several cells of an ordinary Smee battery, with carbon negative plate. The zinc surface exposed in the battery should about equal the surface of the work in the plating bath. A tension of two such cells will be found sufficient for ordinary work. 2. How are the solutions for gold and silver plating made, and what are the proportions for 1 gallon of each of the solutions? A. The whitening bath consists of a solution of 1 lb. potassium cyanide and ⅛ oz. of silver cyanide or chloride to the gallon of water (soft); the plating bath of 1 lb. potassium cyanide and 1 oz. silver cyanide or chloride per gallon of water. For gold plating see p. 2540, No. 160, SCIENTIFIC AMERICAN SUPPLEMENT. 3. How is the quantity of silver deposited determined? What is used in the silver solution to plate bright, and how used? A. Weigh the work before and after plating. This is seldom resorted to, however, the time of exposure in the bath being a sufficient index for practical purposes. Carbon disulphide is sometimes added to the bath with the intent of securing a bright deposit, but as a rule, electroplaters prefer to dispense with any such addition to their baths. 4. How are the plated surfaces polished? A. Usually by burnishing with tools of steel or bloodstone, or by buffing with rouge and whiting.

(22) A. A. & S. ask: How much more water is there in every cubic inch in a pipe at 50 lb. pressure, than when there is no pressure? A. The difference is inappreciable. Water is practically incompressible.

(23) H. B. & S. ask: If the inside of a house has been painted long enough to have been dry and the paint yet sticks, what will prevent the paint from sticking? A. Try a small quantity of linseed oil with plenty of drier, and thinned down considerably with turpentine. You should try the experiment on a small scale at first.

(24) C. T. asks: Which would support the greater weight, a pillar of solid iron, 4 inches in diameter, or one of same diameter of hollow iron, and about what would be the difference in strength? A. One of solid iron. The difference would depend upon the thickness of the hollow pillar.

(25) T. T. P. writes: Our village is watered by a spring about six hundred yards away, at an elevation of some 15 or 20 degrees. The water is conveyed to the town through an inch lead pipe, having only one outlet. I put a stop cock hydrant in the pipe, about one hundred and fifty yards from its outlet. I proceeded as follows: After inserting my faucet or stop cock perpendicularly, I made a short bend upward in the pipe just below, the bend being elevated about ten inches above the cock. The water only made a gurgling noise and passed on by the stop cock without flowing out. What is the difficulty, and how can I make it work? A. You put in the stop cock at right angles to the current in the pipe; the current carries the water past the opening without being diverted from its course. If you insert an enlargement in the main pipe, and divert the water to the stop cock with an easy angle, you will probably succeed.

(26) "Novice" writes: I wish to move a shaft which is now geared to another as follows: The distance between each shaft centers is 8⅝ inches, and on one shaft there is a 4 inch diameter gear, and on the other a 13⅜ inch gear. I wish to move the shaft with the 13⅜ inch gear 3¾ inches further away from the shaft with the 4 inch gear, and retain the present speed of both; what size gear shall I put on each shaft? A. Wheel, 19·21 inch diameter; pinion, 5 53 inch diameter.

(27) W. C. T. asks: 1. Can I place one end of a 2 inch iron pipe in the fire and force air through 100 feet with a fan and have it come out hot at the end from the fire? A. Yes. 2. If the air is forced through very rapid will the speed cool it before it gets through? A. It will probably part with some of the heat, though if sent through the pipe at a high velocity, the loss will be very slight.

(28) P. M. writes: 1. In testing a steam boiler with cold water pressure, if the inspectors apply 120 lb. pressure, how much steam can the boiler carry with safety? A. By inspectors' rules, 80 lb. 2. Which can you get the greatest pressure with, cold water or steam? A. With cold water, having proper appliances. 3. Why is water used in preference to steam? A. If the boiler gives way under the test, the water is not so dangerous or destructive as steam. 4. In your article on the horse power of the steam engine, where do you get the 33,000 that you divide with? A. 33,000 lb. lifted one foot high per minute, is the unit of horse power. It represents the power of one horse.

(29) J. G. B. writes: There is an engine in this place, 8x12 cylinder, which makes 150 revolutions per minute, uses 70 lb. steam on gauge; sold by maker for 15 horse power. By rule in SCIENTIFIC, it is 50 horse power. What is the matter? One fifth off for friction, and it would be 40 horse power. A. Your engine was sold you as a 15 horse power nominal. It is a poor engine that cannot in use give out double its nominal power, and frequently it is 3 to 5 times the nominal power. 2. Will you work out your rule in all its details, so that it can be comprehended by all, with 2 sums, say one engine, 8x12, 150 revolutions, 70 lb. steam, and one 10x20, same revolutions and steam? A. You say 70 lb. steam: this is the pressure in the boiler, but what is it in the cylinder? Boiler pressure does you no good, except you get it in the cylinder. Your 8 inch cylinder, by 12 inch stroke, with 70 lb. steam in cylinder, 150 revolutions is: Area of 8 inches = 50 inches, and 150 revolutions = 300 feet per minute, then $\frac{50\times70\times300}{33,000}$ = 13·8 horse power; deduct 20 per cent for friction and losses, 31·8—6·3 = 25·5 horse power. Then for 10 inch cylinder, 20 inch stroke, 70 lb. steam, and 150 revolutions = 550 feet per minute, $\frac{78·5\times70\times500}{33,000}$ = 83 horse power, less 20 per cent = 83—16·6 = 66·4 horse power.

(30) J. B. H. asks (1) how to Babbitt a brass box of an engine that is worn well down and thumping. A. Drill shallow holes in the box, tin the surface, and then cast in the Babbitt metal. 2. What will stop a boiler from foaming? A. We cannot inform you without knowing the cause. Sometimes throwing a little oil in by the feed pump will check it temporarily. 3. How to find out the pressure of steam in the cylinder. A. By using an indicator. 4. To find out how much water the pump of an engine is throwing. A If the pump is throwing full, estimate its contents; otherwise deliver the water into a tank a certain number of strokes, and measure the water in the tank. 5. How to find out the horse power of an engine. A. See reply to J G. B., on this page.

(31) G. B. M. writes: I wish to transmit five horse power the distance of one mile. Can it be done with a line of shafting; and if so what size iron? A. The use of shafting for your purpose would be very expensive and unsatisfactory; the torsional spring or elasticity would be so great that the speed given off would be very irregular. Wire rope transmission would be cheaper and far better.

(32) W. H. M. S writes: Please give me a rule to determine the horse power of an engine. Suppose a locomotive engine with a driving wheel 5 feet diameter, length of stroke 4 feet, cylinder 16 inches diameter, and a pressure in the boiler of 125 lb. to the square inch: what is the horse power? A. See reply to J. G. B., on this page.

(33) J. F. asks for the best paint or other cheap, available means of protecting a wrought iron post from rust in damp ground. A. Use a good asphaltum varnish thickened with anhydrous iron oxide or burnt ocher.

(34) F. S. W. asks: How can I make lard hard, yet run into an oil when a gentle heat is applied to it? I have tried wax, but it leaves small hard lumps when cold. A. Try paraffine wax.

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

C. W. C.—Argentiferous copper glance. This ore will probably prove well worth working.—F. K.—They are crystals of chrome alum. The carbon had probably been employed in a bichromate of potash battery.—T. A. H.—It is a hydrocarbon closely resembling hatchettite, probably of natural origin. A larger sample would be desirable to properly classify it.—W. C.—Neither of your samples contains silver. No. 1 is a shale, and No. 2 a ferruginous sandstone.—J. W. W.—1. A variety of amphibole. 2. Quartz and argentiferous galena, of some value.—W. R. T.—It is *simpla lunator*.

COMMUNICATIONS RECEIVED.

On Aids to Motive Power of Vessels. By E. R.
On Astronomical Phenomenon. By J. H.
How to Forecast the Weather. By G. R. C.
On the Ground Element. By E. Z.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in th eWeek Ending

August 26, 1879,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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Bird cages, O W. Taft, New York city.
Boilers, steam furnace, C. Smith, Irwin's Station, Pa.
Filtering saccharine solutions, J. S. Howard *et al.*, Philadelphia, Pa.
Journal boxes, anti-friction, S. P. M. Tasker, Phila., Pa.
Knitting machines, W. H. McNary, Brooklyn, N. Y.
Lamp burners and chimneys, Manhattan Burner Company, New York city.
Lanterns and lamps, E. B. Requa *et al.*, New York city.
Metallic fastenings, machine for inserting, etc., G. W. McGill, New York city.
Paper, manufacture of, J. S. Torrey, New York city.
Rolling mill, S. P. M. Tasker, Philadelphia, Pa.
Spinning mechanism, J. W. Wattles, ——, Mass.