in street-sweeping machines which consists in the combination of the adjustable sliding bars traveling in the arc of a circle with the universal joints for driving the diverging shafts upon which the brushes are arranged, whereby the sweeping apparatus is adapted to streets of various widths.

BRIDGES—Charles H. Earle, of Green Bay, Wis. : I do not claim making a bridge in sections.

Nor do I claim the attachment of sections of bridges to their abutments by knuckle joints or hinges, as I am aware that draw-bridges have been constructed with such attachments.

But I claim the supporting of those ends of the several sections, B B, of the bridge which are not connected directly with the abutments, by attaching them to cap pieces, C, or their equivalents, fitted to rise and descend on piers, in combination with the attachment of the sections next the abutments, with knuckles or hinges whereby the bridge is rendered self-adjusting, and prevented being carried away by accumulations of ice, floods, or other causes leading to lift the bridge from its place.

[These bridges are designed to supersede the ordinary ones in places where they are liable to be carried away by floods or ice accumulating round the piers, the whole of the bridge being capable of being lifted with the flood and again falling into its proper place without injury.]

OPERATING VALVES OF STEAM ENGINES—Robert H. Fletcher, of Brooklyn, N. Y. : I claim the arrangement of the slide valve, E, with the pistons P and K, and valves, Z and M, with their respective steam ways operating together in the manner and for the purposes described.

PAINTERS' EASELS—George Gillett, of Little York, N. Y. : I claim the combination of the three motions obtained by the two semi-circles and the rotary motion of the rotating arm between said gathering wheels in the semi-circles, to retain the position, and also as an application to the easel or painting stand.

SAFETY FUSE COMPOSITIONS—Edwin Gomez and Wm. Mills, of New York City : We claim the explosive compound for safety trains, fuses and similar purposes, formed of the ingredients and substantially as specified.

OPERATING WINDOW SASH—John C. Grant, of Salem, Mass. : I do not claim balancing the sash by means of a spring, as that is not new.

But I claim combining with the window frame and sash, the rack, A, gears, B B', pulleys, C, and spring, D, all arranged and operating substantially as above set forth.

FEATHERING PADDLE WHEELS—Lewis T. Howard, of Smith's Mills, Miss. : I claim contracting the hub of the paddle wheel, so as to dispense with an outside bearing, for the purpose of enabling me to place the feathering wheel outside of the paddle wheel, and use any length of connecting arms between said feathering wheel and the buckets that may be deemed most effective, and as set forth and explained.

TREATING COTTON AND LINEN WASTE—Eben Norton Horsford, of Cambridge, Mass. : I do not claim the use of acid for the purpose of removing any of the mordants or native resinous or coloring matters from raw textile or fibrous materials.

But I claim the use of acid to dissolve metallic particles in cotton and linen factory waste, substantially as described.

TREATING FIBROUS AND TEXTILE SUBSTANCES—Julius A. Jilson, of Poughkeepsie, N. Y., and Henry Whittfield, of New York City : We claim the process of treating fibrous and textile substances in a permanent vacuum for extracting coloring, grease, or other foreign matters, substantially as set forth.

POINTING WIRE—C. J. Jilson, of Worcester, Mass. : I claim causing the wire that is being pointed to force the cutter away from the point that is being cut, but forcing it away, controlled by a pattern which regulates the form and the taper given to the wire, the whole being accomplished by means substantially such as herein set forth.

BELT TOOL—David A. J. Lamson, of Cherry Valley, Mass. : I do not claim broadly the combination of a number of implements together, so as to form a complex or universal tool, irrespective of the construction and arrangement of the parts forming such a tool.

But I claim the combination of the several tools specified in one instrument, when constructed and operating substantially as described.

VALVE GEAR FOR OSCILLATING STEAM ENGINES—John C. Pennington, of Paterson, N. J. : I claim a valve gear for an oscillating steam engine, composed of an eccentric set substantially as described, and a slotted arc, the curve in which is concave towards the shaft, and provided with a sliding pin, which is connected with the valve, or the equivalents thereof, and this I claim whether the slot be long enough for reversal, or of such length as may be sufficient for running the engine in one direction only.

SPOKE MACHINE—Samuel Lord, of Perry, Ga. : I do not claim, separately and apart from the arrangement shown, any of the parts described.

But I claim the vibrating frame H, operated as shown, and arranged with the carriage, B, and saw, C, specifically as described, so as to operate conjointly as and for the purposes set forth.

[This machine has the stuff which is to be cut centered in a vibrating frame, the axis of which is oblique, relatively with the stuff, and then by employing a traveling saw and other contrivances, the spokes are turned out direct from the stuff at one operation.]

HARNESS FOR LOOMS—George Matoon, of Chicopee Falls, Mass. : I do not claim making a harness with a knot at the top as well as one at the bottom of each eye thereof, as this has been done before. When the eye is knotted at the top and bottom there is double the friction and wear on the warp that takes place when the eye is knotted only either at top or bottom.

I claim the improved mode of making a harness so that its lease and knot shall be below its eye, and the threads of each loop be caused to pass against one side of their shaft or bar instead of being caused to embrace opposite sides of it, namely, first knitting the harness with a lease at top and one at bottom, or one above as well as one below each eye, and subsequently changing the upper shaft so as to pass it between the several loop threads of the upper side of the harness in such manner as to make both threads of each loop pass against one side of the shaft.

PREPARING TRADING MUSLIN—Jesse K. Park, of Marlborough, N. Y. : I claim the employment of the oil of the fish, cod, or sardine, alone or as an ingredient in the composition for increasing the transparency of tracing muslin, as specified.

REGULATING THE VELOCITY OF WIND-WHEELS—Francis Peabody, of Salem, Mass. : I claim an improvement in regulating the action of wind-wheels, the sectional disk operating in the manner substantially as set forth.

TENONING MACHINE—Perry Putnam and John E. Crone, of Lowell, Mass. : We do not claim the parts of our machine separately.

But I claim their arrangement and operation specifically as shown, for the purposes set forth.

WATCHMAKER'S LATHE—Roswell H. St. John, of Bellefontaine, Ohio : I claim the construction of the chuck formed of the jamb disk, d, the tubular clutch collar or ward brush, e, with the centering plate, i, i, and adjustable jaws, J K L, together and combined with a keying mandrel, a 2 b c, substantially as shown and described.

PRESERVING ALKALIES—George Thompson, of East Tarentum, Pa. : I claim the use of metallic boxes, constructed as described, and united with infusible cement, for the purpose of putting up the caustic alkalies of soda and potassa in small quantities, as described.

Drip POTS FOR SUGAR-HOUSES—John Turl, of New York City : I claim constructing the pot of two metal parts or halves, A A, formed or "struck up" in proper shape by any proper means, and connected together by rivets, a, by brazing, or in any suitable way, substantially as described.

[The ordinary drip pots in a sugar-house are either earthenware or cast and sheet iron combined. The former have to be made very heavy, to prevent breakage, and even then they are liable to fracture, and the others are liable to leak, from the diversity of their halves. The subject of this patent is, however, made in two halves of sheet metal, and brazed together, thus securing lightness and durability.]

ILLUMINATING GAS APPARATUS—Charles E. Warring, of Poughkeepsie, N. Y. : I claim first, The eye-piece and tube in combination, substantially as described.

Second, I claim the peculiar apparatus described, for conveying the gas into the gas holder.

BALL CARTRIDGES—Lemuel Wells, of Astoria, N. Y. : I claim the attachment of a hard metal shell of a ball cartridge to the bullet, substantially as described, by making it smaller than the bullet, and driving it into a cavity in the rear of the bullet.

[This invention consists in making the shell of the cartridge of metal tube, fitting into a seat, and swaged or otherwise to receive the bullet.]

DIAPHRAGMS FOR PHOTOGRAPHIC CAMERAS—J. R. Werner, of New York City : I claim the application of an elastic diaphragm in photographic cameras for the purpose and in the manner specified.

BREWERS' COOLERS—Adam Wood, of Pittsburg, Pa. : I do not claim in the abstract, or separately considered, the corrugated sheet metal bottoms, viewed only as a means to compensate for the expansion and contraction of the metal, for this is a well-known mode of obviating this difficulty, and is employed in metal plates for roofing and other purposes.

Nor do I claim the cooling of the liquor by means of cold water tubes with which the liquor is brought in contact, irrespective of the arrangement shown, for such means have been previously employed.

But I claim constructing the coolers in two parts, A B, corrugated and placed in contact as shown, so that cold water or air passages, e, f, are found between said bottoms, and the bottoms allowed to expand and contract freely without injury, by which the bottom of the liquor within the cooler may be cooled as quickly as the top, or the heat rapidly absorbed from both surfaces, and the cooling of the whole mass or quantity therefore greatly expedited.

[Malt liquor has to be cooled very quickly after the hops have been boiled with it, or it would become acid, and be rendered useless. This cooling has usually been effected by pouring the liquor into large, shallow wooden vessels, but even though this process was very quick, acidification often set in before the whole was cooled. The inventor of these coolers obviates this by having a double bottom of corrugated iron to the cooler through which cold water is continually running.]

RAKING ATTACHMENT FOR REAPING MACHINES—Christian Yost, of Leacock, Pa. : I claim operating the rake, A, by means of the device, D, the regulator, C, in combination with the semi-cog wheels, K L, and pins, N N, arranged and connected substantially as set forth.

TYPE SETTING AND DISTRIBUTING MACHINE—Timothy Alden, of New York City : I claim, first, The method substantially as described for conveying the type to and from the type cases, and the composing and setting tables, consisting of a type carrier in combination with a series of conveyors, which are capable of receiving any type indiscriminately, and also of receiving an indication representing the type so received, or that required, whereby that type may be deposited into or taken from the type cases, substantially as set forth.

Second, The described or any equivalent method of attaching the conveyors to the carrier, by which they are permitted to stop whilst delivering or receiving type without arresting the motion of said carrier, substantially as set forth.

Third, Giving to the conveyor or vibratory or tilting motion upon its central pin, whereby its gripping end is made to closely approach the place at which the conveyor is to receive or deposit a type for the purposes, and in the manner substantially as described.

Fourth, In combination with the devices or mechanism for receiving and for delivering the types into and from the type cases as described, or their equivalents, I claim arranging the types edgewise in said cases, whereby, for all the types of a font, an uniform throw or action may be given to said mechanism.

Fifth, In combination with the type channels, the mechanism for pushing out the type, consisting of the rack, pendulum lever, and propelling rod, and the

pusher upon the conveyors, or any equivalents thereof as described.

Sixth, In combination with the type channels, the mechanism for preventing the stopping of a setting conveyor at a type channel when it is empty, or a distributing conveyor at a channel when full of type, consisting of the tilting bar, S 7, the pendulum lever and rack or equivalents as described.

Seventh, The method of discharging the type from a distributing conveyor into the type channels, or of causing it to be received from such channel into a setting conveyor, consisting of the cam, d 6, and the pusher plate, b 6, or equivalents thereof as described.

Eighth, The mechanism for setting the gripping bolt upon the conveyors, and for releasing the same, consisting of the stationary cam, u 5, and crank lever, f 5, for the setting of said bolt, and for the releasing thereof, of the latch, v 5, and cam or pin, y 6, as described.

Ninth, The method substantially as described of effecting or ensuring the deposit of each type into or the taking thereof from an appropriate case, consisting of the excavated ring, m 5, or any equivalent thereof which shall have upon it or near each type case, a device indicative of the denomination of the type contained in said case, and which device shall cause, at the proper place, an action of the conveyor, to receive or to deposit a type, as the case may be, in accordance with any given set upon the conveyor, as set forth.

Tenth, The stationary inclined pieces, g 7, in combination with the grooves of the ring, m 5, for restoring the indicating points upon the conveyor to a zero or starting point as described.

Eleventh, The movable indicators, e 7, or their equivalents, in combination with the grooves in the ring, m 5, and with the shifting bars of the distributing mechanism, as described.

Twelfth, The method of setting the distributing indicators by means of the system of levers, Z 3, or equivalent mechanism, so constructed and operated as to be acted upon by a system of clicks upon the type, by which certain parts are allowed to be brought into operation to move the indicators, in accordance with the plan or combination of nicks, and whereby the appropriate case or place of deposit of type is indicated upon the conveyors as described.

Thirteenth, The graduated stop, c 4, in combination with the indicating levers, Z 3, for relating the fall of the line of type, as described, and also in combination therewith the mechanism described under e 4, i 4, and l 4, for restoring said levers into position when about to return for a new setting, and for setting the frame, y 3, against its guide plate, as described.

Fourteenth, The arrangement of mechanism for transmitting the movements produced upon the levers, Z 3, by the nicks in the type, and for effecting the proper combinations upon the indicators, e 7, consisting of the detaining levers, n 4, the bars, p 4, bar, t 4, bars, v 4, bar, y 4, and the connecting levers, g 4, together with the operating cams upon the shaft, j 4, or any equivalent combination, whereby the same results will be produced, as described.

Fifteenth, The mechanism for feeding up the column of type, and for elevating the successive lines thereof into the channels, or equivalent devices, as described.

Sixteenth, The method of locking and disengaging the feeding pawls, consisting of hanging lever, a 3, in combination with the frame, X, with the means for depressing the bolt, d 3, and with the ratchet having the engaging and disengaging wedges as described.

Seventeenth, I claim, in combination with the keys, the arrangement of mechanism, whereby the separate different signals represented by each of a great number of keys may be produced by a less number of indicators as described.

Eighteenth, The radially revolving registering levers, in combination with the register wheel, and with the keys as described, or the equivalents thereof.

Nineteenth, The independent registering apparatus constructed as described, or its equivalent apparatus, which will effect the recording of the letters or signs, as indicated by the keys, independently of the type carrying apparatus, substantially as set forth.

Twentieth, The mechanism for transmitting the indications from the register, consisting of the detaining levers, K o, or equivalents, in combination with the setting indicators, and with the register, as described.

Twenty-first, So combining the register and the setting indicators, f o, with the type carrier that the latter shall effect the movements of the register, to set the indicators in time to act upon the setting conveyors, and immediately thereafter effect the retreat of the said indicators previous to the passage of a distributing conveyor as described.

REEFING AND FUELING SALES—G. W. La Bar, of Jersey City, N. J., assignor to himself and Chas. A. Durgin, of New York City : I do not limit myself to any particular mechanism for operating the vertical rollers around which the sails wind, as such mechanism may be varied.

I claim the arrangement of vertical rollers in front or rear of the mast, and operated by mechanism from the deck of the vessel, and whereby I am enabled to operate separately or together the sails on each mast from the deck, substantially as described and set forth, irrespective of the mechanism employed for working the vertical rollers.

SAW FILE—J. J. Near, of Oneida, N. Y., assignor to Eli Near and Levi Vandusen, of Madison county, N. Y. : I claim a clamp to gripe the saw, substantially as described, and carrying hinged vibrating arms provided with springs for holding and operating the file, substantially in the manner described.

ARRANGEMENT OF PASSAGES AND MEANS FOR WORKING STEAM VALVES BY THE DIRECT ACTION OF STEAM—Bartholomew Roberts and Alex. Crumbe (assignors to themselves and John Benson), of Brooklyn, N. Y. : We are aware that the valves of steam engines actuated by steam pressure applied to pistons other than the main working pistons have been used, and therefore we disclaim such use. We are also aware of the patent of Norman W. Wheeler, July 31, 1853, and we therefore claim no part, device, or thing patented to him.

But we claim the arrangement of the steam channels, a, b, c, which are opened and closed by the travel of the main piston, connecting the steam chest and cylinder as described, in combination with the pistons, J J, of equal areas or their equivalents, substantially as described and set forth.

CONTROLLING COG GEAR SASH BALANCE—John MacMurtry, of Lexington, Ky., assignor to Danl. Wichi, of Fayette county, Ky. : I claim arranging the cog gears, F' H', of the lower sash C', on the shaft, G', which is capable of turning vertically, and sliding horizontally, and which has arranged on its back end a locking plate, I, which slides with it, but which cannot turn with it, said plate having a bar or cog, f, on its edge, which serves as a stop to hold both or either of the sashes in any desired position when geared together or separated, substantially as and for the purposes set forth.

BRICK MACHINES—G. J. Washburn, (assignor to himself and Anson L. Hobart), of Worcester, Mass. : I claim the combination of the molds, E, of the frame, A, and hopper, D, constructed, arranged and operated together, substantially in the manner and for the purpose described.

IMPROVED BOOT AND SHOE SOLE CUTTER—Parker Wells, of Middletown, Mass., assignor to Saml. Mower, of Boston, Mass. : I claim the combination of a cutter or cutters with a yielding slide, substantially as set forth for the purpose specified.

LOCKS—H. W. Covert, of Roxbury, N. Y. : I claim the combination of the disks, D, in the manner and for the purpose substantially as described.

MANUFACTURING SHINGLES—J. E. Young, of Augusta, Me. : I claim vibrating the shingle bolt about an axis lying in or near the plane of the cut, and equally distant from each end of the bolt.

Second, I claim the sliding rod, K, and wedges O, constructed and operating in the manner substantially as set forth.

RE-ISSUES.
ELASTIC GORE CLOTH—Chas. Winslow, of Lynn, Mass. : Patented Aug. 4, 1887. I am aware that an elastic cloth has been made as a shirred fabric. This, how-

ever, differs essentially from the "elastic gore cloth," made in accordance with my invention, as the edge of the former is turned over parallel to the warp.

I do not claim the peculiar elastic cloth as made with its filling arranged at an acute angle with its warp; nor do I claim the elastic as made of two layers of such cloth combined.

But I claim as an improved manufacture an elastic band or gore cloth, when made not only of a fabric composed of a cement of India rubber or gutta percha and two pieces of cloth, in which the warp and weft of each piece are made to cross one another diagonally or at acute angles, but with the edges of the cloth cut and overlapped, and cemented down in a line or lines out of parallelism with either the warp or weft threads; the line of maximum elasticity in the binding, making that angle with the warp as well as the weft, which is the compliment of half the angle which they make with each other.

ABDOMINAL SUPPORTER.—Julia M. Milligan, of New Albany, Ind. Patented Feb. 13, 1857: I claim the bandage, a, substantially as described, provided with a series of cords, g, and laces, b, or their equivalents, applied and operated substantially in the manner and for the purposes set forth.

LOOMS.—Wm. V. Gee, of New Haven, Conn., assignor to The Atwater and Bristol Manufacturing Company, assignors to The Nashwanock Manufacturing Company, of East Hampton, Mass. Patented Feb. 27, 1855: I wish it to be distinctly understood that I do not limit myself to the special construction of parts or their arrangement, as these may be greatly varied by the substitution of mechanical equivalents.

But I claim the privilege of varying them, so long as I attain the same ends by substantially the same means. I claim, first, Mounting a loom with two distinct sets of harness, each governing all the warp threads, for the weaving of a web on one side of an intended button hole slit, and capable of being thrown out of action each by itself while the other set is in action, during the process of weaving button holes, substantially in the manner and for the purposes before specified.

Second, I claim connecting each set of harness capable of being thrown in and out of action, and governing all the warp threads on either side as described, with a bar or slide governed by a cam or catch or the equivalents thereof, to throw one or the other of the said sets of harness out of action when necessary, substantially as described.

Third, I claim the combination of the mechanism before described for causing one set of harness to cease its action, or any equivalent thereof, with another mechanism substantially such as is before described for determining the period during which one set of harness shall remain out of action or lay dormant, or the time or moment at which such harness shall cease to act or any equivalent thereof; the combination acting substantially as and for the purposes set forth.

Fourth, I claim the combination of a slow moving cam, or cams, or its or their equivalents, for determining the time and period or time or period during which a set of harness shall be out of action as before set forth, with harness substantially such as is before described, mounted in sets, each set governing all the warp threads on one side of a button hole, so that different sets of harness may be in action or laying dormant at proper times and for proper periods, for purposes substantially such as are described.

Fifth, I claim a contrivance substantially such as is specified for throwing the take-up motion out of gear or any equivalent thereof, for stopping the take-up, in combination with two sets of harness, each governing warp threads, substantially in the manner and for the purposes described.

And lastly, I claim the combination of a slow moving cam, substantially such as is specified, or any equivalent thereof, with a mechanism for stopping or starting a take-up motion, substantially as described, or any equivalent thereof, whereby the time and period, or time or period of the stoppage or cessation, from action of a take-up motion may be determined automatically for the purposes substantially as set forth.

STENCILING WINDOW SHADES.—Daniel Lloyd, (assignor to G. L. Kelly and D. M. Ferguson), of New York City. Patented Jan. 29, 1856: I claim first, Producing patterns on window shades in which long or continuous lines form a prominent feature, by means of a pair or pairs of stencils of the full size of the design, prepared substantially in the manner set forth.

Second, The mode of registering the stencils by the use of the plates, B, and pins, C, for the purpose of adjusting and readily adapting the stencil to shades, as specified.

COATING WATER PIPES.—Jonathan Ball, of Elmira, N. Y. Patented December 15, 1843: I claim lining metallic pipes with hydraulic cement, by means of a cone, or its equivalent, guided through the pipe so as to lay on the cement of equal thickness, and with great certainty and economy, substantially as described.

[For the Scientific American.]

The Aquarium or Aqua-Vivarium.

We have requested the gentleman whose name appears at the end of this description to write it for us, believing that it will prove of interest to our readers:—

I will commence by giving a brief account of the history and theory of the Aquarium. The first hint on this subject is found in a book published at Leyden, in 1778, wherein it is stated that plants immersed in water, and exposed to the action of light, emit oxygen gas. In 1833, a Mr. Danbury, and in 1837 a Mr. Ward, again promulgated the practicability of supporting animal life by oxygen furnished by vegetable growth. In 1852, a Mr. Warrington and a Mr. Gorse almost simultaneously made experiments, which have resulted in the successful sustenance of animal life in connection with vegetable existence.

The Aquarium, or Aqua Vivarium, is founded upon the principle that aquatic plants, while growing, emit sufficient oxygen gas for the support of animal life to a limited extent; the plants, in their turn, forming their solid structure by means of the carbonic acid thrown off by the animals in the process of breathing. This is the theory; the application is as follows:—A clean, tight vessel, with glass sides, is employed for a tank. The bottom is first covered an inch deep with clean, coarse sand, upon which I have found it best to put a thin covering of dark gravel. A rude rock-work adds much to the beauty of the tank and to the comfort of its inhabitants. Over the surface there should be scattered a few aquatic plants—if marine, attached to stones or shells;

if fresh water, having their roots buried in the sand; and water is then added, and the whole left for a week or more, until the plants are acclimatized and are growing nicely. When thus ready, the "stock" may be added by degrees, until the proper balance of animal and vegetable life is effected. In both marine and fresh water *Aquaria*, a mucous or fungous growth is soon developed, which may be kept down by pond snails, or by the buccinum or salt water snail.

My first attempt was with gold fish (*Cyprinus*); but not being able to obtain the proper plants, I stocked a confectioner's glass jar with a few other plants from the sea, and there soon appeared a large number of small animals, which, viewed by lamp-light, were very interesting. I have found that very deep and narrow tanks, of various shapes, have not succeeded so well as those having a much greater breadth than depth. The tank which I successfully stocked was of an octagonal form, of thirty inches in diameter and about eight in depth. Excepting the great difficulty of rendering it tight, this tank has succeeded admirably. After being in use for a long time, the rock-work is still covered with vegetation, and crabs, minnows, eels and mollusca still sport and wrangle in the home which they have so long occupied.

The animals which I have found to thrive most easily, and to accommodate themselves most readily to their new home, are the minnows or killy fish, the stickleback (*Gasterosteus trachurus*), the shrimp, small specimens of lobsters, hermit crabs, serpulidans, small common crabs, eels, and star-fishes. I have been told that the small sheeps-head (*Sargus ovis*) is also very good. The patella, the buccinum or sea-snail, the purpura or whelk, and several varieties of crepidulas, have also succeeded nicely. The scallop, one of the most beautiful of animals, whose iridescent hues are marvelous in their brilliancy, I have not been able to keep for any length of time. The barnacle, also so interesting in its mode of breathing and of catching its prey, has not lived long. The spider crab, which the ancients held emblematic of wisdom, and which is noted for his fondness of dress and mischief, has been found altogether too reckless of the consequences of his pranks, and has been banished to a tank kept for "unruly offenders."

No animal in a tank, however, has behaved with more propriety and been productive of more amusement than the small species of hermit or soldier crab. They are ever active, and constantly ready to change their shells for their own gratification or that of beholders. They seldom pass each other without disputing the right of way, and yet never injure each other at all. A little incident will show the pleasure that may be found in observing them. While watching my tank, I saw a hermit crab cogitating upon the expediency of vacating his shell for an empty one lying near him. After mature deliberation, he concluded upon the exchange, and suddenly popping his tail into the vacant shell, he crowded out a cloud of particles, probably of decayed animal matter; this attracted the attention of a shoal of minnows, which immediately attacked the poor hermit, endeavoring to draw him from his shell. But a new claimant immediately appeared in the person of a common crab, who clasped the hermit in his claws and attempted to carry him off by "force of arms."

The minnows, unwilling to be thus defrauded, now beset the robber, while the hermit, taking advantage of this diversion, crept quickly away from the scene of strife; doubtless convinced that "there is no place like home."

Prawns and shrimps are also objects worthy of admiration. No bird sails through the air with more gentleness than these fish float through the water. Star-fishes, likewise, are very pleasing; they live long in confinement, but are, however, quite greedy, and the larger ones will soon destroy a stock of buccinums. The small sheeps-head is said by those who have kept it to be very hardy. Many other aquatic animals will doubtless be found to be as suitable as those already named.

The study (for study it is) of *Aquaria* is but yet in its infancy in this country; and we may reasonably hope that when those who are close observers of Nature become interested in this matter, we shall learn much more of the "private life" of the inhabitants of the ocean than we have ever hitherto known. Probably no such facilities for the study of natural history have ever been offered as are now presented by the Aquarium. We have in our rooms, where we may examine it at our leisure, a sort of section of the ocean, whose inhabitants may be examined in their natural abode, and under most favorable circumstances. With such facilities it will be easy to learn more in a few months' observation than we have heretofore been able to learn by years of examination of dead or dying specimens.

Tanks may be made of various forms. The simplest are made of confectioners' jars or any open-mouthed glass vessels. These will answer very well for small specimens; but the best kind, most proper for the fish, and well suited for observation, are those made in a rectangular form, with four glass sides. It has been found very difficult to make these permanently tight, and at the same time free from the taint of cement. This has, however, been remedied, I believe, by some of the dealers in tanks, so that they may now be purchased so constructed as to be put into use without fear of leakage.

In a fresh water tank we have no anemones nor hermit crabs; but we have newts, the stickleback which builds its nest beneath the waters, the water-beetles, the tadpoles, and numberless others, which fully compensate for the absence of those that are found only in sea-water.

The speedy popularity of this piscatorial and botanical "institution"—the Aquarium—is undoubted. All that is needed is to exercise patient perseverance, regular attention, and, above all, perfect cleanliness. No decayed matter, animal or vegetable, must be permitted in the tank. A strict care to not overstock or crowd the animals, and a determination to overcome obstacles, will insure success; and the Aquarium will become—what it has already become to thousands in Europe—a "new pleasure."

CHAS. E. HAMMETT, JR.

Newport, R. I., Sept. 21, 1857.

[At the polite invitation of our correspondent, we were permitted, while spending some time at Newport this summer, to examine the specimens to which he alludes; and we have seldom spent an hour more pleasantly. Those who may feel a desire to behold the wonders of the deep, in miniature, are referred to the Aquarium of our correspondent, or to Barnum's Museum, in this city, where some good specimens are on exhibition. Mr. Hammett's modesty forbids his intimating in the above article that he is prepared to furnish *Aquaria* tanks of superior construction (an improvement of his own) to such persons as may desire to try their skill in raising the pisces, molluscs, and articulates of the mighty ocean, and to derive instruction from observing the life and habits of those curious creatures.—Ed.]

The Teeth and the Beard.

Messrs. EDITORS—The remarks of "Dentist" on "the best means of securing a healthy denture" have induced me to suggest whether wearing the beard might not promote that desirable result? Hair is among the best non-conductors; and to deprive the face of that natural protection to the delicate nerves of the maxillary region, must, it seems to me, expose the teeth to the deleterious action of atmospheric vicissitude. S. Y. A. L.

[We think that the growth or want of beard can only affect the teeth by protecting them or otherwise from external cold, as the teeth are formed and grow from the jaw which is separate and distinct from the surface of the skin, in which are the juices that afford nutriment to the hair. We know many persons having naturally excellent teeth, who are very far from hirsute, and also persons with large fine beards and very bad teeth; so it

does not seem as if there was any connection between the two.

Aluminum.

A new method of making this metal has recently been patented in England by F. W. Gerhard. It consists in placing fluoride of aluminum in an iron oven, which may be heated in various ways. This oven is first strongly heated, and on the floor thereof is placed a number of shallow dishes. A number of these dishes are filled with dry and well powdered fluoride of aluminum, and the remainder with iron filings. They are so arranged that all of those dishes which contain the fluoride are on all sides surrounded by dishes containing the iron filings. The oven is then closed and luted, and the heat increased to redness, after which a stream of dry hydrogen gas is introduced. The effect produced is, that the hydrogen gas combines with the fluorine, and forms hydrofluoric acid, which acid is taken up by the iron, and is thereby converted into fluoride of iron, whilst the resulting aluminum remains in the metallic state in the bottom of the trays containing the fluoride.

The Electric Telegraph.

The first overhead telegraph in London has just been successfully put up by an enterprising firm in that city, to connect their two places of business. The distance between the two establishments is about one-third of a mile, and the whole space is traversed by a single wire, suspended from pole to pole, at a great elevation above the intermediate houses. It is understood that another will shortly be erected by the authorities, to connect the police courts, the police stations, and the fire brigade stations throughout the metropolis, by an economical system of overhead telegraph, devoting one wire to detective police purposes, and one to fire purposes. The telegraph has been used for all these purposes in this country for some time. Uncle John is, therefore, behind Uncle Sam by some years in the domestic adaptation of electricity.

Bronze Powder.

The London *Builder* says that Herr Konig has made a series of experiments to ascertain the method of preparing this substance, hitherto a secret. From the result, it appears that the several varieties of bronze powdered leaf are each composed of nearly the same proportions of copper, zinc, and tin, and that the variation of color is owing to different degrees of oxydation, which have been produced by heating the alloy at different temperatures.

Salt.

An improvement in the manufacture of rock and sea salt has been patented in England, which consists in fusing the raw salt, and keeping it for some time in a state of tranquil fusion, decanting it into hot molds, or letting it cool slowly; in this manner all the impurities are separated from the mass in fusion, and are eliminated by crystallization by the dry process, which corresponds with crystallization by the wet one.

Tin Plates.

Tin plates—that is, tin plates of iron dipped into molten tin, which covers the iron completely—are manufactured in South Wales and Staffordshire, to the extent now of about 900,000 boxes annually, equal to 56,000 tons, and valued at over five millions of dollars. In England, almost every article of tinware is formed from these plates. Nearly two-thirds of the total manufacture are exported, principally from Liverpool to the United States.

Telegraph in Brazil.

A proposition has been made to the Brazilian government for the construction of a submarine telegraph from Pernambuco to San Pedro de Sul, communicating with various intermediate places along the coast.

The longest railroad in the world is the Grand Trunk of Canada, 856 miles of which are open. When finished it will be 1,112 miles