

forms it is advisable to conceal bright buttons on occasions; and these buttons the device is especially designed to hold in place.

CARTRIDGE-CARRIER.—DR. EDWARD T. GIBSON, U. S. A., Fort Harrison, Helena, Mont. The invention provides a body-band having pockets for supporting frames or cases for cartridges, which are so arranged on the band that a large supply of ammunition can be carried.

STOVE.—ERNEST C. COLE, 3218 Western Avenue, Chicago, Ill. A casing has a top plate above the firepot and a hot-air chamber above the plate. Opposite pipes in fixed relation to and extending through and supported by the top plate open into the chamber above the plate.

NON-REFILLABLE BOTTLE.—JOHN S. HAGGERTY, Astoria, Queens, New York city. The neck of the bottle is provided with adjacent enlargements. At the bottom of the neck a valve can be seated. A plug or stopper secured in the neck extends past one enlargement and into the next.

ELEVATED RAILWAY.—JOHN W. GONCE, Kinderhook, Ala. This elevated or suspension railway is particularly adapted to fill the wants of communities where there is not enough traffic to justify the construction of a surface railway.

EXHAUST-MUFFLER FOR AUTOMOBILES AND STATIONARY ENGINES.—LOOMIS AUTOMOBILE COMPANY, Westfield, Mass. The Loomis muffler for deadening the exhaust of hydrocarbon-motors is made of aluminum and asbestos.

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

NEW BOOKS, ETC.

KANT'S COSMOGONY. As in his Essay on the Retardation of the Rotation of the Earth and his Natural History and Theory of the Heavens. With introduction, appendices of Thomas Wright, of Durham. Edited and translated by W. Hastie, D.D. Glasgow: James Maclehose & Sons. New York: The Macmillan Company. 1900. 12mo. Pp. cix. + 205. Price \$1.90.

Kant's work in the field of speculative philosophy has so completely overshadowed his scientific labors that the true value and startling originality of his "General Natural History and Theory of the Celestial Bodies" have been fully appreciated only by a few modern physicists.

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

Inquiry No. 2.—Wanted the name and address of a manufacturer of porcelain plaques with pictures inside similar to buttons now used with photographs on same. The are the size of a small saucer.

WATER WHEELS. Alcott & Co., Mt. Holly, N. J.

Inquiry No. 3.—Wanted the name and address of a manufacturer or dealer in fancy wood marquetry for inlaying purposes.

Yankee Notions. Waterbury Button Co., Waterbury, Ct.

Inquiry No. 4.—Wanted the name and address of a manufacturer of portable gasoline motors mounted on wheels.

Handle & Spoke Mch'y. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 5.—Wanted the name and address of a manufacturer of spring motors of one or more horse power.

Rigs that Run. Hydrocarbon system. Write St. Louis Motor Carriage Co., St. Louis, Mo.

Inquiry No. 6.—Wanted the name and address of a manufacturer of acetylene gas engines for automobiles.

Inventions developed and perfected. Designing and machine work. Garvin Machine Co., 141 Varick St., N. Y.

Inquiry No. 7.—Wanted the name and address of a manufacturer of aluminum sheets suitable for strainers.

By mail, \$2.—Goldingham's new book, "The Design and Construction of Oil Engines," Spon & Chamberlain, 12 Cortlandt St., New York, U. S. A.

Inquiry No. 8.—Wanted the name and address of a manufacturer of aluminum rivets.

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Inquiry No. 9.—Wanted the name and address of a manufacturer of automatic speed controllers for hand power elevators.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4. Munn & Co., publishers, 361 Broadway, N. Y.

Inquiry No. 10.—Wanted the name and address of a manufacturer of small photographic instruments that will photograph, develop and finish entirely in the shortest possible time, of half a minute, if possible, for making abstracts of legal records in a county seat.

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Inquiry No. 11.—Wanted the name and address of a manufacturer of duplicating apparatus to copy and make duplicates of records.

Inquiry No. 12.—Wanted the name and address of the manufacturer of the Merritt Typewriter.

Inquiry No. 13.—Wanted the name and address of a manufacturer of autographic supplies.

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Inquiry No. 21.—Wanted the name and address of a manufacturer of pearl button machinery.

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Inquiry No. 24.—Wanted the name and address of a manufacturer of parts and complete models of small steam engines and locomotives.

Inquiry No. 25.—Wanted the name and address of a manufacturer of acetylene lamps suitable for parlors and household use.

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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.

(8049) E. T. W. asks: Suppose a telegraph wire was allowed to rest on iron from one end of the line to the other, would that in-

terfere in sending messages? A. No message can be sent over a telegraph wire which rests on iron. The wire must be insulated from the earth at every pole or support. The insulators are either glass or porcelain.

(8050) E. C. H. asks: 1. Can the armature of a small shunt-wound dynamo be connected to collector rings so as to generate an alternating current? A. A direct current dynamo may have collector rings connected to opposite points on its armature coils, and the current taken off these rings will be alternating. The output of the dynamo will not be affected by the change. Of course, the field must be excited from an external source of current. 2. What does the word "cycle" mean when used with reference to electricity? A. The word "cycle" in an alternating current refers to the number of complete reversals per second.

(8051) D. E. R. asks: 1. In what respect is a motor run by a battery different from one run by a dynamo? A. A motor run by a battery does not differ in any respect, electrically, from a motor run by a dynamo. As the current from a dynamo is usually of a higher voltage, the motor run from a dynamo must be wound to a higher resistance than the one to be run by a battery. 2. What should be the ratio of the size of wire on the armature to that on the field magnet? A. There is no definite ratio between the wires used on the armature and those of the field. The sizes to be used in any case are selected with reference to the number of turns required and the space in which the wire must be put upon the core. No rule can be given. The sizes are the result of the calculation in working out the design. 3. What should be the ratio of the field magnet's size to the armature's? A. The armature of a dynamo or motor is usually designed first. The field magnet is made of such a size that there will be surface of cross-section sufficient to produce the number of lines of force required to produce the voltage needed for the machine. The calculation of the number of turns of wire needed on the field and the size of wire which can be used follows, regard being had to economy in the weight of copper used, the amount of current to go through the field, etc. 4. Does the number of parts into which the armature is divided have any extra effect on the motor? A. The number of coils on the armature of a motor affects the steadiness of the pull of the motor, the more coils, the steadier the torque of the motor.

(8052) H. B. asks: Can you give me a method (simple) for treating wood so that it is impervious to sulphuric acid? A. Soaking wood in hot paraffin for a short time and brushing off excess will render wood impervious to acids to a certain extent. If a tank or wooden vessel to hold acids, the paraffin treatment may be perfected by brushing the hot paraffin on the surface inside and also on the outside, and then go over the surface with a hot iron: a sad iron or tailor's goose is a very efficient tool to drive the paraffin into the wood. A plumber's blowpipe is also very convenient for such work, but must be handled with care, so as not to fire the paraffin. You might try the application of a mixture of paraffin 2 parts and gutta percha 1 part used hot. A heavy coating of asphalt has been used for this purpose.

(8053) C. F. H. says: In SCIENTIFIC AMERICAN, August 11, 1900, a formula is given for photographic paper; the weights are given as parts; would the formula be correct if I should make it as follows, reduced 1-16?

Table with 4 columns: Substance, Weight, and other units. Includes Ferric oxalate, Oxalic acid, Nitrate silver, and Water.

The second column is the way parts can be converted; 1,000 minims is a trifle over 2 fluid ounces, there being 480 minims in one ounce.

(8054) W. G. R. writes: I want to make a solenoid of insulated copper wire, that will pull to best advantage on an iron core 6 inches long and 1/2 inch in diameter. Coil to be about 2 or 3 inches long. Current is alternating, 7 1/2 amperes, 115 volts, 60 cycle. With this current I want to pull iron core about 3/4 of an inch with a force to lift a 2-pound weight. Also, if it can be made to lift 4 or 6 pounds? What wire and size are necessary for solenoids? A. Your proposition to make solenoids to pull an iron core to lift 2 pounds with an alternating current is not feasible. The alternating current cannot be used in an electromagnet for lifting purposes. A direct current is needed. If you decide to use a battery for the lifting, you can wind No. 16 or No. 18 magnet wire to the length you need and till the magnet will lift by experiment what you require. The winding will depend in part upon the battery you use.

(8055) C. S. W. writes: Mr. Hopkins' recent article in your paper about the metal thermometer, does not state how to place the steel and brass strips in relation to the scale, in order to have the reading from left to right. If the expansion bar is placed to the right of the pointer should the steel strip be to the right of the brass strip or the reverse? A. As the brass strip expands more than the steel, it is obvious it should be nearest the roller, with the present scale. If the compound bar is reversed, the scale may be reversed to match it.

(8056) W. H. R. asks: 1. Please tell me where I can find descriptions and results of tests of earth and sea water batteries? A. We have not at hand any tests of earth batteries. One is described in SUPPLEMENT No. 1300, price ten cents, in article on electric clock. Sea water batteries are described in Carhart's "Electrical Batteries," price \$1.50 by mail. 2. Can you tell me where I can find any literature on the unipolar dynamo? A. The unipolar dynamo, so called, is discussed in Hawkins' and Wallis' "Dynamo," price \$3 by mail, and in Crocker's "Electric Lighting," vol. 1, price \$3 by mail.

(8057) W. C. E. writes: I wish to make water motor described in SCIENTIFIC AMERICAN, and would like to ask what will be the water pressure from a tank having a head of 24 feet? A. You will have 10 pounds pressure per square inch with 24-foot head.

(8058) D. S. writes: Our town is located in the "Black Swamp" district of Northwestern Ohio, almost flat, with large ditches, well underdrained, but in the spring of the year these ditches are nearly filled with water, so that the soil is liable to be completely saturated for a few weeks almost to the surface, and it passes through our cement walls into our furnace cellars. I write you to learn whether or not you can tell me how to make a cement that will be absolutely impervious to water. We desire to build a parsonage with a cellar and a furnace cellar. Can it be done without building the bottom of the cellar close to the surface, so that it shall be above the level of the saturated soil? Perhaps, a well-cemented cellar bottom and walls might be a certain distance below the level. A. Cellars made in wet soil may be made tight with Portland cement concrete bottoms and sides. They are made better if built in dry weather, with a coat of asphalt put on hot when the concrete has become dry. For sanitary reasons as well as architectural effect houses should be raised several feet above the ground level in wet or swampy districts, with embankments around the outer walls and with full-size cellars. Thus a full-sized cellar only one or two feet below the natural surface of a wet soil with the excavated part of the cellar made into an embankment, with a small addition from other sources, makes the most desirable cellar for a residence on plains and swampy lands.

(8059) H. L. G. writes: The account of a large gasometer exploding from a lightning flash has aroused in our midst a discussion as to the causes which have led up to explosions of a similar nature in the past. A contents that gas confined in a gasometer can only be exploded by a flash, not directly attributed to the gas itself, whereas B contents that gasometers have exploded by spontaneous combustion of the gas itself, without a primary cause of spark such as lightning or an electrical contact. A. Illuminating gas as inclosed in a gas holder is not of itself explosive. It is only when mixed with air to a large percentage that it becomes explosive by lightning or contact with fire. Usually where tanks or gas holders have been exploded, they have been ruptured by the stroke of lightning and the out-rushing ignited gas has made explosive mixtures with air. With covered petroleum oil tanks the space above the oil and cover is always filled with a dangerous mixture of oil vapor and air. When lightning strikes an oil tank at a time when the air and vapor mixture are in an explosive proportion a most dangerous explosion takes place. Gas does not explode spontaneously in any of its ordinary forms or combinations as used for illumination.

(8060) P. J. A. writes: I am interested in wireless telephony. Could you name some numbers of your paper that I could study up telephone transmitters, practical or impractical? A. The SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 250 and 966, price ten cents each, contain descriptions of telephone transmitters. You would, however, do better to buy Miller's "American Telephone Practice," price \$3 by mail, and have the whole story up to date.

(8061) N. M. S. asks: 1. I am desirous of getting information as to the length of vibration of different colored rays of light. If light vibrates the molecules of a body, why will it not vibrate the body as a mass? Is there any known molecular body or bodies which light will vibrate, or also that have properties of being magnetized? Do you know of any book or books which I could get on light on this line, e. g., vibration, waves, etc.? A. All higher text-books of physics treat of light as a vibration and give tables of wave lengths. We can recommend Barker's "Physics," price \$3.50 by mail. The vibrations of light are too minute and rapid to set ordinary matter into motion. They, however, do affect selenium. 2. Is there a chemical solution which will stop rays of heat and let light pass out? What is it? A. Yes: a solution of common alum in water is quite impervious to heat and allows light to pass with ease. So also iodine dissolved in carbon bisulphide forms a liquid nearly black. It stops light waves and allows heat waves to pass. Glass stops most of the ultra-violet waves, but quartz allows these to pass. Rock salt allows heat waves to pass.

(8062) F. T. asks: 1. Will the motor described in the December 8 and 15 copies give

the same result if the field and armature were cast? A. If cast iron of the same size as the wrought iron parts were used, the magnetism would be cut down about one-half, and the motor reduced in power to the same degree.

(8063) J. L. C. writes: Kindly inform me the most practical dimensions, etc., of an induction coil suitable for gas engine ignition upon motor bicycle. A. SUPPLEMENT No. 1281, price 10 cents, gives valuable data for a coil for igniting a gas engine by means of a battery.

(8064) L. A. T. writes: Please give, through Notes and Queries, the process of case-hardening of tools such as taps, dies, etc. A. Heat the surface to be case-hardened sufficiently hot to melt yellow prussiate of potash (potassium ferrocyanide) powdered and sprinkle on, and again insert in fire and heat to "cherry red," when treat to bath of clear cold water. Remove scale with sandpaper or emery-cloth. The forge is as good a place to harden small or single subjects as a regular carbonizing furnace.

(8065) C. W. B. writes: Please give me the rule for finding the horse power of an engine. Also state what proportion of the power of the engine is required to operate the ordinary slide valve. A. To obtain the horse power of a steam engine with any reasonable accuracy without taking an indicator card, the cut-off of valve and the exact pressure in the steam chest should be known. Sometimes engines are run with the steam partly throttled, which with the length and friction in the steam pipe will give less pressure in the steam chest than is indicated by the gage at the boiler. From the known cut-off the mean pressure may be taken from the steam tables or rule for mean pressure in Haswell's "Engineers' Pocket-Book." We give the mean pressure for the points of cut-off in ordinary use, viz., 3-10 = 0.692; 3/4 = 0.766; 4-10 = 0.787 of the initial pressure. Then the diameter of the piston in inches by the mean pressure per square inch by twice the stroke in feet by the number of revolutions per minute equals the total foot-pounds. The total foot-pounds divided by 33,000 equals the horse power. The power required to operate the slide valve varies from one to two per cent of the power of the engine.

(8066) E. P. asks: 1. Please tell me whether a person on a private ground-circuited telephone line should hear the conversation on other private, ground-circuited telephone lines, if he were not connected at the switchboard? It is this way without telephone lines. A. Whenever telephone wires run side by side, what is said over one line will be heard over the other. This is true whether the line is a grounded line or not, unless the wires are crossed at intervals. 2. Would a return circuit wire be the best way to remedy the trouble? A. A metallic circuit with the wires twisted or crossed at regular intervals is the only way to prevent "cross talk." 3. How many amperes strong should be a dry battery 2 1/2 by 6 1/2 inches? A. A dry cell cannot be said to have any amperes. At least the current varies so rapidly that it can hardly be measured before it has changed. The voltage is about 1.3. The internal resistance varies very rapidly. The amperes therefore vary with equal rapidity.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending FEBRUARY 5, 1901, AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions such as Acetylene burner with two or several flame rays, Acid and preparing same, trimethyl pseudo uric, etc., with corresponding patent numbers.

Main index table listing inventions such as Bed foot rest, invalid, Beer cooling and preserving apparatus, Beer cooling apparatus, Beer storage house, Belt, apparel, etc., with corresponding patent numbers.

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Table listing inventions such as Garbage furnace or crematory, Garbage receptacle, Garment edge protector, L. Mabee, Gas apparatus sight device, G. S. Braner, Gas cut off, automatic, V. E. Campbell, Gas cut off, automatic, J. C. Head, Gas generator, acetylene, C. S. Bartholf, Gas generator, acetylene, J. E. Lytle, Gas generator, acetylene, D. H. McPherson, Gas generator, acetylene, J. A. Mosher, Gas or other hydrocarbon engine, W. E. Simpson, Gear cutting engine, C. H. Field, Gearing, H. B. Keiper, Gearing, ball, H. B. Keiper, Gearing, variable speed, W. L. Schellenbach, Glass grinding and smoothing apparatus, A. Roemisch, Glass, lining metallic or other vessels or tubes with, L. Bergier, Glassware cooling apparatus, Taylor & Woodcut, Glove, A. T. Rogers, Glue cutting machine, C. Keller, Governors, automatic stop for, F. W. Grading and ditching machine, W. H. Morenus, Grain distributing spout, C. P. Smith, Grain drill, Benyes & Schutt, Grain loader, A. Hyland, Grate, J. 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Ruffhead, Nut lock, wagon, P. J. Moran, Obstetrical device, H. C. Fleming, Oiling device, windmill, S. E. Burke, Ore concentrator and separator, G. J. Frey, Painting apparatus, pneumatic, J. F. Redman, Painting or white washing machine, spray, H. A. Sheldon, Paper bottle, J. H. Hanks, Paper box, J. T. Crow, Paper box, folding, M. J. Kane, Paper pail, T. F. W. Schmidt, Paper reel brake, G. A. Wilson, Phonograph records, apparatus for duplicating, T. A. Edison, Phonograph records, duplicating, T. A. Edison, Photographic apparatus, E. L. Boyen, Piano, S. A. Hazen, Piano action, C. A. Ahlstrom, Pile fabric, woven, H. Sarafian, Pin, See Dowel pin, Pipe wrench, C. Peterson, Planter and fertilizer distributor, combined, S. B. Coats, Planter and marker, corn, E. J. Kelley, Plow, cultivating, L. P. Miller, Plow, hillside, J. E. McWane, Plow, lister, C. M. Carter, Plow, reversible, C. Gabel, Pneumatic despatch tube terminal, C. H. Burton, Pocket, W. Shapiro, Pole head device for carriages, T. H. Brigg, Polishing machine roll, C. F. & C. H. J. Peaw, See Grinding power, Practice ball, F. Oakley, Printing press sheet delivering and conveying mechanism, F. C. Stockholm, Projectile, Sims & Merriam, Propeller, C. D. Keller

Table listing inventions such as Leather, Leather rolling machine, Leather splitting machine, Leather, treatment of, E. A. Warr, Leaves from their stems, apparatus for separating flexible portions of, L. P. Whitaker, Leaves from their stems, separating, W. A. Hudson, Leaves from their stems, separating flexible portions of, W. A. Hudson, Lemon squeezer, J. A. Russell, Life saving raft boat, H. Redden, Lightning rod, E. J. Hansen, Limb, artificial, W. H. Kimball, Limbs, ankle joint for artificial, I. R. & L. Limkin, A. A. Stourens, Lime or cement and fixed combustible gases, producing, Schubert & Pierce, Liquid heater, electric, J. A. G. Trudeau, Liquid separator, centrifugal, Marsh & Hackett, Lock, See Sash lock, Lock, J. A. Crawford, Locomotive, J. E. Sague, Loom, Jacquard, operating mechanism for, O. W. Schaum, Loom reed motion, E. H. Ryon, Loom warp tension mechanism, G. F. Hutchins, Loom, weft replenishing, W. Jacobs, Looms, thread parter for weft replenishing, J. Northrop, Lubricator, G. J. Bingham, Mail bags or pouches, means for catching and delivering, G. W. Sebastian, Mail box, F. J. Slezzer, Malt apparatus, pneumatic, F. Knuttel, Mantle suspending attachment, W. D. Hann, Massage device, A. Andrae, Match box, C. E. Laraway, Measure, cloth, D. W. Scott, Mechanical movement, G. F. McIndoe, Merry-go-round, H. Sellers, Metal turning tool, E. C. Henn, Meter, See Electric meter, Motion, mechanism for converting reciprocating into rotary, Ulrich & Wittke, Music box display attachment, F. A. Richter, Musical chromoscope, J. M. Loring, Needle polishing machine, J. Funken, Nut lock, A. M. Burleson, Nut lock, T. G. Ruffhead, Nut lock, wagon, P. J. Moran, Obstetrical device, H. C. Fleming, Oiling device, windmill, S. E. Burke, Ore concentrator and separator, G. J. Frey, Painting apparatus, pneumatic, J. F. Redman, Painting or white washing machine, spray, H. A. Sheldon, Paper bottle, J. H. Hanks, Paper box, J. T. Crow, Paper box, folding, M. J. Kane, Paper pail, T. F. W. Schmidt, Paper reel brake, G. A. Wilson, Phonograph records, apparatus for duplicating, T. A. Edison, Phonograph records, duplicating, T. A. Edison, Photographic apparatus, E. L. Boyen, Piano, S. A. Hazen, Piano action, C. A. Ahlstrom, Pile fabric, woven, H. Sarafian, Pin, See Dowel pin, Pipe wrench, C. Peterson, Planter and fertilizer distributor, combined, S. B. Coats, Planter and marker, corn, E. J. Kelley, Plow, cultivating, L. P. Miller, Plow, hillside, J. E. McWane, Plow, lister, C. M. Carter, Plow, reversible, C. Gabel, Pneumatic despatch tube terminal, C. H. Burton, Pocket, W. Shapiro, Pole head device for carriages, T. H. Brigg, Polishing machine roll, C. F. & C. H. J. Peaw, See Grinding power, Practice ball, F. Oakley, Printing press sheet delivering and conveying mechanism, F. C. Stockholm, Projectile, Sims & Merriam, Propeller, C. D. Keller

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