RECENTLY PATENTED INVENTIONS.

Electrical Devices.

APPARATUS FOR CLOSING ELECTRIC CIRCUITS.—R. DE LAMPRECHT, Paris, France. This invention relates to an apparatus for effecting upon the introduction of one or more coins the closing of an electrical circuit for a predetermined period. It may be used in connection with any apparatus which, through the insertion of one or more pieces of money, is opened for use to the public for a certain time specified in advance—as, for example, self-collecting telephones, auxiliary illuminating devices for railway-trains, etc.—but is particularly suited to effect telephonic communications, for example, by means of the prepayment of specified sum.

ELECTRIC HAMMER.—L. PAULERO, Petersburg, Va. In the present patent this inventor's improvement has reference to electrically-operated hammers, and the more particular object of the invention being to produce a comparatively simple hammer very easily controlled by the operator, and admitting of various degrees of adjustment.

Of Interest to Farmers.

PLOW.—D. G. BURKHART, Dayton, Wash. One purpose of this improvement is to provide details of construction for a plow that adapt it for convenient and effective service as a hillside plow by affording means for quickly changing the moldboard and plowshare from one side of the plow-beam and to the opposite side of the beam, so that by turning the team and the plow around, the plow will operate to turn the furrow over upon the one last plowed and obviating the necessity of plowing around a portion of the inclined land, as is required by an ordinary plow used in hillside-plowing.

STACKER.—P. BROUK, Wilson, Kan. The purpose of the inventor is to so construct the stacker that it may be readily mounted upon and as readily removed from the bed of an ordinary farm-wagon and which can be made very light, yet durable, and built quite high without being cumbersome and also to so construct the stacker that a folding conveyor is employed in connection with an elevator, and especially to provide a horse-power attachment for driving the elevator and conveyor aprons, which attachment can be quickly connected with the framing of the machine or removed therefrom.

SELF-FEEDER FOR THRESHING-MACHINES.—J. JIRSA, Dorchester, Neb. The inventor provides a feeder so constructed that when a surplus of straw is fed to the band-cutters by the bundle-carrier the cutters will continue to act upon the bundles, but the motion of the carriers will be automatically stopped until the normal amount of straw is at the entrance to the machine and in position to be delivered to the concave and cylinder, at which time the driving mechanism for the carrier will again and automatically act to set the carrier in motion, and prevent clogging and ineffective work where the carrier connects with the body of the machine.

FARM-GATE.—J. J. HINER, Woodstock, Ill. The object of the invention is to provide novel fixtures for a gate which are simple, practical, durable, convenient to operate, and inexpensive, which enable the easy opening and closing movement of the gate, permit it to be closed and supported at different heights from the ground, and afford automatic means for locking the gate closed at different heights in a way to resist the efforts of live stock to open it.

APPARATUS FOR DIPPING ANIMALS.—E. W. BENNETT, Rawlins, Wyoming, deceased; D. CLARK, administrator. In carrying out this improvement the inventor had in view as an object the construction of an apparatus through the medium of which animals may be quickly and easily immersed in the bath, and with perfect safety, as the method commonly employed by cattle-owners of forcing animals to jump into the solution, at the risk of broken bones and other injury, is obviated. Means are provided for keeping the cleansing solution at a certain temperature.

GATE.—P. C. FORRESTER, Streator, Ill. In this case the invention relates to improvements in swinging gates for driveways, and of the type designed to be opened and closed from either side by a person in a vehicle, the object being to provide a simple and positive mechanism for causing the swinging movements without binding or straining.

Of General Interest.

BUILDING-BLOCK.—E. E. BENNER, Sargent, Neb. It is the object of this invention to provide an improved building-block adapted to form a wall which shall be strong, durable, firm, and provided with cavities or chambers constituting vertical air passages whereby the radiation of heat is prevented, fire and frost resisted, and material saved.

HOOK AND EYE.—F. L. PRIEST, Houston, Texas. The object of the inventor is to provide features of construction for a hook and eye that enable rapid and cheap manufacture, adapt these coacting parts to be readily engaged with each other, be closed with a snap by lateral pressure, that will not slacken or have play where they engage each other, cannot become accidentally detached, have resilience between the engaged members that insures their remaining connected, and does not permit a gap between the dress flaps which the members join together.

PUZZLE.—I. C. SCUDDER, Middletown, N. Y. This invention relates to improvements in puzzles, an object being to provide a puzzle consisting of two members so formed as to offer some difficulty to attach them, and another object is to provide a puzzle with an advertising device, thus making it useful as an advertising medium as well as amusing.

PROCESS OF REDUCING ORES.—D. R. ROBERTSON, Leadville, Col. Mr. Robertson's invention pertains to processes for separating the values of ores, placer-dirt, sand, and other materials, it being particularly applicable to those containing gold, silver, and copper. Its objects are to provide a ready method of effectively releasing and recovering the values.

SIPHON.—J. J. POWERS, Centralpark, N. Y. One object of the invention is to provide a self-charging siphon with a novel means for causing a quick action of the valve at the outlet end. Another, is to provide at the inlet end of the siphon a simple means for causing a rotary motion of the liquid while passing through the siphon, thus by centrifugal force causing the liquid to impinge closely against the interior of the siphon at all parts, and effectually preventing the entrance of air when the device is in operation, permitting a constant and rapid flow.

BOTTLE.—R. J. MODESPACHER, Hoboken, N. J. The object of the improvement is to provide a bottle more especially designed for containing beer, lemonade, and like beverages, and arranged to allow repeated filling and cleansing the bottle by the bottler, and to permit opening of the bottle by the consumer for pouring the contents and to render it rather difficult, and hence unprofitable, for the consumer to reuse and refill with same or other liquids.

PENCIL.—J. MAKANT, North Adams, Mass. In use when bringing the lead beyond the point or to lengthen it the collar is moved inwardly, releasing the lead from engagement with the sections, the operating member being moved toward the point to protect the lead the requisite amount. Not in use the lead may be released in same manner, and upon moving the operating member in opposite direction the lead may be allowed to fall between sections, where it will not break or soil objects. The eraser is used in the usual way, the sleeve performing double function of holding parts together and serving as protector.

SEWING-AWL.—M. R. BOTKIN, Denver, Col. This invention relates to awls of that character covered by a former patent granted to Mr. Botkin. The structure is simple. Threading of the needle can be accomplished easier than in the prior patent, as the thread is passed through a thread-passage between the jaws before insertion of needle. The spool, while securely fastened in place can be readily detached by unfastening the projections and withdrawing the pin. The jaws have a particular construction. The annular shoulder limits inward movement of the needle, so that it will always be properly positioned. As jaws are cut only to the circular jaw-head there are no notches or slots in which thread can be readily caught.

DISPLAY CABINET OR STAND.—F. R. CURRIE, Mason City, Iowa. The inventor employs a cabinet or stand of special construction at both the front and sides thereof for the reception and storage of tools or other articles, the front being closed by suitable doors, while the sides are closed by doors of special construction to enable the ready display of samples of goods kept in stock or on sale. The structure may be made of any material and of any shape or size to suit the particular location in a store.

PROCESS OF MANUFACTURING BRICKS FROM REFUSE FROM COAL OR COKE.—J. HAMMERSCHLAG, Krutenau 7, Strassburg; H. S. GERDES, JR., Dobben 42, Bremen, and O. DROSTE, Bremen, Germany. In the present patent the invention comprises a process for manufacturing coal bricks, which consists in mixing coal or cokes smalls with peat and solutions of alkalies, or of ammonia, drying the mass if necessary, and pressing the same in a suitable manner.

SUBWAY STRUCTURE.—J. SIMPSON, Veedersburg, Ind. Mr. Simpson's invention has reference to such structures as culverts and the like. Its principal objects are to provide organization of this character which will be strong and may be readily erected. The various elements of his subway structure are preferably molded in concrete, being ready to assemble at the time the ground is broken for erection, this greatly facilitating progress, which is of much importance in connection with work upon railroads and highways.

FURNACE.—E. S. CHASE, Salt Lake City, Utah. The object of the invention is to provide a furnace for steam-boilers and the like arranged to insure complete combustion of the burning fuel, to prevent the formation of smoke, and to utilize the burning fuel to the fullest advantage, and to keep either one or two fire-boxes in action under the steam-boiler.

TRANSOM-OPERATOR.—W. ECKSTEIN, London, England. The invention relates to mechanism for operating such closures as transoms, and has for its principal objects the provision of a simple apparatus, smooth and noiseless in action. A form of groove accomplishes the movement with comparative quickness. If desired the resistance may be reduced by decreasing the pitch of the groove. If the operating member displays any tendency to slip upon the pulley, this may be overcome by substituting for a cord a chain, coacting with a toothed wheel.

Machines and Mechanical Devices.

MACHINE FOR CUTTING BUTTER.—C. F. HELFLINGER, Elizabeth, N. J. One purpose in this case is to provide a compact machine so constructed that butter in bulk may be placed in the machine and fed up to vertically-disposed knives, which separate the upper portion of the body of butter into divisions and to provide horizontally-operating knives which, when the upper portion of the body of butter is vertically divided, act to horizontally sever the butter in bulk, thus dividing the upper portion of the bulk into a given number of pats.

BUTTER-CUTTING MACHINE.—C. F. HELFLINGER, Grand Rapids, Wis. The purpose of the improvement is to provide a machine for cutting pats of butter from bulk, which machine is not only of simple and durable construction, but can be conveniently and expeditiously operated to continuously feed a mass of butter to a predetermined outlet and cut from the mass that portion of the butter which is pressed through the outlet.

ATTACHMENT FOR SPINNING-MULES.—J. BOND and L. H. BOND, Waterloo, N. Y. In this case the invention relates to spinning; and its object is the provision of a new and improved attachment for spinning-mules to securely lock the carriage in position when stopped to prevent rebound of the carriage and imperfect formation of the yarn.

PRINTING-COUPLE APPLIANCE.—F. E. KEMPF, Boston, Mass. The object of the invention is to provide a printing-couple appliance arranged to permit quick adjusting of the printing-cylinder relative to the inking apparatus and the impression-cylinder to enable the printer to conveniently and easily "make ready," and insure perfect impressions. This is a division of the application for Letters Patent of the United States for a multicolor-printing press formerly granted to Mr. Kempf.

WEIGHING-MACHINE.—A. G. WITEK, New York, N. Y. The invention pertains to spring-balance weighing-machines, and has for its object to provide an accurate method of ascertaining the weight of human beings or other bodies, objects, and substances of various kinds. A further object is to provide a device that may be used as an article of furniture—such, as a chair or table—without detracting or departing from the general character of such articles.

TYPE-WRITER PLATEN.—C. H. STUART, Newark, N. Y. The objects of this improvement are to provide a platen or roll which shall permit the type to strike the surface thereof at different points, and thereby increase the durability of the platen. Ordinarily in typewriters periods and other characters strike continuously on the same series of points on the platen and gradually form depressions in the surface of great depth, which necessitates frequent renewal of the platen, and keeps it constantly in a roughened condition.

DOUBLE ROTARY FORCE-PUMP.—J. R. NORTON, San Antonio, Texas. The aim of this inventor is to provide a new and improved double rotary force-pump which is simple and durable in construction, not liable to get out of order, very effective in operation, and arranged to render the pump positive in its action, and to prevent any loss of power. The stream sucked up and forced out by the action of the pump is continuous.

PRINTING-PRESS CYLINDER.—G. K. HENDERSON, New York, N. Y. The object of this improvement is to provide a cylinder for printing which will not have certain undesirable features, but will have the advantage of employing a speedy and economical system of using thin, flat, flexible plates of zinc or aluminium at present in use for lithographic or printing purposes, and having novel means for bringing the whole into exact register.

APPARATUS FOR COOLING LIQUIDS.—C. GROHMAN, Carteret, N. J. In the present patent the invention relates to apparatus for cooling water used for cooling purposes in condensers and other machines. The object of the invention is the provision of a new and improved apparatus for cooling a liquid in a very simple and inexpensive manner, and mainly by the use of atmospheric air.

LEATHER-POLISHING MACHINE.—W. H. GERRITY, New York, N. Y. The apparatus comprises a framing having two endless chains running on sprockets arranged in vertical planes, the chains carrying the skin-sustaining boards, so that by this means the hides are moved through the machine, the hides being manually placed on and removed from the boards. On the framing are arranged one or more pairs of polishing-rollers. These rollers are arranged to have the skin-carrying boards passed between them, and are driven revolubly, so that as the boards carrying the skins pass between the rollers the rollers act on the skins to attain the result.

CALCULATOR.—R. N. COOPER, Saybrook, Ill. This invention pertains to registers, and more particularly to slide-rules; and its object is to provide a new calculator designed for obtaining mathematical computations, such as multiplication and division, raising a number to a given power, extracting roots, finding the natural sine or tangent of an angle, and also the logarithm of a given number.

FRUIT-PRESS.—H. BOLLWEBER, Spokane, Wash. In this case the invention refers to improvements in machines for pressing juice from fruit or fruit-pulp, the object being to provide a press of simple and inexpensive construction, and by means of which the juice may be rapidly and uniformly pressed out.

Prime Movers and Their Accessories.

BOILER-FEEDER.—C. E. FINCH, Forney, Texas. In the present patent the invention is in the nature of a novel feeder for supplying steam-boilers with water in an automatic manner by gravity, so as to maintain the water in the boiler at a practically uniform level. The feeder works equally well with any chamber having an inlet check-valve.

TOOL FOR OPERATING UPON BOILER-TUBES.—J. L. SMITH, Eureka Springs, Ark. Mr. Smith's invention relates to tools for use in removing tubes from the flue-sheets of boilers and in applying new tubes. With this combination-tool the whole operation of cutting out the old tube and inserting the new may be performed, and the elements which carry out the various operations may be quickly assembled, and will operate under application of comparatively low power.

PNEUMATIC ACTUATING DEVICE FOR THE REVERSING-GEARS OF LOCOMOTIVES.—F. WARTHER, Canal Dover, Ohio. In carrying out the present invention the inventor has in view as an object the provision of a new and improved pneumatic actuating device for the reversing-gear of a locomotive arranged to permit the engineer to quickly reverse the engine whenever desired without exerting much physical force.

SLIDE-VALVE MECHANISM FOR STEAM-ENGINES.—F. E. SMITH, Munnsville, N. Y. Locomotives now in general use are so designed that when the stroke of the inlet-valve is reduced to lessen the amount of steam admitted upon each stroke there is a similar reduction of the stroke of the exhaust-valve, and for any reduction of the amount of steam admitted to the cylinder there is a corresponding reduction of the exhaust. This is exceedingly undesirable, because the steam in front of the piston opposes a considerable resistance to the movement of the latter. In the present invention this objection is overcome by providing a separate inlet-valve and exhaust-valve for each engine-cylinder, independent mechanism, preferably comprising link-motion devices for reciprocating said valves, and mechanism for reversing the stroke of both valves simultaneously, which permits the reduction of the stroke of the inlet-valve without affecting in any way the stroke of the exhaust-valve.

Railways and Their Accessories.

RAILROAD-FROG.—P. KYLE and J. R. CRESS, Coalbluff, Ind. An object of this invention is to provide a frog for railroad-switches which shall have its movable part locked when in use against any tendency to be moved or tilted by the lateral outward force of the car-wheel flanges when passing over the same. Means are provided by which the movable part of the frog shall also be automatically clamped to the fixed part thereof by said lateral outward pressure of the wheel-flanges in proportion to force of said pressure.

SELF-OILING CAR-WHEEL.—E. T. THAYER, Charleston, W. Va. The object of this improvement is to provide in a car-wheel of the same general type as that for which Letters Patent were formerly granted to Mr. Thayer, a novel removable closure-cap at the outer end of the wheel-hub to facilitate the cleaning of the oil-chamber within the hub and to provide for the introduction of oil within the chamber with less difficulty than in the wheel in the above-mentioned patent.

AIR-BRAKE.—H. MINNICK, Laredo, Texas. This is an attachment to be applied to the usual automatic air-brake system having communication with the train-line auxiliary reservoir and triple exhaust, and by means of which the pressure may be held in the brake-cylinder, keeping the brakes applied while the train-line pressure is raised and the auxiliary reservoir recharged, after which the brake-cylinder pressure may be released at will, permitting all the parts of the apparatus to resume normal running and released position.

Pertaining to Vehicles.

TIRE-PROTECTOR.—N. CAMPBELL, Elizabethtown, Ohio. The invention refers to protective devices or armor for rubber tires, pneumatic, solid or partially solid, or such yielding or elastic tires as are used upon automobiles and other road-vehicles. The purpose is to provide a readily-applied device constructed in sections, one having limited movement over the other, which device when applied to a tire will completely cover and protect it from puncture and direct wear without in any manner detracting from the elastic qualities of the tire.

Designs.

DESIGN FOR A BACK FOR HAND-MIRRORS, BRUSHES, OR SIMILAR ARTICLES.

–M. T. Goldsmith, New York, N. Y. This is an ornamental design for a back for hand-mirrors, brushes or similar articles. The mirror portion is circular with a graceful handle. A beautiful figure of a lightly-clad female is extended amid encircling flowers.

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

Business and Personal Wants.

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

MUNN & CO.

Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 6712.—For manufacturers of lead pipe making machinery.

Forbridge erecting engines. J. S. Mundy, Newark, N. J.

Inquiry No. 6713.—Wanted, address of parties weaving cotton tubing in 24-inch lengths or longer.

"U. S." Metal Polish. Indianapolis. Samples free.

Inquiry No. 6714.—Wanted, address of parties making or selling spring motors.

Perforated Metals, Harrington & King Perforating Co., Chicago.

Inquiry No. 6715.—For manufacturers of small chains, like bicycle chains, small enough to take place of tape which operates typewriter carriages.

Handle & Spoke Mchy. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 6716.—For parties having good rubber reclaiming process.

Commercially pure nickel tube, manufactured by The Standard Welding Co., Cleveland, O.

Inquiry No. 6717.—Wanted, address of violin maker's tools.

Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

Inquiry No. 6718.—For firms in United States manufacturing apparatus for the dry distillation of wood, for producing alcohol, charcoal and other products.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Machine Company, Foot of East 138th Street, New York.

Inquiry No. 6719.—For manufacturers of machines making shipping tags.

Gut strings for Lawn Tennis, Musical Instruments, and other purposes made by P. F. Turner, 46th Street and Packers Avenue, Chicago, Ill.

Inquiry No. 6720.—Wanted, address of manufacturer or dealer in water glass.

In buying or selling patents money may be saved and time gained by writing Chas. A. Scott, 719 Mutual Life Building, Buffalo, New York.

Inquiry No. 6721.—Wanted, address of firms manufacturing or selling devices for printing quotations, etc., on postal cards with metal or rubber type.

We Manufacture on Contract anything in light Hardware. Write us for estimates. Edmonds-Metzel Mfg. Co., 143-153 South Jefferson Street, Chicago.

Inquiry No. 6722.—Wanted, address of manufacturer of railway ticket machines.

We manufacture iron and steel forgings, from twenty pounds to twenty-five tons. Crank shafts of all varieties. Erie Forge Company, Erie, Pa.

Inquiry No. 6723.—Wanted, oyster baskets in pints and quarts made of white paper with thin copper wire handles.

The Scientific American Supplement is publishing a practical series of illustrated articles on experimental electro-chemistry by N. Monroe Hopkins.

Inquiry No. 6724.—For manufacturers of bullet-proof felt.

Sheet metal, any kind, cut, formed any shape. Die-making, wire forming, embossing, lettering, stamping, punching. Metal Stamping Co., Niagara Falls, N. Y.

Inquiry No. 6725.—Wanted, manufacturers of good reliable air guns, also novelty manufacturers.

FOR SALE. Full rights Patented Steam Cooker. Novel, useful, practical. Big demand certain. Write for terms. W. L. Liggins, 1413 Poplar St., St. Louis, Mo.

Inquiry No. 6726.—Wanted, electric and combination fixture, parts, fittings and electrical supplies; also electro-plating equipment and supplies.

Wanted.—Colonial silverware. Any one wishing to sell any authentic silver made in this country during the eighteenth century, please communicate with C. A. M., Box 773, New York.

Inquiry No. 6727.—For manufacturers of any kind of amusement device operated by dropping a coin in a slot.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 18 South Canal Street, Chicago.

Inquiry No. 6728.—For manufacturers of hand-operating machines for planing wood floors.

You can rent a well equipped private laboratory by day, week or month from Electrical Testing Laboratories. 548 East 80th Street, New York. Absolute privacy. Ask for terms and facilities.

Inquiry No. 6729.—For manufacturers of a device for sawing stone by means of a wire.

Space with power, heat, light and machinery, if desired, in a large New England manufacturing concern, having more room than is necessary for their business. Address Box No. 407, Providence, R. I.

Inquiry No. 6730.—For manufacturers of spoke-turning machines.

Wanted.—Representative to sell our spinning, weaving and batting machinery, by oldest firm in France and Germany. Grand prize awarded Paris Exposition. Address Steeg, 563 William Street, Buffalo.

Inquiry No. 6731.—For the best mixing vats, air compressors, washers, etc., for a dynamite plant.

Splendid opening for a high-grade mechanical engineer, who has had a broad experience in managing machine shops, the manufacture of machinery, engines and metal specialties. Applicants must be in prime of life and now employed. Preference will be given to applicants who have had modern scientific training in mechanical schools of high standing. Unqualified references will be exacted. All communications received will be regarded as strictly confidential. Address Mechanical Engineer, Box 773, New York.

Notes and 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.

(9605) C. J. J. Co. says: Can you do us the favor to answer in the columns of your paper the following question? We desire to know how much water will be lifted by a simple undershot wheel having straight paddles, 14 in number, symmetrically spaced around the wheel. The wheel is 14 feet in diameter with paddles 6 feet long and 16 inches wide. The wheel revolves eight revolutions per minute and dips into the canal carrying water 16 inches deep, the ends and edges of the paddles fitting the canal quite closely, not more than ¼-inch slack showing at any point. The canal is curved to compel the wheel to lift the water 2½ feet so that the total duty is a lift of 2½ feet for the width of the wheel. Can you give us an opinion as to the amount of water that would be lifted by such an apparatus, and the power required to operate it? A. If we understand your question aright, the wheel is to be driven by external means, and used in a sense as a pump to lift the water in the canal up a curved incline two and a half feet. If this assumption is correct, and if there is no slip between the water and the paddle wheel and no leakage past the paddles, 2,500 feet of water will be lifted per minute, which would require, if the efficiency of the apparatus were perfect, 12½ horse-power. As a matter of fact, however, there will be a certain amount of leakage past the paddles, amounting to 10 per cent, or possibly 20 per cent. This would decrease the quantity of water actually lifted from 2,500 to 2,250 cubic feet, and as the efficiency of the apparatus is not perfect, it will require more power by a considerable amount. The efficiency of this device would probably not be far from 55 or 60 per cent. This would increase the power actually required to drive the wheel to from 16 to 20 horse-power. In order to have a reasonable margin of safety, it would be well to allow 25 horse-power. If this device is to be used, it will be necessary to either use buckets in place of flat paddles in the paddle wheel, or else to have paddles considerably wider than 16 inches, or else to have them made with a piece at right angles at the top of the paddle to prevent the water from running back over the top of the paddle after it has been lifted a portion of the way up the incline.

(9606) E. S. asks: Will you kindly give me the scientific reason for the hour before dawn being the darkest and coldest, particularly the former? A. We do not know any scientific reason for the belief among people that the hour before dawn is the coldest and darkest. The popular proverb is, "It is always darkest just before dawn," which we always understood to refer to the mental attitude of a man who is hard pressed and finds help. The coldest hour of the night is found to be from 3 to 4 A. M. The darkest hour is when the sun is furthest below the horizon, or midnight. We do not see any other scientific conclusion. All daylight is gone from the atmosphere after the sun is 18 deg. vertically below the horizon, the time which marks the end of twilight of evening and the beginning of the morning twilight. Between these two times it is deep night and there is no reason why one of the hours should be darker than another.

(9607) W. A. P. asks: I am building a 12-inch spark coil according to Allsop directions. What test can I make to find if I have a good or perfect condenser? If I put 250 volts 1 lamp in series across the foil ends I get no trace of leakage or short circuit, but 110 alternating lamp series does not light the lamp, but there is a big leakage—so much that it cannot be held in the hand. I refer to using the condenser only, as the coil has not yet been built. I have 20 sections secondary built on the primary and receive only ⅜-inch spark with or without condenser, the maximum number being 96 sections. Does this appear right? A. The leakage of a condenser is found by charging it and discharging it immediately, then charging it and leaving it for say 15 minutes and discharging it again. The ratio of the discharge gives the leakage. There is no way of finding the leakage without proper instruments to measure with. We do not see any proof of leakage in what you write, though what you say is not clear. If you mean that a direct current of 220 volts shows no leakage, while with an alternating current 110 volts gives effects across the condenser, we reply that an alternating current does not charge a condenser at all. A condenser is not used on a coil when the alternating current is used with it. Without instruments or means of measuring the condenser you should make sure of each sheet of the paper, make the condenser as well as possible and rely upon the thoroughness of your work.

(9608) A. B. asks: Two weeks ago I purchased from you Hopkins's "Experimental Science." In the description of the ½-horse-power motor in Volume I., I find a few dimensions missing: 1. Diameter of poles of fields. 2. Width of coils on poles and number of layers of wire on same. 3. When soldering wires to bars of armature, should both ends of twisted wires (when cut apart) be connected to same bar? If not, how should they be connected? 4. What thickness of leather board should be used for the lining of armature grooves? 5. Must there be an insulation between armature disks and sleeve? 6. Total thickness of disk (not counting flange and nut of sleeve). 7. In Fig. 498 on page 514, should first coil go from 18-1 to 9-8 as shown, or from 18-1 to 10-9? 8. What size wire should be used for spring of carbon brush? 9. Diameter of driving pulley. 10. Should field magnet be of wrought iron, or would cast iron answer the purpose? 11. Is it necessary that there be insulation between each layer of wire in armature and also in field? 12. Would you please give me data for the construction of the rheostat—wire, etc.? A. The dimensions of the parts of the motor described in "Experimental Science," Volume I., page 510, which are not given in the list of sizes, may be determined by measuring drawings in which the parts appear with others whose dimensions are given. Thus in Fig. 497*a*, the diameter of the pole pieces can be found from the diameter of the field-magnet drum. You will find them to be 2¼ inches. From the same figure the thickness of the field coils is determined to be 1 inch. We do not know the number of layers of wire in each field coil, but you must wind 1⅞ pounds in each coil. The number of layers will be determined by your skill in winding the wire closely. In soldering the wires to the bars of the armature, solder the end of one coil and the beginning of the next to the same bar. Any thickness of leather board may be used which will not be cut by the wire in winding. A piece of the thickness of heavy paper should be sufficient. No insulation is required between the armature disks and the sleeve. It would have been specified had it been required. We do not know the number of armature disks which will be required to fill the space allotted to them on the sleeve. No. 25, B. & S. gage, is 0.0179 inch thick. Slight inequalities and roughnesses will probably prevent you from bringing the disks into actual contact all over their surfaces and so you will not get the total number into the core which this thickness would indicate. The coils of the armature are to be put into the slots as given in the winding plan. Follow the directions closely. For a spring upon the carbon brushes several sizes of wire would do equally well. No. 16 or 18 will answer. The driving pulley should be of a size to produce the proper speed in the machine to be driven by the motor, which is to give 1,600 turns per minute. From this you can calculate the diameter of the pulley required. The field-magnet frame is of cast iron. The cut shows the mark where the two parts of the pattern came together in molding for the casting, in Fig. 497. The insulation between the layers of wire in all the coils is thick shellac, which is dried by baking the coils after they are wound. We have no data for the rheostat. Usually a rheostat giving three speeds is purchased. One with the coils imbedded is to be preferred.

(9609) G. C. T. asks: Will you kindly answer through the notes and queries column the following questions? 1. While trying to find the direction of magnetic lines of force in the fields of a small dynamo I used a hand compass, and after letting the compass touch the poles a few times I found that the north end of the needle had been influenced some way and would be at rest only when pointing due south. The compass is still in that condition. Please explain reasons for this and a way to change needle back to original condition. Compass is inclosed in brass case and with what I suppose is a steel dial. A. The needle of your compass has its magnetism reversed by the dynamo field in some way, so that the former north end is now south. To restore it to its former polarity, place the compass so that the needle cannot turn and bring the end which you wish to have north against the south or minus pole of the dynamo. In a short time the needle will be charged in the proper direction. 2. Is it necessary with a series-wound dynamo to have the external circuit closed when starting, provided the field coils are separately excited? A. It is necessary to have the external circuit of a series dynamo closed when it is started. It will not generate E. M. F. on open circuit, since no current can flow around the field until the external circuit is closed. It is not the same with a shunt machine, which has its field circuit always closed. 3. Are series or shunt wound field coils best adapted for dynamos that are direct connected, or does the manner of winding affect the coupling of dynamos in any way? Hawkins's "Catechism of Electricity," page 157, states that dynamos of the under type are invariably used for direct connections but does not say whether manner of winding affects this or not. A. Series-wound dynamos are not used in parallel or coupled together, because if either generates too little current that fact reduces its power to generate still further and finally reverses the machine, which short-circuits the system. These matters are fully discussed in Crocker's "Electric Lighting," two volumes, which we can send for $6.

(9610) A. L. R. asks: 1. In running levels for a waterway of considerable length, like the Panama Canal, is not the rotundity of the earth an important factor that must be considered? A. In running levels for waterways of considerable length the line which is actually run is substantially a circle whose center is the center of the earth. The sites taken by the instrument between successive settings are so short that the curvature of the earth does not appreciably affect them, and at each new setting of the instrument the line of the level is parallel to the circumference of the earth at that point. 2. If it were possible to stretch a wire, perfectly taut, across a lake ten miles in width, so that it is perfectly level and absolutely without sag, would it not be necessary that the shore end of the wire be anchored at an elevation of not less than 16 2-3 feet above the water to prevent the immersion of the wire at the center of the lake? A. If it were possible to pass a perfectly straight line across a lake ten miles in width, the anchors must be elevated not less than 16 2-3 feet above the water to prevent the line from going below the level of the water at the center. 3. An extensive and perfectly level plain is traversed by a range of mountains; to pierce which, for a railroad, requires a tunnel ten miles in length. If such a tunnel is excavated with a floor perfectly level, as indicated by the surveyors' level or by "tees" placed at both ends and the center, assuming the possibility of sighting that distance, would not the center of the tunnel be lower than either end or than the plain outside, and would not the water in the tunnel drain toward the center? Would the specific gravity of an object placed in the center of the tunnel be affected by the superincumbent weight of the mountain mass? A. If the tunnel which you mention were to pierce a range of mountains ten miles long, it would not go in a straight line with the mountain, but be an arc of a circle whose center was the center of the earth, or else, as a matter of good engineering practice, it would be enough higher in the center, than indicated in the above statement, to allow drainage in both directions. If such a tunnel were excavated with a surveyor's level stationed at the point where the range of mountains left the level plain on one side, it would come out on the other side of the mountain range 65 feet above the plain. If the tunnel were excavated in an exact straight line from the plain on one side to the plain on the other, at the entrance of the tunnel on either side there would be a down grade of 65 feet in ten miles, or 6⅛ feet to the mile. The tunnel would be level in the center, and would be at that point 16 2-3 feet below the surface of the plain. The specific gravity of an object placed at the center of the tunnel would be slightly less than outside on the plain, because of the influence of the mountain.

(9611) H. M. says: Please give the best receipt for making whitewash for outside work. A. A good durable whitewash is made as follows: Take ½ bushel of freshly burnt lime, slake it with boiling water; cover it during the process, to keep in the steam. Strain the liquid through a fine sieve, and add to it 7 pounds of salt previously well dissolved in warm water; 3 pounds of ground rice boiled to a thin paste and stirred in boiling hot; ½ pound powdered Spanish whiting; 1 pound clean glue, which has been previously dissolved by soaking it well, and then hanging it over a slow fire in a small kettle, within a large one filled with water. Add 5 gallons of hot water to the mixture, stir it well, and let it stand a few days covered from dirt. It must be put on quite hot. For this purpose it can be kept in a kettle on a portable furnace. About 1 pint of this mixture will cover a square yard.

(9612) C. F. writes: Some time ago I read about a liquid or composition which placed into a tree stump or roots would rot and thereby destroy them. Could you explain this or any other similar process of destroying tree stumps? A. In the fall bore a hole in the center of the stump, about 18 inches deep and 1 to 1½ inches in diameter. Put in about 2 ounces saltpeter, and fill the hole with water; plug it up tight. In the spring take out the plug, pour in 8 or 10 ounces petroleum, ignite, and the stump will smolder, but not blaze, to the extremities of the roots, leaving only ashes. Dynamite is also extensively used.

(9613) W. B. asks: 1. A chicken gains about twice in weight for the first twenty-four hours after hatching. What do they live on, as they do not eat anything? A. It is true that chicks can go for several days without food, as there is sufficient of the egg left in the stomach to supply nutriment. They will eat on the first day, however, if food is provided. Chicks almost double in size the first day, owing to the organs being relieved from