(66) W. G. says: I have a steam pump of the following dimensions: 22 inch steam cylinder, 10 inch plunger, 4 feet stroke, 9 inch suction pipe, and 9 inch discharge pipe. The discharge pipe runs 250 feet north on a rise of 40°. It makes a quarter turn, and runs 94 feetcast, horizontally, and then another quarter turn and runs 290 feet north on a rise of 40° to the point of delivery. The pump works as smoothly and with as little jar as possible; but there is a heavy jar in the discharge pipe which moves the whole column when the pump runs over 18 strokes per minute. When it runs less than 18 strokes, there is no jar. Will you please tell me the cause and the remedy? A. According to data sent, the vertical height of column of water is nearly 350 feet. The jar is probably due to the stopping and startingat the end of each stroke, and might be reduced by the use of a larger air vessel.

(67) J. V., of Canterbury, England, says: I have a traction engine, with one cylinder 8 inches in diameter and 12 inches stroke, which I work at 100 lbs. pressure. What difference will there be in the power if I put on an 8x16 inches cylinder, all other things being equal? What difference will there be in the power of a 9x12 inches and a 9¼x16 inches engines, all other things being equal, at 100 lbs. pressure? A. Calling the power of the 8x12 inches 1, that of the 8x16 will be 1·33, that of the 9x12 will be 1·27, that of the 9¼x16 will be 1·78.

(68) J. H. E. says: The following is taken from a book high in authority on mechanical subjects, speaking of an ordinary steam engine: "If, on the introduction of steam to the cylinder, it has a pressure of say 4 atmospheres, it follows that it will act upon the piston with all this force to cause it to descend; since, however, the lower part of the cylinder is at this time in communication with the external atmosphere, there is a resistance = 1 atmosphere opposed to its movement, therefore the actual effective pressure on top of piston = 3 atmospheres." I wish to inquire if the pressure (4 atmospheres) is that which is indicated by the steam gauge, and what becomes of the pressure of the air in the boiler after the air is worked out? I know that an engine will run with less than 15 lbs. pressure by the gauge. A. In the statement quoted by you the reference is apparently to absolute pressure, or pressure above a vacuum. The steam gauge, being pressed internally by the steam and externally by the air, indicates the difference of these pressures, or the pressure above the atmosphere.

(69) W. S. says: 1. Given the boiler or reservoir of a fire extinguisher, tested to 150 per square inch, 24 inches long, of 9 inches diameter, and about ¼ inch thick, laid horizontally and fired with charcoal, required the size of engine it will run, and the best working pressure? A. The reservoir could be made to answer as a boiler; but it would not be advisable to carry a pressure of more than 60 or 75 lbs. 2. I wish to cast the cylinder of brass. If I take a piece of iron, turn it off smooth, and polish it, could I use it for the core to cast the cylinder around, and could I drive the iron out? A. You will not be able to make a very good cylinder in the manner you propose. There is no difficulty in making a sand core quite as smooth as the one that you suggest.

(70) I. C. C. asks: How can I make a good filter, capable of filtering three or four pails of water a day? I have made my box 14x14 inches at top, and 14x 2 at bottom, with a height of 3 feet; and I filled it with alternate layers of charcoal, coarse gravel, and sand. For a week or 10 days it will work well, and then the amount filtered lessens. A. It would probably answer your purpose to use sand only, spread out over a large horizontal surface, and when choked by the accumulated sediment, to remove about one inch in depth of the sand and renew it. After a more extended interval the whole might be renewed.

(71) T. P. B. asks: What is fire? A. Fire is, commonly speaking, gaseous matter in a state of intense heat, due ordinarily to combustion, or a direct and energetic combination with atmospheric oxygen. Scientifically it might be described as matter under the influence of intense atomic or inter-molecular vibration. Consult some good work on chemistry or chemical philosophy.

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

C. W. R.—It contains carbonate of lime and alumina.—Miner, New Mexico.—It consists of red oxide of iron and clay.—G. F.—They are all crystals of quartz (pure silicic acid). They are quite common, and of little value.—M. A.—It does not containsilver, but antimony and lead. —M. A. A.—The sand you send consists principally of quartz crystals and iron, and manganese garnets.

M. H. H. says: 1. An acquaintance claims that, in a sugar cane mill, one of the crushing surfaces should be the surface of a small cylinder, for as it presents a smaller surface to the cane, it will do the same work easier. Is it so? 2. What are the advantages and disadvantages of horizontal and perpendicular rollers? —T. W. D. asks: Which steamboat, running in fresh water, is the fastest, and what is her speed?

COMMUNICATIONS RECEIVED.

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

On Saving Life in Case of Fire. By J. S.
On Nickel Plating. By D. G.
On High Interest. By J. H. S.
On Reclaiming the Desert of Sahara. By R. T. E.
On a Tidal Motor. By A. S.
On the Trisection and Multisection of Angles. By W. T.
On Pernicious Literature. By C. W. B.
On Labor-Saving Machinery. By T. R. V.

Also inquiries and answers from the following:

F. M. B.—C. G. L.—D. B.—G. W. K.—M. A.—W. D. —J. W. L.—J. E. H.—M. J. C.—S. H.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells lampblack by wholesale, and what is its price? Who sells apparatus for the production of sulphate of potash? Whose is the best metallic piston packing? Who makes cotton and wool carding machinery? Whose is the best gas meter? Where can the best fireworks be obtained?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL.

INDEX OF INVENTIONS

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[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

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9,955.—NECKLACE.—H. W. Woods, Brooklyn, N. Y.

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