RECENTLY PATENTED INVENTIONS.

Engineering.

FURNACE TAP.—Edward P. Mathewson, Pueblo, Col. This invention provides means whereby the operator may drive an agitating bar into the molten metal in the hearth or crucible, without stopping the blast or otherwise interfering with the regular process of smelting. A casing fastened to the furnace front has a matte hole and a slag discharge hole, a slag casing being arranged over the matte hole in front of the first casing, and there being slag spouts adapted for vertical adjustment in guideways in the sides of the slag casing.

PISTON ROD PACKING.—Thomas J. Hudders, St. Paul, Minn. This improvement is adapted for use in an ordinary gland or stuffing box, and is arranged to adapt itself to any irregularity in the movement of the piston rod. A concave annular seat is fitted to the stuffing box cap, a sleeve with a collar at or near its center, having a concave surface fitted to the annular seat, and provided with internal circular grooves at opposite ends, while a spiral spring in the stuffing box is arranged to press the sleeve outwardly against the seat. A packing ring of circular cross section is fitted in the grooves. The labor and delay of packing a piston rod is thus obviated, and friction and wear are reduced to a minimum.

LOCOMOTIVE BOILER.—Thomas A. Henderson, Bucyrus, Ohio. This invention provides a readily removable baffle plate and an adjustable deflecting apron secured to its bottom, instead of the baffle plate riveted in the smoke box, according to the usual practice. Under the old method of construction, when a flue bursts, or repairs are needed, the removal of the baffle plate is a work of some hours, which time is saved by means of this improvement.

Railway Appliances.

AUTOMATIC AIR BRAKE COUPLING.—William A. and Benjamin S. H. Harris, Pelzer, S. C. Two patents have been granted these inventors for improvements on couplers formerly patented by them, the main features of the improvements consisting in coupling heads with self-acting valves and locking mechanism, in connection with a supplemental air pressure pipe extending at the side of the brake pipe throughout the train, whereby the brake pipe sections attached to different cars couple and uncouple automatically. When accidentally parting when the train is running the brakes are instantly applied, according to this improvement, not only to the separated cars, but to those that remain connected with the locomotive. The valves of the couplings may also be closed at will by the engineer, preventing the application of the brakes whenever desired. One of the patents is specifically for a new valve locking and releasing mechanism, whereby certain important advantages are obtained in the automatic application and release of the brakes.

STREET CAR FENDER.—George Hipwood, Horatio C. Barrett, and Stephen Porter, Boston, Mass. In lugs depending from either side at the front of the dashboard is journaled a horizontal shaft actuated through bevel gears by a rod provided with a crank handle, and at each end of the shaft is a hollow tube in which is held a spring-pressed rod, the rods being united at their forward ends by a cross bar, forming the outer end of the fender proper. Intermediate spring-pressed bars are also connected with the cross bar, beyond which extends a series of curved, pivoted shoes, cushioned at the rear, and with their forward ends resting on rollers adapted to roll on the ground. The spring-pressed frame is covered by a network, and the shoes are adapted to rock and throw back into the net, without injury, any one accidentally in the track of the car, the toes of the shoes coming down very close to the ground. The device folds up against the dashboard when not in use.

Agricultural.

PLANTER.—Robert B Ormiston, Winnipeg, Canada. This machine is especially adapted for planting cabbage, celery, onion, and similar seed or plants, making the necessary holes in the earth and depositing the seed or plant therein, and properly covering them as the machine advances. The cavities in the ground are made by a forward wheel, and the seed or plants are carried by pockets of a traveling belt, from which they are taken and deposited by fingers of a planting bar and the roots of the plant or the seed are covered by a covering bar. The machine is provided with markers, held out of operative position when not required.

COTTON HARVESTER.—Leonard R. Turner, Sing Sing, N. Y. This machine, in combination with a suitable driving mechanism, has a series of cylindrical fenders carrying whips, which swing in and out of the fenders, in their outward motion delivering blows upon the branches or bolls of the plant, thus loosening the ripe cotton and removing it to a conveying mechanism by which it is discharged into sacks, the unopened bolls being left uninjured for subsequent gathering after ripening.

Miscellaneous.

HOSE BRIDGE AND TOWER.—James Blake and Emil F. Begiebing, Union, N. J. This invention provides an improvement in devices to facilitate carrying a hose over a railway track, so as not to interfere with the free running of cars. The improvement comprises a telescoping body, extended by means of a crank and a rack mechanism, a hose holder being hinged to the top section of the body. It may be quickly and easily extended to make it the necessary height, and as readily folded and collapsed into a small compass. It may also be used by firemen as a tower, from which streams may be advantageously directed into the upper stories of buildings.

DUMPING RACK.—William Underwood and Cornelius Prall, Fair Grange, Ill. A dumping rack which may be attached to the running gear of an ordinary wagon after the body has been removed is provided by this invention, whereby a large load of broom corn and similar material may be carried, and the load readily dumped as desired. A rearwardly extensible fender is arranged to project beyond the tail end of the rack body, to engage and secure the rearwardly projecting portions of the load.

PNEUMATIC TIRE REPAIRER.—Charles E. Buckbee, Flushing, Mich. For repairing punctured pneumatic tires or other rubber tubes, this inventor utilizes a flexible tube for holding rubber cement, the cap of which is provided with a tubular needle, which the cement will follow into the puncture as the tube is squeezed, until the cement accumulates as a small button on the inside of the tire, after which the needle is withdrawn and the tube gently squeezed to supply sufficient cement to fill the puncture and tightly seal the opening.

LIQUID MEASURE.—Harold Gregson, Detroit, Mich. A piston is held to slide in a cylinder having suitable inlet and discharge ports, a handle being connected with the piston and a gauge rod arranged at one side of the handle, while an indicator on the handle moves opposite the rod. The measure is adapted for use with any kind of liquid, however light or heavy, the measure simultaneously filling on one side of the piston as it discharges on the other, as the handle is moved in and out, and the measure being always full so long as the supply of liquid lasts.

PORTABLE PERFUME RECEPTACLE.—Gustavus A. Ritter, New York City. This is a device in the form of an opera glass, and with similar tubular sliding extensions, but of such peculiar construction as to afford two liquid holders adapted for a separate discharge of their contents, and which may be separately sealed in a convenient manner. It is also designed to be carried in a case similar to that of an opera glass, and be appropriately finished, affording a unique and neat design.

BAG OR PURSE FRAME.—Louis B. Prahar, Brooklyn, N. Y. A latch for frames of this kind, devised by this inventor, is of such construction that the frame may be unlatched and opened with one hand only, the device being very simple, strong and inexpensive. A spring-pressed bolt projects above a housing attached to one member of the frame, there being on the other member a keeper on which slides a cap to which is secured a pin working in the keeper and adapted to engage the bolt.

PLATE AND CUP AND SAUCER HOLDER.—Oscar L. Miller, Ravenna, Neb. This is a device of simple and durable design to facilitate the advantageous display of table ware, permitting the articles to be conveniently attached to and removed from the holder. The plate holder is formed preferably of a single piece of wire, bent to the required form, and with which may readily be connected a second plate holder, as well as a hanger, and a cup and saucer holder, each formed of single pieces of wire.

GLOVE.—Henry M. Peyser, Boston, Mass. According to this improvement, two tapes are secured in a peculiar manner to the glove at one side of the slit, to facilitate the closing in of the inner heads of the buttons in a sheathing, at the same time insuring the proper sewing up of the several parts forming the sheathing. The sheathing is thus very conveniently formed without any stitching being seen on the outside.

LIFTING FORK FOR KITCHEN USE.—George M. Parsons, Virginia City, Nev. This is a simply made device to facilitate the lifting of hot dishes. It is strongly made of a single piece of wire, so bent as to enable a variety of different shaped dishes to be readily grasped thereby and handled as desired without danger of breaking the dishes or burning the fingers.

MOSQUITO NET FRAME.—Albert C. Lottman, Houston, Texas. This is an improvement on a formerly patented invention of the same inventor, providing a very simple and inexpensive frame, with but few parts, which may be readily attached to or removed from a bedstead without injuring or marring it. It may also be used to support a tester or frame with its canopy connecting the tops of the posts in a four-post bedstead, facilitating the carrying of the netting over the bed or over the headboard without interfering with the tester.

BOTTLE COVER OR CAP.—Antenor Assorati, New York City. This device consists of a shank capable of a sliding movement in relation to a clip spring upon the receptacle or a bottle neck, a counterbalanced cover being pivotally connected with the shank, and means for holding the latter in place after it has been adjusted. When the bottle or other receptacle to which the device is applied is in an upright position, its mouth will be effectually sealed, but as the receptacle is inclined its mouth will be uncovered.

ANIMAL TRAP.—Newton J. Tanner, Oviedo, Fla. This is a trap which, when sprung, will jump bodily upward, thus raising the jaws so as to make sure that they catch on the leg of the animal springing the trap. It is also provided with a series of hooks which extend outward beyond the free ends of the jaws and overlap, the hooks catching and holding the animal should it escape the jaws as they come together.

EAVES TROUGH HANGER.—Allen R. Lewis, Shelton, Wash. This is a hanger which may be adjusted horizontally and vertically and it may also be adjusted to receive eaves troughs of different widths, or attached to an inclined eave, holding the trough horizontally. It is simply and strongly made, and may be quickly and easily put in place.

DRAIN.—John L. Steitz, Chicago, Ill. This invention relates to stop and waste devices used in cold weather to drain water supply pipes and prevent their freezing. The drain is intended to be used in places where the water pressure does not exceed twenty pounds, the pressure being used to compress air to operate the device. The device is entirely automatic, and during warm weather may be rendered inactive by turning a stop cock.

BADGE HEADING DESIGN.—Edward L. Torsch and James R. Lee, Baltimore, Md. This is a novel form of clasp pin frame, of oval shape and special marginal configuration.

DESIGN FOR EXHIBITION STAND.—Isaac Hermann, New York City. A mirror exhibition stand, designed by this inventor, has vertical panels at right angles to each other, with horizontal figures in retreating, step-like form partially intersecting the panels.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

ENGINEERING EDUCATION. Being the Proceedings of Section E of the World's Engineering Congress, held in Chicago, Ill., July 31 to August 5, 1893. Published by the Society for the Promotion of Engineering Education as Volume 1 of their Proceedings. Edited by De Volson Wood, Ira O. Baker, J. B. Johnson, Committee. Columbia, Mo. 1894. Pp. viii, 342. Price $2.50.

A society for the promotion of engineering education exists in this country, and in this volume we have the first volume of its proceedings. It includes a number of excellent papers on college education, such as the place of mathematics therein, systems of examination and other practical features thereof. These papers are by prominent educators, and discussions on them are introduced. The volume is largely a report on the work done in the direction of engineering education at the International Congress of Engineering held at the World's Fair in Chicago. There is no question that the proper system of engineering education is a problem of the day, and how better to reach a knowledge of its different conditions than by the perusal of such volumes as this is not easy to see. The volume lacks an index, something which would add very greatly to its value.

"The Shoe and Leather Reporter Annual" for 1894 is the title of a solid octavo volume of 773 pages, affording the most complete directory anywhere published of the boot and shoe manufacturers and dealers, tanners and curriers and leather sellers, and those engaged in related branches of business. The lists of names for the United States and Canada cover about all that could be desired and the volume also includes the principal houses in all other parts of the world. The book likewise contains valuable trade records and statistics.

SCIENTIFIC AMERICAN BUILDING EDITION.

FEBRUARY, 1894.—(No. 100.)

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1. Elegant plate in colors showing a suburban dwelling at Plainfield, N. J., erected at a cost of $4,800 complete. Floor plans and perspective elevation. A tasteful design. Messrs. Rossiter & Wright, architects, New York.
2. Plate in colors showing an elegant residence at Pelham Manor, N. Y. Perspective view and floor plans. Estimated cost $7,000 complete. An excellent design.
3. The Jamaica Club House, recently erected at Jamaica, N. Y. Perspective views and floor plans, also an interior view. Cost $9,000 complete. Messrs. Haus & Oborne, architects, Brooklyn, N. Y.
4. A beautiful residence at Portchester, N. Y., recently erected for A. V. Whiteman, Esq. Perspective and floor plans. Mr. Frank W. Beall, architect, New York.
5. Engravings and floor plans of a suburban residence erected at Ashbourne, Pa., at a cost of $4,800 complete. An attractive design. Harrison Allbright, Esq., architect, Philadelphia, Pa.
6. A suburban dwelling recently erected at Edgewater, Ill., at a cost of $10,216. Floor plans and perspective elevation. Mr. F. B. Townsend, architect, Chicago.
7. A colonial cottage at Buena Park, Ill., recently completed for Guy Magee, Esq. Floor plans and perspective elevation. An artistic design.
8. A modern half-timbered cottage at Wyncote, Pa., erected at a cost of $4,250 complete. Floor plans and perspective elevation. Mr. A. S. Wade, Philadelphia, Pa., architect.
9. A modern colonial residence at Oak Lane, Pa., erected at a cost of $6,800 complete. Perspective view and floor plans. Mr. F. R. Watson, of Philadelphia, Pa., architect. An attractive design.
10. The residence of Rev. Samuel Scoville at Stamford, Conn., erected at a cost of $6,616. Mr. W. W. Kent, architect, New York. An excellent design.
11. Examples of interior decoration and furniture in the Moorish style.
12. A Queen Anne dwelling at Jenkintown, Pa., recently completed at a cost of $5,000. Messrs. Burke & Dolhenty, Wyncote, Pa., architects.
13. Miscellaneous Contents: The growth of plants in odd places.—Acoustics in buildings.—Improved steam power brick machine, illustrated.—A new style stamped ceiling, illustrated.—The telethermometer or distant temperature indicator.—The improved Thatcher furnace, illustrated.—Improved sash chains and fixtures, illustrated.—An improved sliding door latch, illustrated.—Aluminite in cement plaster.—Fire losses of 1893.—Graphite paint.—The Columbian sash and door lock, illustrated.—An improved sash lift, illustrated.

The Scientific American Architects and Builders Edition is issued monthly. $2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practically, a large and splendid MAGAZINE OF ARCHITECTURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects.

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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.

(5842) W. C. K. writes: Some people claim that if you will make a noticeable mark upon the trunk of a young tree, the mark will always remain the same distance from the ground as when made. Now, is this a fact? And if so, can you explain? A. Our forest trees are supposed to have a slight rise in the lower parts of their trunks by reason of the expansion and uplift of their roots, so that marks on the bark near the ground may rise a few inches, or a foot or two, in the course of its growth. Some kinds of trees rise more than others.

(5843) O. H. P. writes: 1. What is the power of the motor described below, if the proper current is applied? The field magnet is the same as the one described in SUPPLEMENT, No. 641, for simple electric motor, excepting it is wound with 2¼ pounds of No. 24 magnet wire and No. 18 on armature and connected in shunt. A. About ⅛ horse power. 2. Is there any change you recommend in the motor to increase its efficiency? A. No. 3. What change should be made to make it an efficient dynamo for incandescent lighting? A. Cast iron fields and finer winding. 4. How many, and what voltage and candle power, should the lamps be? A. The voltage depends on the winding. It should give 10 or 12 candle power. 5. I have made a storage cell with thirteen plates cast of lead, 6 inches long, 4 inches wide, ⅛ inch thick, with forty ½ inch holes in each plate. The surface of the plates is roughened with a knurl and the holes were well filled and the surface coated with a paste of red lead. How many such cells will be required to develop ½ horse power for one hour at a time in the motor described? A. Ten. 6. Should the cells be connected in series or in parallel? The cell I have made will run the motor without load for four hours. A. It depends on the winding. For your winding connect in series. 7. How many 6×8 gravity cells will be required to charge the storage cells that I may use the motor one hour each day at full capacity? A. 26 cells in series and 5 in parallel, a total of 130 cells. 8. What would be the effect if the zinc in a gravity cell were amalgamated? A. It is not necessary, and involves loss of mercury. 9. If the positive plates in the storage cell described were ½ inch thick, would it have a greater amperage? A. No. 10. What should be the specific gravity of the acid solution for the storage cell I have made? A. 1.170 before charging, 1,200 or 1,210 after charging.

(5844) L. B. asks: 1. Which requires more voltage, an induction coil having a core of one bar of soft iron, or several wires, to obtain the same results, using the core as a magnet for the circuit breaker? A. The wire-cored coil will work the best in all respects. 2. Could the "Little Giant" water wheel advertised in your paper run the hand power dynamo described in "Experimental Science," and how many eight candle power incandescent lamps could it light? A. Yes. The dynamo would run only a small lamp. 3. In how many ways can the induced currents of an induction coil be regulated? If made with a stationary core (which operates circuit breaker) would it be advisable to use a tube, or would it be advisable to have the secondary coil movable, and which is the best and quickest means of winding a coil? A. By moving one of the coils, by moving the core, by shielding the core and unshielding, by changing the current intensity, and by cutting out some of the secondary. The shielding tube method is by all means the simplest. 4. How many volts does one ½ candle power lamp require? A. 3 to 4½ volts. 5. How many volts will heat a No. 36 platinum wire ⅝ inch long? A. It depends on the temperature to which it is to be heated.

(5845) T. H. D. asks: 1. Why is it that some bricks will freeze and disintegrate and others will not? I know that what is designated as a hard brick will not break up on being frozen, and that soft brick will. Also that there is a sandy clay in some localities, especially about our sea coast, which will upon being properly burned produce hard bricks that will stand the exposure and freezing all right and yet are really softer and more porous than the soft brick made of the clay of our river bottoms; they will absorb three times the amount of water the others will, and yet not disintegrate when frozen. Why is this? A. It is a matter of chemical composition. Some clays develop a higher cementing quality, and one less affected by moisture. 2. Will you please state the per cent of loss in heat-giving properties of Tennessee bituminous coal if it is stacked out in the open air for one year? A. Possibly 10 percent.

(5846) C. E. H. asks: 1. How many and what size zinc and carbon bichromate cells will run an intensity coil of the following dimensions to its full extent? Length 8 inches, diameter of core ⅝ inch, in the primary coil 4 layers or 1 pound of No. 16 cotton-covered copper wire, secondary coil of 14 layers or 2 pounds of No. 25 cotton-covered copper wire, all wire well insulated. A. Four cells quart size. 2. What size condenser had I better use? A. Three or four square feet of tin foil. 3. What will be the voltage of the secondary coil when working to full extent? A. Divide turns of secondary by turns of primary and multiply by 4. 4. Will it give any spark, and if so, of about what length? A. Possibly one-sixteenth inch.

(5847) C. T. V. asks: 1. What becomes of a current of electricity generated by a dynamo after it has passed through a number of lamps? A. A current of electricity cannot be treated as a material that flows. As far as the analogy holds, it flows around the circuit without break. 2. Also if a number of lamps are being supplied by a dynamo and all are turned off, the generator continuing in motion, will any danger be done? And why? A. No. 3. Again, if 50 lamps are being fed from a generator, and 25 are cut off or only 1 is left burning, what would be the result and why? A. It depends on how the generator is wound. The remaining lamps if the dynamo is shunt wound get too much current, and too little if it is direct wound. If compound wound they may be but slightly affected. 4. Will you please send names of storage battery manufacturers. Also your opinion as to their practicability. A. Address the Brush Electric Company, Cleveland, O. They are very practicable.

(5848) W. T. M. asks: 1. How can I keep the fluids of a gravity battery separate without the battery being in action? A. You cannot. It is better to draw off a few inches of the upper layers with a syringe or siphon. 2. Is there any paint that will stick to an iron propeller wheel that will keep it from rusting? Would pitch, or a mixture of pitch and oil, or gas tar do? A. Use marine paint. 3. How fast could I drive a 5 by 30 launch with two 3 by 4 engines at 150 pounds pressure? A. Perhaps 6 or 8 miles an hour. 4. If an unjacketed boiler would hold with a certain fire 100 pounds steam, any valve being wide open, what might I expect if boiler was jacketed so it would be cool to touch? A. 125 pounds more or less.

(5849) Van B. V. asks: 1. Will you please give me a receipt for keeping flour paste from souring when it is made in large quantities? A. Add 20 grains of salicylic acid to each 12 ounces of water used. 2. Also inform me if there is not a method of making the paste without cooking it? And if so, how is it made? A. Flour paste should be cooked.

Wheaten flour	1 oz.
Powdered tragacanth	½ "
Powdered gum arabic	½ "
Salicylic acid	30 grn.
Oil of wintergreen	3 drops.
Water	12 oz.

Mix the powders and gradually add the water, then bring to the boil, allow to simmer for twenty minutes, stirring constantly. When cold add the oil. 3. Please inform me how mouth glue is made? A. Fine pale glue 1 pound, dissolve over a water bath in sufficient water, add brown sugar ¼ pound, continue the heat till amalgamation is effected, pour on a slab of slate or marble, and when cold cut into squares.

(5850) B. K. asks: 1. What is the latest and best definition for electricity, if any? A. There is no good definition. One of the most recent is: "An imponderable and invisible agent producing various manifestations of energy, and generally rendered active by some molecular disturbance, such as friction, rupture, or chemical action." This is from the "Standard Dictionary of the English Language." 2. What also is the nearest correct theory as regards the magnetism of the earth? A. Ampere's theory holds that currents of electricity circulate around it approximately parallel to the equator. 3. Could or would you refer me to which one of your issues contains the best descriptions of Brush electro dynamo? A. See our SUPPLEMENT, No. 274, and SCIENTIFIC AMERICAN, No. 19, vol. 69.

(5851) C. W. Y. asks (1) the number of gravity cells (Crowfoot) required to light a one candle power incandescent lamp. I wish to use it in a dark room lantern and for other purposes. A. 64 cells. 2. Where can I obtain carbon pencil (one-sixteenth inch diameter) for electric lamp described on pages 512 and 513 "Experimental Science"? A. Address dealers in electrical supplies. 3. Least number of gravity cells and least number of Grenet cells required to run same? A. About 20 Grenet or several hundred gravity. 4. Where can I get iron for telephone diaphragm spoken of in SCIENTIFIC AMERICAN? A. Use ferrotype plate. 5. Can I buy the carbon buttons used in Blake transmitters? A. No.

(5852) C. A. S. asks for a cheap finish for wood. A. A cheap polish to brighten hard oil-finished work after being rubbed.

Gum shellac	1 oz.
Gum arabic	¼ "
Gum copal	¼ "

Powderand sift through a piece of muslin, put them in a closely corked bottle with 1 pint alcohol, in a warm place, shaking every day till the gums are dissolved, then strain and bottle.

(5853) M. K.—To make oiled silk.—Coat your silk with boiled linseed oil to which gold size has been added. Give three coats of the oil, drying thoroughly between each coat.

(5854) W. J. B. asks: Do the electric or trolley cars affect a watch in its running? It is argued by some that it does and by others that it does not. I have a fine watch. When I go on the trolley cars I leave it home, which is a great inconvenience, for fear it would be injured by electricity. The above has caused a great deal of argument at my place. A. It is doubtful if it will to any extent, practically speaking. If afraid, carry your watch in an iron box, such as a blacking box.

(5855) W. S. M. asks: I have been told by nautical men that a vessel encounters a drag when sailing through shallow water, even though it may not be within several feet of the bed of the ocean or stream. Is this a fact, and if so, why? A. This is true. The vessel drags water after her, and the bottom wave is impeded and more energy is expended on the water than if there were more depth.

(5856) J. G. L. asks: 1. What steel can take the greatest charge of magnetism? Also if the steel has to be hard or soft? A. Use tool steel. Straw color to blue temper. 2. In charging a piece of steel in an electric circuit, what is the best way to wind the wire around it, whether diagonal or straight? A. As straight as possible.

(5857) X. Y. Z. asks: 1. Where can I get details how to make a 2 horse power motor to be run by battery? A. Our SUPPLEMENT, No. 600, gives a 1 horse power motor; our SUPPLEMENT, No. 865, a 5 horse power. These are the nearest we have. 2. How many cells of carbon acid battery will it take to run same? A. Allow 500 quart cells to one horse power. 3. What will be the amperage of 50 cells (carbon acid batteries) connected in series? A. Two amperes, about.

(5858) E. B. S. asks: 1. Can a 50 volt motor be made to run on a 500 volt street car circuit? Can it be done by introducing a large amount of resistance in circuit? The motor can, if required, stand 75 volts. A. By winding with very fine wire or by introducing a resistance in series, about nine times that of the motor. 2. Also, what size fuse wire will protect a No. 22 copper wire, American gauge? A. Use a piece of No. 23 wire.

(5859) C. D. M. asks: 1. How many storage batteries and what size plates shall I have to use to run a two candle power lamp about two hours each day? A. Three cells in series, with 24 square inches of positive plate in each cell. 2. How many gravity cells, and how long will it take to charge them? A. Eight gravity cells in series would require several days. By putting 18 in parallel and 8 in series you could charge in 10 hours. 3. How long would it take to charge 2 storage batteries with 5 gravity cells? The plates of the storage batteries are to be coated with red lead. A. It depends on the size of the plates.

(5860) A. B. C. asks: 1. Please tell me through the columns of Notes and Queries what SUPPLEMENT you have that will tell how to make a small dynamo that will light two 16 candle power lamps (incandescent). A. See SUPPLEMENT, No. 844, for nearest approach to your size. 2. What would be the voltage of a dynamoone-half the size of the one described in SUPPLEMENT, No. 600? A. It depends on the winding. For calculations see Sloane's "Arithmetic of Electricity," $1 by mail. 3. What is the cause of the shadows seen on a frosty window at night when there is a strong light, as an arc light, opposite the windows? A. It may be due to network around the globe or to stains in and deposits on the glass of the globe.

(5861) E. C. D. asks: 1. What amperage would a storage battery give that has two positives and three negative plates 7 x 8½ of the pasted kind? A. 4 to 5 amperes. 2. How long will a storage battery of three cells connected in series, the plates 3 x 5 and two plates to each cell, burn a two candle power lamp continually, before the battery has to be recharged? A. The battery will not do the work. For other queries address the author of the book referred to.

(5862) W. A. H. asks: A grocer uses a false weight of 15 ounces instead of a pound. What per cent does he gain by his dishonesty? What per cent do his customers lose? A. 6⅔ and 6¼ per cent respectively. Your other query is insufficiently stated.

(5863) C. S. W. says: Will you please tell me if there is a premium on a large copper cent dated 1841? A. Yes. The coin is worth 5 cents, if in good condition.

(5864) B. D.—Aluminum is about as elastic as silver; it does not compare well with steel as regards elasticity.

(5865) W. J. S.—The dimensions of a hole made in a block of metal would be increased on heating the block.

(5866) C. W. — Use maple for violin bridges.

(5867) A. C. F.—A good red ink is as follows: Pure carmine, 12 grains; water of ammonia, 3 ounces; dissolve, then add powdered gum, 18 grains; ½ drachm powdered drop lake may be substituted for the carmine where expense is an object.

(5868) J. B., Alaska, asks why the streams of water in that country freeze at the bottom; it is a common occurrence here in the creeks and flumes or ditches to see from two inches to one foot of ice on the bottom and a strong flow of water on top of it, in fact the water often overflowing the banks; after a time the ice will become loose and lifting gravel and bowlders will float down the stream. This generally occurs in the early winter, October and November, after which time it does not occur. A. The freezing of water at the bottom of streams in severely cold weather is the anchor ice so well known to millmen and in the quick-running streams of the northern United States and Canada. It is well known that quick-running water or water in agitation does not commence to freeze at a temperature just below the freezing point, but may reach a temperature even lower than 25° before ice crystals begin to form. A quick-running stream at this temperature may not freeze at the surface from agitation, but will cool the bed of the stream or the projecting stones to its own temperature, at which temperature the thin film of water in contact with the stones or bottom freezes to the surface and continues to keep the icy surface at the temperature of the running water, and so accumulating the icy coating at the bottom until a change in temperature changes these peculiar conditions. The thickness of the anchor ice in time ceases to convey the freezing temperature to its point of contact with the stones or ground, and the earth heat melts the contact surface and the buoyancy of the ice raises it from the bottom.

(5869) B. M. asks: What portion of its traveling distance will the piston of a steam engine travel over at a quarter stroke of the crank? A. At quarter stroke the crank is at 45°, the versed sine of which is the travel of the crank pin in the central line of motion of the piston. Calling the crank one, or one foot, the sine of 45° is 0·7071 +, the versed sine is 1—0·7071=0·2928 + which as the total piston travel is twice the length of the crank makes $\frac{0{\cdot}2928+}{2}$=0·1464 + of the total stroke due to the crank position. To this must be added the gain by the position of the connecting rod, which if of six times the length of the crank, then the square root of the square of the length of the connecting rod minus the square of the sine of the crank radius, subtracted from the length of the connecting rod, is equal to the versed sine of the connecting rod as radius, or as above the $\sqrt{6^2 - 0{\cdot}7071^2}$=5·995, and 6—5·995=0·005 + 0·1464=0·1514 in proportion to the whole stroke. Or for an engine of 2 foot stroke with a 6 foot connecting rod the piston will have advanced 3·63 inches when the crank is at 45°.

(5870) F. M. G. asks: How can an engineer find the water level in a boiler when the water is foaming? A. If the glass water gauge is properly connected by the use of a stand pipe connected with the top and bottom of the boiler, the mean of the oscillation of the water in the gauge will indicate the solid water level in the boiler. If there is no water gauge, the gange cocks should give a safe indication of the solid water level by a slight opening and noticing the character of the discharge. The bottom gauge cock should show less sputter than the top one. The difference is easily noticed and with a little experience may be relied on.

(5871) "Reader," Yarmouth, N. S., writes: Pipe improperly laid from source of supply weakens our water pressure. It is proposed to improve it by pumping and storage. One proposal is to put up a two million gallon reservoir, the water level of which would be 150 feet above high tide, or no higher than highest points of town. This would, however, improve pressure in lower parts of town, and in case of fire an electrically worked gate would divert steam pumps from the reservoir directly on to the main. The second proposal is to put up a steel or iron standpipe, to store 600,000 gallons, the highest level of which would be 100 feet higher than reservoir, also to be kept full by pumping. Both proposals are advocated by experienced men. Would reservoir or standpipe be best, under circumstances described, for both fire and domestic purposes in town of 8,000? Is lack of durability in standpipes compared with reservoirs a good reason for condemning standpipes? A. The highest part of the town does not explain the desired point required as to the merits of the reservoir or standpipe plan. If it means the street level, the standpipe offers the only way of supplying the houses in the upper part of the town. If the house top level, is meant, the reservoir plan is the most desirable, as great pressure is not desirable on account of the plumbing work in the lower part of the town. With the standpipe 100 feet higher than the reservoir would, as we understand you, make a pressure of over 200 feet head in the lower part of the town, which would be a cause of danger to the plumbing work. If a standpipe is adopted it should not be over 50 feet above the house tops of the upper part of the town, which should be sufficient for fire service. The reservoir offers the safest and most satisfactory plan, if it will supply the houses in the upper part of the town by gravity, on account of the large surface storage with its ready and ample supply for a fire department.

(5872) F. S., Winnipeg, asks: What is the latest improved and best equipped system of heating, ventilation and water closets for public schools? A. For your climate steam heating by the duplex system is most satisfactory. The severity of the long winters requires direct radiation in the exposed parts of the school rooms or under the windows. Coils of pipe along the walls being preferable to radiators as a better distributor of heat, and of about half the quantity to properly heat the rooms. The balance of heat should come through hot air flues from basement coil heaters for ventilating the rooms. Water closets should receive heat through air flues from basement coils only, with a special view to ventilation. All rooms should have ventilating flues on each side, as far as possible from the hot air flues, with registers at both top and bottom of the rooms. The bottom registers only to be used in extremely cold weather.

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AND EACH BEARING THAT DATE.

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