

(35) J. W. asks: 1. How is lead pipe prepared for making a welded joint? A. Clean it thoroughly. 2. What is the solder composed of? A. Equal parts of lead and tin. 3. Are there any practical books on plumbing? A. Send for catalogue to one of the publishers who advertise in our columns.

(26) E. C. D. L. asks: How are concave razors made? A. By transverse grinding.

(27) H. L. asks: 1. How much heating surface is required for a yacht engine, 4 x 4 inches, to give plenty of steam without crowding the boiler? A. Make a boiler with about 100 square feet of heating surface. 2. Is a 3 1/2 inch cylinder large enough for a boat 25 feet long and 5 feet beam? A. A cylinder 3 1/2 x 5 inches will answer. 3. What is the best wheel for speed? A. A three-bladed screw, of as large diameter as can be immersed, will give good results.

(28) C. L. D. writes: 1. I have an upright tubular boiler 7 feet high, 26 inches diameter, 20 inches grate, 32 2-inch tubes 5 feet long. At what distance from the top of the boiler should I keep the water, with 60 lbs. pressure? A. From 12 to 15 inches. 2. Will it furnish any more steam with a given amount of coal than a boiler 2 feet shorter and tubes 3 feet long? A. Generally speaking, yes. 3. How much coal is generally used in 10 hours in such a boiler to produce 4 horse power? A. From 200 to 500 lbs. 4. What will be the best way to jacket a boiler—brick it to return the smoke down (after it has ascended the tubes) outside the boiler and in the chimney, or let the smoke go from the tubes to the chimney and brick it in? A. The first plan will generally be slightly more economical than the other. 5. My engine is 4 x 10 inches cylinder. If it is run 150 revolutions will it produce the same power that a cylinder 4 x 5 inches, run 300 revolutions, would? A. Other things being equal, it would. 6. Why are cylinders made lately 5 x 5, and 6 x 6, and 8 x 8, etc., and run so fast, instead of 5 x 10, etc.? A. To increase the efficiency for a given weight. 7. What distance should a 4 inch piston travel in a minute to produce a 4 horse power? A. It depends on the pressure.

(29) A. A. asks: Will Portland cement and sand make an artificial stone that will answer for a water table and window sills for a brick house? If so, what proportions are best? A. Coignet's beton (5 measures sand, 1 measure quicklime, 1/2 to 1/4 measure hydraulic cement) will answer for the purpose about as well as stone.

(30) E. E. V. asks: What sized screw will it take to propel a flat bottomed boat 20 feet long, 6 feet beam, and 5 inches draught, at the rate of 3 miles an hour, with the screw two thirds immersed and running at the rate of 150 revolutions per minute? A. You have fixed the diameter by the draught and immersion. Make the pitch such as to give 1 1/2 the required speed. A stern wheel will, however, probably answer better for such light draught.

(31) H. C. M. asks: What is the best way of removing lime scale in a locomotive boiler without injuring the latter, when the scale cannot be got at by mechanical means? A. Allow the water to become cool in the boiler before blowing out.

(32) W. O. asks how river steamers are propelled overbars. A. In some cases levers are used to lift the boats over, and in others they are pulled over by throwing out an anchor connected to a steam winchlass.

(33) C. A. L. asks: What speed may be expected of a flat bottomed stern wheel boat 8 x 35 feet, drawing 1 foot of water, and having two slide valve (double valves) engines 4 x 12, with 150 lbs. steam? A. Probable speed, 5 to 6 miles an hour. 2. How many square feet of heating surface will be necessary to furnish steam enough with forced draught? A. Boiler may have from 150 to 200 square feet of heating surface. 3. If I set the boiler so that the fire can go all around it, will not that part of the shell above the water line become too hot and injured before steam is got up? A. By getting up steam slowly you will have no trouble. 4. Will I have to pay a license for running such a boat on the Missouri river? A. Yes.

(34) J. W. R. asks: 1. What is the horse power of a locomotive firebox boiler with 52 flues, each 7 feet long by 2 1/2 inches? A. There is no standard for rating the horse power of a boiler. 2. What is the horse power of a 10 x 22 inch engine? A. Multiply the area of the piston in square inches by the mean pressure in lbs. per square inch, and by the piston speed in feet per minute, and divide the product by 33,000. 3. How much coal per day of 10 hours would the boiler use? A. With a good draught such a boiler should burn from 12 to 15 lbs. of coal per square foot of grate per hour. I wish to pump water 100 feet inclined up 45°. Can I do it with a common suction pump that carries 1 inch pipe by placing the pump half way and getting that far by suction and forcing the other part? A. You cannot draw water, in ordinary practice, through a vertical height much exceeding 27 feet.

(35) T. N. C. asks: Is there any well tested and established system of gas making by which half a million feet of heating or 200,000 feet of lighting gas can be made from a ton of pulverized coal by aid of steam? A. No. By Lowe's process about 43,000 cubic feet of combustible gas is obtained per ton of anthracite coal expended. This includes the fuel used under the steam generators.

(36) W. T. N. asks: What is the mode of preparation of sodium sulphate, and how is it known commercially? A. The pure salt is prepared in the laboratory by passing hydric sulphide gas through an aqueous solution of pure sodium hydrate to saturation. Commercial sodium sulphate consists almost invariably of the higher sulphides, mixed with sulphite, hypsulphite, and sulphate of sodium.

(37) W. R. R. asks: How can I make indelible ink for marking clothing? A. India ink ground up with a little good writing fluid makes one of the best indelible inks known.

What will prevent plaster of Paris moulds used in vulcanizing from cracking in the dry heat? A. Dry the mould thoroughly in an oven and impose in an iron form.

(38) C. F. asks how rancid butter may be made palatable, or at least improved. A. Rancid butter if boiled in water with a tenth part of new animal charcoal will be divested of its rancidity, and may be used for cooking purposes, although its fresh flavor will not be restored. A better way is to melt the butter in a stoneware or enameled iron vessel over a water bath, with an equal quantity of fresh animal charcoal, in coarse powder free from dust, and strain through a clean piece of uncolored flannel. The butter may then be worked over with new milk, and colored, if desired, with a little annatto. Butter thus recovered will not remain sweet very long in warm weather, but this tendency towards rancidity is in a measure overcome by well salting it and adding a few grains of sodium salicylate to the pound while working it.

(39) L. H. F. asks: 1. What is the thickest solid armor plating put on vessels? A. About 18 inches. 2. How thick have such plates been rolled? A. 22 inches.

COMMUNICATIONS RECEIVED.

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

- Corroded Cannon Primers. By W. P. M.
Fixation of Atmospheric Nitrogen. By J. J. B.
Steam Cannon. By H. S. B.
Locomotive Strokes. By F. G. W. and E. S. N.
The Rail Problem. By W. G. B.
Utilizing Solar Heat. By W. A.
Causes of Explosions. By C.
Liverpool Engineering Society. By W. W. S.
Saw Straightening. By S. R.
Moon Rising in the West. By C. I.
Air in Water Pipes. By W. B. H.
Stovepipe Joints. By W. R. A.
Dividing Circles into Odd Numbers of Parts. By T. S. M.
Velocipede Brakes. By I. H. D.
Extermination of Wild Beasts. By A. H. L.
Fast Locomotive Building. By D. Z. A.
Atmospheric Telegraphy. By H. C. S.
Smokeless Factory Chimneys. By J. C. E.
Mirror Galvanometer. By A. F. D.

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INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending March 5, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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