

PATENTED INVENTIONS.

Agricultural Implements.

SICKLE-GUIDE.—JAMES T. LIGHTNER, Redwood, Cal. The body portion of the sickle has a laterally projected tongue formed with a cavity on its under face to receive an anti-friction roller, held in place by a keeper. A bolt is mounted in the body of the guide and is formed on its lower end with a cone, situated in a cavity in the under side of the body. Located on the bolt and within the cavity of the body is an anti-friction cup-wheel which engages bearing-balls. The construction provides an admirable anti-friction guide for the finger-bars of harvesting-machines. The sickle is held true in every direction without materially increasing the friction.

TRIP FOR HAY-FORKS.—JOHN PATTEN, Sr., Manti, Utah. In some hay-forks the position of the trip is such that only a certain amount of pressure can be exerted when the fork is closed. Therefore it frequently happens that the center of the load drops out before the trip is sprung. Mr. Patten has devised a fork by which this difficulty is overcome.

POWER DEVICE.—RODNEY C. COBLE, Marion, Kan. This power device is particularly adapted for use in connection with hay-stacking machines, the purpose of the invention being to provide a portable device having means for ready attachment to the body of a hoisting-machine and connection with the hoist of such machines. The feature of the present invention relates to the manner in which a fork, for example, is raised and lowered. Such a construction of elevating mechanism is provided that a fork may be made to drop without backing the animal employed to operate the power mechanism.

Engineering Improvements.

ROTARY FURNACE.—CHARLES GROLL, Roubaix, Département du Nord, France. A certain number of pieces are so combined that their expansion does not modify the contour of that portion of the periphery of the grate which forms the joint at the contact, or nearly at the contact, of a ring fixed to the walls of the hearth. The expansion of all the parts, whether fixed or moving, forming the joint between the grate and ring is much reduced and equalized by the action of a current of air which is circulated around the periphery of the grate. The pivot of the grate is mounted on a cross-piece fixed at one end to the ring, and capable of longitudinal movement at the other end. The play left between the fixed and movable parts of the furnace is exceedingly small, so that the fragments of coal cannot enter between the parts.

VACUUM-PUMP.—CHARLES E. LEGGETT, Joplin, Mo. This pump is actuated by the pressure of steam against water to expel the water from the pump cylinder or reservoir, the steam being then condensed to form a vacuum, or partial vacuum, into which water flows to fill the cylinder. The apparatus is constructed with special reference to its use in mines, where it is necessary to use a pump capable of handling much water in a short time and of being economically slowed down when the water in the mine has been placed under control.

SUPERHEATING APPARATUS FOR FEED WATER OF MARINE BOILERS.—MASSIMO LEVI and GIACOMO RABONICICH, Venice, Italy. This invention provides in the smokebox of steam-boilers in general, but in marine-boilers in particular, economizing arrangements of tubes through which the feed-water is compelled to pass before being fed into the boiler, for the purpose of causing it to absorb heat from the gases of combustion in the smokebox. Thus the expense for fuel may be considerably diminished; for, hitherto, much energy has been dissipated with the hot gases into the atmosphere.

Gas Apparatus.

ACETYLENE GAS GENERATOR.—THEODORE G. AMES, 1200 South Walter street, Albuquerque, New Mexico. The invention provides a simple and practical machine for generating acetylene gas. The machine may be cheaply and strongly constructed with couplings, holders, and fittings already on the market. These parts, when properly adjusted, will act automatically until the charge of calcium carbide is exhausted.

APPARATUS FOR CARBONATING LIQUIDS.—GARRET D. RHINEHART, Newark, N. J. Mr. Rhinehart has devised a simple and effective means for producing a quick and thorough mingling of gas and liquid in a soda fountain. The apparatus is so constructed that the gas enters the fountain at its bottom portion. A water supply and water overflow are provided at the upper portion of the fountain. According to the invention, two fountains can be so coupled together that both may be simultaneously or independently supplied with gas and water, so that the overflow of one or both fountains can be brought into operation as desired.

Mechanical Devices.

LOCK.—CHARLES M. BURNS and FREDERICK T. MERCER, Philadelphia, Pa. The lock can be operated either by a knob or by a key, or by both. When desired, an extra key-operated latch can be employed to prevent the knobs

from turning; the door, however, may be readily opened by means of the key. The bolt from the keeper section of the lock is automatically made to enter the body of the lock when the door is closed. A spring latch or bolt is not required, whereby the face-plate of the body of the lock and the surface of the door receiving that plate will not be marred by openings or projections.

ADDING-MACHINE.—JONATHAN T. DAVIS, Greenfield, Mo. This is an ingenious key-operated machine for mechanically adding amounts of any size. The construction is such that the machine can be sold for a comparatively low price and operated with ease. Columns of figures can be quickly added without mental exertion and with no error, if directions are followed.

TENSION DEVICE.—WILLIAM GERHARDT, Hazleton, Pa. The purpose of this invention is to provide a tension device adapted particularly for controlling the wires leading current to electrically-operated cloth-cutting machines, which tension device permits entire freedom of movement of the machine without danger of entangling the wires. The slack of the wires is taken up by a weight which is so combined with sheaves that the wires can be drawn out as the machine is moved away from the tension device.

CARTRIDGE LOADER AND RELOADER.—WHEELER W. MOORE, Rushville, Ill. The device removes the spent caps from cartridges and applies fresh caps, trims the edges of the cartridges and crimps them after they have been loaded. The cartridge tool has a body with a transverse passage. A revoluble crimping-cap is in alignment with the passage. With this crimping-cap the cartridge is pressed into engagement. A movable cartridge-holder employed in connection with the crimping-cap is projected through the passage mentioned. A knife is arranged adjacent to the holder so as to engage the cartridge and trim it.

TRANSMITTING-GEAR FOR WINDMILLS.—JESSE H. ALLISON, San Antonio, Texas. The windwheel-shaft is mounted in brackets and is provided with a pinion. An elongated internal rack is held in mesh with the pinion. Downwardly-projecting rods secured to a ring mounted in a circular bearing on the tower carry a bearing at their lower ends, through which the shank of the rack loosely passes. By reason of this construction a long stroke is imparted to the pump-rod or other device.

Electrical Apparatus.

CLOTH-CUTTING MACHINE.—WILLIAM GERHARDT, Hazleton, Pa. The machine can be freely moved over the cutting-table to cut the cloth without necessitating the operator's using one hand to press the cloth down and feed it in position, since this frequently causes the operator to be seriously cut by the machine. On a framing secured to the base of the machine a motor is carried. Below the motor two stub-shafts are mounted having transverse openings in their ends. Each stub-shaft carries a circular knife provided with a bevel-gear. A vertically-disposed rotary shaft, geared with the motor, extends through the openings in the ends of the stub-shafts. These openings form bearings for the vertical shaft. The bevel-gears on the knives mesh with bevel-gears on the vertical shaft.

Miscellaneous Inventions.

UMBRELLA-NOTCH.—WILLIAM DAVISON, 1 Queens Down Road, Clapton, London, N. E., England. The invention consists of a plain, perforated flange (stamped out in one with a cylindrical collar or tubular portion), in combination with U-shaped wire staples, which are fixed in the holes in the flange, the staples before being so fixed being threaded through the usual pivotal holes in the ends of the ribs or stretchers. Each rib or stretcher will, therefore, swing upon the bow portion of the corresponding staple. The staples are clenched in the flange by bending their points over at right angles or twisting them at the side of the flange opposite to that from which they project.

STOVE.—ERNEST C. COLE, 3218 Western Avenue, Chicago, Ill. In stoves which burn soft coal a large mass of fuel is put into the combustion-chamber, with the result that a large volume of gas is set free which cannot be controlled without overheating the stove. To avoid this difficulty Mr. Cole forms the combustion-chamber with a series of openings at the bottom, communicating with a surrounding chamber, whereby the products of combustion find exit only through these openings. Through the burning fuel, which is amply supplied with oxygen by means of a blast draft above the openings, and by means also of a grate below the openings, the flues will be prevented from filling with soot.

DENTAL BRIDGEWORK.—AUGUST P. JOHNSON, Ada, Minn. All-porcelain post-crowns have metallic posts for attachment to the natural-tooth roots. These posts are provided with lateral projections or arms which pass through the body of the crown and project on the side, where the ends are enlarged to form a base for the attachment of the improved dummy-crowns constituting the bridge proper. A strong bridge is thus produced from all-porcelain post crowns and all-porcelain dummy crowns.

SEAL FOR MILK-BOTTLES.—HENRY O. ROBINSON, 103 East Brooks Street, East Bos-

ton, Mass. As seals for milk-bottles, sheet-metal disks have been employed, provided with a central fold. Pasteboard disks have also been used, provided with a hinge. Both of these seals are objectionable for various reasons. In this invention a regularly oval pasteboard-plate is provided with a single, central crease in the under side and two crimps in the upper side, which are parallel to and equidistant from the central one. By reason of this novel construction the plate is enabled to fold in the manner required.

POLE OR SHAFT COUPLING.—ROBERT O. NEVILLE, Elkhart, Ind. Mr. Neville has devised a simple anti-rattling coupling which holds the pole-iron or thill-irons connected with the draw-shackles, while the pole or thills are in use, or when they have been placed in an upper or lower position for the storage of the vehicle, or when the animals are unharnessed. The device is so constructed that the thill iron or pole iron may be quickly disconnected from the draw-shackles. The coupling is manufactured by the Elkhart Carriage Specialty Company and Indiana Buggy Company, of Elkhart, Ind.

ACETYLENE-GAS GENERATOR.—FRANKLIN E. LAYTON, Corning, N. Y. The apparatus comprises a gas-holder and a generator which employs a feeding apparatus by which the carbide is discharged into a surplus of water in the generator in small quantities. As the gas-holder rises to its maximum height, the valve through which the carbide must pass is automatically closed to stop the generation of gas; as the gas-holder falls, the valve is opened. The refuse can be readily removed from the generator without cutting off the supply of gas; and the carbide-holders can be refilled without interfering with the operation of the machine.

GARMENT-FASTENER.—MOSES W. WINSTON, Manhattan, New York city. The fastener is of the ball and socket type and consists of a button member projecting from one section and extended in the direction of the other section and inclosing the point of junction of these sections.

SAFETY-ADJUSTER FOR PRINTING FILMS.—BENJAMIN DAY, West Hoboken, N. J. This invention relates to adjustable holders for frames for printing films used in lithography or similar arts. By means of the construction provided, the operator is enabled accurately to adjust and hold the frame-film; to adjust, remove and readjust the film after inking or re-inking, with the certainty of obtaining accurate shading; and to shift the frame minutely and accurately in two directions, thereby throwing subsequent prints slightly out of register with the first print, so as positively to cause the subsequent prints to overlap, continue, or thicken the original print to produce darker tones of the original tint. Thus, the shading can be accurately varied.

CALCULATOR.—FREDERICK D. FERGUSSON, Paeroa, Auckland, New Zealand. The object of the invention is to provide a new and improved calculator which is easily manipulated and which is more especially designed for calculating timber, earth quantities, interest, etc. The invention consists principally of carriers or blocks movable in parallel guideways, a connection between the two blocks, and a scale between the guideways, on which the connection is read.

CAN-HOLDING ATTACHMENT FOR LADDERS.—HARVEY KEPLER, Dawson, N. D. The attachment is intended to hold paint-cans, and consists of a plate on one end of which is a guide-block for engaging the channel formed in one of the side rails of a ladder. A spring-pressed jaw on the lower portion of the plate engages any of the teeth in the channel. An arm, extended from the plate, has a hook portion to engage in the channel, formed longitudinally in the inner side of the side-rail of the ladder. With the plate, a can-holding platform is removably connected. The attachment can be adjusted to hold the can level at any angle, either while the side of a building or a roof is being painted.

WINDOW OR DOOR.—CHARLES E. REYNOLDS, Bronx, New York city. In this window or door, a joint and locking strip is adapted to extend simultaneously into adjacent grooves and is arranged to pass wholly into one of the grooves. The strip has a number of inclines. An operating-plate is mounted to slide lengthwise of the joint strip and has a number of inclines engaging the corresponding inclines on the strip. The window sash or door can be readily manipulated in the usual manner or disconnected from the adjacent part for cleaning. A perfect joint is produced between the parts to prevent draft and exclude dust.

SHINGLING-BRACKET.—WARREN L. DUDLEY, Watertown, Minn. This shingling-bracket comprises a base adapted to extend transversely under adjacent shingles. At or near the middle of the base an upright rises. A key moves transversely in a slot in the upright to bear on the top of adjacent shingles and clamp the bracket in position. The upright forms a rest for a part of the staging. This shingling-bracket can be readily placed on a shingle roof to support a stud or other part of the bracing.

HEATER.—HERMAN SCHWICKART, Brooklyn, New York city. The heater has a perforate shell in which spaced deflectors are contained, one above the other, and formed to produce a central draft space and inwardly and upwardly inclined air passages. These pas-

sages begin at the perforate shell and lead to the central draft space at a point above the base end of the next deflector above. A heating and free circulation of air is established, so that it is possible to heat a large quantity of air with a small amount of fuel and at the same time cause a proper circulation of the air in the room.

SAW-HANDLE.—CHARLES W. STITES, Manhattan, New York city. The saw-handle is so secured upon the saw-blade that it can be quickly detached without the use of a tool, and that it can be attached by the latching movement of a portion of the handle. The handle can be applied to any number of saw-blades, which may be carried so that they take up but little space.

CIPHER-CODE SYSTEM.—CHARLES P. HALL, Manhattan, New York city. This new cipher-code system enables one to send long messages with the use of very few words or numerals. The system employs a book having an index-page with a column containing subject words or sentences; a column containing cipher numerals for the subject words of sentences; and a key for the message, arranged for use in connection with the numerical value of the message, to change the numerical value. Besides permitting the receiver readily to decipher the message sent, secrecy can be preserved.

ARTIFICIAL FLOWER MADE OF FUR.—CARL HARTMANN, Manhattan, New York city. Mr. Hartmann has devised an economic and practical means whereby artificial flowers can be made from furs, the flowers being so formed that the nap of the fur will naturally run or lie in the direction of the outer edges of the petals or flowers. The parts of the flowers are so assembled that their centers are independent of the body of the flowers, whereby these centers may be fixed in position simply and quickly.

WELL-PACKER.—FRED J. MOSER, Kane, Pa. Heretofore, owing to the great pressure in oil-wells and the unevenness of the walls, the packing of the wells has been accomplished with difficulty. According to this invention, an annular packing-tube of rubber is employed, which tube is formed with an annular chamber. When this chamber is filled with a fluid, pressure on the end of the tube will be evenly distributed around all the sides of the tube. By these means the tube is caused to expand against the walls of the well, and to adapt itself to inequalities and effectively sealing the bore.

Designs.

BLANK FOR PAPER BOXES.—JOSEPH T. CRAW, Jersey City, N. J. Mr. Craw has devised a one-piece blank from which boxes can be easily made to meet the various requirements of manufacturers.

BELT.—LOUIS SANDERS, Brooklyn, New York city. To the many belts which Mr. Sanders has already designed may be added the one which forms the subject of the present patent. In this new belt two members are employed, which interlace and lose themselves in the longitudinal edges of the belt.

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.

THE METALLURGY OF GOLD. A Practical Treatise of the Metallurgical Treatment of Gold Bearing Ores, Including Assaying, Melting and Refining of Gold. By M. Eisler. London: Crosby, Lockwood & Son. New York: D. Van Nostrand Company. 1900. 8vo. Pp. 638. Price \$1.50.

The fifth edition of a standard treatise upon the metallurgy of gold is now before us. It is illustrated with 300 illustrations and numerous folding plates. The gratifying demand for successive editions of this work, together with the striking and continued advance made during the last half dozen years in the way of appliances for gold mining has led to the great expansion of the work before us. The use of the cyanide process alone would make a new edition imperative. A careful examination of the book shows that every phase of the subject is treated with great care, the relative values of the various processes being carefully considered. It is probably the best book on the subject for the American and English reader.

THE ATTAINMENT OF WOMANLY BEAUTY IN FORM AND FEATURE. Edited by Albert Turner. New York: The Health Culture Company. 1900. 12mo. Pp. 256.

The book consists of a number of chapters written by the various authorities, and the whole forms a compilation of considerable interest to women.

GLUE AND GLUE TESTING. By Samuel Rideal. London: Scott, Greenwood & Company. New York: D. Van Nostrand Company. 1900. 8vo. Pp. 140. Price \$4.

The author has rendered a substantial service to technical literature in the preparation of the present volume. He has gained very valuable experience by the examination of commercial samples. There are too few books

upon such subjects as the present. It is a book which all who are in any way connected with glue will find absolutely indispensable.

PRINCIPLES OF CHESS IN THEORY AND PRACTICE. By James Mason. London: Horace Cox. 1900. 16mo. Pp. 327. Price \$1.

The author is a well-known chess expert and he has produced an admirable book. What he terms the "elements of chess" is particularly valuable. It gives not only the rules of the game, but common sense directions for playing it. The diagrams are unusually clear.

HAND-BOOK OF THE ELECTRO-MAGNETIC TELEGRAPH. By A. E. Loring. New York: D. Van Nostrand Company. 1900. 16mo. Pp. 116. Price 50 cents.

The first edition of this work was published in 1878, and the original text has now been thoroughly revised, so as to include the present state of telegraph practice. A new chapter describing in outline the new duplex and quadruplex methods of telegraphy has been added.

BERICHT VON SCHIMMEL & COMPANY. (Inhaber Gebr. Fritzsche.) Fabrik äther. Oele, Essenzen, und Chemischer Präparate. 1900. Leipzig.

DIE ASSANIERUNG VON PARIS. Bearbeitet von Dr. med. Th. Weyl. With 56 illustrations and 3 maps. Leipzig: Wilhelm Engelmann. 1900. Octavo. Pp. 62. Price, paper, \$2.

This book is the first of a series of monographs on the sanitation of the world's large cities. The pamphlet before us is a clearly-written, fairly well-illustrated account of the system by which the city of Paris disposes of its waste products, receives its water, and is drained. The account is thoroughly scientific, and so far as we have been able to determine, fully trustworthy.

ROPER'S CATECHISM FOR STEAM ENGINEERING AND ELECTRICIANS. Including the Construction and Management of Steam Engines, Steam Boilers, and Electrical Plants. By Edwin R. Keller, M.E., and Clayton W. Pike, B.S. Philadelphia: David McKay. 1900. 18mo. Pp. 365. Price \$2.

The great value of a catechism lies in the fact that a judicious questioning emphasizes the more important points of a subject, and also stimulates the student to think more definitely and clearly upon it than would be the case if merely reading about it. In these respects the written catechism is the best substitute for oral teaching, and the authors have performed their task in the preparation of the present volume in an admirable manner. It was written by Stephen Roper in 1873, and has been so useful and popular that twenty-one editions have been called for. The present is rewritten and greatly enlarged. It is profusely illustrated.

PITMAN'S TWENTIETH CENTURY BUSINESS DICTATION BOOK OF BUSINESS LETTERS, LEGAL DOCUMENTS AND MISCELLANEOUS. New York: Isaac Pitman & Sons. 1900. 16mo. Pp. 240. Price 75 cents in boards, cloth \$1.

A most valuable book for all who are interested in stenography. It is a complete manual of dictation for the use of schools, colleges, teachers, law stenographers and students of shorthand and typewriting. The letters are admirably selected and cover a vast range of subjects. We notice on page 87 one of our own letters relative to patents on inventions.

ON SANITARY AND OTHER MATTERS. By George S. Keith, M.D. London: Adam & Charles Black. New York: The Macmillan Company. 1900. 12mo. Pp. 127. Price \$1.

The author's chapters deal with the waste of water in houses and the modern systems of treating and nursing infectious diseases, how to profit by life at sea, on rice meal, the story of an eye, and the rapid and progressive deterioration of the young, on athletics, etc. The papers all point out the prevailing errors of sanitary or economic matters which seriously affect the well-being of the community, and which, but for the strangely resistant force of conventionalism, could easily be set aside and with much advantage to all.

ROYAL NAVY LIST DIARY AND NAVAL HAND-BOOK FOR 1901. London: Whitherby & Company. 1900. Pp. 535. Price \$1.25.

This is the fourth volume of a publication which has been well received by the naval officers for whom it is specially prepared. Over 400 pages are devoted to the diary, a page for each day of the year. At the end of every month is a printed page on which the officer may enter the dates on which the various drills, incidental to the vessel in commission, took place in that particular month. At the commencement is a considerable amount of historical and statistical information respecting the Royal navy, including an important article on the naval progress of the year by L. Carr Laughton. The hand-book contains several pages devoted to astronomical phenomena of the year, and these are also tables of tides and tidal constants, together with a variety of information to meet the special needs of the naval officer.

Business and Personal.

Marine Iron Works. Chicago. Catalogue free.

For logging engines. J. S. Mundy, Newark, N. J.

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

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

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

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

Machinery designed and constructed. Gear cutting. The Garvin Machine Co., Spring and Varick Sts., N. Y.

New Book.—Design and Construction of Oil Engines. By Goldingham. By mail, \$2. Spon & Chamberlain, 12 Cortlandt St., New York.

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

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.

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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.

(8039) J. S. asks: How to make a small heater by utilizing a 110-volt electric current. A. For a small electric heater use iron wire of a size which will carry the current, and take enough to have the needed resistance. Coil this, and mount the coils on iron frames covered with several thicknesses of asbestos cloth to prevent short circuits. You can get an idea how to make the heater by examining the cuts of heaters in the catalogues of makers of such articles. If you wish 5 amperes or thereabout to flow when the wire is hot, take 300 feet of No. 18 American wire gage iron wire. You will see that the heater is but a rheostat applied for use as a heater. It may be provided with a switch, so as to give various degrees of heating. The rheostat of an electric lantern will answer very well as a heater.

(8040) W. E. G. asks: How can I establish upon my premises a pond for the pleasure of my water fowl—say, 30 by 40 feet, fed by the water supplied by the corporation? My land is a rich loam, with loose subsoil. A. For preventing seepage into the soil from an artificial pond, make a puddle of clay and sand about equal parts or a little more clay if the sand is coarse or loamy. Ram it well all over the bottom, and rise within the embankment to the top or above the water line. If carefully done with the embankment previously wet-ramped, the clay puddle may only line the bottom and side and be covered with sufficient sand to protect it. The thickness of the puddle depends upon the depth or pressure. If from 5 to 7 feet deep, the bottom puddle should be 1 foot thick and the sides may taper to 6 inches at the top above the water line. The overflow may be a pipe leading through the bottom or side as convenient, with a strainer, or may be a stone dam overflow protected by a net of galvanized wire, if it is to be also used as a fish pond.

(8041) M. T. writes: Please give me the resistance of 1,000 feet of German silver and platinum wire of the following numbers by B. & S. gage: 30, 31, 32, 33, 34, 35, 36; also price and place where they can be purchased. A. The resistance of German silver is 12.9 times as much as that of the copper wire of the same size and length, and that of platinum is 5.5 times that of a copper wire of the same size and length. Hence, if you multiply the number of ohms per 1,000 feet of copper wire from the tables by these numbers, you will have the resistance of 1,000 feet of German silver and of platinum wire respectively. Let us may not have the figures for copper wire, we add them for B. & S. gage:

Table with 2 columns: No. and R. per 1,000 feet. Values range from 103.30 to 415.24.

Any dealer in electric material can obtain these wires. See our advertising columns from time to time.

(8042) C. W. C. asks: 1. Can you tell me if phosphorus is dangerous to handle?

A. Yes. 2. Is it an explosive, or what is there about it that is dangerous? A. No; it is not an explosive. An explosive is a substance which is suddenly transformed into a gas, occupying many times the space which the substance occupied before the explosion. The danger from phosphorus arises from the ease with which it takes fire. It is the substance which is used upon the tips of ordinary matches to ignite the wood. 3. How does it come? A. It is sent to market in rolls about 1/2 inch in diameter and 3 inches or thereabout long. 4. How long would a piece 1 inch long and 1/2 inch square burn if about 1/4 of an inch was exposed at a time? A. It could not be controlled in burning in that way. It would burn very violently when set on fire, as a match does. 5. Does it burn with a flame when not submerged in water? A. Yes. 6. Can you tell me some other chemical that would burn with a flame by pouring acid or water on it? A. Potassium or sodium will take fire when dropped into water, and burn in the water. 7. What is its cost? A. Potassium is about \$1.50 an ounce, and sodium about 30 cents an ounce. 8. In what form does it come? A. In sticks in bottles covered with kerosene to prevent them from taking fire. No one should play with any of these substances. They are very dangerous, and frequent accidents result from people without experience attempting to handle them.

(8043) J. B. H. writes: In our business, as in many others using large quantities of liquid mixtures, there is often occasion to find the contents of a kettle or other round vessel, or to find the number of gallons already in any such kettle when the contents are of a known depth. I send you the formula which I have found for use in such cases. With it the labor of computing is, I believe, reduced to a minimum. Should you consider it worthy of publication in your magazine, I have no doubt it will prove helpful to some of your readers. To find the capacity in gallons (of 231 cubic inches) of any vessel having straight sides (either parallel, convergent, or divergent), having a circular horizontal cross-section and having a flat, spherical, or spheroidal bottom,

3C(a+b)^2+8Db^2 / 529 = capacity in gallons.

Measurements are all in inches. In case the vessel has a flat bottom, the second term in the numerator of the fraction disappears. A. The formula given above is an approximation, perhaps close enough for factory use, but in any special case the result obtained from its use will vary somewhat from a correct gaging of the kettle. It would seem to be better to gage a new kettle before it is put into use by measuring the depth for each

unit of quantity of water used in filling it. A table of these results kept near the kettle will enable the workman to work with accuracy, and without the trouble of making any calculation in order to find the quantity of liquid in the kettle. He will only need to measure the depth of the liquid in the kettle, refer to the table, and opposite the depth read the quantity in gallons or any other desired unit. Much time would in the long run be saved.

(8044) C. E. T. asks: 1. How would you wind and with what size wire, the armature and field magnet of the hand power dynamo in "Experimental Science" in order to secure the best results of electric lighting on a small scale: that is, to light the greatest number of small lamps with this dynamo? A. We should not change the winding from the plan given in "Experimental Science." The machine will give 10 to 12 volts and about 3 amperes at full speed. 2. How many lamps of one candle power, requiring 3 1/2 volts and 1.5 ampere, will the hand power dynamo light at the winding in "Experimental Science"? A. Put three lamps in series to use up the voltage, and as many series as you wish till you use up the amperes. 3. If the primary coil of a telephone induction coil were attached to a magneto-electric machine, would the current received from the secondary coil be a direct current? A. No. If the magneto gives a direct current, there would be no secondary current at all. An induced current is only produced in the secondary when the primary current is varying, rising, or falling, starting or stopping. When the primary current flows without change of value, there is no inductive effect produced by it upon the secondary. An interrupter is introduced into the primary circuit to make and break the current; that is, to vary the strength of the primary current. Then there is a secondary current produced, which is alternating in character, when the secondary terminals are brought together; but is interrupted and in one direction when the terminals are drawn apart, so that a spark is thrown across the gap.

(8045) L. V. C. asks: Will you tell me the time necessary to magnetize steel

blocks? A. Very little time is needed to magnetize steel to saturation, by a suitable current, such as is given by a dynamo. A few seconds will suffice. There is little gain in strength by prolonging the process.

(8046) O. S. asks: 1. About how many pounds of wire would it take to wind the armature and field coils of the simple electric motor of SCIENTIFIC AMERICAN, vol. lxxxiii, No. 23? A. About half a pound is required for the armature, and about the same quantity for the field. The quantities are given in the description in feet. 2. Is it possible to use this motor as a hand generator, and, if so, how many volts should it give? A. Probably not. It is a little fan motor. 3. How many cells of battery (each giving 1.5 volts) would be required to run the above motor? A. Six or more.

(8047) W. F. G. asks: 1. Is it necessary for best results to include Leyden jars in the circuit of a focus tube? A. Yes; in using a static machine for exciting the tube. 2. Are thin copper sectors of a Wimshurst required to be in perfect contact with the glass at all points? A. No; though it is desirable to fix it as completely as possible to the glass.

(8048) R. N. D. asks: 1. Is the ordinary bichromate battery, consisting of a zinc plate suspended between two carbon plates in a solution of bichromate of potash and sulphuric acid, a closed circuit battery? A. No. The battery polarizes quite rapidly on closed circuit. 2. Should the zinc plate be removed from the solution when not in use? A. Yes, always. And after the battery has worked a few minutes, the zinc should be raised and lowered to displace the hydrogen. 3. Is it necessary to amalgamate the zinc? A. Yes.

(8049) J. B. H. writes: In our business, as in many others using large quantities of liquid mixtures, there is often occasion to find the contents of a kettle or other round vessel, or to find the number of gallons already in any such kettle when the contents are of a known depth. I send you the formula which I have found for use in such cases. With it the labor of computing is, I believe, reduced to a minimum. Should you consider it worthy of publication in your magazine, I have no doubt it will prove helpful to some of your readers. To find the capacity in gallons (of 231 cubic inches) of any vessel having straight sides (either parallel, convergent, or divergent), having a circular horizontal cross-section and having a flat, spherical, or spheroidal bottom,

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