RECENTLY PATENTED INVENTIONS.

Engineering.

ROTARY STEAM ENGINE.—Edward H. McDonald, Wytheville, Va. This is an engine of the double piston pattern, in which the casing is composed of a series of sections, and having a steam chamber in which epicycloidal pistons are arranged, while there are inlet and exhaust plugs communicating with steam and water passages, levers being attached to the plugs and pitmen connecting the levers. The parts of the engine are also so made that it may be used as a pump for forcing feed water to the boiler, and so that the exhaust steam may be employed to heat the feed water.

Railway Appliances.

CABLE GRIP MECHANISM. — George Muller, Hoboken, N. J. This invention provides an improvement specially designed to enable the operator in charge of the car to quickly and conveniently throw off the cable after it is released by the gripping jaws, or to pick up a cable traveling in the same or a different direction or at a different rate of speed, and place the picked-up cable between the jaws of the grip. The invention consists of an angular arm or arms connected with a pivoted guiding arm, and a link pivotally connected with a sliding bar, and facilitates the picking up or throwing off of the cable at will whenever desired.

SLIDING RAILWAY.—Charles A. Barre, Paris, France. This invention relates to hydraulic propulsion railways of the S. D. Girard type, in which the rails are on an elevated structure with a main carrying water under great pressure, from which there are upwardly projecting branch pipes termed propellers having discharge nozzles, automatically operated by shifting levers on the car, the water being turned into chambered slides or skates which slide on the track, and which when the train is at rest have a metallic contact with the rails. The slides or shoes constructed according to this invention are designed to have several important advantages, being arranged for an oscillatory and vibratory movement on the support and bearing axle, and having a water-receiving chamber open at the bottom, with contact or slide faces surrounding the opening, and other novel features.

Mechanical Appliances.

ROCK BREAKER. — John H. Bloomer, Jersey City, N. J. A derrick having a laterally swinging boom has a hammer or weight freely suspended by a cord or cable from the free end of the derrick boom, while in connection with the derrick is a winding and releasing mechanism for the cable. It is designed to use with the device a heavy, steel-faced hammer, which is to be raised by the cable as high as the boom will permit and then dropped upon the rock or stone to be broken.

BELT SHIPPER. — James R. Balsley, Connellsville, Pa. This device comprises a hanger on which is pivoted an arm terminating at one end in a depending bend opposite which is a shoulder, a dog being pivoted on the shoulder to impinge against the arm, while a lever is pivoted to the lower end of the dog and to the hammer, with means for operating the lever. By this means the belt may be conveniently shifted from the tight to the loose pulley or *vice versa*, and will be started in the right direction when shifted to the tight pulley.

SET SCREW. — Lycurgus A. Geisinger, Center Valley, Penn. Combined with a punch is a headless screw formed with a central aperture adapted to be engaged by the punch, with a plug adapted to be driven by the punch passing through the screw and adapted to be engaged by the latter to hold the plug in place. This set screw can be readily applied, and is designed to very securely fasten parts together, while presenting no outside projections when in place. The same punch can be used for driving a large number of set screws.

GLAZIER'S HAMMER. — Thomas C. Grimshaw, Pittsfield, Ill. This is an improved form of hammer, of simple and durable construction, for conveniently driving the points to hold the pane of glass in place in the frame. It has one head on which is pivoted a triangular face, the face thus being movable, while the other head has a ring of soft material, preferably rubber, to deaden noise when moving the hammer over the pane of glass when driving the points.

Agricultural.

ENSILAGE HARVESTER AND CHOPPER. —William J. Conroy, Aylmer, Canada. By drawing this machine over a field of standing fodder, it is designed to harvest or mow the fodder, cut it up into pieces of the right size, and deliver the chopped material to a receptacle on a cart following. A conveyer is located at the rear of the harvester knives, and at the rear of the conveyer is a downwardly extending chute, above which spirally arranged revoluble knives are journaled, while there is a second conveyer at the base of the chute, there being a driving connection between the driving mechanism of the harvester, the conveyer shafts, and the knife shafts.

GUANO DISTRIBUTER AND SEED PLANTER.—Hezekiah Vickery, Willacoochee, Ga. This invention relates generally to agricultural implements and especially to a combined fertilizer distributer and corn and cotton planter. A corn hopper is secured to the central beams, and in an apertured lug on the lower end of the hopper is a spring rod on which is a disk forming the bottom of the hopper, there being a transverse shaft on which is an arm intermittently engaging the rod to move the disk to one side, to discharge a measured quantity of the contents of the hopper. Different hoppers are provided for the fertilizer, corn, cotton, seed, etc.

HAY STACKER. — Oliver H. Buck, McLean, Ill. This is a portable structure, consisting of an open frame tower mounted on runners, and having two central cross pieces or platforms through which extends a mast, adapted to be raised and lowered by a rope, there being on top of the mast a swinging arm with a pulley and hoisting rope. The hay is elevated by tongs connected with the rope from the arm, which may be swung around to place the hay where desired, and the mast is readily raised in the tower as the stack increases in height.

Miscellaneous.

VENDING APPARATUS. — Oscar T. Smith, Buena Vista, Va. Upon a track which is preferably endless and circular, a goods receiver in the form of a locomotive and tender is adapted to run, there being in the track a stop device and a tripping readjusting device, the locomotive having a motor mechanism and stop devices to be operated through the aid of a coin. The motor is preferably a clock mechanism, and the goods receiver has a pin which operates the discharge devices, the receiver traveling through a passage where it receives a portion or quantity of goods, and then passes out to deliver the goods to a purchaser. The device is automatically operated by the insertion of a nickel or other coin in the coin chute.

MONEY DRAWER.—Frank Mahannah, Omaha, Neb. A cover is hinged to the top of the drawer near its rear end, the cover closing when the drawer is shut, and flanges or guards closing the spaces between the sides of the drawer and cover when the latter is raised. The improvement is designed for adoption in sliding money drawers used on counters in stores, offices, banks, etc., to prevent exposure and abstraction of the contents of the drawer when open, by parties standing in front of the counter.

KNOCKDOWN SAFE.—Henry J. Moyer, Frackville, Pa. This is a safe for fruits, vegetables, and other food products, designed to be convenient, inexpensive, and afford through ventilation, while being so made as to be readily taken apart and quickly and easily set up. It has two pairs of detachable end standards, a sectional and folding bottom, a central folding shelf, a sectional and folding top, a back formed of two vertically swinging doors and a front formed of two horizontally swinging doors, while the four sides of the safe have openings covered by screen cloth.

RUCHING MACHINE. — William H. Holeywell, New York City. In this machine a traveling chain composed of a series of tubular dies pivoted together is operated in combination with a reciprocating plunger, a spring-actuated presser foot bearing and sliding on the open ends of the traveling dies. When a strip of material is fed to the machine it automatically forms therefrom a ruffle or ruching, flat or puffed, and integral with the body of the trimming is a continuous strip to be used for the attachment of a band. The machine makes a grouping or chain of figures, each simulating a complete ribbed shell, all of the shell-like figures apparently forming a portion of a common base.

WICK TRIMMER. — Chauncey R. Burr, Boston, Mass. This is a device designed to facilitate the accurate and convenient trimming of circular wicks on a burner, without the operator soiling his hands or the lamp. It consists of a ring to engage the outside of the wick, and a knife mounted to turn in the opening of the ring to engage and cut the wick from the inside. Any desired length of the wick can be trimmed off, the cutting being accurately and evenly effected.

CLOTHES PIN. — John A. Johnson, Trempealeau, Wis. This device is made of wire, and has at one end a spring clip to receive the clothes line, while at the opposite end is an oblong loop having a narrow tapering portion, a spring tongue extending through the loop. The pins are attached to the clothes in the house, or where it is most convenient, the attachment of the pin to the clothes line being readily effected by the spring clip.

OVERSHOE ATTACHMENT.—Joseph H. Morison, Centralia, Kansas. This is a clamping device for attachment to the heel end of rubber or other like overshoes, and having opposite lateral clamping wings in hinged connection at their inner ends with a central plate on the shoe, a cam lever being pivoted on the plate to bear on the backs of the wings. The improvement is designed to insure the quick, easy and firm fastening of overshoes upon the feet, so that they cannot slip or be accidentally drawn off.

ELEVATOR AND DUMP. — William H. Enos, Chebanse, Ill. This invention relates to devices used for unloading grain from farm wagons, and provides means by which wagon body may be raised from the running gear and the grain quickly dumped in suitable bins, the wagon body being quickly returned to place. A rope from a windlass is passed over guide pulleys, pulley blocks being mounted in loops in the rope, while there is a shaft between the loops around which one member of the rope is wound, with means for operating the shaft. The improvement may also be used for dumping coal or other articles.

LAWN SPRINKLER.—William A. Russell, Los Angeles, Cal. The head of this device is made in two sections fastened together and mounted to turn on a fixed tapering discharge pipe opening into the head, the latter having discharge chambers with an inclined end formed with openings. A high pressure is not required to revolve the head, which is designed to distribute the water quickly over the entire area covered by the sprinkler, and the device is simple and durable in construction and not liable to get out of order.

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Notes & Queries

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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.
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Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(3802) D. D. asks: What will stick glass to cast iron or brass frames so that it will not let go in rough handling? A. Try gelatine dissolved in acetic acid, with a small percentage of glycerine (about 1 part to 10 parts of the dry gelatine) added.

(3803) A. D. F. writes: 1. I have a bichromate battery, and after I have used it and let it stand a while, it will not work at all. I take out the carbons and zinc every time, but it won't work. Can you tell me the reason why? A. Your trouble may arise from one of several causes. Your carbon surfaces may be too small; your solution may be too weak; possibly you have not paid sufficient attention to the amalgamation of your zincs. Your binding screw connections may be imperfect. 2. I have eight permanent magnets. How can I have them remagnetized? A. You can recharge your magnets by drawing them across the poles of a strong electro-magnet, or inserting their poles in coils and sending a current through the coil.

(3804) O. C. W. asks: Does an electric car generate any current while running down a grade with the current from power plant shut out? A. It does if the motors are run in series. Thus one car going down a hill may help to pull another distant car up a hill. As on the usual system of working in parallel the circuit of the motor of an electric car is open while the car is on a down grade no current is generated. The motor is capable of generating a current when driven in the manner described.

(3805) L. K. asks: What is good to clean tombstones the quickest way, where they have been discolored by the weather? A. The tombstones that have become weatherbeaten and dusty should be thoroughly washed with soap, water and fine beach sand applied with a stiff scrubbing brush. Then if stains require to be removed, a solution of oxalic acid in water may be applied with the brush, and after standing a few hours, should be washed off with clear water. Marble can be much improved by rubbing the surface with fine sandstone. Keep oxalic acid off the hands, as it is poisonous. Or apply a mixture of ¼ lb. soft soap, ¼ lb. whiting and 1 oz. washing soda, and a small lump of copper sulphate. Leave on the marble for a day and then wash off and polish.

(3806) O. M. W. writes: 1. I would like to know what solution jewelers use in which to dip plated silverware to take off the oxidation; and how is it prepared? A. Any solution which will remove the oxidation of silver-plated ware will tend to remove the silver itself, and should therefore be used with great care. A solution of hypo-sulphite of soda will remove the tarnish; a solution of cyanide of potassium is more efficient, but exceedingly poisonous, and should be used with great care. 2. I have a medal about the size of a $5 gold piece, but lighter gold color, having on one side a head of Queen Victoria and "Victoria Regina, 1837;" on the other, "To Hanover," with a king on horseback and a dragon underneath. It is in good preservation. Is it of any value? A. In regard to the value of your medal, we advise you to write to some reliable numismatist.

(3807) P. K. asks: Is there any good and practical method known to make drawings on paper temporarily translucent, in order to take blue copies directly therefrom, kind of blue print paper mounted on cloth which answers well for use as working drawing. It would save much time if the original drawing could at once be rendered translucent and fit for blue copying. The generally used transparent paper or cloth is unfit for original drawings, as it soon gets dirty, and does not permit the use of India rubber. A. Drawings made on cardboard drawing paper are made temporarily translucent by flooding the paper with purified benzine. The latter must be of the best quality. This liquid soon evaporates without injuring the drawing. While in the translucent state, the blue print may be taken.

(3808) E. B. K. asks: 1. In the analysis of illuminating water gas, to get at the per cent of hydrogen and marsh gas, by burning with pure oxygen through heated platinum tube, what amount of oxygen should be admitted to burette for burning the H and CH_4 (say the analysis showed 1·8 CO_2; 15·8 of CH_4; 2·4 of O; 29 of CO; having a volume of 51 per cent in burette). A. Enough oxygen must be added to completely burn all the marsh gas and hydrogen present. If it were pure marsh gas, then 51 cubic centimeters would require 102 cubic centimeters of oxygen. If it were pure hydrogen, then 26 cubic centimeters would suffice. If no nitrogen is present, simply add a good excess of oxygen, as any excess, within reasonable limits, does no harm. If nitrogen is present, the combustion can be effected with pure air, as oxygen combustion in the presence of small quantities of nitrogen is liable to give oxidation products of nitrogen, which would invalidate the analysis. 2. Also what is the rule for calculating height of barometer from certain heights above sea level? A. La Place's barometric formula is X (height in feet) $= 60{,}346\,(1 + 0{\cdot}00256 \cos \phi)\left(1 + \frac{2T + T'}{1{,}000}\right) \log \frac{H}{H'}$ In this T indicates temperature at the upper station and T′ temperature at the lower station in degrees Centigrade. H and H′ denote the height of the barometer in inches at upper and lower stations respectively reduced to 0° C. To effect the last reduction, apply the formula $H = h\left(1 - \frac{t°}{6{,}500}\right)$ in which h is the observed height and $t°$ the temperature in degrees Centigrade. For heights under 2,000 feet the following formula may be used:

$$X = 52{,}500\left(1 - \frac{2\,(T + T')}{1{,}000}\right) \times \frac{H - H'}{H + H'}$$

(3809) E. C. L. asks what is used to give the luster to artificial diamonds, and how is it made? A. They are sometimes backed with bright foil or with mercury or looking glass or amalgam. See queries 3717 and 3793. Foils are described in the "Techno-Chemical Receipt Book," $2 by mail.

(3810) W. M. asks (1) how to make aldehyde-ammonia. A. Evolve ammoniacal gas in any convenient way, such as treatment of ammonium sulphate dissolved in water, with caustic soda or potash. This should be done in a flask or retort. The gas evolved is dried by bubbling it through concentrated sulphuric acid, or by passing it over dry calcium chloride. It is then passed into a solution of aldehyde in ether. The aldehyde-ammonia will crystallize in large rhombohedrons. 2. How to make crystallized nitrate of silver. A. Dissolve silver in as little nitric acid as possible and evaporate, best on a water bath, until it crystallizes. If the silver is not pure, the crystals should be fused at a gentle heat until quite liquid, and then redissolved, exposed to the sun for a day, filtered, and recrystallized.

(3811) W. E. B. says: The recent severe gale started in Texas and moved northeast into Canada. Why was it not accompanied by northeast winds, the same as when a storm starts in the Gulf of Mexico, and moves up the Atlantic coast? A. The great storms that come up the eastern coast of the United States are generally of the cyclone type and have their origin in the tropics. The winds on the northerly side of this class generally blow from the northeast. The storms that are generated in the southwestern States are often of the same order, and have their northwest winds in the Western States, while the Atlantic States will have easterly to southeasterly winds, the winds on the opposite sides of a great storm of this type generally blowing in opposite directions. 2. Will the wet and dry bulb thermometers work when placed inside, so that you can depend upon their readings? A. The wet bulb (Mason's) hygrometer must have a good exposure to the outside air and shaded from the sun and wind. It will not give reliable results inside of a house. 3. I have a record of my mercury barometer falling to 29·32 on June 16, 1891, and the thermometer was 92. Why did it fall so low when no storm appeared? A. A considerable fall of the barometer without a storm is a frequent occurrence. There are dry storm waves, the moisture of the atmosphere being too far below the point of saturation to produce rain or snow by the change in pressure. High temperature also increases the hygrometric capacity of the air, which may prevent rain during a barometric depression.

(3812) "Unscientific American" says: Will you please state in your paper the difference between a copper flue, copper pipe, copper tube? A. The only difference is in their use, each kind being made for a special line of trade. Copper flues are made of sizes and thickness for boiler flues and designated by their outside diameter. Copper pipe is made to the outside gauge of iron pipe and thick enough to take iron pipe threads and designated by the nominal inside diameter. Copper tubes and tubing embrace a great variety of sizes and thicknesses usual in trade and generally designated by their outside diameter.

(3813) G. A. R. writes: A man has been working at electrotyping during the past three years; he handles considerable plumbago, bluestone, and iron rust, the bluestone being a solution in water. His hands are black and have been so for years. Can you give me a receipt for something that will clean them? A. Possibly some modification of a tattoo removing process might be applicable. Such is described in our SUPPLEMENT, Nos. 695 and 722. There is always danger to be apprehended in severe treatment applied to such large areas of skin surface.

(3814) G. B. M. asks what rule to use to wind a dynamo to obtain a certain number of volts and amperes. How to wind a motor to obtain the best results from a given number of volts and amperes, as six volts twelve amperes, twelve volts six amperes. Is four volts eight amperes as useful for power, as, eight volts four amperes? How many amperes can be safely carried through No. 14, 16, 18, 20 respectively? A. As the length of wire on the armature is mainly concerned controlling in the generation of the current, the first question to be settled in planning a dynamo is the voltage of the current to be generated. In the best dynamos two feet of active wire are allowed per volt. Having determined the amount of wire required for the armature to produce the specified voltage, the next question to be determined is that of the current. The wire selected must be of sufficient size to carry the current without being unduly heated. The next step is to plan the armature, which must be of sufficient length and diameter to hold the wire. It is desirable to limit the depth of the winding so that the iron core of the armature shall not be too far from the polar extremities of the field magnet. The winding should be divided up into as many coils as convenient. After having constructed the armature with a suitable commutator, the iron part of the field magnet should be made in such a manner as to inclose the armature, leaving air spaces between the poles equal to about one-third the diameter of the armature. The field magnet should be constructed so as to permit of using interchangeable coils. For a shunt machine the field magnet should have about fourteen times the resistance of the armature. The amperage of a machine is determined by dividing the E.M.F. by the resistance. It will therefore be seen that if a large current is required, the resistance of the machine must be very low. In designing a motor, the same general rules should be followed, and the total resistance of the machine required to secure a certain power from a given current is determined by Ohm's law, the basis of the calculation being that it requires 746 watts for a horse power, a watt being a volt multiplied into an ampere. It is impossible within the limits of an ordinary reply in Notes and Queries to furnish you with the full information desired. We therefore refer you to Sloane's "Arithmetic of Electricity," $1; Hering's "Dynamo Electric Machines," price $2.50; Hering's "Magnet Winding," price $1.25; and "The Electromagnet," by Silvanus P. Thompson, price $6, all of which we can send you by mail. Nos. 14, 16, 18, and 20 copper wire would carry respectively 6·4, 4, 2·5 and 1·6 amperes.

(3815) M. H. C. asks: 1. Is the current from a primary cell proportional to the surface of the elements exposed to the solution? A. Nearly. 2. In a carbon zinc cell, why is the exposed surface of the carbon so in excess to that of the zinc? A. Depolarization of a battery depends to a large extent upon the carbon surface. If it is large in proportion to the size of the zinc, it is more effective than it is when smaller. 3. Are electric street trailers ever lighted by an incandescent system connected with the circuit of the motor? A. It is common to light electric street cars by the current derived from the power system. We do not know that the light has ever been applied to the trailer. 4. What causes the armature (of a dynamo) to require more power in turning than a fly wheel of the same weight? A. The turning of any conductor in a magnetic field is always at the expense of considerable energy.

(3816) G. F. A. asks: 1. How long does it take to make the vacuum in the incandeseent electric lamps? A. From one to several hours. 2. Does the air pump which is used for this purpose cost a great deal more than a good piston air pump? A. A Geisler or Sprengel air pump costs about $50. 3. Is there any difference between an air pump and a vacuum pump? A. No. 4. What is the ratio of relative brightness used in classifying the stars into their different magnitudes? A. The accepted light ratio of star magnitudes is 2·512 and 0·3981—*i. e.*, a star of the first magnitude is 2·512 times greater than a star of the second magnitude, and a star of the second magnitude is 0·3981 the light ratio of one of the first magnitude, and so on through the series.

(3817) M. R. asks: 1. Can refuse arc light carbons be used in place of square carbons in a battery, and does a rod with the same amount of surface exposed as a square carbon give the same intensity of current? Also tell me how to fasten same to a brass connection post. A. Electric light carbons may be used in a battery, but if they are coppered, the copper must be removed. This can be done by dipping them in nitric acid. After this treatment the carbons should be thoroughly washed and dried, and about one inch of one end of each rod should be heated and soaked with paraffin. These ends can now be electroplated with copper and soldered to the wire connections, or they may be soldered together side by side or fastened together by means of lead cast around their upper ends. The round rod is an excellent form for the purpose. 2. Tell me how to make a white ink to write on a dark background. A. For white ink use barytes or Chinese white and a little gum water. 3. Tell me in what number of the SCIENTIFIC AMERICAN or SUPPLEMENT I can find directions for making a common plunge battery with glass or wooden cells. A. You will find a large plunging battery described in SUPPLEMENT, No. 792. 4. Please tell me what elements were discovered since 1886 and who are the discoverers? A. None have been definitely discovered and identified as elements. The work of Crookes, Von Welsbach, De Boisbaudran and others in the direction of identifying new elements have had no very definite result in the period named. Norwegium, holmium, thulium and many doubtful oxides from the minerals samarskite, gadolinite, etc., cannot be allowed to figure as authentic discoveries of elements. There are still left about twenty blanks in Mendelejeff's table to be filled possibly by newly discovered elements.

(3818) M. E. W. writes: I am thinking of being an electrician. What is the salary of an electrician? What is his work? Does he have to go to college or can he not study as an apprentice? What would be the best studies to take while at school? A. The salaries of electricians vary from $4 to $40 a week. The work required of him is according to his ability. Some parties who only run electric lines call themselves electricians. Others are able to go into the most intricate calculations. If you expect to be an electrician and not an electrical engineer, you can probably gain the necessary knowledge by studying as an apprentice. At school you should study mathematics, physics and chemistry, and if there is a course in electricity, obviously you should take that.

(3819) E. F. B. asks what the surface maasure would be to 1,000 feet elevation, also what the elevation would be to 79 miles surface measure for vision. A. In round numbers the possible range of vision for an observer 1,000 feet elevation for an object on the surface of the earth, and allowing for refraction, is 48 miles. For 79 miles range the necessary elevation, allowing for refraction, is 2,680 feet. Not allowing for refraction, for 1,000 feet elevation we have a range of 44½ miles, and for 79 miles a necessary elevation of 3,180 feet. All this applies to objects on the surface, and is of course subject to limitations of eyesight, clearness of atmosphere, power of telescope, etc.

(3820) F. C. G.—To remove fruit stains from table linen moisten with dilute sulphuric acid and then rub with aqueous solution of sulphite or hyposulphite of soda in water.

(3821) Index.—In regard to the solidification of potatoes the process is not patented and is said to be as follows: Make a solution of 4 parts of sulphuric acid in 50 parts of water. Treat peeled potatoes with this solution for thirty-six hours. Dry the mass between blotting paper and subject to great pressure. By using very strong pressure, billiard balls have been made closely resembling ivory. The material can be carved and doubtless could be used for the larger types. We have had no practical experience with this receipt or the substance described.

(3822) W. B. S. asks for the voltage and resistance of a Fuller battery, and how many cells would be required to light a two candle incandescent lamp, a three candle and four candle. A. The voltage is about 1·90 when in good condition. The resistance will depend on size; ⅓ ohm would be a fair average. Allow one cell to a candle power.

(3823) W. E. S. says: Three men are to lift a timber 18 feet long, weighing 200 pounds, and each to sustain one-third the weight. One to lift from the end and the two others to support their end by means of a cross bar. How far from the end must the two men place the cross bar to bear two-thirds the weight? A. The cross bar should be placed 4½ feet from the end of the timber for three men to carry it with even load.

(3824) J. K. asks how to solder metal to glass. A. We give you the following from the "Scientific American Cyclopedia of Receipts, Notes and Queries:" "Cover the glass with a thin layer of platinum, by brushing a neutral chloride of platinum mixed with essential oil of camomile. The oil is slowly evaporated by heat, and when the vapor ceases to be given off, the temperature of the glass is raised to a red heat. This reduces the platinum salt to a metallic state. The platinum thus attached to the glass is electroplated with copper. The article to be attached can be secured by electro soldering, or by means of soft solder applied in the usual way to the coppered glass."

(3825) J. L. says: 1. Lately I was vulcanizing India rubber in a Hay's vulcanizer. The safety point is about 320° temperature, but it got up to about 390. I immediately shut off the gas and opened the window, when somebody said that it would be dangerous to do so. Now, would the act of raising that window have any effect upon the vulcanizer or the contents? A. We can see no danger in opening the window under the circumstances stated, and only a cooling effect. 2. What is the cause of the bursting of an emery wheel? A. The bursting of emery wheels may be from defects, as a flaw or a crack unnoticed on the outside, or from too great speed. 3. Do you think that a small drill could be operated by springs, they (springs) furnishing the power. Could you give any hints as to how it could be done? A. Spring motors are practicable for small drills. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 46, 47, 48, 50, 473, for illustrated descriptions of spring motors.

(3826) L. A., Jr., asks: 1. What is the best dressing for leather belts to prevent slipping? Rubber belts the same? A. Rub a little beeswax on the inside of leather or rubber belts, to make them stick. This does not injure the material. 2. How much heat may be obtained by placing 1,000 ft. of one inch steam pipes, charged with 80 lb. steam pressure, in the basement of a 16 ft. square kiln? A. You should be able to obtain from 150° to 200°, according to construction and closeness of the room. 3. Is not mutton tallow and cut rubber mixed a good leather boot waterproofing? What can you recommend? A. You will find your mixture to stiff and difficult to mix. Try 1 oz. beeswax, ½ oz. suet, 2 oz. olive oil.

(3827) E. A. D. asks: What is the so-called "photographic process" of printing? For instance: I heard a bookseller remark to a purchaser: "This book is not as clearly printed as the original, for it was printed by the photographic process." A. The bookseller probably meant that the book was made from copied printing plates produced by the photographic process. Of each printed page of the book to be copied, a photo-negative is made. A photo print from the negative is made on sheet zinc. This is etched with acid, which eats out all the parts of the plate except the printed letters and lines, thus producing a printing plate without the need of setting types. Books are copied in this way.

(3828) G. H. asks: 1. How can meerschaum be colored artificially? A. Fill the pipe and smoke down about one-third, or to the height you wish to color, leaving the remainder of the tobacco in the pipe undisturbed for several weeks, or until the desired color is obtained. When smoking, put fresh tobacco on top and smoke to the same level. 2. Have there ever been "professional fasters" in any other country than America? A. As human nature is pretty nearly the same the world over, we think you will find cranks of the class named in every country under the sun. 3. Where does the water exert the greatest pressure against the sides of a moving vessel (steam boat)—at the bow or at the stern? A. At the bow.

(3829) A. McB. asks: 1. What proportion should the resistance of the field magnets be to that of the armature of a motor in order to secure the best results? A. In the shunt machine the resistance of the field magnet should be about fourteen times that of the armature. 2. Is the resistance of a drum armature one-half or one-quarter of the original resistance of the wire? A. One-quarter. 3. Are there any other numbers of the SCIENTIFIC AMERICAN or SUPPLEMENT that have anything in them about photo-engraving, besides SUPPLEMENT, No. 612? If so, give me numbers please? A. You will find photography and photo-lithography described in SUPPLEMENT, Nos. 656, 603, 642, 501, and 749.

(3830) A. D. B. writes: In the gas engine, the charge is taken in before compressing fills the same space in which it expands. What I wish to find out is this: Would I derive any more power from the same amount of gas (compressed just the same as in the first illustration) if allowed to expand to say one-half greater volume than in the first case. That is to say, if I increase the length of stroke one-half, leaving the volume of gas the same with the same compression, how much, if any, would I gain in power? And how far could I carry that principle in practice? A. If the gas engine utilizes the pressure exerted by the expanding gases to such an extent as to reduce the pressure at the point of exhaust to such a degree that it would be no longer available in driving the piston, it is obvious that an increase of stroke would not increase the efficiency of the engine; but if, on the other hand, the exhaust takes place while the pressure is still great in the cylinder, an increase in the stroke would be beneficial.

(3831) D. McN. asks how to waterproof cloth without using rubber? A. Soak the clothing in a weak solution of alum; afterward immerse it in strong soapsuds; then rinse it in clear water and dry.

(3832) H. B. D. asks: How can I ebonize a piece of white holly for inlaid work? A. Steep the wood in strong liquor of logwood or galls; let it dry and wash it over with a solution of iron sulphate. Wash with clean water and repeat if the color is not dark enough.

(3833) A. M. asks: 1. How can I give to steel the right degree of hardness for permanent magnets? A. Heat the magnets to a low red; plunge them in water and draw the temper to a straw color. 2. How are the Burnley dry cells made? A. To secure the details of this battery, you should purchase a copy of the patent in which it is described. 3. What size of platinum wire will become red hot with current from three cells of battery? A. It depends upon the amount of current generated by the battery. Usually very fine wire, either No. 34 or No. 36, is used. 4. How can I make a galvanic battery in which there will be no chemical action except when the circuit is closed? A. There is very little action in the Leclanche battery when the circuit is open. You will find this battery described in SUPPLEMENT, No. 157.

(3834) C. M. M. asks: 1. Whether hydrogen gas has been introduced for purpose of domestic heating? A. It has not, owing to the expense of generating it. The nearest approach is the Dabereiner lamp, introduced early in the century to do what matches do now. 2. If no such apparatus is known in the trade, what kind of gas has been found most practicable for use in private houses out of town? A. Gasoline gas, made by passing air over the surface of gasoline.

(3835) G. R. F. asks what to use, as of a kind of varnish, to put on a rubber hose used for gas, to prevent the smell of gas which comes from it, I think, through the pores of the said rubber hose? A. Try shellac varnish applied to the interior. A good hose should be practically gas tight. A solution of shellac in strong ammonia water is one of the regular varnishes for india rubber goods.

(3836) F. Z. C. writes: I have tried to recharge a porous cup of Leclanche battery in the following way, but cannot get a current, although set up the same as a new cup. Bits of carbon from electric light lamp and powdered black oxide of manganese nearly equal parts. Where is the trouble? Is it because I did not use the granulated manganese? Please locate fault. A. We can see no reason why you did not succeed with your battery. Possibly you failed to wet the carbon and manganese mixture in the porous cell before trying to start the battery. You may have sealed the porous cell so that the air cannot escape to permit the solution to enter. There should always be one or two air holes in the sealing at the top of the cell.

(3837) E. N. asks: Can you inform me how to make an emulsion of cod liver oil? A. Take 8 oz. cod liver oil; 2 oz. gum arabic in powder; 3 oz. water. Rub up the oil and gum, and then add the water. Of this concentrated emulsion take 13 oz.; oil of wintergreen, 24 drops; simple sirup, 1 fl. oz.; water 3 fl. oz. Triturate the concentrated emulsion and oil of wintergreen together, and then add the water and then the sirup. Other formulas are given in the "Scientific American Cyclopedia of Receipts."

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