(30) W. S. D. writes: 1. I have made a steam engine cylinder 1¼x2 inches; now I want a boiler, can I get steam enough by using a boiler on a common cook stove—boiler to be about 8 inches in diameter made of cast iron? I want it to run a bracket saw on large work. If this will not do, how can I generate sufficient steam? Of what can I make a boiler; and how large? A. If you set the boiler in the fire, you can probably make enough steam. It would be better to form it of copper, from 8 to 10 inches in diameter. 2. Is cold rolled iron as good as steel for piston rods, arbors, etc.? A. It is not as strong, comparing good qualities of each. 3. How shall I temper machine steel to have it the toughest? A. You can make the steel very hard, by heating it and plunging into cold water. After this, you can temper to any less degree of hardness, by reheating, and allowing it to cool somewhat, before plunging into cold water.

(31) E.W. T. asks: What form would be the best to copy to make a small magneto-electric machine, costing from $8 to $10? I want a continuous current for physiological experiments. A. Probably Clarke's machine would be best for your purpose, but we do not think you can make one for the price named.

(32) J. G. A. and C. K. will find receipts for ebonizing woods on pp. 191 (19), 219 (67), and 251, vol. 38, SCIENTIFIC AMERICAN.

(33) W.B.S. writes: In heating our factory we take steam from the steam dome, and the return or drain pipe into the heater then (after the pipes are heated up) turned into the mud drum. It seems there is enough greater pressure at the mud drum to prevent the return water from flowing back into the boiler by a head of about eight feet or more generally. How can this be remedied? A. Ordinarily, this is not enough head to secure good circulation, in an extensive system of radiators, unless all the return pipes can lead with a fall into a vertical main. Fortunately the difficulty can be easily solved by adding a good trap.

(34) S. G. B. asks if there is a difference between one "square foot" and one foot square. A. Square foot is the more comprehensive term, since it includes the "foot square" (*i. e.*, a square one foot each way) and all other figures having the same area, 144 square inches. The first is a unit of measure, without regard to form; the second is a particular form of a particular size.

(35) A. G. L. asks: 1. Is there anything that will prevent kerosene oil from smoking when used for cooking purposes? I used three tubes similar to those used on torches, but a black deposit soon formed on the bottom of the kettle. A. The burner for a kerosene stove should be made on exactly the same principle as a first class lamp burner. 2. Can I make the electric light by using a battery composed of zinc and copper plates immersed in solution of 9 parts water, 1 part sulphuric acid, the plates being 3 x 4 in., ⅛ in. thick; how many cells would be sufficient? A. 50 such cells would produce a light, but not for a great length of time, as a battery of this kind is not constant. 3. What size copper wire is best for connections? A. No. 12 or 14. 4. When I melt zinc in an iron ladle it is brittle; is it fit for battery plates? A. Yes.

(36) R. W. S. asks: If a malleable iron casting ⅛ of an inch thick by 2½ wide, is securely held at each end by a solid support, so that there is two inches of unsupported metal between the supports, what pressure in pounds brought to bear upon the center of the casting will break it? A. Trautwine gives the following rule: Breaking weight in pounds

$$= \frac{(\text{Depth in inches})^2 \times (\text{Breadth in inches})}{\text{Clear length in feet}} \times 4200$$

This rule is for the case in which the ends are immovably fixed.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

S. F.—It is a micaceous sand. Not valuable. We could not indicate the probable value of the stone from your description alone.—J. G.—It is magnetic iron sand—magnetic iron oxide or magnetite. It will make an excellent quality of iron if properly smelted. It may be freed from sand and other impurities by means of large magnets.—J. B.—The light colored specimens are principally marcasite (an iron sulphide), with traces of copper and arsenic, in slate. The other sample contains a large per cent of lead (galena) and chalcopyrite (iron copper sulphide). The ore will probably prove of value.—J. T.—The quartz contains galena (lead sulphide) and a little chalcopyrite and zinc. The property is doubtless of some value.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

Wagon Wheel Problem. By M. S. C.
On Subdivision of Electric Current. By J. T. P.
Metric System. By R. F.
Facts and Figures for Mathematicians. By L. S. B.
Electric Light Telegraph. By F. P.
Acoustic Telephone. By E. D. V.

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HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

[OFFICIAL.

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FOR WHICH

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November 5, 1878,

AND EACH BEARING THAT DATE.

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