NEW BOOKS AND PUBLICATIONS.

THE MECHANICS OF MACHINERY. By Alex. B. W. Kennedy. London and New York: Macmillan & Co.

The author, Professor of Engineering and Mechanical Technology in University College, London, has sought herein to make a book specially adapted to the wants, requirements and difficulties of young engineers and students of engineering. It is far from being an elementary work, but rather such a one as would form an excellent aid for the more ambitious students of our technological schools, such as Cornell, the Rensselaer Polytechnic, the Massachusetts Institute of Technology, or the Stevens Institute. This treatise is not as wide in its scope, and does not involve such complicated mathematical formulæ, as the great work of Dr. Weisbach, but it will be found to require diligent application and close thought in the student—a necessity which the young mechanic, be he ever so industrious, generally finds extremely irksome until he acquires the mental habit which comes only of steadily pursued intellectual work. The strong logic, clear analysis, and smooth style of Dr. Kennedy's work will be great help to such young learners, so far as possible making an ordinarily very dry study attractive in itself.

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 This is for our information, and not for publication.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.

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Minerals sent for examination should be distinctly marked or labeled.

(1) D. E. M. asks: In a stick of timber 40 feet long, 24 inches square at one end, and 12 inches square at the other end, how many feet of lumber are there? It is also stated that the proposition has been given to several lumbermen in the Chicago Exchange building, who have found various results; among others, the following: 60 feet, 600 feet, 720 feet, 876 feet, 1,080 feet, 1,200 feet, and 2,400 feet; that if the cubical contents of the timber in feet is what is wanted, 1,200 would be the correct answer; but if a lumberman were buying the stick, and desired to find how many feet of board measure there was in it, and put his rule at work, he would find but 1,080 feet, an allowance being made for sawing, or the "kerf." A. For obtaining the solid contents, the rule in Haswell's is for the frustum of a pyramid. Add together areas of the two ends and the square root of their product; multiply sum by height, and take one-third of product. Thus:
4 sq. ft. +1 sq. ft. = 5 sq. ft. + $\sqrt{1\times4}$ = 7 × 40 = $^{280}/_{3}$ = 93⅓ cb. ft. which ×12 = 1,120 feet board measure without allowing for kerfs and waste. Considering the taper of the timber and allowing for kerf, you cannot make more than 10 feet of lumber to a cubic foot. Then 93⅓ × 10 = 933 feet merchantable lumber 1 inch thick that could possibly be obtained from the piece.

(2) G. H. B. and others: For answers to your questions, apply rule as above.

(3) Reader.—For description and illustration of the "boomerang" see SCIENTIFIC AMERICAN of January 29, 1887, which we can send you for 10 cents. —The periodicity of fermentative action would depend upon the life history and course of development

(4) D. W. asks the meaning of the word "pitch" when used in connection with screw propellers. A. The distance that the screw would travel in one revolution without slip, or as an ordinary screw follows in the nut.

(5) E. W. writes: Can automatic engines be worked by the heat of the kitchen fire so as to supply electric light by night and to pump water and do other domestic work by day? A. There are devices for utilizing the kitchen fire for raising water. An electric light would probably require too much power for a kitchen appliance.

(6) J. S. G. asks: Do you know of a wash of any kind to prevent sun's rays from shining through stained roll cathedral glass? A church I built seems to be troubled with the sun's glaring rays. If you can give me either a recipe to make or a name by which it can be bought, I will be greatly obliged. A. Try photographers' "ground glass varnish or substitute." This may be too opaque.

(7) H. L., C. G., H. O., and T. L. write: 1. There are four of us making four galvanometers from your paper, December 4, 1886. How can we test it after it is done? A. Place the coil exactly in a central position between the poles of the magnet. Adjust the torsional wire so that the plane of the coil is parallel with the face of the permanent magnet. Adjust the mirror so that it will be in a plane parallel with that of the coil. Project a beam of light from the mirror on to the scale. Arrange the scale so that the light spot will fall on 0° of the scale. Send a weak current through the coil. Note the deflection of the light spot. Now reverse the current and note the deflection. If the two deflections are equal, the instrument is correct and needs no further adjustment. If the deflections are unequal, the correction may be made either by turning the mirror slightly on its support or by swinging the scale. 2. What instrument does it require, if we use the Daniell battery? All we know is the coil gives 150 ohms resistance, as stated in your book. A. You will need to place enough resistance in the circuit to reduce the deflections to the limit of the scale. It is immaterial what the resistance is. 3. What does a volt mean? A. A volt is the unit of electromotive force. It is about equal to the electromotive force of one Daniell cell. 4. What does an ampere mean? A. A current delivered over the resistance of one ohm, by the electromotive force of one volt, is an ampere. 5. I cannot find any book that will guide us. We have made a splendid instrument according to SCIENTIFIC AMERICAN, December 4, 1886. Can you tell me name of book we can get? We have lots of books, but it seems they are too high a grade. We want to make them correct. We have improved on the one with a mirror. A. Thompson's Elementary Lessons in Electricity and Ganot's Popular Natural Philosophy.

(8) Dr. G. L. T. asks the best composition for blacking leather used in tannery. A. The composition and application of the black are largely controlled by the kind of leather, and more depends on its manner of use. It is a trade in itself. A good harness and grain leather blacking is made as follows: Take nine pounds of copperas, a quarter of a pound Epsom salts, and six ounces of acetic acid; thoroughly dissolve together in 1 gallon of boiling water. Take a vinegar or kerosene oil barrel, knock out one head, and put within 40 gallons of cool, soft water (condensed steam is much preferred), then add the above ingredients. Stir well, and it is ready for immediate use, at a cost not exceeding one cent per gallon.

(9) C. B. N. asks the cause of, and a remedy for, ringing in the ears. A. It is frequently caused by the use of quinine, which produces hyperæmia of the tympanum. In any case it is an abnormal condition, which may if it increases produce paralysis, though in its commencement usually light and transitory. If continued, you should consult a physician.

(10) R. F. L. desires (1) a receipt for making polish suitable for polishing pianos. A. A fine varnish is made as follows: Take 700 parts of alcohol, 15 parts of copal, 7 parts of gum arabic, and 30 parts of shellac. The resins are first pulverized and bolted through a piece of muslin. The powder is placed in a flask, the alcohol poured over it, and the flask corked. By putting the flask in a moderately warm place, the solution will be accomplished in two or three days. It is then strained through a piece of muslin, and kept in hermetically sealed bottles. 2. A preparation for whitening ivory? A. Use hydrogen peroxide. See article on this subject in SCIENTIFIC AMERICAN SUPPLEMENT, No. 339.

(11) C. F. M. asks (1) the method of obtaining extracts of flowers. A. Take of the flowers 3 to 5 pounds, proof spirit 2 gallons. Digest for a few days, and then draw over by distillation 1 gallon of essence. For those flowers that are not strongly fragrant, the product may be distilled a second and a third time, or even oftener from fresh flowers. These should be picked to pieces, or crushed or bruised, as their nature may indicate, and should always be selected when in their state of highest fragrance. 2. Is this extract diluted with alcohol before fit to use? A. They are generally diluted with alcohol, depending largely upon what purpose they are to be put to. See Piesse, Cristiani, and others on perfumery, etc.

(12) E. F. R. asks: What is used in laundries in washing clothing to make it so white, kinds of indigo, etc.? Also what is used in getting that beautiful gloss on collars and cuffs which some laundries are used to get? A. See "Laundry Hints," on page 388 in the SCIENTIFIC AMERICAN for December 18, 1886, also "Starch and the Starching Process as used in Laundries," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 577. A solution of gum arabic in water is used to stiffen and impart a gloss to linen.

(13) I. V. M. writes: I wish to glue white holly silhouettes on black walnut, and then oil the walnut. Is there any preparation which I can put on the holly to prevent the oil from soaking into and discoloring, or rather coloring, the holly? A. Give both walnut and holly a thin coating of shellac in alcohol over those surfaces which come in contact before you apply the glue.

(14) G. C. R. asks: When was the first electric street railroad put into practical use in the United States? A. In Baltimore, Md., in 1885; it runs two miles, operates five cars, and last year carried 200,000 passengers. There are about a dozen others now in operation, and as many more under contract, in this country, and about a dozen operating in Europe.

(15) S. I. D. asks how to make water ices. A. Flavor water with the proper extracts, and freeze with agitation as you do ice cream.

(16) W. H. writes: 1. I have a valuable work ready for binding, but through accident one number got stained with linseed oil; how can I remove the stain? A. Apply a little pipe clay, powdered and mixed with water to the thickness of cream, on the spot. Leave it on for about four hours, and then scrape away. 2. How can powder be removed from the skin? A. Grains of powder in the skin must be removed by a surgeon, but will sometimes gradually disappear with new growth. 3. Which is the best journal on electricity? A. There are so many journals now making this subject a specialty that we would not like to decide, unless it were in favor of the SCIENTIFIC AMERICAN and SUPPLEMENT.

(17) J. S. asks how to make the mineral water that is drawn from fountains in the drug stores. A. It generally consists of water charged with the proper salts and with carbonic acid, and requires special apparatus to charge the fountains under pressure. The special mineral waters desired are made by dissolving the ingredients known to exist in the natural water.

(18) L. F. B. asks: 1. How can I clean a number of Carter, Stafford, and Arnold ink bottles, so they would be perfectly wholesome for catsup and such like use? A. For cleaning ink bottles, the best and quickest agent is oxalic acid, bnt it is a violent poison. Try shaking small nails, with water or vinegar, in them, and if this does not answer, use muriatic acid (also poisonous), carefully washing out two or three times after its application. 2. Will you tell me whether I have made on correct principles an induction coil which I describe as follows: Core of soft iron wires No. 16, core 1 inch in diameter, wound tightly with a layer of fish line, whole thickly covered with hot sealing wax about $^{1}/_{16}$ to ⅛ thick, then wrapped twice with No. 16 Edison electric light wire, which has a very good, durable insulation, the whole varnished several times, and covered with several turns of waterproof packing, case lining, and brown Manila paper, and then wrapped, and not very evenly, by hand, with a pound or a pound and a quarter of No. 36 cotton-covered copper wire. I should judge there to be 25 or 30 feet of No. 16 in first coil, wound on core (primary?) A. With regard to your induction coil, you do not give the length. You have apparently used an unnecessary thickness of insulating material. Otherwise it should work quite well. For description of induction coil see SCIENTIFIC AMERICAN SUPPLEMENT, No. 160. 3. How many cells Leclanche battery would be necessary for the above coil? A. Three Leclanche cells would answer for your coil, but they of course would rapidly polarize. 4. How and what to use, to produce a good wax or other polish for cabinet work? A. For wax-polishing woodwork, many receipts are given. We give the following: 1. Dissolve beeswax in cold alcohol to the consistency of butter, and polish by rubbing this on the wood, finishing by rubbing with a clean linen cloth. 2. 8 parts white wax, 2 parts resin, ½ part Venetian turpentine, are heated over a moderate fire, and 6 parts of rectified oil of turpentine are stirred in. After 24 hours' standing, when it should have the consistency of butter, it may be used. The wood should be perfectly clean, and after this is rubbed in, a second rubbing may be given after one-half hour. If necessary, the wood should be cleaned with soap and water and dried perfectly.

(19) F. T. asks: What will remove oil stains from marble statuary? A. Make a paste with fuller's earth and hot water, cover the spots therewith, let it dry on, and the next day scour it off with soft or yellow soap.

(20) J. F. G. asks: Is there any way to generate gas under a high pressure and maintain the pressure while the supply is being exhausted, the same as steam in a boiler? If so, what is the cheapest and best way to do it? How many cubic feet of such gas does it take to equal a ton of coal for heating purposes? What does it cost per 1,000 cubic feet? How much coal does it take an hour per horse power to run a steam engine? A. You can generate gas in a retort under pressure by igniting coal therein, but better results are attained with lower pressure. About forty thousand feet would be required to equal in heating power a ton of coal. It will cost about 75 cents a thousand. For running a steam engine 1½ to 5 or more pounds of coal are required per horse power per hour.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

June 28, 1887,

AND EACH BEARING THAT DATE.

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