the compression of the eggshell, and as the down on the chick dries, it fluffs out and adds to the apparent size. It may be that in individual instances they double in weight, but it is far from true as a general rule. We have known cases where the reverse was true. Where too much moisture has been kept in the incubator, the egg does not dry down enough, and the chicks hatch in a swollen, puffy condition. During the first day the surplus water in them evaporates, so that they shrink, and weigh less than when they were hatched. It may be true, too, that when there has been too little moisture in the incubator, and the eggs have been dried down too much, the chick will absorb moisture after being hatched and so increase in weight. Where the chick has been hatched under a hen, or where the conditions of moisture have been kept just right in the incubator, there will be very little, if any, change in weight during the first day. 2. A hard-boiled egg weighs quite a bit more than a raw egg. Where does it get the extra weight? A. The shell of an egg is very porous, and moisture and air also pass through it without difficulty. Hence in boiling water is absorbed by the egg, and this increases the weight of the egg. 3. Why does sap run up the tree? A. Sap is carried up a tree by osmotic pressure and capillarity, chiefly. The evaporation from the leaves tends to assist the flow during the season when the leaves are on the trees. These matters are explained in textbooks of physics.

(9614) R. A. asks: Would you please explain to me if a magnetic needle would show any greater resistance to turning out of directions if it was made much longer, if it had a large surface, of if it was made with electro-magnets. A. A long magnetic needle swings more slowly than a short one, and one with a larger surface in a vertical direction is resisted by the air more than a flat needle. It makes no difference to the swing whether the needle is a permanent or an electro-magnet.

(9615) M. S. asks: Is it not the tendency of a bullet fired from a rifle to ascend until it has spent its force? A. A bullet is a falling body, and descends by gravity after it leaves the gun, just as if it were dropped through the air. For this reason a bullet will not hit a target if the gun is aimed directly at the target. The sights of the rifle are so adjusted as to point the gun above the target to such an extent that the bullet will curve up above the target and down to the target when it has flown for the time required for the bullet to pass from the gun to the target. This curving increases as the distance from gun to target increases. A ball from a gun fired in a level line does not curve upward or ascend till it has spent its force. If it were so, there could be no science of gunnery.

(9616) H. H. A. asks: Kindly answer the following question: Does the date change between points on opposite sides of the 180 deg. meridian, or is it merely nautical reckoning that recognizes the date line? A. The date changes at any place when the line or meridian of midnight passes over that place. The date is constantly changing all the way around the earth during the twenty-four hours of any day. The international date line is a line which is very nearly coincident with the 180th meridian. To the east of that line the date is always one day later than on the west of that line. Night covers half of the world all the time. The meridian through the middle of the night is moving all the time around the earth. On the east of that meridian there is one day, on the west of that meridian there is another. A day is dying on the west side of that meridian, a new day is coming on the east. At eleven at night in your place, the line of midnight is one hour to the east of you. The day has one hour left. The next day is only one hour away to the east. In an hour it has reached you and passes over your head, speeding west ceaselessly, around and around the earth. However, when a ship passes the 180th meridian, it changes its date, since it has passed out of one day into another.

(9617) E. A. W. asks: 1. Why does a condenser increase the current in an induction coil, and is one necessary in wireless telegraphy? A. The condenser suppresses the spark which would be produced on the closing of the primary circuit of an induction coil and intensifies the spark upon the breaking of the primary circuit. All coils which are to throw sparks must have condensers. Hence one must be used in wireless telegraphy. The full action of the condenser is given in answer to Query 8184, Vol. 84, No. 20, which we send for ten cents. 2. Could a spark coil such as are used on gasoline engines be used instead of an induction coil? A. If the spark coil of the gasoline engine has a primary and a secondary winding and condenser, it may be used to send wireless signals for a short distance. 3. How large a coil and how many batteries would be needed in a wireless outfit between two places 500 feet apart? A. We should not advise any one to experiment with wireless telegraphy over any short distance even without having a coil capable of giving an inch spark. 4. Which is best in a wireless telegraph receiver—a coherer containing carbon granules connected directly with the battery and a telephone receiver, or a coherer containing nickel or brass filings with a decoherer and connected with a relay which operates a sounder? A. The coherer should contain metallic filings, and be provided with a tapper to decohere the filings. 5. Does there have to be a spark in the secondary coil to make the Hertzian waves? A. The Hertzian waves are produced by the surgings of the discharges of an induction coil, or some other electric discharge of similar character. Lightning produces them. 6. Can a magneto generator be used in a transmitter? A. A magneto cannot be used as a transmitter unless it can be used to send current through the primary of the induction coil, and they are not usually wound for any such purpose. 7. What size of wire is usually used in winding electric bells? A. Any size of wire may be used upon an electric bell which will allow current enough to pass to magnetize the core of the magnet and thus ring the bell. To ring through great resistance a fine wire, No. 30 to 36, is commonly employed, and as many as 1,000 ohms may be wound on the spools. 8. If a meteor is heated by friction with the air, how is it heated when it is out in space? A. A meteor is not heated on the outside of the earth's atmosphere. In external space the temperature is supposed to be in the neighborhood of absolute zero, and all small bodies there must be as cold as the place in which they are.

NEW BOOKS, ETC.

HOW TO KNOW THE STARRY HEAVENS. An Invitation to the Study of Suns and Worlds. By Edward Irving. New York: Frederick A. Stokes Company, 1904. 12mo.; pp. 313. Price, $2.

This book is a popular introduction to the study of astronomy, and in its pages will be found a careful selection of the most typical, interesting, and instructive facts and theories known so far concerning the universe. These are described and illustrated in a way that will make them attractive, not only to the general reader and beginner, but also to persons having a more advanced knowledge of the subject. The idea of the author in writing this book (which is the first of a series dealing with the sciences of astronomy, biology, and sociology) is to give a bird's eye view of the subject without the confusion of too many details. The figures given in the work are mostly in round numbers, and while they may not be absolutely accurate, they are fairly so. Within the twenty-five chapters of the book such subjects are dealt with as the Construction and Dimensions of the Universe and Principles Utilized in Measuring It; Kepler's Three Laws; Galileo's Laws of Motion; Newton's Laws of Gravitation; the Nebular Hypothesis, and many theories and discoveries regarding it, as well as the various Modifications of the Nebular Theory; the Apparent Motions of the Heavenly Bodies, as Shown by Observation, and the Rival Theories to Explain Such Apparent Motions; Some Problems Used in Celestial Measurements; the Principles and Applications of the Spectroscope; Lunar Geology and Geography and Igneous Forces on the Moon and Elsewhere. The book is very completely illustrated with no less than 128 full-page illustrations and 121 smaller cuts, besides a number of colored charts. Many of the half-tones are from excellent photographs of the heavens obtained in the various leading observatories. Altogether, this book forms one of the best popular treatises which has yet come to hand.

PRACTICAL ELECTRIC-LIGHT FITTING. By F. C. Allsop. New York: The Macmillan Company, 1905. 12mo.; pp. 283; 242 illustrations. Price, $1.50.

This work, which is now in the sixth edition, forms a treatise on the wiring and fitting up of buildings deriving current from central station mains, and the laying down of private installations. It is a thoroughly practical treatise for fitters and others who require plain, practical instruction and diagrams, rather than abstruse mathematical formulæ. All forms of switches, cut-outs, lamps, meters, heaters, storage batteries, dynamos, etc., used in electric lighting are described in detail, and full descriptions, illustrated with diagrams, are given regarding the wiring of buildings.

UNCOOKED FOODS AND HOW TO USE THEM. By Mr. and Mrs. Eugene Christian. New York: The Health Culture Company, 1904. 12mo.; pp. 246. Price, $1.

This book is a treatise on how to get the highest form of animal energy from food. It opens with a general consideration of the food question, and the various products, such as cereals, fruits, nuts, milk, etc., are discussed and comparative tables of food values, time of digestion, etc., are given. The effects of cooking upon various kinds of food are set forth in full, the authors claiming that the application of heat in the cooking of food destroys some of the vital and organic food elements by rendering them inorganic. Many of these elements are needed in building up the system and maintaining the bodily and mental health. The book tells how to begin the use of uncooked foods, and discusses their proper use under various conditions. About 200 receipts for the preparation of fruits, cereals, vegetables, nuts, salads, cakes, puddings, sauces, etc., together with a seven days' menu, are given; and these show very clearly how much can be done in the way of setting an attractive table with purely uncooked foods.

How to Mix Paints. By C. Godfrey. New York: The Industrial Publication Company, 1904. 12mo.; pp. 64. Price, 50 cents.

This small book gives simple and clear directions for the mixing of paints so as to obtain various shades and tints that may be found desirable for house painting and the like. Besides the above information, there are notes on color harmony, shades, and tints, the use and care of brushes, etc. The book will be found useful by both amateurs and men in the trade.

Jiu-Jitsu. The Wonderful Japanese Method of Attack and Self-Defense. By Captain Harry H. Skinner. New York: The Japan Publishing Company, 1904. 8vo.; pp. 118. Price, $1.

This much-talked-of Japanese method of self-defense without the aid of weapons is here illustrated by sixty-five photographs, which were posed for by B. H. Kuwashima, of Columbia University. Each illustration is described in simple language in such a way that the amateur, by studying the illustrations in connection with the diagram showing the muscles, bones, and arteries of the human body, can soon learn to perform the various tricks described. The fact that the United States government has taken up Jiu-Jitsu, and taught it to the naval and military students at Annapolis and West Point, shows that it is a method of self-defense which can be relied on, and which gives confidence to the person who knows it sufficiently well to be able to use it in emergencies.

Preliminary Report of the Ohio Co-operative Topographic Survey. By C. E. Sherman, Inspector.

This report is printed by the State of Ohio for gratuitous distribution. The survey is being carried on in connection with the United States Geological Survey, and the survey sheets of the different towns may be had from the Director of the latter survey at Washington, D. C., for five cents each. The report gives the legislation that was passed with reference to this survey, and some of the preliminary work that was done.

A Handbook for Superintendents of Construction, Architects, Builders, and Building Inspectors. By H. G. Richey. New York: John Wiley & Sons, 1905. 16mo.; pp. 742; 357 figures. Price, $4.

This book is one of the best pocket handbooks for builders, carpenters, contractors, and superintendents of construction which we have seen. It starts with the building of foundations of various sorts, and follows this with information on stone laying, setting, and cutting; marble and slate work; brickwork, bricklaying, and paving. Concrete construction, fireproof construction, and fire protection of buildings are discussed in Part III. Part IV deals with lathing and plastering; carpentry; plumbing; tin and sheet-metal work; painting, glazing, and paper hanging; iron work, electric wiring, and heating. The laying out of work, mensuration, and drawing are discussed, as are also hydraulics and the strength of various materials. The book is completed by various engineering formulas and tables that always come handy to the engineer. It is thoroughly up-to-date in every particular.

Strength and Elasticity of Structural Members. By R. J. Woods, M.E. New York: Longmans, Green & Co., 1904. 8vo.; pp. 310. Price, $3.65.

This book is a very complete textbook for students of engineering. It is extremely practical in character, and the methods described are simple and concise, and involve only a fair knowledge of elementary mathematics. All kinds of forces, stresses, and the way they affect girders, beams, retaining walls, riveted joints, etc., are thoroughly described, and the mathematics relating to them are given. Not the least useful are the chapters on cantilever and suspension bridges. The book will be found useful by all students in engineering, and also to men engaged in all kinds of engineering work.

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