

pare favorably with those of the American annuals. In the introduction the editor has summarized the progress of the year in saying: "If the year just closing has not been remarkable for the introduction of any new photographic process of cardinal importance, steady progress and improvement in most branches has still to be recorded."

PUBLICATIONS OF THE LICK OBSERVATORY OF THE UNIVERSITY OF CALIFORNIA. Vol. III. 1894. Sacramento: State Office. 1894. Pp. 229.

This report contains not only the purely astronomical work, but also papers treating of apparatus and materials. It will be a sine qua non in every astronomical library but it is also of interest to all cultured readers. The moon supplies a great part of the text, and a most superb series of plates from negatives taken at the observatory illustrate the contour of the lunar surface.

THE REPAIR AND MAINTENANCE OF MACHINERY. By Thomas Walter Barber. With about 400 illustrations. London: E. & F. N. Spon. New York: Spon & Chamberlain. 1895. Pp. x, 466. Price \$3.50.

This practical work seems to really cover, to a certain extent, a new field, relating as it does to the repairing of broken parts of machines. The book is excellently printed and contains a very full text, and it is impossible to believe that it does not fill a most excellent field, and it will doubtless be very acceptable to the practical machinist in this country. It is elaborately illustrated and contains a good index.

THE MECHANISM OF WEAVING. By T. W. Fox. London and New York: Macmillan & Co. 1894. Pp. xx, 472. Price \$2.50.

This work naturally does not lend itself to review. It is enough to say that it appears to embody an elaborate treatment of the subject, with numerous illustrations and full and satisfactory index. In its make-up it is worthy of all commendation; the illustrations are particularly clear and the type and paper most attractive, while as a sample of ornamental and suggestive binding it is especially to be noticed.

SCIENTIFIC AMERICAN BUILDING EDITION. JANUARY, 1895.—(No. 111.)

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- 1. An elegant plate in colors, showing a Colonial cottage at Williamsbridge, N. Y., recently erected for Chas. H. Love, Esq. Two perspective elevations and floor plans. Cost complete \$4,250. Mr. Arthur C. Longyear, architect, New York City. A pleasing design.
2. A Colonial residence at New Rochelle, N. Y., recently erected for J. O. Noakes, Esq., at Iselin's Park. Two perspective elevations and floor plans. Cost \$5,000 complete. Mr. Manly N. Cutter, architect, New York City. An attractive design.
3. Colonial residence at Montclair, N. J., recently erected for Sylvester Post, Esq. Two perspective elevations and floor plans. Messrs. W. S. Knowles & A. H. Thorp, architects, New York City. A pleasing design.
4. A seaside cottage recently erected for C. H. Manning, Esq., at Kennebunkport, Me. Two perspective elevations and floor plans. A picturesque and unique design after the "New England" lean-to roof order. Mr. H. P. Clark, architect, Boston, Mass.
5. A residence at East Orange, N. J., erected at a cost of \$7,000. Architect Mr. W. F. Bower, Newark, N. J. Perspective elevation and floor plans.
6. The First Presbyterian Church at Stamford, Conn. Two perspective elevations and ground plan. A design of great architectural beauty, treated in the Romanesque style. Mr. J. C. Cady, architect, New York.
7. A residence at Scranton, Pa., erected for E. B. Sturges, Esq., at a cost of \$5,000 complete. Architect Mr. E. G. W. Dietrich, New York City. Perspective elevation and floor plans.
8. A summer residence at Cushing's Island, Me., recently erected at a cost of \$3,100 complete. Two perspective elevations and floor plans, also an interior view. Mr. John C. Stevens, architect, Portland, Me. An excellent example for a summer home.
9. View of the Armory of the Seventy-first Regiment, New York City. Architect Mr. J. R. Thomas, New York City.
10. Perspective view and floor plans of the fourteen story Reliance Building, Chicago.
11. Miscellaneous contents.—Buff brick popular.—Ceiling and cornice tinting.—Home ground arrangement of plants, illustrated.—Stone dressing by compressed air, illustrated.—Brick dust mortar.—Interesting ruin of cliff dwellers.—Removing the front wall of a warehouse, with sketches.—Improved woodworking machine, illustrated.—Buff brick in New York.—Ceiling paper.—"Decore-o," a new material for decorative purposes, illustrated.—Improved gutter hangers, illustrated.—Draughtsman's supplies, illustrated.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and addresses 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.

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Minerals sent for examination should be distinctly marked or labeled.

(6349) S. W. asks: 1. Having given 6 inches as length of coil and 1/4 inch as diameter of iron core, how many ampere turns are required to magnetize the said core to saturation, and how great (approximately) would be the lifting power of the electro magnet so formed? A. Owing to leakage and to the fact that there is no real saturation point, no exact answer can be given. A very large number of ampere turns can be given with increase of the magnetic power on account of the long air path. 2. If I place two electro magnets end to end with poles near together, is the combined attractive power increased, i. e., will the magnets each pull more than they would acting separately on armatures? A. The combined power will be the same if similar poles face the same way.

(6350) T. H. B. writes: 1. Are all points of the earth's surface at the same potential (electrically)? I have heard it said that, owing to presence of certain minerals, metals, or acids in certain combinations, the potential might be higher at one place than at another, and that, owing to this difference of potential, a current might flow in a telegraph wire joining these two places, sufficiently strong to operate instruments in circuit, even when all batteries were removed from the wire. (The line of course being grounded at the terminals.) I have heard that this experiment has been successfully tried on certain lines removed from any sources of induction. Is the current present in the wire due to conditions stated, or is it due to other sources, and is not such a current, if it exist, properly called an earth current? A. Earth currents so called act as described. Their cause is obscure, but they are due to chemical changes. Telegraphic messages have been transmitted by them. 2. What becomes of the energy of a coiled spring when dissolved (under tension) in acid? I have seen the answer to this question in an earlier copy of the SCIENTIFIC AMERICAN, but cannot recall it. A. The so-called energy is simply the capacity to convert heat into mechanical energy. If a spring does work, its temperature falls. By solution in an acid this capacity is destroyed; there is no destruction of energy.

(6351) H. C. R. writes: 1. Do you consider a plastered ceiling safe that has been saturated with water during a cyclone; and then again soaked before the roof could be repaired? A. No; not safe. 2. Would not the vibrations of a power l church organ tend to bring down such a ceiling? A. Yes. 3. Can such a ceiling be thoroughly examined by simply inspecting the keys from above? A. No. 4. Is it not possible for the keys to appear all right, while the plastering has given way below? A. Yes.

(6352) R. W. K. asks: In designing a generator, is it necessary that there should be from five to seven times the weight of iron in the field as in the armature? Is it necessary that the spaces between the pole pieces should be five times the air gap? A. The factors given merely represent good general practice; there is nothing absolute about them.

(6353) A. T. asks if following dimensions and windings of dynamo will generate 30 amperes with a potential of 52 volts at the brushes: Length of wrought iron field magnets 3 1/2 inches by 5 inches diameter, wound with 25 pounds of No. 18 double cotton covered wire, 10 layers, 140 turns on each leg of magnet. Armature 4 1/2 inches diameter, 6 inches long, best laminated iron core, wound with No. 12 double cotton covered wire, 32 coils, 4 convolutions in each coil, speed about 1,800 revolutions per minute, general shape of dynamo about same as 60 light dynamo in SUPPLEMENT, No. 865. A. If you succeed in getting the above results, you will do well. If shunt wound, the product of your armature and field resistance should equal the square of the external resistance, or say three ohms.

(6354) J. P. G. asks: In making a Gramme size 3/4 inch diameter armature of 12 sections, is it absolutely necessary to wind each section in even layers and convolutions if wires on each section are of equal length? A. To secure a uniform current there should be an equal number of turns of wire in each section; the length is not necessarily identical.

(6355) A. B. says: I take the liberty to offer a suggestion to your answer to F. G. C.'s query, No. 6329, in SCIENTIFIC AMERICAN of December 22, for telling the points of the compass by the aid of the sun and a watch. If the hour hand of the watch be pointed at the sun—the watch lying flat—half way between the hour hand and twelve on the dial will be south. After south is located the other points are easily determined. Doubtless a compass would be more correct, but the method given will be found correct enough for ordinary requirements.

(6356) S. R. H. writes: I have a few questions that I would be glad to have answered in SCIENTIFIC AMERICAN. How far could a person live below the surface of the earth, say for instance 1, 2, or 3 miles deep? Would the air become too dense or compact for them? Is it not a fact that the earth's surface acts as a medium line for the center of gravity, atmospheric and water pressure? How far above the earth's surface is the air considered to be pure and healthy, to contain no poison matter? A. The depth at which a person can live below the surface of the earth depends upon the condition of temperature and the constitutional ability of the person to bear heat. The internal heat of the earth increases 1° Fah. for every 50 to 70 feet of vertical depth in various regions, so that from 2,000 to 3,000 feet in depth is about the limit that a man can work. In parts of the earth which have been subject to volcanic action, as in some of the mining districts, the temperature rises somewhat more than 1° in 50 feet, and 120° is the temperature at about 1,500 feet in depth. At this temperature labor is very difficult and forced ventilation has to be resorted to, and by this resource a depth of 4,000 feet may be attained in the undisturbed strata of the earth. The earth's surface is the plane of demarcation for atmospheric and water pressure. The barometer indicates decreased pressure as we go down in mines, the same as in ascending in the air. Water also increases in pressure as the distance beneath the sea. The atmosphere has no known difference in composition at the greatest heights observed. It is its lightness or rarity that affects the lungs at great heights.

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