of the ore in a comminuted state, and was told that it could not be melted. I put some of it, with some borax for a flux, in an anthracite coal furnace, and obtained something like the inclosed sample. Is it of any value? A. The sample probably consists of the double borate of manganese and sodium, used in Germany as a substitute for litharge in the manufacture of paint driers, japans, etc. It would hardly command a remunerative return here.

(12) W. C. B. asks: How much more (if any) than its own weight, can a railroad engine start on a perfectly level track, assuming that there is no slack between the engine and cars? A. It depends upon the style and proportions of the locomotive, number of drivers and diameter, proportion of weight on drivers, and steam carried, also the style of the cars in the train.

(13) J. W. M. asks: How many feet should the piston head of a steam engine travel per minute? A. There is no fixed rule for the speed; it depends upon the length of stroke and the work that is to be driven, in other words, the speed of the piston is adapted to the work to which the engine is applied.

(14) C. E. B. writes: I am running an engine in a saw mill, driving wheel 20 feet, drum on saw shaft 2 feet, engine makes about 35 revolutions per minute. Can I increase the capacity for work by double gearing: if so, I would like to reduce the driving wheel to 16 feet? A. No, it would be better, if you wish to reduce the pulley to 16 feet, to increase the speed of the engine proportionately.

(15) L. M. D. asks: 1. What is the best way to pack the screw shaft of a toy propeller? A. Pack with cotton wicking. 2. What should be the dimensions of cylinder for running the boat, which is two and a half feet long? A. From 1 inch to 1½ inch diameter, and 2 inch to 2½ inch stroke. 3. What is the best shape of boiler? A. A vertical tubular.

(16) J. C. M. asks: 1. In a flour bolt is it usual to put on two widths of bolting cloth; what would be the objection to putting on three? A. Two, three, or four are used; it is common to put on three; it depends upon the number of grades you wish to turn out. 2. I have built my dam V shaped, sharp part down stream; would that shape cause the water to rise less on the abutments? A. In strong currents there will be less rise on the shore abutments. 3. At what speed should an overshot water-wheel run? A. 4 to 8 feet per second. 4. Can a horse pull as much 500 feet from his load (on a level with his shoulders) as if within 5 feet? A. Yes, all other things being equal; but if there is 500 feet of rope dragging on the ground, its friction is a part of the load.

(17) W. N. R. writes: In a late number, p. 267, SCIENTIFIC AMERICAN, you gave a simple method of finding pressure in steam boiler with weight at a certain point on lever. Now, will you please give as simple a method of finding the point at which to place the weight so that steam will blow off at any required pressure? A. 1st, Multiply the pressure per square inch by the area of the valve; the product is the total weight required upon the valve. 2d, Divide this total pressure by the weight to be hung on the valve lever; the quotient is the number of "leverages" which you must give the weight from the fulcrum. Suppose 100 lb. steam and 12 inches area of valve: then total pressure on the valve is 1,200 lb.; and if the weight be 80 lb., then 1200÷80=15 "leverages." Now, if the distance from fulcrum to center of valve be 3 inches, then the weight must be set at 3x15=45 inches from fulcrum, or 42 inches from center of valve. Of course this does not take into account the effect of the lever or weight of the valve.

(18) E. F. W. asks: Can you inform me of a place where engineering ability is appreciated and paid for, and where men are obliged to be engineers who have charge of engines? A. We know of no such paradise. The ability of a competent engineer is not appreciated. So long as men will employ any one at low wages who can stop and start an engine, so long real engineers will not be put in their proper place.

(19) J. S. A. asks: 1. How fast an engine, with cylinder 3¼ inch diameter and 3 inch stroke, and 80 or 100 lb. of steam, and connected with paddle shaft by gears (bevel), would propel a flat-bottomed skiff 15 feet 6 inches long and 30·5 inches wide, and drawing 5 or 6 inches of water? A. If geared 3 or 4 to one, would probably drive the boat about 5 miles per hour. 2. What would be the dimensions of the boiler to supply 100 lb. steam, and how thick should the iron or steel plates be of which it is constructed to safely withstand the pressure and at the same time be as light as possible? A. The size of your boiler and thickness of iron depend upon the speed you run the engine and the design of the boiler.

(20) M. B. writes: We have placed a hydraulic ram to force water to the barn, a distance of 1,300 feet, and 40 feet rise and 2 feet fall for a 2 inch feed pipe 40 feet long. We had at first a No. 4 ram, which furnished but a ¼ inch stream, and have now placed a No. 5 ram, which will not strengthen the stream. We were advised to place a ¾ inch discharge pipe, which we did. I would like to know if it would not throw a stronger stream with ½ inch pipe, and work more freely. A. According to the tables the ram should have 1 inch pipe instead of ½ inch. Apply to the maker of the ram for advice. 2. How much water is contained in the air chamber? A. The quantity of water in the air chamber will depend upon the pressure under which the water is delivered.

(21) J. N. T. asks: What is a suitable size of engine for a boat 35 to 40 feet long and 8 feet beam? A. A high pressure engine of 8 inch cylinder and 9 or 10 inches stroke will give your boat good speed.

(22) B. T. L. asks: 1. Supposing a horse attached to an empty wagon runs rapidly around a sharp curve, which wheels of the wagon bear hardest on the ground? Or, in other words, if the velocity be sufficient to raise any of the wheels from the ground, from natural causes which will be raised, the inner or the outer wheels? A. Inside wheels. 2. If a man be in a wagon rapidly turning a curve, will he, to preserve his balance, instinctively lean toward the outer or inner edge of the curve? A. Toward the inner side of curve. 3. Why, on railroad curves, is the outer rail raised several inches above the inner? A. To counteract the effect of centrifugal force in running the curve.

(23) C. R. J. asks: Will black lead do for a substitute for gas coke in batteries? A. Yes, Professor Silliman, Jr., used it in the Grove form of battery as a substitute for platinum, in 1842. Gas carbon is found to answera better purpose.

(24) L. H. H. asks: 1. Does a low pressure engine gain power by condensing its steam? A. Yes, the gain is considerable. 2. Are high pressure engines made with walking beams? A. Yes, in great numbers.

(25) "Tropic" asks if there are furnaces made to burn petroleum oils (that could be used instead of coal or wood in hot climates) sufficient to heat a large-sized fruit evaporator continuously, and where such can be got. A. There are several petroleum furnaces now in the market, one of which would doubtless answer your purpose. See "Business and Personal" column. 2. Can you inform me if any material can be had that would absorb the moisture from the saturated air in a large sized drier so that the heat may be confined and yet the water or vapor disposed of? A. We know of nothing likely to be if any practical service in this connection. 3. Do you know of any of the refiners of petroleum oils door will prepare the "petroleum jelly" made with digested soap wort and refined kerosene oil? A. "Petroleum jelly," or vaseline, is manufactured on a large scale. It is a proprietary article.

(26) T. F. writes: We have a natural supply of water at an elevation of about 100 feet and 1,500 feet distant from the center of our village, and we propose bringing the water down in pipes for the purpose of extinguishing fires. The main pipe will enter the main street at right angles, and a branch run not to exceed half a mile, and, as it is not probable that we can have hydrants near enough together, or have hose enough to bring more than two streams of water to bear upon one building, now what size should main pipe and branches be, or rather, what is the smallest size that can be used and make it effectual, and of what size should the hose and the discharge nozzles be? A. The larger the pipes the less the loss of head by friction. We think the main pipe should not be less than 6 inches, and the branch pipes, 4 inches diameter.

(27) A. W. S. asks what is put upon microscopes to keep them from tarnishing. I have just made one and wish to know what lacquer to put on it. A. A thin coating of fine alcoholic shellac varnish applied to the work, which has been previously warmed, will preserve the color of the brass. The color of the lacquer may be heightened by adding turmeric or dragon's blood, or both. 2. How can I resilver or recoat the back of a concave mirror or reflector for microscope? A. See article on silvering glass in SUPPLEMENT, No. 105. 3. I am a brass finisher by trade, and would like very much to know how yellow brass may be made to keep its color without appearing varnished. A. A thin varnish of white shellac or a coating of collodion will do this. It will retain its color for a long time without a protective coating of any kind, if the finish is sufficiently fine. A light film of gold is the best possible coating for fine brass work.

(28) D. J. T. O. asks for a good receipt for making wine for home use out of our common grapes. A. Put 20 lb. of ripe, fresh picked, and well selected grapes into a stone jar, and pour on them 6 quarts of boiling water. When the water has cooled enough, squeeze the grapes well with the hand; cover the jar with a cloth, and let it stand for three days; then press out the juice, and add ten pounds of crushed sugar. After it has stood for a week, scum, strain, and bottle it, corking loosely. When the fermentation is complete, strain it again and bottle it, corking tightly. Lay the bottles on their side in a cool place.

(29) J. S. writes: 1. I propose making an electric motor, and would like to use in its construction the Camacho electro magnet, as illustrated in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 182, page 2,900. Is the yoke made of iron or wood? A. Iron. 2 If of iron, would pieces of ordinary gas pipe, soldered to the yoke, do for the tubes? A. Gas pipe will do, but it must not be soldered. The iron of the yoke must make a good contact with the iron of the tubes. 3. Would ¾ inch (outside diameter) gas pipe be too large for first, or inside tube? A. It would be better to use a smaller size, say ½ inch. 4. Must the inside of each outer tube press tightly against the insulated wire of each inner tube? A. It need not necessarily press tightly, but the space between the two should be small. 5. The battery will be close to the magnets: will No. 16 cotton covered wire be suitable? A. Yes. 6. I propose making the cores five inches long, and use three or four thick tubes: how thick should the yoke be? A. ½ inch. 7. If four tubes are used in each core, about what attractive force would such a magnet exert, at a distance of ½ of an inch, with a battery of 12 elements (large size), such as is illustrated and described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 149, page 2363? A. It would be difficult to estimate the attractive force of such a magnet without knowing more of its construction and the circumstances under which it is used.

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

G. A. B.—No. 1. Limonite, a very fine iron ore. No. 2. Clay, aluminum silicate, containing much silica. If properly washed, of some value for the production of cheap pottery ware. No. 11. Hematite, an iron ore of good quality. No. 12. Chiefly iron pyrites, sulphide of iron. No. 10. Partially altered calcium carbonate, calc spar, containing traces of strontium carbonate and manganese oxide. No. 8. Ferruginous limestone. The other specimens are limestones. No. 6 will probably yield the best lime.—J. M. G.—It is a syenitic gneiss rock of little value.

COMMUNICATIONS RECEIVED.

On Boiler Explosions. By R. H. B.
Plan for the Darien Canal. By C. A.
On Fire Alarms and Fire Escapes. By W. A.
A Positive Discovery. By T. B. M.
On the Holloway Process. By L. C.

[OFFICIAL.]

INDEX OF INVENTIONS

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AND EACH BEARING THAT DATE.

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From August 8 to August 12, inclusive.

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Bed bottoms, C. D. Flynt, Brooklyn, N. Y.
Boiler flue, regulating draught in, A. C. Harrison, Philadelphia, Pa.
Burnishing screw heads, machinery for, C. D. Rogers, Providence, R. I.
Carding engines, J. Abbott, Philadelphia, Pa.
Clasps, B. Greig, New York city.
Deaf, instrument for, R. S. Rhodes, Chicago, Ill.
Glazed surface, treatment of, W. Gibson, N. Y city.
Governor, automatic for marine engines, C. W. Cooper, New York city.
Grinding machine for cards of carding engines, B. S. Roy, Worcester, Mass.
Motors, Molera & Cebrian, San Francisco, Cal.
Plaster and pad therapeutic, R. M. Kennedy, Pittsburg, Pa.
Sewing machine, carpet, J. Hess, San Francisco, Cal.
Ventilating buildings, apparatus for, F. L. Norton, New York city.
Veneer cutting machine, H. T. Bartlett, New York city.
Window cleaning chair, Anna Dormitzer, N. Y. city.