

ENGINEERING INVENTIONS.

An electro-magnetic car uncoupler has been patented by Mr. John D. Reed, of York, Neb. There is a pivot shackle on the drawhead with an electromagnet for operating it, conductors, contact strips on the ends of the cars for uniting them, with numerous parts and details of combinations, whereby cars may be uncoupled by electricity.

A vessel and apparatus for cutting channels in water ways has been patented by Mr. John Gates, of Portland, Oregon. The vessel has propelling apparatus and a movable rudder, with tanks or compartments for sinking the stern to any desired depth, a hoisting apparatus, and cables with anchors, to hold the stern in position to cut a channel by the backwash from the screw.

A pilot car has been patented by Mr. Jose Pasana y Pinol, of Madrid, Spain. It has transverse partitions with buffer springs, with a water tank and bar or block of lead held transversely on the car, the side bars and braces having hinges, so the car can collapse, and the springs, water tank, and lead take up the force of concussion, the car being adapted to be coupled to the front of a locomotive to lessen danger or loss from collisions.

AGRICULTURAL INVENTIONS.

A potato planter has been patented by Mr. Joseph L. Ullathorne, of Memphis, Tenn. It consists of a frame, rolling drum with wheels, and an open sided hopper arranged behind, and will also distribute a fertilizer in the furrows at the time of planting the potatoes.

A combined sod cutter, seeder, and harrow has been patented by Mr. William F. Hubbard, of Walla Walla, Washington Ter. This invention covers a special construction and combination of parts in a machine mounted on wheels, to be drawn over a field by a team, to pulverize hard soil, and at the same time drop and cover seed therein.

A cultivator has been patented by Mr. Thomas E. Gregg, of Mineral Spring, S. C. This invention covers a novel construction and combination to facilitate the cultivation of cotton and other plants planted in rows or drills, and also to promote convenience in adjusting the cultivator to work deeper or shallower in the soil.

A spade wheel plow has been patented by Hiram Skillings, of Minneapolis, Minn. This invention covers modifications and improvements in the construction of a spade wheel plow previously patented by the same inventor, the changes being principally with the view of reducing the expense of manufacture, and to promote convenience in putting in and removing the spades.

A stalk cutter has been patented by Messrs. Guernsey W. Davis and George A. Davis, of Pine Bluff, Ark. A cutter roll has end disks with radial grooves on their inner surfaces, and hubs on their outer central faces, wings with blades secured thereto being held in said grooves, and other novel features, for breaking down two rows of corn, cotton, or other stalks, and cutting them into pieces.

A harrow has been patented by Mr. William W. Robinson, of Odebo, Iowa. The teeth are carried by rocking beams under control of a lever, to change the angular position of the teeth relative to the ground, but the beams are of novel construction, with peculiar means for fastening the teeth as well as for carrying the beams and connecting them with the devices by which they are rocked.

MISCELLANEOUS INVENTIONS.

A nut lock has been patented by Mr. Seth A. Lesan, of Mount Ayr, Iowa. This invention consists in a special construction and combination of a screw bolt, a screw nut, washer, and key, for securing nuts upon screw bolts.

A gate has been patented by Mr. Absalom King, of Wawpeong, Ind. This invention relates to gates adapted to close by their own weight, on farm and other roads, to prevent the straying of stock, and to this end covers a special construction and combination of parts.

A weather board gauge has been patented by Messrs. William J. Dyer and Thomas W. Maxey of Nevada, Mo. This invention provides a means for carpenters to more accurately space weather boards, and hold them exactly in proper relation to previously placed boards, while nailing them in position.

A log turner has been patented by Mr. William F. Fidler, of Rock Cave, West Va. This invention provides special means, in combination with the hook and tackle, the carriage, and its knees or blocks for preventing the log from sliding laterally out of place while being turned.

A copy book has been patented by Mr. Edward P. Conner, of Alameda, Cal. It includes a book support, which may be shut up with the book or spread out and extended, a novel arrangement of covers and other special features, designed to afford a copy book which will facilitate giving instruction in penmanship.

An ale faucet protector has been patented by Mr. George Hirschman, of Morristown, Pa. It has a flanged base, with an opening and recess in front, so it can be easily secured in place, and the faucet readily applied, detached, and operated, so the faucet will be protected.

A wire fence has been patented by Mr. Lafayette W. Lindley, of Danville, Ky. It is a fence which can be erected or taken down very rapidly, and folded compactly for storage or shipment, and is an improvement on a former patented invention of the same inventor.

A window bead fastener has been patented by Mr. Ezra W. Talbot, of Napoleon, Ohio. This is an improved device for holding the stop of a window in place on the frame in such a manner that it can be readily removed or secured in place, and need not be nailed or screwed.

A stencil holder has been patented by Mr. John W. Bennett, of Halifax, N. S., Canada. This invention covers a peculiar construction and arrangement of two clamp plates or frames for holding the stencil plates, and means for fastening the plates together and preventing them from moving laterally.

A piano forte attachment has been patented by Mr. Emil Hofinghoff, of Barmen, Germany. This invention covers a bar held to be movable across the strings, a series of tongues being fastened to the bar, and these tongues having rubber surfaces facing the strings, whereby the tones of the piano are changed.

An anchor support and tripper has been patented by Mr. Rufus P. Trefry, of Bridgewater, N. S., Canada. The anchor is so made as to hold by the fluke, while its stock comes against the hull or the vessel, and it is also so constructed as to facilitate its casting off without danger of fouling.

A game apparatus, or a new and improved game, has been patented by Mr. James A. Fitzgerald, of Salt Lake City, Utah Ter. It is formed of a vertically slotted board held between two side pieces or standards rubber face plates being secured on the surfaces of the bars between the slots, and the game being played with a series of disks or flat rollers.

A device for transmitting power by belts and pulleys has been patented by Mr. Nicholas Yagn, of St. Petersburg, Russia. This invention covers a means of using pressure rollers upon both driving and driven pulleys to increase the power transmitted by belts, with the design of thus increasing their efficiency and economy in amount of belting needed.

An improved universal joint has been patented by Mr. Rollin H. Gleason, of Egan, Dakota Ter. The invention consists in providing one of two abutting ends of two shafts revolving in the same direction, but meeting at an angle with a socket, which has an inwardly projecting rib or flange upon its opposite interior sides, with other novel features.

A shield for brooms has been patented by Messrs. Neil W. Dew and Columbus F. Robertson, of Charleston, Ill. A safety shield of novel construction is made to cover that portion of the broom where the straws are joined to the handle, and thus largely dispense with the labor of winding and braiding, while giving a neat and durable finish.

An inkstand has been patented by Mr. Morris Herzberg, of West Point, Ga. It has a removable aperured tube, with a spring, and a vertically reciprocating dip cup resting on the spring within the tube, with other novel features, so there is no danger of covering the pen holder with ink, and if the inkstand is upset only the ink in the dip cup will be spilled.

A hoop fastener has been patented by Mr. William D. Richardson of Springfield, Ill. This invention consists of a flat metal key, with converging rows of projecting barbs on one side and a flange or lip on the other side at the end, the key to be driven between the hoop and the barrel staves, with its barbs in contact with and burying in the wood, and the end flange turned outwardly and forming a shoulder.

An apparatus for painting wire fences has been patented by Messrs. Alonzo L. Marsau and Henry C. Hill of Milton, Iowa. This invention relates to apparatus in which revolving brushes are supported in a paint reservoir moved along the wire, and provides for moving the apparatus continuously without stopping at the posts or removing the brushes off of contact in passing the posts.

A roll for forming link blanks has been patented by Mr. Jesse T. Wright, of New Albany, Ind. The curved ends of blanks to be subsequently punched are made on the last pass when rolling the bar to prepare for the blanks in deep, narrow grooves of the rolls, for passing the bar edgewise, with dies corresponding to the length of the blanks, and for shaping the ends separating the blanks for car coupling links.

A measure for grain, shot, and other like articles has been patented by Mr. Hiram W. White, of Yankton, Dakota Ter. This invention covers a special construction and arrangement of parts, bins with hopper shaped bottoms, having lozenge shaped apertures, a measure, with novel means for operating the slides to convey the material from the bins to the discharge chamber, and other peculiar features.

An improvement in the manufacture of bichromate of soda has been patented by Mr. William Simon, of Baltimore, Md. It consists in evaporating the solution of neutral chromate of soda to dryness before adding the sulphuric or hydrochloric acid, and adding to the dry salt common sulphuric acid, whereby anhydrous sodium sulphate crystallizes out, whence the concentrated solution of bichromate of soda is mechanically separated.

NEW BOOKS AND PUBLICATIONS.

TRAITÉ PRATIQUE D'ÉLECTRICITÉ INDUSTRIELLE. Par E. Cadiat et L. Dubost.

This work, as its title indicates, is a practical treatise on the subject of electricity and it has been the purpose of the authors to present the subject in a form as free from technicalities and abstruse mathematical calculations as possible, and to render it at once interesting and instructive and a ready work of reference to the artisan, the engineer, and mechanic. The first part of the treatise is devoted to definitions and fundamental laws as well as the most important subject of units and measures. Then follows an examination of the different kinds of batteries, dynamos, and electric generators, secondary batteries, etc. The third section contains a review of the various systems of electric lighting, also a comparison between the cost of lighting by electricity and gas and the application of the former to the illumination of ships, theaters, studios, shops, and residences. Electricity as a motive force as applied to railways and aerial navigation is treated of in part four. There are two other sections, which are devoted to galvanoplastic and electro metallurgy and telephony. This work of 500 pages contains numerous illustrations. Price 15 francs. Publisher, J. Baudry, 15 Rue des Saints Pères, Paris, France.

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Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

Munsou's Improved Portable Mills, Utica, N. Y.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co., Box 423, Pottsville, Pa. See p. 332.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 350.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

Clark's Rubber Wheels. See adv. next issue.

Curtis Pressure Regulator and Steam Trap. See p. 236.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Emerson's 1884 Book of Saws, New matter. 75,000. Free. Emerson, Smith & Co., Limited, Beaver Falls, Pa.

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 302.

U. S. Standard Thread Cutting Lathe Tool. Pratt & Whitney Co., Hartford, Conn.

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The Porter-Allen High Speed Steam Engine. Southwark Foundry & Mach. Co., 430 Washington Ave., Phil. Pa. Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 286.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Notes & Queries

HINTS TO CORRESPONDENTS.

Name and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each. Minerals sent for examination should be distinctly marked or labeled.

(1) J. T. W. writes: In the issue of October 25th, W. G. F. asks how calcium sulphide is used to remove hair, etc. Now, will calcium sulphide effectually and permanently remove superfluous hair, and if so, which of the sulphides of calcium? A. The calcium and barium sulphides are considered effectual depilatories. The particular one that is used is the CaH_2S_2 or CaS, H_2S , called by Watts the sulphhydrate of calcium.

(2) C. J. D. asks: Is celluloid used to coat metals, as is nickel? Can you give me a good solution to coat tin with to prevent acids from eating same? A. Celluloid is not used in the manner suggested. Celluloid is soluble in chloroform, and by painting the surface with such a solution, as the chloroform evaporates a coating of celluloid will be deposited. A coat of good hard drying asphaltic varnish would, we think, be more suited to your wants.

(3) H. A. D. asks for the formula for making a fluid substitute for silver plating which will last for a few days. A. Prepare a solution of one part potassium cyanide in 6 parts water; add to it a concentrated aqueous solution of silver nitrate (free from acid) until the precipitate is redissolved. Mix this solution with fine chalk, and apply after previously clearing the objects.

(4) E. B. B. asks how to extract the oil from the skins of duck or other water fowl, to be used for trimmings. A. Dip the feathers for a few minutes in coal tar naphtha or benzene, and then dry by exposing to the sun.

(5) V. J. P. asks if there is any way to hold sulphur in solution in mineral oil (paraffine) to be used as a lubricator. A. Sulphur is frequent a constituent of crude petroleum; it is soluble generally in the fatty oils, in naphtha especially, when the liquids are hot.

(6) E. S. B. writes: In a late number you say 1 ounce of salicylic acid will prevent fermentation in cider. Is this acid injurious to health? Would it not be a good ingredient in the composition of brine for the preservation of meat, making it unnecessary to use so much salt to make it keep? A. It is used as suggested by you for the preservation of meat. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 226, for exact quantities to be employed. By some its use is condemned, while others assert that it is not at all injurious to the health.

(7) P. S. M. asks the average amount of square plate or pipe surface used in practice for heating 1,000 cubic feet of room space in buildings by hot water or low pressure steam, say 5 pounds, and the same for high pressure steam. A. 10 to 12 square feet per 1,000 cubic feet for hot water, 7 to 9 square feet per 1,000 cubic feet for low pressure according to exposure, and 6 to 7 square feet per 1,000 cubic feet for high pressure.

(8) G. C. G. asks a good receipt for preparing raw meerschaum for smoking purposes. A. When freshly exhumed the mineral is covered with red, oily earth, and is so soft as to be easily cut by a knife. Its preparation is slow and troublesome. After removal of the earth, it is dried 5 or 6 days in the sun or 8 to 10 in a hot chamber, then it is cleaned again and polished with wax. Then the different kinds, of which there are ten, are sorted and carefully packed with wood in boxes. In Germany, where the bowls of the pipes are principally exported, they are prepared for sale by soaking them first in tallow, then in wax, and finally by polishing them with a share glass.

(9) J. C. A. writes: Can you give me a formula for an ink which after being printed on paper the print can be transferred to cloth by a warm flat iron, the ink not to crack when the paper (printed on) is folded or rolled up? A. The process you desire has been described as follows: Dust over the stencil white lead (or any suitable coloring material) with a little resin, fixing the pattern by covering with a piece of paper and ironing with a hot iron. When the cloth can be turned (as by placing between boards or book covers) without scattering the powder, it may be preferable to apply the heat directly to the back of the fabric. It is also possible to prepare an ink by dissolving the coloring material and adding a thin solution of mucilage of gum acacia. The mixture should have the consistency of thin paste.

(10) B. F. A. asks: 1. I have a casting 8 inches in diameter, how much sulphuric acid is required to make it 2 pounds lighter, and how strong should the pickle be? A. Castings are generally turned smaller by cutting away a certain amount on the lathe. From the data furnished no estimate could be given. 2. What is the composition of inclosed mineral, and what acid will take the rock off without injuring the diamond? It is found in hard coal mines. A. The specimen is iron pyrites, or sulphide of iron. Mechanical treatment will remove the coal; possibly a gentle heat might be used to burn away the coal. Acids would decompose the mineral, and would be without influence upon the matrix.

(11) E. E. S. writes: I desire to construct a small electric engine, with power enough to run a sewing machine or such other machinery of about the same size. Can you tell me where I can get a description or directions for so doing? A. There is little difference between a small dynamo electric machine and an electric motor. By following the instructions given in SUPPLEMENT, No. 161, for the construction of a small dynamo, you will be able to make a machine that will answer as a motor, by altering the adjustment of the commutator.

(12) W. A. M. asks how to make yeast cakes known as dry hop yeast, and used for raising dough for bread. A. Marion Harland gives the following: 2 quarts water cold, 1 quart pared and sliced potatoes, double handful hops, tied in a coarse bag, flour to make stiff batter, and 1 cup Indian meal. Boil the potatoes and hop bag in two quarts of water for three-quarters of an hour. Remove the hops, and while boiling hot, strain the potatoes and water through a colander into a bowl. Stir into the scalding liquor enough flour to make a stiff batter. Beat all up well, add two tablespoonfuls lively yeast, and set in a warm place to rise. When light, stir in a cup of Indian meal, roll into a sheet a quarter of an inch thick and cut into round cakes. Dry them in the hot sun or in a very moderate oven, taking care they do not heat to caking. When entirely dry and cold, hang them up in a bag in a cool dry place.

(13) W. F. S.—Perhaps the best method of preventing frost from forming on window glass is to cover the glass with a thin film of glycerine.

(14) A. De W. asks (1) if there is anything to bleach vaseline to a pure white or lard color. A. According to the U. S. Dispensary, vaseline or petrolatum is decolorized by passing it through charcoal when in a liquid condition. 2. What is the best thing to remove paint and grease spots out of last year's overcoat without spoiling the goods? A. For the cleansing of various fabrics see table given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(15) J. M. P.—Receipts for burnishing ink for shoes are numerous, but all the successful makers of this article have secrets, either as to the ingredients or the method of manufacture, which they guard as a valuable property right. As pertinent to this subject, we have knowledge of an attempt by a New York dealer to make an ink similar to that furnished by a leading Eastern manufacturer, in which the New York dealer failed after expending more than \$10,000 in his experiment.

(16) J. S. O'B.—The American Bell Telephone Company claim to control all speaking telephones. If they are able to sustain their claim, you will, of course, not be entitled to make the telephone referred to for your own use or for any other purpose. The telephone described in SUPPLEMENT, No. 142, if well made, will talk for five or six miles. You should not use smaller than No. 14 iron wire; the No. 12 is the size commonly used. A magneto call bell is generally used with this kind of telephone. You can get a good ground connection by attaching your wires to the water pipes or to plates of copper, each having an area of about 8 or 10 feet, buried in earth that is constantly moist.

(17) F. U. S. writes: I have some fine colored engravings which have been badly soiled with printer's ink. Can you inform me what will remove the same without defacing the pictures? A. The process of cleaning soiled engravings is described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 44. It would apply also to printer's ink, but the process is a delicate one, and great care must be taken not to injure the engraving. Hydrogen peroxide is another excellent bleaching agent.

(18) J. H. M.—As a young man desiring to become a thorough electrician, we think your better way would be to secure employment in some establishment manufacturing electrical apparatus, and while thus engaged to study the subject of electricity. You might begin with Sprague's new work on electricity, then study the works of Gordon and others on electric lighting and the general applications of electricity.

(19) D. W. asks how the polish is put on playing cards. A. All the successful manufacturers have some secrets in this department of their business, but the polish is made by a coating of size or varnish and then passing the sheets, with metal plates, through polishing rollers.

(20) D. E. C.—Lacquer for tin: Brass color 3 ounces seed lac, 2 drachms dragon's blood, 1 ounce turmeric powder, 3 quart 95 per cent alcohol or methylic alcohol; put in a bottle well corked, and place in a warm place and shake up occasionally for a week or ten days, then strain through a fine cloth. Temper with methylic alcohol so as to spread freely with a brush. Heat the tin in an oven about as hot as boiling water; brush the lacquer on quickly. Vary the dragon's blood and turmeric to suit your taste as to depth of color.

(21) J. M. F.—Lime cylinders for calcium lights are commonly made from selected pieces of unslaked lime of good quality. They are also made of lime obtained by calcining marble. We know of no method of utilizing slaked lime in a calcium light.

(22) F. B.—Leclanche battery is good for certain kinds of experiments. It will not yield a constant current for a very long time; it certainly is cheap and clean, and if you require a current intermittently for a few moments at a time, it will probably answer your purpose. If you want a continuous current, the Daniell or the gravity battery would be better for your purpose.

(23) A. F. L. asks the cheapest and most practical way to finish cheap soft wood furniture, and what ingredients are used for such finishing. A. Fill the pores of the wood with a Wheeler wood filler, then apply one or two coats of white shellac varnish.

(24) J. C.—The process of separating fiber from vegetable growth depends something on the kind

of fiber and the kind of vegetable from which it is to be separated. In general the vegetable may be reduced to a pulp by rolling or pounding, and then it may be washed away from the fiber. There are machines in use for this purpose, and a number of them have been patented. We know of no process of making the fiber stronger than it is, after being thoroughly freed from the vegetable pulp.

(25) J. F. D.—The great proportion of the carriage hardware used now is made of malleable iron, generally cast in one piece. Some of the better kinds of carriage hardware are made by the process of drop forging. The machinery used for producing such forges is a drop press and a steam or drip hammer.

(26) E. L. K. writes: I have an oscillating engine cylinder 1 1/4 diameter, 2 inches stroke. Have got to make a boiler. Have got a 3 burner oil stove, and am going to make boiler all of copper, and following dimensions to fit it: Drum 6 inches diameter, 6 inches long, shell one-sixteenth inch thick, heads a quarter of an inch thick, 40 drop tubes three-quarters of an inch diameter outside, 6 inches long, one-sixteenth thick, tube passing through drum as flue in center for stay. This will be well jacketed. Would like to know how much pressure is safe to carry, and if of sufficient capacity for above engine, understanding of course that boiler is to be well made. A. We doubt the propriety of putting 40 tubes 3/4 inch in a 6 inch head. If the heads are slightly raised and the tubes made radial, you will add to its efficiency; one tube through center will not be sufficient vent. Such a boiler, if properly made with well brazed joints, ought to carry 30 pounds pressure and of capacity equal to your engine.

(27) H. M. F. asks (1) the size and kind of wire to make a spark coil for lighting gas. A. You will find instructions for making induction coils in SUPPLEMENT, No. 160. A simple magnetic coil of eight or ten layers of No. 18 or 20 wire will answer for gas lighting purposes. 2. How many cells of Faure's secondary battery would it take to light an incandescent light to read by, the secondary cells to be charged by one of Edison's large dynamos? How long would it take to charge them, and how long would they last? A. There is no economy in operating a single incandescent lamp by means of a secondary battery or in any other manner. A sixteen candle power incandescent lamp will probably require from 15 to 20 cells of secondary battery. To charge a secondary battery economically should take several hours, and the length of time during which the battery will yield a current depends altogether upon the resistance of the circuit through which it has to work. If the resistance is high, the battery will work for several hours; if the resistance is very low, the battery will run down in a few minutes.

(28) J. H. C. asks: 1. Is there an established rule for the speed of the circumference of the paddle wheels of a steamboat to give best results? A. No. 2. What length should the paddles be in proportion to width of boat? A. Usually about one-third, but depends much on model and draught of water. 3. Would a one horse engine run a boat capable of carrying a ton, the boat of fair proportion, and at about what speed? A. It would run a boat with speed, but little if any better than with two pairs of oars. 4. What length and width of boat—not to draw more than eight inches—would it require to carry 2,500 pounds? A. Depends much on model and weight of boat; if model is sharp, boat not less than 34 feet long and 6 1/2 feet beam.

(29) E. L. S. asks: 1. What per cent of the power required to run a dynamo machine is utilized by the best motors in use, if they should receive the current from the dynamo? A. About sixty per cent. 2. Where can I buy a small dynamo of sufficient power to give electrical shocks? A. From any of the dealers in electric supplies who advertise in our columns. 3. About what is the electro-motive force of a small Grenet battery in good order in volts? A. About 1 1/2 volts.

(30) C. G. S. writes: I have dipped my pencil into a goblet, and brought up a drop of water. 1. What force binds together the pencil and the drop? A. The attraction of adhesion. 2. What holds the drop to other drops? A. Cohesion. 3. Why is not this ice instead of water? A. Because it is fluid. 4. If I shake the pencil, in what direction does the drop fall? A. In a tangent to the line followed by the point of the pencil. 5. If the drop were larger than the world, which way would the world go? A. It might follow the drop of water. 6. What other force is there in it which, according to Faraday, is equal to that in a flash of lightning? Here are, then, five great forces in a drop of water. What I wish to know is the name of those forces, as cohesion, gravity, etc.? A. If furnished with the proper accessories, it might generate an electric current, which would equal in quantity the quantity of a very small flash of lightning.

(31) H. B. asks the size of boiler to give the best results in working a ten horse power engine (vertical), and says he will also require two horse power of live steam for other uses. A. If for anthracite coal, 32 or 34 inches diameter of shell and 11 feet in length; 20 or 22 return tubes 3 inches diameter. If bituminous coal be used, it would be best to make the boiler 18 inches or 2 feet longer. This boiler should supply the power with small grate, and economically.

(32) H. B. M.—We understand the engines referred to, to be the same which have so often broken down. You can rely upon it, that there is to be no gain of 30 per cent by the "patent quadrant."

(33) W. H. M. asks for the length and original cost of steamers Bristol and Providence, plying between Fall River and New York? A. Three hundred and thirty-two feet long; original cost understood to be about \$900,000 each.

(34) F. W. writes: 1. Will you instruct me how to build a Holtz electric machine? A. Consult SUPPLEMENT, 278, 279, and 282. 2. Is hard rubber or glass preferable? A. Use common window glass. 3. What is the price of bard rubber in sheets? A. We

believe it is about a dollar a pound. 4. Does the machine work equally as well in damp as in dry weather, or does moisture in the air affect it, as is the case with the old time electric machine with glass disk and rubbers? A. It will work better than the old fashioned disk and rubber, but it will sometimes fail in very warm damp days. 5. Will size of spark be increased by increasing size of plates? A. The size of a spark will be increased by increasing the size of the Leyden jars attached to the machine. The length of the spark will be increased by using plates of larger diameter. 6. Would it be possible to utilize the spark for illuminating purposes, and if not, why? A. No. The current generated by the Holtz machine has a very high intensity, whereas a quantity of current is required for illumination.

(35) N. E. F. writes: If a man makes an improvement on the Bell telephone that does not infringe their patents, has he a right to attach it to an instrument he has rented of them, and use it for his own use? A. We know of nothing to prevent you from applying and using your improvement.

(36) C. M. writes: I have modeled flowers in clay, and would like to know how to bake them so that I can paint them. What else would answer the same purpose as clay? A. The method of baking the flowers you have modeled in clay depends in a measure upon the character of the clay, and we know of no way to determine the best method without experiment. A mixture of glue, resin, and whiting is used for the ornaments of gilt frames, and it might possibly answer your purpose. It is moulded warm, and, of course, needs no baking.

(37) W. B. R. asks of what agate buttons are made? A. Genuine agate buttons are, of course, made from natural agates; the artificial article is made of colored glass.

(38) W. M. B. writes: I desire to sustain a weight, say 2,500 pounds, on two floats, 24 feet apart; the weight must be 4 feet from one and 20 feet from the other float. I know the total displacement will be approximately 403 cubic feet; how much displacement will there be in the large float, four feet from the weight, and how much in the small float, twenty feet from the weight? I think approximately 82 cubic feet in the large float and 8 feet in the small float. A. Your figures are correct for the centers of floats from supporting fulcrum. This is without consideration of the weight of the material of the floats and balance beam. The floats must be as much larger than your figures as is equivalent to the weight of the apparatus, in order to be equal to the support of 2,500 lb.

(39) J. T. writes: I use a good deal of walrus tusk for handles, and very often they have a yellow stain in them. I used to bleach them in the sun, but it is a very slow process. Is there any quicker way? A. Elephant tusks are bleached in three or four days by immersion in turpentine, keeping near the surface, and exposing to sunlight and probably this is the best way now known for your purpose.

(40) G. W. B. asks: 1. What kind of cement used, and how to cement gum face on band saws? A. Ordinary rubber cement, such as you can purchase at any of the rubber stores, will answer your purpose. 2. Is there anything to be put in glue to prevent moisture from disturbing the joints in patterns? A. A little bichromate of potash put into your glue will render it insoluble, after exposure to light. 3. Is there anything to prevent shellac used for patterns from getting dark before using after it is mixed some time? A. We know of no way to prevent this.

(41) A. C. H. asks by what mode or process the rust stains in old Leclanche porous cups can be removed? A. Try dilute sulphuric acid.

(42) E. L. H. asks is there any way or process to reharden annealed brass rods? A. We know of none, except redrawing or burnishing, which will only harden the surface.

(43) S. E. F.—Waxed paper, such as used for wrapping soap, is prepared by placing cartridge or other paper on a hot iron and rubbing with beeswax or brushing on a solution of wax in turpentine. On a large scale, it is prepared by opening a quire of paper flat upon a table, and rapidly ironing it with a very hot iron against which is held a piece of wax, which, melting, runs down upon the paper and is absorbed by it. Any excess on the topmost layer readily penetrates to the lower ones.

(44) W. S. C.—In closed circuits for steam heating, the pressure of the steam along the flow pipes and in coils in well arranged systems is so nearly equalized with the pressure in the boiler, that it requires but small elevation of the water of condensation in the return pipe above the water level in the boiler to allow of its return by gravity. In this system all of the radiators should be not less than from 1 to 5 feet above the water level in the boiler, according to the complication and extent of the circuit. The air is discharged at the radiators, and no waste of water is necessary.

(45) W. B. R. writes: I have about a ton of tacks slightly rusted. How can I clean them? Sulphuric acid does it, but they rust again before I can dry them. Attrition in a rattler ruins the points. If dried in sawdust, how can I separate them from the same? If with lime, how remove that? They must be clean enough to carry in the mouth, as is the practice of most users of tacks? A. Put the tacks in a wire cloth basket, dip in the sulphuric acid bath and quickly plunge in boiling hot water, then in boiling hot lime water, then throw the tacks upon a wire cloth over a fire to dry quickly. The lime water should only contain as much lime as the water will hold in solution cold. It should not be milky.

(46) Dr. E. H.—Remove your carbon electrodes from the porous cells of your battery, and soak them for a day in warm water. Remove the granulated black oxide of manganese from the cells, and soak the cells in warm water for the same period; then replace the carbon electrodes in the cells, and fill with fresh

granulated black oxide of manganese, and seal the cells with pitch, leaving a small aperture in the sealing for the escape of air, and we think you will find your batteries as good as new.

(47) G. D. writes: 1. Can you give formula for gelatine pads and the ink for use with them? A. Consult article on "New Copying Process" in SUPPLEMENT 374. 2. I wish to light with bichromate batteries, using at different times 2, 5, and 10 Edison lamps. How many cells will I require in each case, and how should they be connected—for quantity or intensity? A. We cannot advise you to attempt to operate ten Edison lamps with bichromate batteries. You will find it exceedingly troublesome and expensive. You can light one or two for experimental purposes readily enough, but if you desire to run ten lamps for actual use, we advise you to purchase a dynamo and a steam engine to generate the current. If you conclude to try the experiment of lighting by means of incandescent lamps, operated by batteries, you might begin with about 150 cells of carbon bichromate battery of the Bunsen type. The lamps should be connected in multiple arc and the batteries in series of two to four, and these series connected for quantity.

(48) G. H. P. writes: I have a turbine water wheel which I am running with a full gate. using it to drive a paper machine. I am told, if I put on a larger driving pulley, that I will then drive the machinery faster with the same power. I contend that this cannot be so. A. Our opinion is that you cannot gain power by enlarging the pulley unless you can raise the head of water; much depends upon the present speed and size of wheel. The opinion of the maker of the wheel will be more reliable than that of those not knowing the peculiarities of its construction. If the wheel is now running at a very high speed, the reaction may not be perfect; in such case, increasing the size of the pulley might be of benefit. Our reference to the maker is therefore the best advice.

(49) W. A. M.—Good glue mixed with about one-quarter its bulk of fine wood ashes makes a strong cement impervious to oil. Gutta percha dissolved in bisulphide of carbon makes a strong cement not easily penetrated by oil. Make the cement as thick as treacle. Warm the parts to be cemented, and press together tightly.

(50) W. O. McK.—The Scotch water gauge glasses are made of silica and kelp or potash, and are slightly soluble, especially in acid waters, in which we understand, your State abounds, as we frequently hear of its action upon boiler tubes and pipes. Its action is more marked where there is rapid circulation. If you will measure accurately the inside of a new glass tube, and make comparison after a few months' use, you will probably find the hole larger by the dissolving or wearing away of the interior, as well as the exposed end.

(51) W. S. P. asks: What is a solar compass? On what principle it works? A. The solar attachment is a frame with arms and graduated limb, placed upon the telescope of a compass or field transit for the purpose of obtaining local meridians by observation of the sun's position. We cannot give a detailed description that you can comprehend without illustrations.

(52) M. R. S.—The crystallizing barometer or weather glass should not have a closed tube or be hermetically sealed, but should have an open top covered with gold beater's skin or fish bladder so loosely that the difference of pressure of the air may be transmitted to the liquid within the glass, otherwise it is of no value whatever. The alcohol holding camphor in a saturated solution crystallizes variably with the pressure, and does not always rise and fall, contrary to the motions of the mercury barometer, but often in the most fantastic combinations. It is a pretty and curious instrument for the study of the formation of crystalline combinations, but useless as an instrument of precision.

(53) W. M. J. M. asks: Would it be advisable in building a small steam yacht with a high pressure engine to put the exhaust under the fan tail and under water, to prevent the noise? A. The exhaust may be carried through the bottom and alongside of the keel, opening under the screw. It will partly condense in the pipes, and makes a little noise by concussion with the water. We do not think it of much advantage. Making the upper part of the exhaust pipe two or three times larger than at the engine, will modify its intensity.

(54) S. R. L. asks for receipts for dyeing cotton fabric red, blue, and ecru. A. Red: Muriate of tin, two-thirds cupful, add water to cover goods; raise to boiling heat; put in goods one hour; stir often; take out empty kettle, put in clean water with Nicaragua wood one pound; steep one-half hour at hand heat, then put in goods and increase heat one hour, not boiling. Air goods, and dip one hour as before. Wash without soap. Blue: For three pounds goods blue vitriol 4 ounces, boil few minutes, then dip goods three hours; then pass them through strong lime water. Ecru: Continue the foregoing operation for blue by passing the goods through a solution of prussiate of potash. Also see the receipts given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 167.

(55) E. H. S.—Coal tar alone with gravel and sand for side walks does not dry well. Asphaltum with equal parts of coal tar melted together and sprinkled upon the mixed sand and gravel that has been made hot upon an iron plate (the mixing to be done in a large pan of iron), putting no more asphalt and tar upon the sand and gravel than will just make it stick together; then dump into place while hot, spread quickly, and beat level with a ram or heavy roller. Dust over the surface with fine sand before rolling or beating, to prevent the material from sticking to the roller or beater. This operation requires a little care and experience as to just the amount of asphalt and tar for a given measure of sand and gravel, and also for the proportions of sand and gravel required to make the best pavement. Sometimes a thin bed of broken stone is laid as a foundation. Also a thin bed of coarse gravel is sometimes spread before dumping the hot mixture.

(56) J. F. S. writes: Can you inform us as to preparation or manufacture of "oil of apple" or "essence of apple," advertised by manufacturers and dealers in oils, extracts, essences, etc.?

(57) A. H. says a manufacturer of ladders here contends that ladder rounds (for a common straight ladder) tapered off from the center gradually to the ends down to the size of the tenons are stronger and stiffer than to leave the rounds straight and taper them off at the ends just enough for the tenons; rounds the same size in the center. Is he right? A. No. He is wrong.

(58) S. Van D. asks: Why does a sulphurous smell always accompany a thunderbolt? A. The odor is supposed to be due to the formation of ozone.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted November 25, 1884, AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table of inventions with descriptions and patent numbers, including items like 'Acid, making hydrochloric, L. Mond', 'Adding machine, Noyes & Stark', 'Advertising device, J. C. Blevney', etc.

Table of inventions with descriptions and patent numbers, including items like 'Fastener, metallic, G. W. McGill', 'Faucet, compound, C. H. Waters', 'Faucet protector, ale, G. Hirschman', etc.

Table of inventions with descriptions and patent numbers, including items like 'Regenerator furnace for use of natural gas, T. G. Kirkpatrick', 'Roaster, See Cocoa roaster', 'Rock drill, H. C. Serreant', etc.

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