

RECENTLY PATENTED INVENTIONS.

Electrical Apparatus.

SWITCH.—JOSEPH C. DE JANISCH, Avenue des Champs Elysées 121, Paris, France. Each contact-piece of the switch is operated by means of two movable buttons which project alternately beyond the casing of insulating material inclosing the contact pieces. The arrangement of the buttons, either one of which projects when the opposite button lies within the casing, obviates any cause for hesitation in operating the switch when turning on or shutting off the current.

Mechanical Devices.

ADDING-MACHINE.—DR. PIERCE HUBERT, Louisville, Ga. The principal parts of this adding-machine are a series of rotatable disks or wheels, the peripheries of which bear numerals. Pivoted levers actuated by depressible spring-keys also bearing numerals, operate the disks or wheels. The improvements devised have resulted in greater simplicity and economy of construction and in a more trustworthy and rapid operation.

LUNI-TIDAL TELLURIAN.—THOMAS MC-DONOUGH, 913 Canal Street, Ottawa, Ill. By means of this apparatus pupils can be shown in a simple and convincing manner the cause of the tides and the phases of the moon, as well as the causes of eclipses and other celestial phenomena.

MACHINE FOR WHIPPING CREAM.—EMILIO MONTANI, Manhattan, New York city. The machine consists of a framework, in the upper part of which a countershaft is journaled, connected by belt and pulley with an auxiliary shaft journaled in the lower part. A beveled gear on the end of the auxiliary shaft meshes with a gear on a base-plate, which carries the vessel of cream. From the countershaft a support, which carries beaters, extends downwardly into the vessel. By means of belt and pulley, the beaters are rotated in the dish.

CHAIN-WRENCH.—WILLIAM H. BROCK, Long Island City, N. Y. In the wrench forming the subject of this invention two different units of adjustment are available, the one, as in ordinary wrenches, corresponding with the distance between the chain-pins and the other a fraction of this distance. The second adjustment is due to a novel arrangement of the hooks for engaging the chain. Thus finer adjustments are obtained than are possible with ordinary chain-wrenches.

AUTOMATIC LETTER-BALANCE.—JOSEPH C. DE JANISCH, Avenue des Champs Elysées 121, Paris, France. A series of weighing operations is automatically effected by means of weights corresponding each to a unit charge or load placed in the weighing-pan of the apparatus. The weights are so combined with an oscillating-lever that the load put upon the weighing-pan causes the successive rising of the weights until the beam is in equilibrium. This equilibrium occurs when the charge in the pan is equal to the total weight of the lifting weights and the total weight increased by a unit charge or load. Thus, whole valuations can be automatically obtained.

CONCENTRATING-JIG.—SAMUEL ORR, Leadville, Colo. The invention provides an improved concentrating-jig for treating ores as they are brought from the mines, in order to separate the ores according to their specific gravity. The float silver and float gold are carefully saved. The jig is arranged to be worked with a comparatively small quantity of water, which can be used over and over again.

EXHIBITING DEVICE.—CHARLES E. LUCKE, Kingsbridge, Bronx, New York city. This exhibiting device belongs to a class of advertising-machines which intermittently move a band or ribbon carrying the advertisements to be displayed. In such machines it has always been a matter of considerable difficulty to bring the picture or other sign into proper position. By means of a simple compensating device the inventor has succeeded in thus adjusting the position of each advertisement, notwithstanding the variation in the diameter of the roll or band of ribbon. An improvement is also incorporated in the invention, which provides a new means of illuminating the sign.

STIPPLING-MACHINE.—GUSTAV ARNOLD, Manhattan, New York city. This machine is to be used in lithography to reproduce any design made with pencil, brush, or other drawing implement. The novel features of construction are an elastic diaphragm carrying isolated stipple-points. These points are closely related to one another and extend loosely through an apertured plate so that they are kept apart.

DRIER.—JOHN WATERHOUSE, Manhattan, New York city.—The drier is an improvement upon a machine for drying fruit, meats, sand, and the like, invented by Mr. Waterhouse and described and illustrated in the SCIENTIFIC AMERICAN of June 9, 1900. The improved drier consists of a rotary tumbler through which a series of perforated pipes extend. The perforations in the pipes are located at one side and nearest the wall of the tumbler. The pipes are supplied with air, and are consecutively opened and closed. The valve of each pipe remains open as long as it is covered with the material rolling down the sides of the tumbler.

ENVELOP-SEALING MACHINE.—ALFRED HEYDRICH, Brooklyn, New York city.—The table upon which the envelop is placed to be

sealed is stationary or has a limited cushioned movement. Means for dampening the gummed surface of the envelop are provided. Sealing-rollers are moved to and from the table. By means of a gage or guide, envelops of various sizes can be sealed by the same machine. The actuating mechanism of the sealing-rollers and their carriage is so constructed that the sealing section of the envelop at the forward movement of the carriage will be received between the rollers during the return movement of the carriage in order to allow the mucilage to dissolve. But when the carriage again moves forward, the sealing-rollers are set in motion and the envelop held between them is discharged.

Vehicles and Their Accessories.

VEHICLE.—JEAN REY, Maxwell, Cal. The invention is a three-wheeled wagon especially adapted for farm and city use, and in places where a wagon and dray can be used. The wagon-bed is a platform having slats, the adjacent ends of which fit in rabbeted seats on the rear axle. At the front end of the platform is a vertically-pivoted frame. The platform, being very low, can receive its load easily and is not liable to be overturned.

BICYCLE DRIVING-GEAR.—OCTAVE ROUERT, Paris, France. The inventor has devised an elastic gearing mechanism, the different parts of which are interchangeable. Nuts, screws, and bolts are dispensed with. The gearing mechanism is based on a principle which permits the parts to be easily manufactured, and the gearing of the pinions to operate perfectly. The transmission shaft being uninterrupted and rigid, the machine is easily handled.

COUPLING FOR HAME-TUGS AND TRACES.—ORANGE A. DEAN, Toulon, Ill. The coupling is so constructed that the hame-tugs and traces can be made lighter than usual and yet to stand much more strain than when connected in the usual way. The pull on the hame-tugs is about equally divided. By means of this coupling, the trace can be lengthened or shortened through the medium of the hame-tug without punching holes in the trace.

Railway Contrivances.

ELEVATED RAILWAY.—JOHN W. GONCE, Kinderhook, Ala. The railway is particularly adapted to fill the wants of small communities. The road can be built over level or hilly country at small expense, and can be provided with either single or double tracks. A uniform tension is to be maintained in the tracks and supporting cables during the various changes of the weather,—a result achieved principally by mechanism deflecting the track laterally at intervals from a straight line and sometimes by a lengthwise pull on rails and cables.

Miscellaneous.

LAMP.—BOMONJEE DORABJEE PUDUMJEE, Charni Road, Opp. Allbless Pag, Bombay, India. The lamp is a triplex lamp which can be used with an oil light alone, with oil or with acetylene, or candle, or acetylene or candle alone. The lamp, although especially designed for vehicles, can also be used for other purposes by slightly modifying the construction.

SUSPENDERS AND SHIRTWAIST ATTACHMENT.—RALPH B. HEAD, Fairbury, Ill. When suspenders are worn over shirtwaists or shirts the effect is not pleasing. Hence, it is customary to arrange suspenders beneath the shirtwaist by providing slits in the material near the waistband of the trousers. The invention is an improved clasp for temporarily securing the suspender ends to the shirtwaist.

HOOK-PLATE FOR LAMP HOLDERS OF MINERS' CAPS.—AUDLEY H. STOW, Hunter, W. Va. The lamps generally used by miners consist of an oil-cup having on one side a spout for the wick and on the opposite side a hook for attaching the lamp to its holder or support. It is often necessary for the miner to remove his lamp and replace it quickly with one hand alone. With the hook-plates new in use such removal is very slow, owing to the difficulty of finding the proper hole with the end of the lamp-hook. The present invention overcomes this difficulty.

BASE-PLATE FOR LAMP HOLDERS OF MINERS' CAPS.—AUDLEY H. STOW, Hunter, W. Va. The first and main object of this invention is to provide a base-plate readily adjustable to any size of lamp, while also providing, incidentally, a base-plate having the strength of the usual ribbed base-plate. The lamp is thus kept from swinging, not merely sidewise, but in any direction. Waste oil is carried off very simply. The cost of manufacture is comparatively small.

GARBAGE-HOLDING ATTACHMENT FOR SINKS.—CHARLEY E. COX, 4824 Clark Street, Chicago, Ill. The attachment is a receptacle applied to the bottom of a slop or kitchen sink for the purpose of arresting grease and solid substances, while allowing water to pass freely into the waste-pipe. The receptacle is provided with a trap, so that foul odors cannot pass upward to pollute the air above the sink.

SKIRT-SUPPORTER.—ADA M. WALLACE, Princeton, Ind. The invention provides a simple supporter which is to be attached to a corset, and with which a skirt may be readily connected and held without danger of becoming detached. No sharp points liable to scratch or prick are anywhere present.

COMBINED CANE AND UMBRELLA.—RUFUS WAPLES, JR., 565 Chestnut Street, Philadelphia, Pa. As the title of the invention indicates, the inventor has combined a cane and an umbrella in one device. So compact is the construction that the cane, when the umbrella parts are folded, presents the appearance of a neat walking-stick.

LAMP-CHIMNEY CLEANER.—DANIEL S. ZEILER, Sunnyside, Pa. The cleaner comprises a handle; two hooks, oppositely-formed on a looped wire rod, the looped portion of the rod being bedded in an end portion of the handle, and a ferrule adapted to secure the wire loop on the handle. The hooks hold the sponge or cloth.

DRAINING DEVICE.—SAMUEL H. BOLLING, Ittabena, Miss. The object of the invention is to provide a new device especially designed for removing surface water, such as that of ponds, ditches and the like, to a lower stratum. The invention consists of a box provided with a perforated inlet-pipe, a like outlet-pipe, and an air-pipe.

DRIVE-WELL DEVICE.—CHARLES F. ALLEN and WILLIAM B. GROW, Hueneme, Cal. The invention provides novel features of construction which permit the free and rapid insertion of the well-casing into a vertical perforation in the ground without injury to the casing, and which will also permit the ready removal of the casing. The lower end of the well-casing is provided with a novel point which can be driven independently of the main portion of the well-casing. Thus, a vertical hole is produced of greater diameter than that of the casing, and thus the casing can be allowed to drop into the well-hole.

NOTE-PROJECTION.—JOHN KRUPP, West Hoboken, N. J. The invention relates to note-sheets or barrels for mechanical musical instruments, and provides an improved note-projector of peculiar formation, which is exceedingly strong and, therefore, not liable to bend or break.

SPECTACLES OR EYEGLASSES.—VERNER R. GATES, Sherman, Mich. Mr. Gates has devised a slip-lens holder of simple construction so arranged that when not in use it can be turned down toward the face and held substantially at right angles to the main lenses. These changes in position can be made without removing the glasses from the nose.

TOBACCO-PIPE.—DOMINGO J. G. FERREIRA, Butte, Mont. The tobacco-pipe is so constructed that a perfect draft is insured and a ready means provided for cleaning the pipe whenever desired. Nicotine is discharged merely by blowing through the mouth-piece.

FABRIC.—JOHN A. SCHARWATH, Jersey City, N. J. The fabric is to be used particularly as a roofing material or siding for buildings. Not only is the fabric waterproof, but also flexible, light and strong, and not liable to suffer deterioration by reason of changes in temperature.

CIGAR-TIP CUTTER.—CHARLES W. B. MOLONY, Bulawayo, Rhodesia, South Africa. The purpose of this invention is to provide a cigar-tip cutter, which, while effective for the purpose in hand, will nevertheless be so simple and cheap in construction that one may be applied to each cigar. Hence, when the tip of the particular cigar to which it has been applied is cut, the cigar-tip cutter can be thrown away.

SECTION-GAGE FOR JOISTS, COLUMNS, ETC.—WILHELM DOHM, Bielefeld, Germany. The gage or slide rule devised by the inventor ascertains the size of the section required for a joist designed to sustain a certain load. The gage or slide rule will show the size of the required section of the joist for any load, length of joist, and safe limit of stress.

STOP FOR CUT-OFF SAWS.—AMOS W. MILLEN, Overton, Cal. The invention is an improvement in stops or gages used in connection with saws for cutting timber into lengths for boxes or the like. The construction is such that the stop can be quickly changed for different lengths while the saw is in motion.

COLUMN.—JOSEF A. OHMAN, Manhattan, New York city. This column is to be used in the construction of fireproof buildings, the object being to make the column light, yet strong, and to enable the sections to be readily formed by rolling.

DETECTOR DEVICE FOR BOTTLES, ETC.—EDWIN J. BROWN, Oneida, N. Y. The invention is an improvement in devices for preventing the filling of glass bottles or jars with glass tops. Ordinarily such devices are part of the bottle or require some change in its shape. This invention does not affect the bottle and requires no change in its shape. After the receptacle has been used once it can be used again for the same or for other purposes. The detector device, however, can be used but once, for it is destroyed immediately by the mere uncovering of the receptacle.

TRUNK-HANDLE.—BERTNIE M. WILHITE and FRANK A. HOYT, Gordon, Neb. The purpose of this invention is to provide a handle for trunks, which when grasped by a person will not tend to crowd the hand against the side of the trunk. It will, on the contrary, spring outward, so that the trunk can be conveniently lifted and carried. This end is attained by means of a spring which runs longitudinally through the handle.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. In every case it is necessary to give the number of the inquiry.
MUNN & CO.

- Marine Iron Works, Chicago. Catalogue free.
- Inquiry No. 765.**—For manufacturers of small stambling and grading machinery and also printing presses and types.
- TURBINES.**—Lefell & Co. Springfield, Ohio, U. S. A.
- Inquiry No. 766.**—For manufacturers of printer's cases.
- "U. S." Metal Polish. Indianapolis. Samples free.
- Inquiry No. 767.**—For the address of malleable iron works that are nearest Portland, Me.
- WATER WHEELS.**—Alcott & Co., Mt. Holly, N. J.
- Inquiry No. 768.**—For manufacturers of alloy wire, also roll plate wire in fifty ounce lots.
- Yankee Notions, Waterbury Button Co., Waterbury, Ct.
- Inquiry No. 769.**—For cheap stone or glass sels in mountings for wire work.
- Dies & Special Machinery. Amer. Hdw. Mfg. Co., Ottawa, Ill.
- Inquiry No. 770.**—For castings for gasoline engines from 10 to 12 horse power, vertical.
- Sheet Metal Stamping: difficult forms a specialty. The Crosby Company, Buffalo, N. Y.
- Inquiry No. 771.**—For manufacturers of belts suitable for sand belts, also for crushed glass for the same.
- Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.
- Inquiry No. 772.**—For manufacturers of rotary pumps.
- For Sheet Brass Stamping and small Castings, write Badger Brass Mfg. Co., Kenosha, Wis.
- Inquiry No. 773.**—For manufacturers of automatic sewing machines.
- Rigs that Run. Hydrocarbon system. Write St. Louis Motor Carriage Co., St. Louis, Mo.
- Inquiry No. 774.**—For manufacturers of condensed milk machinery.
- Our Specialties.—Steel rims, steel tubes, steel boilers. The Standard Welding Co., Cleveland, Ohio.
- Inquiry No. 775.**—For manufacturers of molds for making different images out of plaster of Paris.
- Ten days' trial given on Daus' Tip Top Duplicator. Felix Daus Duplicator Co., 5 Hanover St., N. Y. city.
- Inquiry No. 776.**—For manufacturers of small riveting machines.
- SAWMILLS.—With variable friction feed. Send for Catalogue B. Geo. S. Comstock, Mechanicsburg, Pa.
- Inquiry No. 777.**—For the most approved method and machinery for the evaporation of salt.
- Wanted.—Punch and Die Work, Press Work and light Manufg. Daugherty Novelty Works, Kittanning, Pa.
- Inquiry No. 778.**—For an improved method of screening bank sand or gravel.
- Gear Cutting of every description accurately done. The Garvin Machine Co., 149 Varick, cor. Spring Sts., N. Y.
- Inquiry No. 779.**—For manufacturers of carpet cleaning machinery.
- We are equipped to manufacture all kinds of specialties. Send samples. Chicago Handle Bar Co. Chicago Ill.
- Inquiry No. 780.**—For parties to manufacture a small special machine.
- Kester Electric Mfg. Co's. Self-fluxing solder saves labor, strong non-corrosive joints, without acid, Chicago, Ill.
- Inquiry No. 781.**—For parties to manufacture an improved tool in the form of a small pipe cutter for gas fitters' and machinists' use.
- The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 88th Street, New York.
- Inquiry No. 782.**—For manufacturers of steel grain elevators.
- The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail \$4. Munn & Co., publishers, 361 Broadway, N. Y.
- Inquiry No. 783.**—For machinery for the manufacture of brass disk pins.
- Wanted.—General Superintendent for large manufacturing concern near New York. Must be an executive and organizer of ability and force. Give age, references, experience etc.—E. B. B., 16 and 18 Park Place, N. Y. City.
- Inquiry No. 784.**—For manufacturers of plain box delivery wagons suitable for coal.
- Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.
- Inquiry No. 785.**—For manufacturers of tile 40 to 42 inches in diameter.
- Inquiry No. 786.**—For manufacturers of observatory and field telescopes.
- Inquiry No. 787.**—For an outfit to equip a large room for cold storage by the use of liquid air.
- Inquiry No. 788.**—For manufacturers of patent car steps and coverings for same.
- Inquiry No. 789.**—For manufacturers of small brazed brass tubing.
- Inquiry No. 790.**—For a machine capable of giving 200 candle power incandescent light, wound for 220 volts, and directly connected to engine.
- Inquiry No. 791.**—For manufacturers of fountain pens for exportation to Russia.
- Inquiry No. 792.**—For a machine for making large wooden bowls or trays.
- Inquiry No. 793.**—For manufacturers of iron and copper smelting furnaces, using crude petroleum for fuel.
- Inquiry No. 794.**—For parties to make battery carbons according to specifications.
- Inquiry No. 795.**—For a good, second-hand incandescent dynamo from 200 to 800 or 1,000 lights.
- Inquiry No. 796.**—For information for lighting small towns with acetylene gas.
- Inquiry No. 797.**—For a machine for making straw into fuel.
- Inquiry No. 798.**—For parties to make acetylene gas generators to order.
- Inquiry No. 799.**—For sheet metal workers.
- Inquiry No. 800.**—For a directory of American iron manufacturers containing a list of such concerns using annealing furnaces of whatever type.
- Inquiry No. 801.**—For manufacturers of show case materials, such as show case moldings, etc.
- Inquiry No. 802.**—For a small ozone generator for commercial use.

- Inquiry No. 803.**—For dealers in small bevel gear wheels in large quantities and of special dimensions.
- Inquiry No. 804.**—For a boiler run by crude petroleum, gas or gasoline.
- Inquiry No. 805.**—For manufacturers of novelties.
- Inquiry No. 806.**—For machinery for the manufacture of macaroni.
- Inquiry No. 807.**—For a machine for automatically cutting and shaping sticks.
- Inquiry No. 808.**—For dealers in powdered mica.
- Inquiry No. 809.**—For manufacturers of second-hand core drills.
- Inquiry No. 810.**—For bluing in dry paper form in quantities.
- Inquiry No. 811.**—For manufacturers of water regulators attached to the meter to control pressure.
- Inquiry No. 812.**—For manufacturers of can labeling machines.
- Inquiry No. 813.**—For manufacturers of sponge in sheets or shapes to order.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names 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. **Buyers** wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. **Special Written Information** on matters of personal rather than general interest cannot be expected without remuneration. **Scientific American Supplements** referred to may be had at the office. Price 10 cents each. **Books** referred to promptly supplied on receipt of price. **Minerals** sent for examination should be distinctly marked or labeled.

(1819) J. E. H. asks: 1. How to tin a soldering iron. A. File the bolt clean over the part to which the tinning is to be applied. Wet this part with soldering fluid. Heat the bolt till it is hot enough for use and rub it into solder placed upon a piece of tin. If this does not secure an even coating, heat the bolt again and attend to the bare spots in the same manner as before. If you use a soldering pot, you can keep sal-ammoniac on top of the solder, and dip the iron into the solder through the liquid. 2. How to magnetize steel so as to use it as a tack hammer. A. Forge the hammer of good tool steel and harden the ends. Then magnetize by a dynamo or by another magnet in any of the modes which have recently been described several times in this column. 3. Some process for hardening steel and also be tough. I want to know this, as I use chisels in my work. A. We fear you are asking an impossibility. Woodworking chisels are tempered so high that they are of necessity brittle. If they were tempered low, they would be too soft to hold an edge.

(8200) E. T. asks: 1. In any form of magnet does it increase the magnetism to any practical extent by winding near the poles, all conditions being equal? A. All conditions being the same, the magnetizing force is proportional to the number of amper turns, without reference to the arrangement of the turns. But the length of the circuit affects the number of lines of force inversely. The longer the circuit the fewer the number of lines. The form of the magnet must be determined by the space at one's disposal, and the circumstances. 2. Does it increase the magnetism by spreading the winding over a larger area than by winding in a bunch? A. A turn of wire near the core is very much shorter than one further away. Hence it requires less copper if the magnet is made longer. Here a balance must be struck between length and diameter, according to the particular case. 3. How can I make a depolarizing salt cell? A. All closed circuit cells have depolarizers; the Daniell's or the gravity are the most constant of these. See SUPPLEMENTS Nos. 157, 158, 159, price ten cents each. Sulphate of copper is the depolarizer used in these cells. 4. Can the speed of a motor be controlled by allowing the current to pass through part of the winding on the field and switching on the rest as required? A. To a certain extent.

(8201) F. M. asks: Can you inform me how to make a good dry battery, or where I can get a book on the same? A. Consult SUPPLEMENTS Nos. 792 and 1001, price ten cents each.

(8202) A. B. C. asks: Where and at what price can I get a book treating in scientific fashion such recent advances in electricity as wireless telegraphy? If the book also contains such matters as the X-ray, so much the better. A. We can send you Fahie's "History of Wireless Telegraphy," price \$2 by mail; Cottone's "Radiography," price \$1 by mail; Leadwercraft's "A B C of the X-ray," price \$1 by mail; "Experimental Science," \$4.

(8203) C. D. C. writes: In the making of a barometer I have tried your suggestion of placing wax in the bottom of the mercury cistern for the purpose of excluding air from the tube at the instant of inverting it. My tube having a bore of 1/8 inch or less, the wax plugged it up entirely. I would suggest cutting a small square of leather from a kid glove, of a size to amply cover the end of the tube. With a heated table knife melt beeswax into this patch until it is saturated, leaving no excess of wax on the surfaces. Stick this patch on the end of the tube, turn the empty cistern down over it so that the patch shall be

safely held between the tube and the bottom of the cistern. Hold securely and reverse carefully. When in the upright position pour mercury into the cistern until it is one-third or one-half full; then, with a needle, get hold of a corner of the kid, and by careful manipulation get it from its place on the tube. There is no difficulty in this method. The filling of a barometer tube is a rather troublesome operation by any ordinary process. I have found the following method quite simple and convenient: Provide first a perfectly straight iron (not brass or copper) wire somewhat longer than the tube, and much smaller than the bore of the tube. Next roll up a small funnel of stiff writing paper and pin it together. Make the small end fit closely around the tube, then with a heated table (or other smaller) knife seal the lap of the paper with beeswax and fill between the paper and the glass with the wax. If this work is done near a stove or radiator the wax will work better and adhere more surely. By placing a teaspoonful of mercury at a time in the funnel, and then using the wire as a plunger within the tube, the air gets out and the mercury in without trouble or loss. A. These suggestions are very practical. We would add that it is usual to attach to the bottom of the iron wire a piece of soft leather or cloth to act as a scraper and detach the air bubbles from the glass as the plunger is drawn up. Thus the air is almost completely removed as the tube is filled. There is, however, no method of getting rid of air completely and with certainty except to boil the mercury in the tube itself. The trouble with the wax could be avoided by using harder wax.

(8204) A. K. D. asks: 1. Can I learn what kind of wire, what size, and how much of it should be used to make a very high resistance, say to carry 15 or 18 milliamperes, suitable for battery purposes, from 2 to 8 volts? A. To obtain the current which you wish at the pressures you specify will require resistance as follows:

- 18 milliamperes at 2 volts...111 ohms.
- 15 milliamperes at 2 volts...133 ohms.
- 18 milliamperes at 8 volts...444 ohms.
- 15 milliamperes at 8 volts...533 ohms.

This does not take into account the resistance of the external circuit, outside the resistance box, an element which we do not know. You can allow for this and deduct from the resistances given above. Probably No. 34 German silver wire will carry the current without overheating. This has about 0.3 foot per ohm. About 180 feet may be taken and made into a variable resistance with, say, 10 points. You will then have the range you desire, with a finer adjustment than you specify. SUPPLEMENT No. 1210, price ten cents, describes such a construction of rheostat. 2. In answer to query 8088, March 9, 1901, in reference to lightning rods, you say: "They act as a path from the earth up into the clouds to neutralize electricity before lightning strikes." Would not rods do that part better if run up much higher than they usually are on buildings? Also if rods were thickly distributed over the country sufficiently high, could not thunder storms be altogether avoided or prevented? A. With reference to preventing thunderstorms by numerous lofty lightning rods, we fear you cannot succeed. The suggestion has been made to dissipate tornadoes in this way, but it is not possible to provide points enough to carry sufficient electricity into the upper air to accomplish the result. Nature's dynamos can generate faster than man's rods can neutralize the product.

(8205) W. H. W. writes: In one of your late issues of the SCIENTIFIC AMERICAN, under "Notes and Queries," it was stated in effect that pure water was a non-conductor of electricity, although even a trace of acid might make it otherwise. So I take the liberty of handing you herewith an account of a recent fire in our city, in the Edison Electric Light Company's power house, wherein it states that "knowing well the conductive features of a stream of water, which is a perfect pathway for an electric current, the firemen elected to fight it with their chemical apparatus," etc. A. The firemen did quite right to take no chances in subduing the fire in the lighting station. Common water is far too good a conductor for their use of it in such a place. The slightest trace of impurity renders it so, whatever the character of the impurity. Yet there is no water which is a "perfect pathway for the electric current." No electrician could have written that statement. Water is often used as a resistance; but it is usually necessary to add salt to the water in order to reduce its resistance still further before it can be so used. This would not be done if water were even a good pathway for electricity, and if water were a perfect pathway for electricity it would not be possible to use it for a rheostat, since it would offer no resistance at all. Perhaps it would be right to say that water does not offer resistance to lightning, since the voltage of lightning is so enormous that any ordinary resistance is as nothing before it. To all ordinary voltages, however, water, chemically pure water, is a non-conductor, and by that term we do not mean water good enough to drink, but water containing nothing else but H₂O, water in the sense in which a chemist uses the term, pure water. Thompson, in his "Elementary Lessons in Electricity," gives the resistance of "pure water" as 26,500,000,000, when the same quantity of copper would have a resistance of 1.57. If pure water is not a non-conductor, what is it?

NEW BOOKS, ETC.

PRACTICAL ELECTRO-CHEMISTRY. By Nertram Blount. New York: The Macmillan Company. Westminster: Archibald Constable & Company, Limited. 1900. Pp. 373.

This volume, as its title indicates, deals with the practical side of one of the youngest and most promising of modern industries—electro-chemistry—and shows the advantages gained in many instances by its use. An introductory chapter on the general principles of the science is followed by chapters on electro-chemical processes which have been already or are likely soon to be turned to industrial use. A review is made of the electro-chemistry of the different metals and a comparison given with the old processes. A chapter is devoted to the reduction of metals in the electric furnace as practised to-day. Another chapter is given up to the electrolytic manufacture of organic compounds and fine chemicals, and the book concludes with a discussion of the efficiency of the existing methods of producing electrical power, in which the carbon and gas cells are described.

This work will be found of much interest to any one interested in the science, and will also be of use as a guide to those engaged in the practical application of electricity to chemistry for industrial purposes.

EXPERIMENTAL PHYSICS. By Eugene Lommel. Translated from the German by G. W. Myers. London: Kegan Paul, Trench, Trubner & Company, Limited. Philadelphia: J. B. Lippincott Company. 1900. Pp. 664. With 430 figures in the text.

This work, by Prof. Lommel, of Munich, is the outcome of a series of experimental lectures on physics, and is noteworthy for the clear, concise exposition of the principles of the science and their constant application to practical, everyday uses. It is this practical application of principles that renders this work especially valuable to the beginner, as the principle is firmly fixed in the reader's mind by its practical application. Numerous simple experiments illustrative of principles involved are also given. The subject is presented in its historical sequence as far as possible; and this edition, which is the third, contains a discussion of the Roentgen rays, and a new plate showing the spectra of the sun and of several of the elements. The book contains numerous notes in fine print which still further develop the subject and make it useful as a book of reference for advanced students.

THE CHEMIST'S POCKET MANUAL. By Richard K. Meade, B.S. Easton, Pa.: The Chemical Publishing Company. 1900. 16mo tuck. Pp. 204. Price \$2.

A practical handbook containing formulas, calculations, physical and analytical methods for the use of chemists, assayers, metallurgists, manufacturers and students. It is a most valuable book, it is a time saver and is eminently practical. We strongly commend it.

SUR LES NIDS DE LA VESPA CRABRO. Ordre d'apparition des premiers alvéoles. Par Charles Janet.

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