ENGINEERING INVENTIONS.

A rotary engine has been patented by Mr. John W. Emerson, of Opoka, Fla. It has a driving wheel with a central passage, and curved passages radiating therefrom to and through the periphery of the wheel, to receive and discharge the steam or other driving fluid admitted under pressure through a hollow shaft of the wheel from a supply pipe.

An automatic railway gate has been patented by Mr. James K. Patterson, of Crete, Neb. It has main bars pivoted to a side post, and pickets hinged to the bars, so that as the gate is lifted vertically by the weight of an approaching train, the pickets will hang down somewhat as a fan closes, and after the train has passed the gate will come down in place mainly by its own gravity.

AGRICULTURAL INVENTIONS.

A corn planter has been patented by Mr. John A. Cherry, of Roads, Mo. By this device the corn is clucked by knife blades mounted on a revolving axle, which mark the ground at every hill of corn deposited, and the weight of the driver is utilized to effect the desired pressure on the runners and wheels for working the marking knives.

A seed planter has been patented by Messrs. James A. Roden and Nicholas C. Morgan, of Deerbrook, Miss. It is more especially intended for planting cotton seed, and provides means whereby the seed discharged at one time can be regulated, the soil packed upon the seed and the top of the row rounded and the plows adjusted to work at any desired depth or be supported above the ground.

MISCELLANEOUS INVENTIONS.

A revolving sign has been patented by Mr. John F. Bengert, of Brooklyn, N. Y. This invention covers a manner of constructing signs in such way that they will be revolved by the wind, and thus attract attention, the construction being simple, and signs so put up not liable to get out of order.

A lathe chuck has been patented by Mr. Edward Pement, of Esmond, Dakota Ter. This invention relates to improvements on a recently patented improvement of the same inventor, and provides a simplified construction, intended also to render the chuck more effective.

A blind slat adjuster has been patented by Mr. Peter Rundquist, of New York city. The slats have end recesses, and cranks with side lugs on their stems engage with these recessed ends to turn the slats, while the slats can thereby be readily adjusted to any desired angle.

A cabinet for tobacco, cigars, etc., has been patented by Mr. Charles N. Swift, of New York city. It has a water receptacle and novel construction of capillary conductors, whereby the air throughout the interior of the cabinet may be kept at uniform humidity, and the degree of moisture may be readily regulated.

A ticket case has been patented by Mr. William M. Stevenson, of Adelaide, South Australia. Combined with a containing case and its inclosed spring pressed follower is a sliding cap with slots to receive lugs on the follower, whereby tickets may be forced out of the case one at a time as desired.

A vegetable grater has been patented by Mr. Peter Blum, of Orrville, Mo. It is made in cylindrical form, of sheet metal, punched to form the cutting points, and attached at one end to a circular head, the opposite end being open, through which the grated material is discharged, the cylinder being revolved by a crank.

An embroidering machine has been patented by Fridolin Schnelle, of West Hoboken, N. J. This invention relates to improvements on the Heilman or Swiss embroidery machine, with special reference to those designed for embroidering handkerchiefs, and relating particularly to the construction of the immediate attaching frame carried by the tambour frame.

A draught equalizer has been patented by Mr. Joseph M. Langston, of Berlin, Ill. It is a device adapted for use with four horse teams, and so constructed that with its use an equal amount of the load will be drawn by each animal, the invention being an improvement on a former patented invention of the same inventor.

A swimming apparatus has been patented by Mr. William J. Corbett, of Tucson, Arizona Ter. To the under side of a plate made to conform to the bottom of the foot is pivoted a blade frame carrying a novel construction of feathering web, giving a broad surface for the stroke, which surface is diminished on the return movement of the leg.

A clamp for stopping leaks and bursts in pipes has been patented by Mr. William W. Knight, of Jersey City, N. J. It has a side opening and interior recesses at the opposite sides, with a pad of leather, copper, or other suitable material, concaved saddle, and key, whereby the pad and saddle can be readily forced down upon a pipe and held in place.

A water elevator has been patented by Mr. Robert C. Dugan, of Millersburg, O. This invention covers special devices for lifting water by a windlass from wells, in connection with a carrier, with pulleys, by which the water may be carried horizontally to a distance and delivered in a spout or as otherwise desired.

A mechanical movement has been patented by Mr. Frederick Reed, of Solomon City, Kansas. This invention covers a novel arrangement and combination of parts by means of which motion can be transmitted from one crank to another, or from a reciprocating bar to a rotating crank, or from a crank to a reciprocating bar, avoiding dead centers.

A fetter for cows' tails has been patented by Mr. Benjamin S. Slinn, of Spring Valley, N. Y. It consists of an anti-switching attachment, made with a rod having spring clamps, whereby the attachment can be readily applied to and detached from a cow's tail, to prevent the cow from switching her tail in the milker's face.

A safety attachment for watch pockets and similar uses has been patented by Mr. John H. Barnes, of Greencastle, Ind. It has a plate to be secured to the pocket with a chain-supporting hook and a lock, with a watch-securing device, whereby the watch may be made fast and the chain passed up over the hook, so that any strain only binds the watch more firmly.

A mail bag catcher has been patented by Messrs. Ethan Allen and William H. Harrod, of Sellersburg, Ind. It is attached to a crane or post at the side of the tracks, and so made that at the same time a pouch is taken from the crane by the gripper on the car a pouch is taken from the car by the gripper on the crane, a bar being reversible to catch pouches on trains running in either direction.

A gas pressure regulator has been patented by Mr. Robert F. Hatfield, of New York city. Combined with the inlet pipe and regulator having valve apparatus operated by the gas pressure is a float and attached valve operated by the rise and fall of the liquid constructed in such manner that the float valve and the regulator valve shall be independent of each other.

A telegraph sounder has been patented by Mr. Alphonso S. Keating, of Corry, Pa. The invention consists of a novel combination with a magnet coil of a pivoted armature in which a diaphragm is held, to be used as a telephone when the telegraph signals cannot be understood readily, or as a telegraph instrument when the telephonic communications are rendered indistinct by induction.

A soldering iron has been patented by Mr. Henry M. Dixon, of New York city. The larger or tip end is countersunk, with an oblique perforation, in which is removably fitted a copper tip, that may be replaced by another of different shape, according to the work required, the construction being such as to give the greatest amount of metal to retain the heat at the working end of the stock.

A machine for sawing hoop poles has been patented by Mr. Edwin Powell, of Williamsport, Pa. This invention provides a machine with which the hoop may rest flat at the point of sawing, whether the pole be bent or straight, so that crooked poles may be cut with greater facility, and the gauge is simple, held rigidly at right angles to the saw, and moving freely therefrom in the arc of a circle.

A watchmaker's screw driver has been patented by Mr. Oliver L. Neal, of Waltham, Mass. It is also adapted for holding and working a drill, and has a flexible thumb and finger pieces to allow them to be bent according to the hand of the operator, in working a miniature pinion wheel and rack bar, whereby a screw can be turned in or out at one movement or a drill rapidly rotated.

A combination folding bed has been patented by Mr. Abraham T. McCurry, of Goodland, Ind. It is adapted for construction with a bookcase or other upright article of furniture, having an apartment at the top for bed clothing, the bedstead being attached by plates to corner irons in the case, which irons constitute two of the legs of the bedstead when it is lowered to a horizontal position.

A bark cutting machine has been patented by Mr. John C. Hagerty, of Santa Cruz, Cal. It has a rotating wheel within a suitable casing, the wheel being provided with knives, which cut off the ends of the bark as the latter is fed down a chute, the cut off ends of the bark being carried inward toward the hub of the wheel and then inward ejected to fall downward through an opening in the bottom of the casing.

An apparatus for dyeing has been patented by Messrs, John O'Connell and Frank E. Weeden, of Providence, R. I. Combined with operating and supply tanks and a force pump is a system of pipes, and other novel features, intended to dye, wash, under pressure and a continual stream of either liquor, air, or gas, wool in the fleece, card balls, roving and yarn, in hank or in spools, as well as cotton, flax, and jute, and other fibrous or woven materials.

A pump has been patented by Mr. Hiram M. D. L. Babcox, of San Francisco, Cal. The air chamber has an open lower end combined with the plunger, the upper enlarged end of the pump case, and an enlarged upper air chamber with a lower open end, and the combination with these parts of the working barrel with a surrounding water space, the invention being an improvement on a former patented invention of the same inventor.

A damper regulator has been patented by Messrs. Charles A. McDonald and Charles W. Townsend, of Portland, Oregon. This invention covers means whereby a positive action or direct pressure of the working vapor, gas, etc., is used to close the damper or valve, also means for providing for the escape of the vapor or gas after it has performed its work, and for draining the connections of fluid or condensed vapor. The same inventors have likewise patented a damper regulator for steam boilers on the same principles, but especially applicable to controlling the dampers in the ash pans of locomotive steam boilers.

A billiard cue tip fastener has been patented by Mr. Henry A. Harmer, of East Newark, N. J. This invention consists in the combination, with a cue tip, of two half screws or pins having prongs passed into the tip, the half pins or screws being secured in the end of the cue, and thus holding the tip on the end of the cue, or the fastening may thus be permanently made with glue. For State rights for this patent apply to J. Harmer, 236 Harrison Avenue, East Newark, N. J.

NEW BOOKS AND PUBLICATIONS.

THE PRACTICAL ESTIMATOR. By J. D. Sibley and A. O. Kittredge. New York: David Williams, 1885.

Furnishes in a compact form some very good hints upon how an estimate should be prepared, a complete list of the items to be considered, and a table of rules and formulæ for calculating quantities. With this assistance he can go to work at once, without puzzling himself as to whether anything has been forgotten.

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Iron, Steel, and Copper Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn.

Metallic Pattern Letters and Figures to put on patterns of castings. H. W. Knight, Seneca Falls, N. Y.

The Beginning of Consumption.

Blotches, pimples, eruptions, "fever sores," ulcers, and enlarged glands are but so many *outward* manifestations of poisonous and scrofulous humors in the blood, which sooner or later are apt to attack the delicate tissues of the lungs, causing ulceration and consumption of these organs. Be wise in time and use Dr. Pierce's "Golden Medical Discovery," the greatest blood purifier, pectoral, and strength giver yet known to medical science. It cures all these dangerous maladies having their origin in the blood, if taken in time.

Tunneling Under the Hudson River. Giving full particulars of the prosecution of the work thus far. With working drawings, in 27 handsome plates, showing all details. By S. D. V. Burr. $2.50.

Catarrh, Catarrhal Deafness, and Hay Fever.

Sufferers are not generally aware that these diseases are contagious, or that they are due to the presence of living parasites in the lining membrane of the nose and eustachian tubes. Microscopic research, however, has proved this to be a fact, and the result is that a simple remedy has been formulated whereby catarrh, catarrhal deafness, and hay fever are cured in from one to three simple applications made at home. A pamphlet explaining this new treatment is sent free on receipt of stamp by A. H. Dixon & Son, 305 King Street West, Toronto, Canada.—*Christian Standard.*

Wm. Frech, Manufacturer of Sensitive Drills, Turret and Speed Lathes, Power Punching Presses, 68 W. Monroe St., Chicago.

Modern M'ch. Tools a specialty. Abbe Bolt Forgers, Power Hammers, Lathes, Planers, Drills, and Shapers. Send for estimates. Forsaith M. Co., Manchester, N. H.

To Manufacturers.—The owner of 260 acres of ground at Pittsburg, on the Allegheny River and Pennsylvania system of railroads, in order to improve the property, offers to donate a number of excellent manufacturing sites. See adv. of Whitney & Stephenson, this issue.

Order our elegant Keyless Locks for your fine doors. Circular free. Lexington Mfg. Co., Lexington, Ky.

Geo. E. Lloyd & Co., Electrotype and Stereotype Machinery, Folding Machines, etc., Send for catalogue. Chicago, Ill.

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Grimshaw.—Steam Engine Catechism.—A series of thoroughly Practical Questions and Answers arranged so as to give to a Young Engineer just the information required to fit him for properly running an engine. By Robert Grimshaw. 18mo, cloth, $1.00. For sale by Munn & Co., 361 Broadway, N. Y.

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Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Wood Working Machinery. Full line. Williamsport Machine Co., "Limited," 110 W. 3d St., Williamsport, Pa.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Curtis Pressure Regulator and Steam Trap. See p. 350.

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Cyclone Steam Flue Cleaners are the best. Crescent Mfg. Co., Cleveland, O.

Curtis Pressure Regulator for Steam Heating Apparatus, Waterworks, etc. Curtis Regulator Works, Boston, Mass.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 93.

Magic Lanterns and Stereopticons of all kinds and prices. Views illustrating every subject for public exhibitions, Sunday schools, colleges, and home entertainment. 136 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., New York.

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Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

Pattern and Brand Letters, Steel Punch Letters. Vanderburgh, Welis & Co., 110 Fulton St., New York.

Astronomical Telescopes, from 6″ to largest size. Observatory Domes, all sizes. Warner & Swasey, Cleveland, O.

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.
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.
Minerals sent for examination should be distinctly marked or labeled.

(1) J. W. asks: Will you please inform me, through the correspondence column of the SCIENTIFIC AMERICAN, of what the prisms of a Leclanche battery are composed? A. They are formed of granulated oxide of manganese, and a small percentage of cement material, such as shellac. 2. Is it necessary in all cases, in the construction of a dynamo machine or electric motor, to use a smaller gauge of wire on the armature than on the electro magnets, and if so, in what ratio is the difference generally made? A. The winding of the armature and field magnet of a dynamo electric machine depends altogether upon the use to which the machine is to be applied. It is not always necessary that the wire of the armature should be smaller than that of the field magnet. In Edison's large machines the winding of the armature consists of large copper bars, while the winding of the field magnets consists of wire very much smaller than the copper bars of the armature. 3. Is the carbon taken from gas retorts identical with that used in electric batteries. If so, how is it prepared? A. It is of the same character, but of better quality than is generally employed. Battery carbons are generally prepared from selected pieces of coke, pulverized and mixed with carbonizable cement, and afterward carbonized in a closed retort.

(2) E. M. D.—Oil barrels are painted with glue and any cheap color. Where large quantities are used, the color and glue, of the consistency of oil, is run through a paint mill. Chalk or whiting tempered with yellow ocher or indigo blue is the color generally used. It is not for sale mixed. The paint trade can furnish the materials.

(3) G. W. D. asks: Can vinegar be deodorized without impairing its efficacy? A. The odor of vinegar will be lessened by filtering the fluid through charcoal. Its strength will not be impaired by this process.

(4) A. C. J. asks: What is the best way to clean alabaster? A. Soap well, and wash with hot water. If stained, apply fuller's earth, pipe clay, or whiting for three or four hours, then wash off. If very dirty and stained, first wash with nitric acid diluted with water.

(5) W. B. asks for a formula for making flint glass. A. The following quantities form a very excellent glass:

Fine white sand	300 parts.
Red lead or litharge	200 "
Refined pearl ashes	80 "
Niter	20 "

Arsenic and manganese, a small quantity.

(6) R. C. B. writes: A bets B that there is only one pair of driving wheels on a locomotive. B bets A there are two pairs. Which is correct? A. All are driving wheels that are connected with the cylinders, directly or indirectly.

(7) W. R. C. writes: I am interested in building a small steamer. I have an engine 8 inches in diameter and 8 inches stroke. Cutting off steam at half stroke, what heating surface will I require to keep 100 pounds pressure running at 300 revolutions per minute? Also, can a single slide valve be used to cut off steam at half stroke advantageously? A. You will require 434 square feet of heating surface in your boiler. A single slide valve can be made to cut off at half stroke, economizing 86 per cent of the initial pressure, for which the lap should be arranged for the cut off at half stroke. We recommend you McCord's "Practical Treatise on Valve Gear," which we can furnish for $3.

(8) R. F. desires a good cement that will cement asbestos, one that does not contain grit. A. See the article on "Cements," contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158. Ordinary glue would be all that is necessary if the asbestos is to be used with wood.

(9) W. A. O. asks for a simple method of testing coal oil. A. A simple petroleum tester is described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 289.

The principle underlying petroleum examination is the determination of the temperature at which the oil takes fire or flashes. Heating a sample in a cup over a spirit lamp and applying a burning match or taper to the surface until the oil flashes, and noting the temperature, is the crudest plan that can be adopted. Good oil should flash only above 110 deg. F.

(10) C. J. H. writes: There are many houses in Leadville whose ceilings, in lieu of lath and plaster, are covered with canvas and calcimined. In many cases, leakages of water from the roofs or upper floors upon the canvas have caused fantastic stains to appear, which will not "out" by covering with calcimine. A. The calcimine has not sufficient body by itself to cover the stains. By mixing with it zinc white, the difficulty will be overcome.

(11) S. N. H. asks: 1. How to make an article known as aureoline, for bleaching the hair. A. The substance called aurcoline is simply hydrogen peroxide perfumed. See description of its manufacture in SCIENTIFIC AMERICAN SUPPLEMENT, No. 184, also consult the article in No. 339. 2. The receipt for a liquid that is used to "show up" microscopes. It resembles a thin flour paste, but when viewed through a small microscope it reveals innumerable animalcules. A. The substance is tripoli or infusorial earth, sometimes called diatomaceous silica.

(12) W. M. R. asks: 1. How to set a common slide valve in a stationary, locomotive, or marine engine. A. To explain slide valve adjustment for various kinds of engines would take up too much space for the department of Notes and Queries. We recommend to you a book on "The Slide Valve Practically Explained," by Rose, $1, or "The Side Valve," by N. P. Burgh, $2, and "A Practical Treatise on Valve Gear," by McCord, $3, all or any of which we can furnish. 2. What is the rule for calculating the safe working pressure of steam boilers when the material dimension of construction is known? A. For cylindrical boiler shells, divide the tensile strength of the iron by the diameter of the shell in inches. Deduct one-half of quotient for single rivets, or one-third, if double riveted. Multiply the remainder by twice the thickness of the iron in decimals of an inch, and divide this sum by 4, as a factor for safety in working pressure. Thus for a cylindrical tubular boiler of good iron and well stayed heads, 48 inches diameter, say for tensile strength of 48,000 pounds to the square inch, with five-sixteenths inch shell, double riveted, we have 48,000 ÷ 48 inches = 1,000 less one-third = 667 × 0·625 = 416·8 ÷ 4 = 104 pounds maximum of safety. 3. What is the rule for calculating pressure of water to the square inch when the height is known? A. Multiply the height in feet by 0·433.

(13) C. N. V. C. asks: 1. How to tune up a set of glasses to use as musical instruments? A. Tones of musical glasses are dependent on the glasses and the amount of water used, this being determined by ear. 2. Where can the juice of the fruit of cajurio tree be obtained, and at what price? A. There is no such tree known to botanists. 3. Is there any cure for drunkenness, such as chloride of gold and other remedies? A. We have but little faith in cures for drunkenness. The taking of medicine will not produce abstinence in an individual. It is a question of will power. The so-called double chloride of gold is said to consist of:

Ammonia chloride .....1 grain.
Aloine .....2 grains.
Compound tincture of cinchona.....3 ounces.
Water to make up.....4 ounces.

No gold is found in the preparation, and therefore its name is not even reliable.

(14) C. H.—The continued application of any preparation of lead to the skin is full of danger. It can, beyond question, cause paralysis and other forms of nervous disturbance.

(15) J. H. writes: With 5 pounds of pressure (steam), how many feet or inches or what surface does it require to heat one hundred square feet of glass roof and sides of a greenhouse in order to maintain a night heat of 55 to 65 degrees in the house, while the thermometer outside ranges at 15 to 20 degrees below zero. Also, the boiler surface necessary, etc.? A. One square foot of heating surface to 8 square feet of glass. Wrought iron pipe is the best for steam. Place along the sides of the house, both below and above the benches, 1½ or 2 inch pipe, according to size of house. The boiler should have 1 square foot of heating surface to 6 square feet of radiating surface, and should have the water level in boiler not less than 4 feet below the floor of greenhouse. A horizontal tubular boiler is the best and most reliable. Steam heating for greenhouses requires that the fire should be stoked during the night as well as day. It is therefore not economical for small houses.

(16) H. W. asks for the best remedy to deafen a floor after the floor is laid, but not yet sealed? A. Nail furring strips on the sides of the beams 2 or 3 inches above their lower edge, and lath and plaster. Then cross-fur the beams with strips and lath and plaster for the ceiling.

(17) A. L. asks: What flux is used with hard solder? A. The usual flux for hard solder is borax. The common method of preparing it for use on small work is to grind it up with water into a cream on a slate or porcelain slab, and apply it to the joint and to the solder with a brush.

(18) J. G. S. asks: What can I mix with lead to make it harder to bend, and no harder to melt, for small castings in plaster moulds? A. A small percentage of antimony. Try type metal; it is an alloy of lead and antimony.

(19) W. S. asks if there is any simple way of making it more difficult to pick a watch from a vest pocket. I have had one watch picked out of my pocket, and don't care to lose another. A. Various kinds of safety pockets are in use, but probably the best way to prevent the removal of your watch from your pocket would be to wear a stout auxiliary chain around your neck, and carry it through the armhole of your vest.

(20) W. M. H. asks: What are the reasons why electric clocks (regulated by a chronometer in electric connection with them) are not in more general use in towns? A. We believe that the use of such clocks is constantly increasing. Probably they would come into more general use if it were not for the cheapness and reliability of common clocks.

(21) W. E. S. P. asks: What metal, if any, held near a permanent magnet, will strengthen the magnet? Can it be done in any way other than that commonly employed in the telephone? A. No metal in its normal condition, held near a magnet, will strengthen it, but by winding the magnet with copper wire, or any other electrical conductor, and sending a current through the conductor, you may increase the strength of your magnet.

(22) C. W. M. asks: What substance placed between a piece of steel and a magnet will stop the attraction of the steel to the magnet, that is, having the steel about an inch or so from the magnet? A. A large body of iron placed near or in contact with the pole of a magnet will asborb its magnetism; but no insulator of magnetism has been discovered.

(23) L. G. asks: Which wagon draws the lighter—the one with large wheels or the one with small wheels? A. The wagon with the larger wheel, as the leverage of a large wheel over obstructions is greater than that of a small wheel.

(24) W. L. C. asks: 1. Why would not a rapidly revolving disk of soft iron cut stone same as it does cold iron rails? A. We think the stone would rapidly wear away the soft iron disk. You could not expect to get the same effect upon the stone that is realized in the case of iron. 2. How can I harden iron or steel to make teeth for circular saw to cut stone? It is impossible to keep "borts" firmly in the saw. A. We do not think you can harden iron or steel so that it will answer for the teeth of circular saws for cutting stone, because the extremely hard steel is too brittle to maintain a cutting edge. Probably the best way to make steel extremely hard is to heat it to the required degree for hardening, and then plunge it into mercury. Care should be taken not to inhale the fumes of the mercury.

(25) W. H. H. asks: Will you tell me if the chrome battery is equivalent to two crowfoot batteries, and will they work on a ground connection for a telegraph line, and if so, how are they made up? A. One cell of bichromate battery when first set up is equal to two cells of gravity battery, but it rapidly runs down, so that the fair average would probably be about 1½ volts, and about 1½ times the electromotive force of a cell of gravity battery. For information on batteries consult SUPPLEMENT, Nos. 157, 158, and 159.

(26) W. C. R. writes: In making the dynamo electric machine of the SUPPLEMENT, No. 161, I am told by an electrician, connected with the electric light plant in this city, that the numbers 18 and 14 are not the best sizes to use, that a finer wire on the armature would increase the intensity, etc. A. The sizes of wire given for the dynamo described in SUPPLEMENT, No. 161, were for general purposes. Of course, if you desire a current of high tension, you can procure it only by the employment of finer wire. On the other hand, if you desire a current of low tension, for electro plating and similar purposes, you will need to wind your armature with No. 14 or 16 instead of 18, and the size of the wire on your field magnet should be correspondingly increased.

(27) J. R. W. asks: How is it that the ticking of the telegraph instrument can be heard over the telephone wire if the wires of each instrument run parallel with each other for a short distance? A. The ticking produced in the telephone is caused by the electrical impulse passing over the telegraph line. It is simply a matter of electrical induction.

(28) C. E. K. asks: Can persons learn telegraphy themselves, and receive by sound with an instrument without the aid of any one? A. We think you could attain fair proficiency in telegraphy by studying the subject with the aid of a suitable instrument, but you might fall into habits which could not be easily corrected. Better consult some good operator from time to time during your study and practice.

(29) F. H. F. asks: In what way are the teeth cut in wood saws, hack saws, and gig saws? A. In the smaller sizes they are generally cut in a milling machine; a number of saws being clamped together, so that one row of teeth will be cut through the whole series by one operation. The teeth in larger saws are cut one at a time by means of dies.

(30) C. A. Y. asks: 1. How large a gravity cell will it take to swing a one second pendulum which weighs about ten pounds, and how large should the electro-magnet and the wire thereon be? A. If your pendulum is properly constructed, two to three gravity cells ought to keep it in motion. You will probably require a magnet with cores ⅜ inch in diameter and 1½ inches long, wound with about six or eight layers of No. 24 wire. 2. By what process is the great heat obtained from the gasoline stoves or machines now used for analyzing and melting specimens of ore? A. The flame is urged by means of a blowpipe. Petroleum burners, on the principle of the atomizer, produce very intense heat. 3. How close may the flues be placed in a boiler to generate steam with the greatest rapidity for the amount of water? A. This depends so much on the diameter of the flue, the size of the boiler, and its position, that we are unable to give you a definite reply. However, half the diameter of the flue is probably a good distance for horizontal boilers.

(31) C. D. V. asks (1) how to make a storage battery which will give from 4 to 5 volts, its width and length not to exceed 4 inches, nor the thickness 1⅛ inches. A. We do not think a storage battery can be made to fulfill your conditions. A storage battery, to yield a current having an electromotive force of from 4 to 5 volts, will occupy considerably more space than 4x4x1⅛ inches. 2. Also tell me how long 16 Fuller bichromate cells, which are used to run a 16 candle power incandescent lamp, will last without renewal? A. We think you will find it impossible to run a 16 candle lamp with 16 Fuller bichromate cells. The Fuller bichromate battery is not so well adapted to continued use as the Bunsen bichromate battery. The Bunsen battery requires renewal once in from 4 to 6 days.

(32) W. G. asks how to make a battery to be carried in a belt, the two poles of which I want to apply to the body by means of conducting cords and disks; one that will last a week or so without recharging. Do not want a very strong current, or it will burn the skin. Something that will take the place of an electric belt. A. To make such a battery as you require, take a plate of zinc and a plate of copper of the same size, and cut 24 sheets of blotting paper about the size of the plates, saturate 12 of the sheets of blotting paper with a saturated solution of sulphate of copper, and saturate the remaining 12 sheets of blotting paper with a weak solution of sulphate of zinc. Place the two packages of blotting paper together, then apply the copper plate to the paper saturated with the sulphate of copper, and the zinc plate to the paper saturated with sulphate of zinc; now solder a wire to each plate and connect the wires with your electrodes. The plates, together with the wet paper, may be wrapped up in thin sheet rubber, or you may make a rubber case for inclosing the battery.

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