

of the effect of variations in velocity on the motion of trains is fully treated; the mechanics of curve resistance is discussed from the standpoint of a large amount of data obtained from actual experience; the theory of various details of the locomotive is set forth, with ample references to the numerous designs which have proved most effective, as well as the greater number where innovations have proved unwise; and the whole work is written with the practical end of railway construction ever in view—the relation of cost to probable traffic and revenue. The writer has been a regular contributor to publications making a specialty of railway construction and operation for many years past, and has thus kept abreast of the topics which most interest practical men in this line, while he has also filled engagements as an engineer in the location and surveys of the Mexican National and Mexican Central Railways, and the American line from Vera Cruz to the city of Mexico. The volume is well printed and fully illustrated.

ELEMENTARY PRACTICAL PHYSICS. Vol. II. ELECTRICITY AND MAGNETISM. By Balfour Stewart and W. W. Haldane Gee. London and New York: Macmillan & Co. Pp. xviii, 497. \$2.25.

In this book the text is subdivided into a series of lessons, 83 in all, each descriptive of something to be done by a definite method with definite apparatus, the divisions being made in a way calculated to lead young investigators to a more systematic study of electricity and its manifestations by a plainer marking of the steps from the simple to the complicated. The first three chapters or 22 lessons are introductory, and largely elementary, but the matter which they contain is presented in attractive form, with a clearness of arrangement and conciseness of statement that make a good foundation for the study of the less elementary portions of the subject that follow. The book is, throughout, conspicuously free from vague generalizations, setting forth theories concisely, defining questions, describing apparatus, and presenting numerous experiments for practical trial, with full precautions and instructions for doing the work.

SHORT LECTURES TO ELECTRICAL ARTISANS. By J. A. Fleming. London and New York: E. & F. N. Spon. Pp. 206. \$1.50.

These lectures were delivered by the author to the pupils and workmen of an English firm largely engaged in electrical work, to better instruct those thus practically engaged in the business as to the principles underlying modern electrical engineering. They are most entertaining in form, abounding in anecdote and reminiscence, and happy in the use of comparisons likely to fix troublesome data in the memory, and cannot fail to meet with a large audience among the great numbers who are now interesting themselves in electrical investigations, besides those who find their occupation in this field.

The Vulcanite Emery Wheels Price List of the New York Belting and Packing Company is an instructive pamphlet, which all users of goods in this line would do well to consult. It is herein urged that for all general work, wheels should be run at a high speed—with a circumferential travel of 6,000 feet per minute and over; and the mode of manufacturing the vulcanite wheel is described, to show how it is that they are not liable to burst, even when run at the very highest speed which users may desire. It is also claimed that the compressed vulcanized rubber in which the particles of emery are held in the wheel forms a just sufficiently elastic backing to present in most effective form the cutting edges of the emery to the work, making the wheel as durable as it is capable. The book is full of valuable and interesting information.

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. 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.

(1) A. J. A.—Professor L. O. Howard, of the Division of Entomology, Washington, says: "The small brown beetle which you find in your flour is the common Sitodrepana, a species which is found in almost all parts of the world, and which is a very general feeder. It is particularly fond of stored food products, and will breed in large numbers in many of the dried roots which are kept in drug stores. From its great diversity of food it is a difficult insect to fight, and the method of treatment of course will depend upon the individual case to be treated. The vapor of bisulphide of carbon can be successfully used where the insect infests any substance which can be placed in a tight box or barrel, and which will not be injured by the fumes. Occurring in a house in the manner described (and I think I never heard of an exactly parallel instance), it will probably be found by careful examination that there is some particular spot or some particular substance in which the beetles breed and from which they spread; or it will be found that the shop from which food supplies are purchased is infested. The beetle would not develop without a plentiful supply of some kind of food, and it will not be difficult to eradicate it by going carefully over the storeroom and examining all the food supply on hand, destroying that which is badly infested, and afterward fumigating the room

with the bisulphide. The other specimen is a small, active, silvery white insect about a quarter of an inch in length and elongate-ovate in form. It belongs to the genus Lepisma, and although badly crushed in the mail it seems to be Lepisma domestica, which Dr. Packard described from specimens found commonly around fireplaces in Salem, Mass. This insect feeds upon the paste in book bindings and wall papers, and will eat the surface of glazed paper of any kind. It can be destroyed by a free and persistent use of Persian insect powder or buhach."

(2) E. K. writes: I wish to employ a metal screw to work in iron and steel. What would be the best metal of which to make the screw, to prevent any rusting of screw or corroding? A. Use gun metal—copper 1 lb., tin 3 oz.—or phosphor bronze.

(3) J. L. B. asks: 1. Can cast iron be mended in any way? A. See page 98 of this issue for a practical method of soldering. 2. How can a person most easily melt copper and zinc? A. Melt copper in a crucible in a furnace or forge fire, and add the zinc if you wish to make brass. Otherwise melt zinc in an iron ladle over a fire. 3. How can copper, zinc, magnesia, sal ammoniac, quicklime, and cream tartar be compounded, and where can each be obtained? A. You can buy the materials through the drug and hardware trades. Mechanically compounded, they would only make a mixture without cohesion and of no value, and they are not susceptible of chemical combination. 4. How can moulds be made which can be used to mould badges? A. Moulds for brass may be made in fine moulding sand. For metals that melt at a low heat, moulds may be made of brass or iron. See Brass Founder's Manual, by Graham, which we can mail you for \$1.

(4) J. F.—The sample arrow head you send is not of unusual shape; they are found of almost all conceivable shapes in New Jersey. Their being of white or black flint or jasper depends upon the source of supply of the material. You will find a most interesting account of the implements of the "stone age in New Jersey," fully illustrated, in the Smithsonian report for 1875, by Dr. C. G. Abbott, of Trenton. The flint implements are supposed to have been chipped with hammers of the same material upon anvils or bowlders, also of flint.

(5) G. W. R. writes: I have an old fashioned Siemens H-armature taken from a generator which I have tried to use in a motor, but there is a dead center where the armature hangs. How shall I remedy the difficulty? A. The armature will have a dead center, but when the strength of the magnetism of the armature is about equal to that of the field magnet, there will be no "hanging," provided the commutator is properly adjusted. Possibly you may have a commutator such as is used for alternating currents. If so, you will need to modify it somewhat. See SUPPLEMENT, No. 161, for full information on the subject.

(6) H. S.—The plant which you send to be named is Erodium glutinosum, or vulgarly "Yerba santa." The leaves are the parts used in medicine. These have balsamic properties, and have long had a reputation among the Spanish settlers in California in diseases affecting the mucous membrane, such as chronic coughs, catarrhs, consumption, etc. A sirup prepared from the leaves is extensively used as a vehicle for the administration of quinine, as it has the property of extinguishing the bitter taste of that alkaloid, and of presenting it in a readily assimilable state.

(7) S. A. S. asks (1) how to clean nickel plate easily, without injuring the nickel. A. Use rouge, electro-silicon, whiting, or fine chalk, mixed with water. 2. How to make a glossy black, enduring enamel for polished steel? A. Use black japan varnish painted on the metal and baked hard in an oven at about 270° temperature. 3. A remedy for an obstinate case of catarrh in the head? A. For catarrh and its cure, see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 216, 84, 262.

(8) T. K. asks (1) if the tide flows up the Hudson River as far as Troy. A. It cannot be said that the tide flows up thus far; but the current of the river is affected by the tides as far north as the Troy dam, six miles above Albany. The fall of the Hudson River from Albany to its mouth, according to the U. S. Coast Survey reports, is only about five feet, which is a little less than the ordinary difference between high and low tide at New York, while it is a good deal less than some of our very high tides. 2. Was New York Bay frozen over during the revolutionary war? A. During the winter of 1779-80, New York Bay was frozen over from Staten Island, and 200 heavily laden two-horse sleighs crossed on the ice in a body at one time, escorted by 200 horsemen.

(9) W. W. C. sends an object for identification. A. The object is the seed pod of Lumarla diensis, a plant very common in old fashioned gardens, and known vulgarly as "honesty," from the transparency of the two valves of the pod.

(10) G. R. F. asks how canvas is prepared for artists' use, with a smooth surface. A. Grind equal quantities of white lead and whiting, well dried, with five parts of raw oil, add one part boiled oil; prime the cloth over on the face with a brush, palette knife or trowel. The latter is preferable, to those who can use it. After the canvas has had sufficient time to dry, scrape off from the back any superabundant color which may have passed through the canvas, then repeat a second coat on the face, leaving it as smooth as possible. When hard and dry, rub it smooth with a piece of light pumice stone and water, so as to cut off or lay all the knots in the canvas; then grind two parts white lead, two parts whiting, and one part burnt ochre, with a small quantity of pumice stone, all well ground and separately, rather stiff in raw oil; afterward mix the whole, adding a little gold size; dilute with half raw oil and half turpentine, and apply a third, fourth, or fifth coat; repeat rubbing down with pumice stone and water until smooth enough for painting upon.

(11) W. L. Mo.—The right of private companies, not organized as State militia, to meet and drill with firearms is, in many States and most municipalities, restricted by statute, and permission there-

for must be obtained of the authorities.—By act of Congress approved January 19, 1886, in case of the death of both President and Vice President of the United States, one of the Cabinet officers is to act as President, to succeed in the following order: Secretary of State, Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy, Secretary of the Interior.

(12) C. S. writes: I make an imitation of Russia leather, but do not succeed in imparting to the same the exact odor of the genuine, which I have seen in other imitations. What essential oils are to be used? A. Use birch bark extract, imported from Russia, to be had of dealers in tanners' supplies. A slow process, using not too much of the extract, gives the more delicate and lasting smell of genuine Russia leather.

(13) R. M. R. asks: What will remove red wine stains from linen? A. See the table given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158, for the "Removal of Stains and Grease Spots."

(14) W. W. M.—Latitude of North American magnetic pole 70°, line of no variation, now passes through Eastern Ohio, West Virginia, and central North Carolina. The line of no variation is now moving westward. The annual advance being for Pennsylvania about 3 1/2 minutes. The time of complete variation from extreme easterly to extreme westerly inclination of the magnetic needle is supposed to be about 300 years.

(15) Wm. S.—Graphite or black lead is much used for piston rod and valve rod packing. Mix it with cylinder oil or tallow, and smear the packing with the mixture. If fragile asbestos packing is used, the oil mixture is preferred. Graphite is not used in cylinders. It is liable to accumulate and clog. Use the best cylinder oil, which may be a mixture of petroleum with paraffine, or cold pressed refined lard oil, or with sweet refined tallow.

TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

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