

screw power to do the work than the pulley which runs slower and does the work direct. P claims that there will be no difference of set screw power required, or, if any, the slower pulley would require less on account of having no countershaft to drive. Which is right?—S. B.

(132) How would I proceed to harden a razor which is hollow ground and quite soft, so much so that it requires honing every three or four weeks. It will not hold an edge. Are there any chemicals that I could use without resorting to tempering in the forge?—W. H. M.

(133) I want to transform a current of carbon monoxide (CO) into carbon dioxide (CO2) by other means excepting combustion. Will you kindly show me a solid substance, cheap and abundant, that contains oxygen in such a state that, on passing by it, the carbon monoxide takes oxygen, and therefore turns into carbon dioxide?—J. A. M.

(134) If one has a 20 horse power engine, is it more economical (leaving first cost out of the question) to have a 20, 30, or a 40 horse power boiler?—C.

(135) Inform me through your columns how I can make and use a preparation for silver plating and one for gold plating.—A. A.

(136) 1. My neighbor owns a thrashing outfit, in which the power is conveyed from the horse power to the separator by means of a tumbling rod, in four sections, connected by four knuckle joints. The total deflection of the tumbling rod is about 40°. What percentage of the power is absorbed by the knuckles? 2. What course would you advise a young man to pursue who desires to become an electrical engineer? He has a good common school education. 3. As a profession, how will electrical engineering compare with civil engineering, during the next twenty-five years?—C. B. S.

(137) Please tell me what it would cost to make an induction coil as that described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161. Please tell me if aniline green contains any copper in solution. If not, what gives it the copper appearance when in a liquid state?—Wm. R.

(138) Will you kindly inform me the initial electro-motive force and the strength of current of the following batteries: 1. The Disque Leclanche. 2. The Fuller mercury bichromate battery. 3. The perforated cup battery, size 4 in. square. 4. The Bunsen battery spoken of in correspondence No. 34 of SCIENTIFIC AMERICAN of December 1, 1888. Which is desirable for electric bells, a battery of high E. M. F. or one of considerable strength of current? For miniature incandescent lamps? What kind of iron is the best to use in a casting of the field magnet of the simple electric motor? If this motor be used as a dynamo, what current will it produce?—J. G. P.

(139) I want to make a cold box in an icehouse, but without altering the ice house very much. It keeps ice all right, but my cold box inside of the ice house I can't get below 50°.—A. G. D.

(140) In a family of sixty, we use between 500 and 1,000 bushels of apples. Apple sauce is on the table three times a day, and the same with tomato sauce. We want vessels to cook these in, that will not poison us. Have tried the best we could find in market—copper washed with tin, agate, marbled iron, etc., but all fail to give satisfaction; we are poisoned. If you can help us in this dilemma, it will be an act of humanity. The sisters want something light to handle.—F. W. E.

(141) Would you kindly inform me of any publication treating about the different trials in the United States of explosives, such as robitite, melinite, bellite, carbo-dynamite, graydonite, smolianoff, snyder, and where such works or publications may be had?—H. B.

(142) I have a quantity of pure chloride of silver, and would like to know how to convert it into pure nitrate of silver.—G. O.

(143) I have made the electro motor described by you some time since, with some slight variations, the principal one being cast iron field magnets, and have had quite good success. I now wish a machine to run as a dynamo to light an Edison 20 C. spiral lamp, which requires 90 to 38 volts, 1 to 1.5 amperes, and has a resistance of about 0.34 ohms. Can I make an armature which will take the place of the motor armature and give the required current? If not, can magnets and armature both be wound so as to produce the required current? If the resistance of machine cannot be kept low enough, will not a slightly increased voltage answer to produce required current? Lastly, if machine can be made, at about what speed should it be run?—H. M. P.

(144) Please inform me whether there are any chemicals, when put into a quantity of water (a tub of water for example), which will cause it to freeze, and what they are? What is the process for making ice? I am trying an experiment for keeping apples. I am going to make double wall building out of concrete, with about 18 inches space between the walls, and then fill the space full of water. And then I want to freeze the water in a body. Will I be able to accomplish it? How would fruit keep with just water alone in the space? Would it keep the temperature inside as low as 36 degrees? Would the water be liable to leak through the concrete walls? Apples will not keep well in California, in cellars under ground. They seem to keep better in double wall buildings above ground. Now I want to try and make a fruit house after the principles of these cold storage companies, so as to be able to preserve fruit perfectly for four or five months. Now can you give me any light on the subject?—H. W. C.

(145) How much power does it take to run a coffee mill, grinding 1 lb. of coffee? Height of mill is 2 1/4 ft. It has two flywheels of 2 ft. in diameter, made by Enterprise Co., of Philadelphia, No. 12. A boy of 16 can easily grind 1 lb. of coffee without stopping. Will a C. C. 1/2 h. p. battery motor run it? Battery has E. M. F. of 1 1/2 volts; internal resistance, 1 ohm. Motor has resistance of 1.7 ohm. Will a 1/2 round belt transmit power?—A. M.

(146) What will make a durable ebony finish for a Georgia pine soda water counter? Please answer through the columns of the SCIENTIFIC AMERICAN.—F. McD.

(147) Can you tell us how to make stamping powder, such as is used with perforated paper patterns for stamping fancy designs on cloth, etc.? Something that will not rub off from handling while working the pattern.—F. P.

(148) I am going to make a photographic camera as described in SCIENTIFIC AMERICAN October 13, 1888, page 231. Instead of a spherical wide angle lens, I bought a 75-cent microscope or magnifying glass, brass mounted, with two adjustable lenses, focal length a little more than an inch. In order to get a fixed focus for all distances, a diaphragm probably has to be used, but I don't know the size of the opening for making instantaneous photographs. Would you please inform me whether the diaphragm should be placed between the two lenses or in front of them? Can such a microscope or a 75-cent reading glass be used in the construction of a lantern for enlarging small negatives?—W. L. W.

(149) Can a horse do as much work on a tread power as on a common circular horse power with the same exertion?—J. I.

(150) I owned a locomotive steam boiler three years ago, and it is still in use, that was built before 1854, and has had very little repairs? Are there many older boilers in use in this country? She has copper fire box and brass tubes.—J. E. E.

(151) I would like to know the composition of the varnish used upon canvas boats, to keep them from leaking. Also if said varnish will exclude air or common coal gas?—J. A. W.

(152) Is there a process by which crude oil, say the Lima crude oil, can be used as a fuel in kitchen stoves or parlor stoves? Or is there a burner made using crude oil for fuel for household purposes?—P. F. B.

(153) The mixture of salt with mortar has been spoken of recently as an effectual prevention of the crumbling of the mortar from frost. Will you please inform me the quantity and mode of admixture, and oblige a constant and attentive reader?—J. A.

(154) Please tell me what kind of acids I can use to remove the sand and hard crust from the castings, so as to leave them a bright brassy color and take the grit, so as not to wear the edge off the tools, also is there any chemicals that I can use in a steel ball, 13-16 in., that the loadstone will not have any effect when it drops into its seat as to hold the two together, as I wish to use a steel ball and seat? I wish to use them in oil wells, where the magnets or loadstone is bothersome. Also would you please tell me how I can make my brass moulder's sand tough, so as it will hold together?—W. H. W.

(155) Will you please answer through the question column of the SCIENTIFIC AMERICAN whether it is possible to run three circular saws through a log at the same time on one saw kerf? Please let me know if it has ever been done, and how. It is reported by some men from Washington Territory that there are some mills there that have such machinery for cutting up the large timber of that Territory. Some have disputed the possibility of it, and we have agreed to submit the question to you for settlement.—W. W. Y.

(156) Will you kindly inform me how the acoustic properties of a hall can be improved, the dimensions of which are 46 x 60 feet, and whose ceiling is oval-shaped? It is 12 feet to beginning of the curve of ceiling, and about 22 feet to top of same.—G. A. C.

(157) Which of the two boilers would be the more economical, using wood for fuel: No. 1, shell 5 ft. x 12 ft. with 86 three-inch tubes; No. 2, shell 5 ft. x 12 ft. with 150 two-inch tubes? Also which would last the longer? What per cent saving in fuel is there between a common slide valve and an automatic cut-off engine of 40 horse power?—W. McV.

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(52) Polishing Wire by Pickling or Galvanizing.—Neither of the processes you name will polish wire. The proper treatment depends on its material and how badly corroded it is. Rust may be removed from iron wire by soaking in solution of chloride of tin. Emery of increasing degrees of fineness, followed by rouge, putty powder, whiting, or rotten stone will polish metal.

(53) For Enamels for Clay Goods consult Spon's Encyclopedia of Industrial Arts, part 25. Also SCIENTIFIC AMERICAN SUPPLEMENT, 387 and 402.

(54) 1. Making Small Flat Springs.—Cut them off a watch or clock spring. To perforate, punch an indentation with a sharp-pointed punch and file off the projection or drill it. It may be necessary to draw the temper for this. If so, reharden again and draw to a blue color. 2. Printing Name on Velvet in Gold.—Dust with finely powdered resin or mastic and stamp with hot metal type. Afterward wipe off excess of gold. Or paint the letters with gold size and apply with cold type.

(55) Large and Small Hose Nozzles.—Other things being equal, a large nozzle will throw a jet of water higher than a small one. If the supply is insufficient, the small nozzle may throw the highest. The stream of water should not be "wire drawn" or throttled for either nozzle to work well.

(56) Horse Power Transmitted by Compressed Air.—A pipe 5 feet diameter and 1 mile long at 100 pounds pressure at inlet would transmit about 55,000 horse power; at 200 pounds pressure about 82,000 horse power. If 30 miles long, about one-fifth as much.

(57) Horse Power required to heat Iron Plates.—I have calculated this according to one formula with the following results: In heating a

round iron plate 2 inches thick and 8 inches diameter to 1,000° Fah., about 160 electrical horse power would be absorbed. To heat it twice as hot, about 320 electrical horse power would be required. Allowing for conversion loss, etc., these figures might safely be increased to 200 horse power and 400 horse power respectively as giving the power of the engine. To heat a plate 4 inches thick and 8 inches in diameter to 2,000° Fah. would require about four times as much as for the smaller plates. No allowance is made for loss by conduction.—S. V.

(58) Tests for China Clay.—The quality may be judged by observing its whiteness and freedom from grit. It may bring from \$10 a ton upward.

Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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