

which will prevent small threaded articles of bright iron or steel wire from rusting or turning in color, by immersing therein, when the finished surface of said articles are broken. A. Try water glass or borax.

(27) N. Q. P. asks: How many ways are there for propelling water vessels? What is meant by screw steamer? A. Screw propellers, immersed paddle wheels, partly or wholly under water, water jets, paddles, oars, and their equivalents, have been used. A screw steamer is one that is fitted with a screw propeller.

(28) G. N. F. asks: 1. Can I make a permanent earth battery to supply a current of electricity for an electric light equal to that of two kerosene lamps? A. An earth battery is not suited to the electric light. 2. Will you give me the name of some good works on physics? A. Ganot's Physics is a good elementary work. 3. Are there any books published, containing lectures on various subjects, such as would do to read at a lyceum? A. You may obtain such books as you require from any of the dealers who advertise in our columns.

(29) A. B. P. writes: I am making a shock-machine: 1. Can I use iron wire in making induction coil? A. Not to advantage. 2. What size wire must I use for making the little magnet for breaking the current? A. The same as you use for your primary, probably No. 18 would answer. 3. Is it necessary for the U to be hollow? A. No. 4. Must the current be broken between the battery and the induction coil? A. Yes. 5. Will 3 or 4 quart jars, of zinc and copper and sulphuric acid, be strong enough? A. Yes. 6. Can I use charcoal and zinc for making a battery? Would it be better than copper and zinc? A. Copper and zinc are the best.

(30) M. V.—For ink receipts see SCIENTIFIC AMERICAN SUPPLEMENT, No. 157.

(31) J. H. S.—You will find an explanation of the wagon wheel problem, on p. 394, of vol. 39, SCIENTIFIC AMERICAN.

(32) J. J. asks for a formula for silver solder. A. Fine—Silver, 66 2/3; copper, 23 1/3; zinc, 10. Common—Silver, 66 2/3; copper, 30; zinc, 34. See soldering in SCIENTIFIC AMERICAN SUPPLEMENT, No. 20.

(33) E. F. K. writes: I intend to erect works which need a chimney 55 or 60 feet high, the draught of which must be quite strong. A brick chimney costs much more than an iron one. Will the draught of the brick chimney be the strongest? A. Yes, but there will not be a great difference. 2. How long will the iron chimney last, the heat but no fire reaching it? A. A number of years, if properly painted and cared for.

(34) D. J. C. writes: 1. In a little volume entitled "Familiar Science" I notice the following question and answer: "Q. Why does the sun, in shining upon a fire, make it dull, and often put it out? A. Because the air (being rarefied by the sunshine) flows more slowly to the fire; and 2d, even that which reaches the fire affords less nourishment; and 3d, sunshine also produces some chemical effect upon the air and fuel detrimental to combustion." What is your opinion of the above? A. We do not think sunlight ever put out a fire. Its superior brightness will undoubtedly make the fire look dull. The difference in the heat of a fire with and without sunlight must be infinitesimal, if anything.

(35) J. R. asks: 1. Do iron shipbuilders use cast iron rivets to rivet the outside plates on vessels? A. No, the best wrought iron is used. 2. What is the correct focal distance for the lens of a camera, the distance from the lens to the back being fourteen inches? A. 14 inches.

(36) G. L. G. writes: 1. I have my house and another (1/4 mile distant) connected with the Bell telephone, which works without a battery. Is there any kind of arrangement that will increase the sound? A. If the telephones are well made and properly adjusted, we know of no way to increase the sound. 2. I have made a microphone according to directions, Fig. 5, SCIENTIFIC AMERICAN, No. 20, vol. 39, but cannot make it work. A. If carefully made according to description it should work.

(37) J. R. D. asks: What power would be required to run a vertical sawmill, say in sawing an oak log 2 1/2 feet through, feeding 1 1/2 inch? What speed, in strokes per minute, would be most profitable? What power is required to saw the same log with a circular saw? What would be the effect if an 18 inch circular saw were run at a rate of 10,000 revolutions per minute, not considering the liability of bursting? Would it cut? A. Running either saw so as to cut the same amount of lumber in a given time, there would probably be little difference in the power required, but as the saws are usually run, you could do good work with the vertical saw, 150 to 200 strokes a minute, with from 10 to 15 horse power, when you might require from 20 to 30 horse power for the circular saw. The circular saw would cut well at the speed stated.

(38) A. E. J. asks: What is meant by squaring the circle? A. Finding the side of a square whose area is exactly equal to that of the circle: in other words, doing what is impossible.

(39) G. C. M. writes: Please inform me of the greatest depth that a diver was ever known to go down at sea in a bell or diver's suit, also the depth that they generally like to go. A. The ordinary depth is from 30 to 40 feet, but the greatest diving feat which we have seen recorded is that of a diver named Hooper, who, in removing the cargo of the ship Cape Horn, wrecked off the coast of South America, made 7 descents to a depth of 201 feet, and at one time remained down for 42 minutes.

(40) J. N. M. writes: Suppose a loaded wagon should be weighed on scales in perfect balance, then the empty wagon weighed on same scales, would the net weight of the load be the same if the scales had been out of balance? A. No, as we understand your meaning.

(41) D. J. asks: 1. What is the average expansion per degree C. of soft brass rod or wire from 32° to 50°, from 50° to 70°, and from 70° to 100°? A.

Brass expands lengthwise 0.00018782, for each degree between 0° and 100° centigrade. 2. A current from a galvanic battery traverses a wire to other apparatus 100 feet distant and return. If the wires to and from the remote apparatus be properly covered and insulated, and then united together in a single cable, will the effect of the battery on an electro-magnet be materially less than when the two wires are separated from each other? A. No.

(42) R. S. asks: 1. Will mercury put in melted zinc volatilize? A. The mercury will volatilize. 2. Would the fumes be liable to salivate a person? A. Yes. 3. How is galvanizing (so called) done? A. The metal to be galvanized is first cleaned by pickling in dilute sulphuric acid, and scouring with sand if necessary, passed through a strong slightly acid bath of zinc chloride, and from this directly into and through the bath of melted zinc, covered with sal ammoniac.

(43) J. A. F. writes: I have a thrashing engine of the following dimensions: Cylinder 7 inches in diameter, stroke 10 inches, speed 200 revolutions per minute, cutting off at four fifths stroke, using steam at 60 to 80 lbs., size of steam pipe 1 1/4 inch, size of exhaust pipe 1 1/2 inch, size of blast nozzle 1 inch, slide valve, Pickering governor. Dimensions of fire box, 36 inches long, 19 inches wide, to 31 inches high, boiler 24 inches waist, with 26 2-inch flues 66 inches long, with locomotive smoke stack 7 1/2 inches in diameter, fitted with disk and screen spark arrester. I am running a thrasher with the above engine, with 36 inch cylinder, and 51 inches separator, and some of the time am short of power. I have consulted boiler makers in regard to lengthening the fire box about 8 or 10 inches. Would the flues and smoke stack be sufficient? Could I improve it by using a smoke stack 8 or 10 feet long (present stack 3 1/2 feet long)? How much gain in power would there be by covering the boiler with some good material? Is the engine using steam economically, and are the proportions proper to get the best results? A. The engine seems to be fairly proportioned. You might make a saving of between 5 and 10 per cent by covering the boiler. If the draught is good, there would be no material gain realized by raising the smoke stack. Instead of increasing the length of fire box, it would be better, if practicable, to change the point of cut off to half stroke, and increase the speed of the engine. You do not send sufficient data to enable us to form an opinion in regard to the economy of performance.

(44) C. C. D. asks (1) for the best method of softening iron to be used in making electro-magnets. A. A good quality of soft bar iron does not require annealing for ordinary electro-magnets. Iron may be annealed by heating it cherry red and plunging it into powdered quicklime and allowing it to remain until cool, or it may be thrown on a fire and allowed to cool as the fire dies out. 2. What is the best No. of covered wire to use in making an electro-magnet? A. It depends on the battery power to be used, and upon the purpose to which the magnet is applied. If you use it merely for experimental purposes, No. 18 will probably answer.

(45) A. E. S. asks: What is understood by soft iron core for magnets? Is it wrought or cast iron? A. It is the portion around which the helix is wound. It is usually of wrought iron, but soft gray iron castings are often used.

(46) A. H. S. asks: Does the gas of coal or coke injure steel when heated in the flame so as to prevent a fine spring temper. If so, which is better? A. For fine work a charcoal fire is better than an anthracite or coke fire.

(47) M. F. H. asks: Why do axes break more frequently in cold weather than in warm? Is there frost in the steel, or is the wood harder to cut? A. Steel is rendered more brittle by cold, and the wood, if green, is undoubtedly harder to cut when frozen.

(48) E. A. H. asks: What is a good receipt for dyeing woods black to imitate ebony? A. See SCIENTIFIC AMERICAN, vol. 39, p. 411 (2).

(49) Engineer asks if brass or bronze shafts will run as well in cast iron bearings as cast iron shafts will run in brass or bronze bearings; that is, will the wear and friction be the same, and will they be equally good at work—in neither case to be overloaded? A. Yes.

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

J. H. B.—It is stibnite—a sulphide of antimony, which affords nearly all the antimony of commerce. Antimony is quoted in New York at 12 cents. This ore contains nearly 70 per cent of the metal.—C. K.—No. 1 A silicious limestone. It will probably make a fair hydraulic lime. The small fragment is quartz. No. 2 Chiefly lime carbonate. No. 3 Calciferous sandstone containing much iron.—W. S. B.—Clay slate, mica schist, and iron pyrites—iron sulphide—not valuable.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects: On Aerial Navigation. By F. B. Signaling. By T. H. H. On the Collisions at Sea. By P. O. P. On the Significance of the Popular Interest in the Electric Light. By T. F. D. On the New Patent Law. By L. F. On the New Patent Law. By L. D. N.

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.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending January 28, 1879, AND EACH BEARING THAT DATE. [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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