

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.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

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 you 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. Rows include numbers 30 through 36 with corresponding resistance values.

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

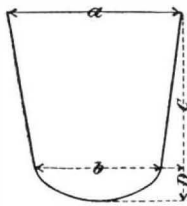
(8042) C. W. C. asks: 1. Can you tell me if phosphorus is dangerous to handle?

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 / 3529 = 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.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

JANUARY 29, 1901, AND EACH BEARING THAT DATE.

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

Table listing various inventions and their patent numbers. Includes items like 'Adding machine attachment', 'Advertising device', 'Agricultural implements', etc.

(Continued on page 93)



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The "Wolverine" Three Cylinder Gasoline Marine Engine.

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BALL BEARING AXLES AND RUBBER TIRES.

A paper read before the Carriage Builders' National Convention, Philadelphia, October, 1894, showing the advantage to be derived from the use of ball bearings and pneumatic tires in road vehicles.

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Table listing various mechanical and scientific items with prices, including pumps, engines, tools, and instruments.

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Table with columns for publication name and price. Includes Scientific American (weekly), Scientific American Supplement (weekly), etc.

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Table with columns for publication name and combined rate. Includes Scientific American and Supplement, Scientific American and Building Edition, etc.

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COMBINED RATES TO FOREIGN COUNTRIES

Table with columns for publication name and combined rate. Includes Scientific American and Supplement, Scientific American and Building Edition, etc.

The above rates include postage, which we pay. Remit by postal or express money order, or draft to order of MUNN & CO., 361 Broadway, New York.

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