

each end means for attaching it to the sections of a book, the index slip having movement on the guide. The movable or duplicate index is adapted to be carried over the face of one or more pages, to temporarily locate the names, letters or figures at a point distant from where they are entered on the book, economizing time and lessening the chances of mistakes.

POTATO CUTTER.—Oscar A. Bulette, Seattle, Wash. This is a simple and easily operated device for cutting potatoes into longitudinal blocks. The blades of the cutter are so arranged that they will cut all sides of the blocks, insuring a uniform shape and avoiding feather edges, which have a tendency to crinkle or become too crisply cooked before the entire block has been perfectly cooked. The several parts of the device may be readily detached to facilitate thorough cleaning.

INKSTAND.—Francis B. Pratt, Canton, Miss. This inkstand has an ink well and a supply well, a feeder duct leading from the bottom of the ink well to the bottom of the supply well, while an air duct leads from the upper portion of the ink well to the supply well. A cup shaped plug, closed at the bottom and open at the top, and suited to hold a sponge, has a screw thread engagement with a flange in the upper end of the ink well, and by screwing the plug downward the ink is forced into the supply well. The inkstand is easily cleaned and filled, and but a small quantity of ink need be exposed at any time.

PLAYING CARDS.—Charles B. Rosenberger, Pittsburg, Pa. This invention provides a plurality of suits of cards, each suit having an identifying character common to all the cards in the same suit, and each card having scoring numerals, one for an identifying character without color thereon, and the other for the same and its color. The game affords two grades of chance, and a commensurate degree of remuneration for the winning player.

TEMPORARY BINDER.—Jos. W. Wood, Baraboo, Wis. This improvement comprises a back piece from the ends of which metal clips extend forward, each clip being curved to form a channel providing seats for a lacing cord which is woven back and forth through the clips in the channels. A simple and inexpensive binder is thus formed for pamphlets and newspapers, in which the back edges and bottom ends of the matter bound will be protected from abrasion.

MOLE TRAP.—Jacob W. Reger, Charles W. Denison and George D. Denison, Judson, Mo. In a U shaped frame whose pointed ends are adapted to be pressed into the earth at opposite sides of a runway is held a sliding trip rod, on whose lower end is a head which is made to rest on the earth directly over the runway. The mole, in passing, raises the earth slightly, when the trip rod releases a spring pressed follower, which carries prongs or teeth that pass into the runway and through the mole or other animal.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 10 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

THE PRIMARY FACTORS OF ORGANIC EVOLUTION. By E. D. Cope. Chicago: The Open Court Publishing Company. 1896. Pp. xvi, 547. Price \$2.

This work by Prof. Cope is entitled to a far more extended review than we can possibly give it here. We hesitate, indeed, to say anything about the present book, feeling that a mere statement of its title and the author's name will be enough to give it standing. It is a very elegantly printed book, thoroughly indexed, elaborately illustrated, and is a valuable contribution to and presentation of the doctrine of evolution. Darwinism itself is in such a state of evolution, has been so modified by Weismannism, that what is known as a "New Darwinism" has been created, so that it really requires almost as much reading to keep pace with the modern science of evolution as with electricity or any other science. The author does not seem to be, by any means, a pronounced Weismannist. A cursory glance at the index inclines us to the belief that it is not very accurate in its paging.

AN EXAMINATION OF WEISMANNISM. By George John Romanes. Chicago: The Open Court Publishing Company. 1896. Pp. ix, 221. Price, paper 35 cents, cloth \$1.

As a companion to Prof. Cope's book, we here have Weismannism critically examined by one who figures as having produced more effect on modern Darwinism than all others, probably, put together, and to those who desire to study modern evolution, perhaps the reading of both these books will be of value.

ON GERMINAL SELECTION AS A SOURCE OF DEFINITE VARIATION. By August Weismann. Chicago: The Open Court Publishing Company. 1896. Pp. xii, 61. Price 25 cents.

This paper was read in the first general meeting of the International Congress of Zoologists at Leyden on September 16, 1895, as we are informed in the preface. We have put it with the other two books to complete the series which they seem to form.

THE CENTURY SCIENCE SERIES. James Clerk Maxwell and Modern Physics. By R. T. Glazebrook. New York: Macmillan & Company. 1896. Pp. vi, 224. Price \$1.25.

The students of the history of science have some favorite characters whose lives they are never tired of reading, either because of their interesting characters or because of their interesting work. Fleeming Jenkin is, perhaps, the most fortunate in his biographer, Robert Louis Stevenson having written a most graphic life of the scientist. Faraday and Maxwell form two kindred spirits whose lives will ever be favorites with all who admire the simple and gentle in humanity. As a supplement to the Campbell and Garnett more personal biography of Maxwell, the same publishers give us here, in brief, an account of his life in science and what he did in

the scientific world. We have just reviewed several books on evolution, and it seems a little peculiar to find in them, as well as in this, no apparent reference to Maxwell's physical demonstration of the difficulties attendant upon the acceptance of Darwin's theory based on the probable size of the molecule. As a supplement to the life of Maxwell, the present book will be quite indispensable.

THE SUGAR FACTORY MANAGER'S HANDBOOK OF NOTES, TABLES, RULES, AND DATA. For managers, engineers, chemists, overseers, panboilers, and others engaged in the manufacture of cane sugar and the distillation of rum. By B. R. Body. Manchester: Office of the Sugar Cane. 1896. Pp. 78. Price \$1.50.

This is one of those familiar little English books containing information relating to particular trades and businesses. It is written from the technical standpoint and can be recommended to sugar manufacturers and chemists as representing a most practical view of the subject.

VAN NOSTRAND'S SCIENCE SERIES. Sewerage and Sewage Purification. By M. N. Baker. New York: D. Van Nostrand & Company. 1896. Pp. iii, ii, 144.

This excellent little addition to Van Nostrand's Science Series is devoted particularly to the disposal of sewage from the American standpoint. It really relates as much to the laying of sewers as to the disposal works, and the disposal works themselves are very fully treated, the discussion of which is particularly to be commended.

AN ADVENTURE IN PHOTOGRAPHY. By Octave Thanet. Illustrated from photographs by the adventurers. New York: Charles Scribner's Sons. 1893. Pp. xi, 179. Price \$1.50.

There are few brighter writers than Octave Thanet, and to our mind the authorship of this book is an excellent recommendation. It describes the author's adventures in the South with her camera, details her troubles and her successes, and throughout is replete with hints as to photographic processes. The work throughout is couched in most lively language, and whether one understands photography or not, is most excellent and lively reading. There are numerous illustrations, many of which serve as pegs on which to hang the story.

DOMESTIC SANITARY DRAINAGE AND PLUMBING. Lectures on practical sanitation delivered to plumbers, engineers and others in the Central Technical Institution, South Kensington, London, under the auspices of the City and Guilds of London Institute for the Advancement of Technical Education. By William R. Maguire. Second edition. New York: D. Van Nostrand Company. 1896. Pp. 475. Price \$4.

Sanitary engineering from the scientific aspect is here excellently treated, for the book presents the practical application of scientific hydraulics to the plumbing of dwellings, and with much success. Instead of starting out with the practical presentation of its subject, the book opens with a reasonably good treatise on the elementary science, touches on the subject of the education of plumbers, passes on to sewage and sewage disposal, the rest of the work being devoted to sewerage and water supply. Throughout the plumber is kept in mind, and many useful hints may be gleaned by the workman of even many years' standing from the pages of this work. It has an index and a table of contents, is liberally illustrated, and is a tribute to the present desire of the public to have the best sanitary appliances in the dwelling house.

THE LOCOMOTIVE. Hartford, Conn. Published by the Hartford Steam Boiler Inspection and Insurance Company. New series. Vol. XVI. 1895. Pp. iii, 191.

The Locomotive is a trade publication and an example to all of how such a work can be conducted. It is a journal in which details of boiler accidents and explosions and much information in regard to boiler inspection, etc., are given; in which the practical points about boilers are discussed, and into which a considerable amount of interesting scientific matter relating to the subject finds its way. To our mind the journal is most interesting, and bound in book form, is a welcome addition to the library.

GESCHICHTE DER EXPLOSIVSTOFFE. Von S. J. von Romocki. II. Die rauchschwachen Pulver in ihrer Entwicklung bis zur Gegenwart. Mit vielen Abbildungen. Berlin: Robert Oppenheim (Gustav Schmidt). 1896. Pp. xi, 324. Price \$4.

This second section of this work is devoted to smokeless powders, and really gives a most admirable treatment of the subject. Those conversant with the language need not be troubled with the German type in reading it, the Roman type used in this book being one of its merits.

CHEMISTRY AT A GLANCE. A study in molecular architecture. Issued in series. No. I. Oxides. By Herbert B. Tuttle. New York. 1896. Pp. 59. Price 60 cents.

This is the first of some ten successive publications designed to cover the field of chemistry. The author works almost entirely with graphic formulae, and while this system of treating the subject is apt to lead one too far, yet the book, for a young chemist properly warned, will be, we believe, a most useful one, and will do a great deal to systematize his ideas. It will be easy enough for him to escape the danger of too great fixity by his work in the laboratory and his study of other books. Indeed, we believe that for the young chemist to start in this way, with chemistry as a purely mathematical science and then to find from investigation in the laboratory and in subsequent reading the numerous exceptions to the fixed theory which he will have formed, is perhaps the best and most useful way.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

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Wet Tool Grinder, Sensitive Drills, for all light work, especially adapted for Bicycle work. C. N. CADY, Canastota, N. Y.

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Notes & Queries

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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.

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Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(6908) S. E. E. says: I would like to know, first, what is the proper dressing or polish to use on kangaroo and goat or kid shoes to keep them from cracking. Also the proper dressing for patent leather to prevent cracking. A. Add some olive oil to some pure wax which has been melted in a water bath and then add lard. Mix thoroughly by stirring over a moderate fire. Add oil of turpentine, then a little oil of lavender. This will form a paste which should be put in boxes. Apply with a linen rag. The paste keeps the leather soft and restores the gloss.

(6909) R. G. writes: I have been experimenting with thin films. Thus far I have failed to secure a soap bubble mixture that would produce a lasting film. Can you give me a formula for a good mixture? A. C. V. Boys, in his interesting work on soap bubbles, says, "Common yellow soap is better than fancy soap." The mixture we like best is made as follows: "Fill a clean stoppered bottle three-quarters full of pure water (distilled water preferred). Add one-fortieth part of its weight of oleate of soda, which will probably float on the water. Leave it for a day, when the oleate of soda will be dissolved. Nearly fill up the bottle with pure glycerine and shake well. Leave the bottle stoppered for about a week in a dark place. Siphon off the clear liquid, add one or two drops of strong ammonia to every pint of the liquid. Use the mixture from a small working bottle. Do not get out the stock bottle every time a bubble is to be blown. Do not warm or filter the mixture." This mixture will keep for a year or so.

(6910) E. McD. asks: Can you inform me how to prepare a slide of crystals of Iodosulphate of quinine for microscopical examination? A. Mix 3 drachms of pure acetic acid with one drachm of alcohol, add 6 drops of diluted sulphuric acid (1 part acid, 9 parts water). Place one drop of this fluid on a glass slide and add a minute particle of quinine. After this has dissolved add a very small drop of tincture of iodine by means of a fine glass rod. After a time, chemical action ceases and the crystals begin to form slowly, without heat. These crystals are beautiful in polarized light.

(6911) J. D. asks (1) the meaning of ampere turns. A. The product of the amperes passing through a wire multiplied by the number of complete circles made by such wire. 2. Name some good open circuit batteries. A. The Leclanche is standard. Dry batteries are also excellent. For batteries see our SUPPLEMENT, Nos. 157, 158, 159, 792. 3. Where can I get catalogue of small electrical apparatus? A. Address any of our advertisers of electrical goods. 4. Name SUPPLEMENT number with simple ammeter and voltmeters. A. There are no really simple ones. For examples see our SUPPLEMENT, Nos. 652, 663, 618, 623, 668, 353, 734. 5. How many grains of copper does one ampere deposit? A. 0.33 milligramme per second. 6. Is T. A. Edison a college graduate? A. No. 7. Name SUPPLEMENT number with induction coils. A. Nos. 160, 569, 323.

(6912) A. J. E. writes: 1. Constructed as directed, which of the two motors, 759 and 641, would give more power? A. The motor of SUPPLEMENT, No. 759, is the more powerful. 2. Could motor 641 be wound so as to furnish $\frac{1}{2}$ horse power, with two cells of Edison-Lalande batteries? A. No. 3. For a drum armature would disks of tin answer as well as carriage washers or punchings? A. Disks of sheet tin would answer, as this is simply tin-plated sheet iron. 4. Are the disks insulated from the shaft in a drum armature? A. They need not be. 5. Which is better for the fields of motor 641: (a) the laminated sheet iron as shown, (b) cast iron fields, or (c) fields made up of a piece of wrought iron $\frac{1}{2}$ inch thick? A. For even cross section the solid wrought iron field is slightly the better.

(6913) S. & T. write: We wrote you about length and size of wire for resistance for Plante storage cells. You gave iron wire 10-12, but did not know potential or current. The dynamo is 110 volt current and is made to run 100-110 volt lamps. Is the number of lamps the machine is able to light the potential? A. There is no such thing as a 110 volt current. Potential is expressed in volts, current in amperes. You require about 50 amperes of current for 100 16 candle power 110 volt lamps. A No. 5 or even No. 6 copper wire would carry this—a No. 0 or No. 00 iron wire. The amount a wire will carry varies with its surroundings. If exposed to the air, it will carry more without dangerous heating than if insulated and tightly wound. The smaller iron wire would be quite large enough, if wound in a loose spiral. The potential of the machine gives the voltage of the lamps proper to go with it.

(6914) F. A. McL. asks how many vibrations it takes to produce the lowest note on a piano, say A, and if they increase regularly or not. That is, does each note increase with the same number of vibrations of its neighbor? Do every two notes differ with the same number of vibrations as you go up the scale? What is the number of vibrations to produce each of the notes of the piano keyboard? A. The middle C is taken generally as corresponding to 256 double vibrations per second. C one octave below has one-half this number of vibrations, C one octave above has double, two above four times and so on. Then for the musical scale, taking C as unit, the other notes are represented by fractions, as C=1, C sharp= $\frac{16}{15}$, D flat= $\frac{16}{15}$, D= $\frac{16}{12}$, D sharp= $\frac{16}{11}$, E flat= $\frac{16}{11}$, E= $\frac{16}{10}$, etc. Thus to get the number of vibrations in any of the above in the octave above middle C, multiply 256 by the fraction. All this is subject to variations in the standard pitch. Thus the French standard middle C has 261, the English 256 double vibrations. The lowest audible note is about 16 per second; under some conditions it is claimed that 9 vibrations per second have been audible. On some grand pianos A with 27 $\frac{1}{2}$ vibrations per second is included on the keyboard, and the range may go up to A \sharp with 3520 or C \sharp with 4224 vibrations per second. The intervals between notes are expressed by fractions, thus: C to D $\frac{9}{8}$, D to E $\frac{8}{7}$, E to F $\frac{4}{3}$, etc., each interval being the quotient of the ratio of the lower divided by the ratio of the higher note.

(6915) W. asks: 1. Approximately, what would be the dimensions of permanent magnets, giving an output of three or four 16 candle power lamps—alternating current? A. This question cannot be answered without knowing the quality of the magnets and voltage of lamps. You would need 20 square inches of pole area and 2,500 turns of No. 18 wire on the armature, taking low excitation of the magnetic circuit. 2. Driven by the same power, how many more 16 candle power lamps would an alternator furnish over a direct current machine? The fields being excited by a separate dynamo, the above power being figured on the basis of one-half horse. A. There should be little or no difference. 3. Will the power or current required to excite the fields equal the additional lights in the above? A. You cannot escape using power to excite fields, whether derived from an outside source or from the dynamo itself. 4. Would it not be better in small plants to use the alternator more extensively, of course double winding the armature, for current to excite the fields? Would there not be less fluctuation in the lights with the variations of the power, and would not less trouble be experienced in general management of dynamo and lights? A. Each type of generator and plant has its own advantages and disadvantages. The direct current is more convenient in some ways and is less liable to give bad shocks.

(6916) H. V. S. asks how to prepare a simplex or hektograph for producing copies of letters. A. Our SUPPLEMENT, No. 438, contains an illustrated description with full details of the hektograph. We can supply it by mail for 10 cents.

(6917) E. A. B. says: There is a preparation being sold by parties in different parts of the country, which, in solution, will preserve quite perfectly fruits and vegetables immersed in the solution and kept covered by it, sealing not being necessary. Can you tell me what this preparation is, and how to make it, or where to procure it in bulk? A. Use only fruits and vegetables which are thoroughly sound. The fruit or vegetables may be washed if desired. The fruit may be packed in jars, crocks, or kegs as desired. Put it in as closely as possible without injuring the fruit, as the more compact it is packed the smaller will be the quantity of liquid required to cover it. Take two ounces of salicylic acid and twenty-five pounds of sugar (coffee C); the acid and the sugar are dissolved in $6\frac{1}{2}$ to 7 gallons of hot water. See that both the sugar and acid are all perfectly dissolved, let the solution get cold and then pour on enough of the liquid to cover the fruit. The top of the vessel should be covered, but need not be sealed. The quantity of sugar is usually sufficient to make the fruit sweet enough for table use. The quantity of liquid named above is sufficient to cover about twenty-five gallons of fruit. For preserving pease, beans, tomatoes, sweet corn, pickles, etc., the quantity of acid remains the same, but twenty ounces of sodium chloride (common salt) are added and the quantity of hot water is reduced to five gallons; proceed as before. When cold, the vegetables can be covered with the liquid. It is very essential to see that the fruit or vegetables are completely covered by the solution at all times. Any fruit found floating on the top should be promptly removed, as it would tend to contaminate the contents of the vessel. If it is found that the solution is evaporating, more of the liquid should be added. It is perhaps as well to have the crocks, etc., have

