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J. H. P. can make a cement for mending

rubber boots by following the directions given or p. 203, vol. 30.—S. A. G. will find that the fireless locomotive, described on p. 96, vol. 30, answers his description .- A. V. S. will find a description of the glass-tempering process on p. 402, vol. 32.-P. V. will find an excellent recipe for yeast on p. 183, vol. 33.—M. G. F. will find directions for hardening soap on p. 194, vol. 32.-J. J. M. and others, who inquire as to pisciculture, should address Seth Green, Esq., Rochester, N. Y.—J. A.'s query as to the relative motion of parts of a wagon wheel is answered on p. 298, vol. 31.—W. Y. Jr. is informed that we do not know the copying fluid he mentions.—J. F. M. and others, who ask as to the construction of special machines, sho ld address the manufacturers.

-A.R. W. will find a recipe for a deep black ink on p. 92, vol. 33.—W. & S. will find a recipe for a cement for filling millstones on p. 251, vol. 31.—0. C. will find a recipe for a waterproof whitewash on 408, vol. 24.-O. C., S. P. B., F. B. P., G. H. R., J. W. D. should consult the Beekeeper's Magazine 14 Murray street, New York city.-J. W. C. will find a recipe for a good mucilage on p. 373, vol. 33. H. H. B. will find a recipe for aquarium cement on p. 43, vol.33.-J. J. R. will find some information as to galvanized iron water pipes on p. 218, vol. 25, and on p. 264, vol. 26.—F. J. R. will find a simple recipe for tanning hides on p. 147, vol. 30.—C. L. R. will find a recipe for invisible ink-on p. 299, vol. 30. -H. B. will find a description of Professor Tyndall's respirator on p. 178, vol. 32.—G. A. McC. can convert his black ink into copying by adding a little refined sugar.—C. G.W. can repair hisrubber life preserver by following the directions on p. 203, vol. 30.—J. A. will find a recipe for black ink on p. 92, vol. 33; for laundry blue, see p. 219, vol. 31.—S. K. S. will find directions for soldering of all kinds on p. 251, vol. 28.—W. L. D. will find directions for building a windmill on p. 241, vol. 32.—E P. C. will find full directions for making colored fires on p. 165, vol. 24.-L. C. K. will find answers to his questions as to small boilers and engines on pp. 225, 257, vol. 33.—J. D. B. will the dimensions of the various gages of wire on p. 363, vol. 28. For the relative prices of gold and platinum, see p. 169, vol. 33.—J. C. will find a good recipe for baking powder on p. 123, vol. 31.—J. R. will find directions for scouring castings on p. 139, vol. 31.-W. C. can utilize tinned plate scraps by the method described on p. 319, vol, 31.-J. D. will find a description of Professor Draper's method of silvering glass on p. 267, vol. 31.—J. T. W. will find a recipe for furniture polish on p. 315, vol. 30.-W. N. will find directions for coloring photographs for magic lantern use on p. 390, vol. 30.—W. K. will find directions for laying out a sun dial on p. 469 vol. 29.-R. S. can prevent mildew on canvas by the method described on p. 90, vol. 31.-F. T. will find a recipe for shaving soap on p. 251, vol. 32. The type writer is described on p. 79, vol. 27.—S.N. will find recipes for Worcestershire sauce on pp. 241, 281, vol. 26, Galvanizing cast iron is described on p. 59, vol. 24. -M. G. can make condensed milk by the process described on p. 343, vol. 30.-D. Q. can separate silver from lead by the method described on p. 138, vol. 32.—J. N. can temper millpicks by the process given on p. 202, vol. 31.

(1) O. G. says: I have charge of a pair of ergines at a coal shaft, and have had a great deal of trouble by the breaking of the teeth in the cog wheels, or rather in the sections of the cogs. The breakages generally occur at the starting and stopping of the engine. The engine is 11 by 25 inches, and our usual speed is 125 revolutions per minute. How can we prevent the accident? A Make the width of the teeth greater.

(2) J. T. H. says: We cannot get speed enough from our main shaft toruna fan for a cupola. Which would require the most power, to increase the pulley on the main shaft or to use a a countershaft, to get the same speed? A. To use a countershaft.

1. I am making a small engine, 21/2 inches stroke by 11/4 bore. Would % inch steam ways be large enough? A. This depends on the pressure. 2. Of what size should the fly wheel be? A. About 6 inches in diameter.

(3) H. C. S. asks: Is there any non-conductorthat will not be affected by steam at 200 lbs. pressure? A. Yes, charcoal.

(4) D. H. asks: 1. Will plumbago serve to make good cores? A. Yes, if used with sand. 2. Can plumbago be molded at a core for an internal screw, so as to have a perfect thread when the iron or steelis cast? A. Not by itself. 3. What is put into pulverized plumbago or black lead to cause it to mold with facility? A. We are not aware of any substance for this purpose.

Can a good square thread of an internal screw. from % to 11/2 inches diameter, be cast in iron or steel? A. No.

Is there any danger of a kerosene lamp exploding when the blaze is fluttering and shoots upwards two or three inches? A. Yes.

(5) N. H. C. says: R. R. & G. E. saythat cut nails are made from bars of iron rolled into widthsof the length of nails to be cut, and then they are cut crosswise. I say they are rolled in wide plates, then cut by shears across the end of the plates in widths of the length of the nail. which brings the nail lengthwise of the rolled iron. Which is right? A. You are.

(6) C. F. R. says: A pressure gage on a boiler indicates 15 lbs. Is that the pressure on a square inch of the inside of the boiler, or is the strain 15 lbs.+15 lbs., to balance the air driven out by the steam,=30 lbs., 15 lbs. of which only is available for working purposes. I hold that the latter is true. A. The total pressure is 30 lbs., and the available pressure 15 lbs., per square inch.

church, has lost several tubes or flues from a sort of pinhole corrosion, the water side of the flues being very clean when taken out. I contend that the rain water is too pure and dissolves the iron away, thus weakening it, and that they should use well water, partially or even entirely, to retain their boiler longer. Am I right? A. Rain water is generally more pure and better for steam purposes than well water, and it will remove some de posits from boilers.

(7) T E says: I am making a wrought iron fence, which I intend to have galvanized; but I find that galvanizing will cost more than the fence Do you know of any good substitute? A. No, not an effective one.

(8) J. N. P. asks: In putting in a heating apparatus for a greenhouse, we made rust joints with a composition of 2 ozs. powdered sal ammoniac to a keg of iron borings. Is that the best proportion? A. Sal ammoniae 1 lb., sulphur 1/2 lb., iron turnings 100 lbs., is the best proportion.

1. I notice on a locomotive a rod running from the cab to the base of the smoke stack, joined to a lever that runs into the smoke stack. Whatis it for? A. To open and close the blast pipe to as sistthe draft. 2. Suppose a locomotive be standing with no steam in the boiler, what is the quick-est method to set the valve without removing the steam chest cover, there being no centerpunch marks? A. It cannot be properly done. 3. What is the quickest method of placing the crank of a ocomotive on the exact center when she is standing on an incline? A. An answer to this question would require too much space for these columns. We may probably before long elucidate the ques

(9) M. H. C. asks: Will a rotary pump, running at a slow rate of speed, force a stream of water through a hose with a very small nozzle without loss of power by the water striking back into the supply pipe? A. Yes.

(10) O. A. Jr. asks: In setting up motion with gearing say, from 1 revolution of driver to 36 of driven pulley with 6 gear wheels, is it best to divide the motion equally along the train, or to gain more motion on the first pair of gears? A. Gain most motion on the last pair of gears.

1. I am using best boiler plate iron for steam boilers for agricultural purposes, ¼ inch thick for shell, and % inch for heads. How much can I reduce the above thicknesses by using cast steel? A. Make the shell $\frac{3}{16}$, heads $\frac{1}{4}$ inch thick. 2. Will a boiler made of steel plates in above proportions last any longer than an iron boiler? A. Yes.

(11) T. S. asks: Is there a way to temper iron wire from No. 6 to No. 21? A. No, except by asehardening it.

(12) R. A. McC. says: 1. I wish to put a whistle on the roof of my elevator, which is 38 feet from boiler. Would a whistle work as well as at a shorter distance from boiler? A. The whistle would work well, but not as well as if close to the boiler. 2. Would felt covering on pipe be any help in regard to keeping lead pipe warm? A. Yes felt covering would answer well.

(13) J. B. asks: Please let me know the simplest rule for finding the diameter of pulleys to run a machine at a certain speed: for instance main shaft has 90 revolutions and pulley on machine is 14 inches diameter. What size of pulley will I require on main and counter shafts? A Multiply the diameter of the driving pulley by the number of its revolutions per minute, and divide by the number of revolutions you require your machine pulley torun at, and the quotient will be the required size of the latter.

(14) A. S. says: My doctor pump runs from right to left, and the plungers and stuffing boxes wear to one side. I have examined the pump and found it to be correctly in line, and level. In order to put the wear on the opposite side, could I not set the eccentric of the cut-off round, so that the pump will run in the opposite direction, namely, from left to right? A. We do not think the alteration would affect the wear to one side if the parts are in line.

My partner claims that putting 3 or 4 pieces of wood in the furnace, and then putting on a heap of coal, prevents the falling through of the small coal, the grate bars being % of an inch apart. I claim that putting one piece of wood into the furnace, and putting a heap of coal on it, will prevent the wastebetter than his way; because in my way the coal will form a cake, which, when stirred up, will give a good fire, and thus save fuel, time, and labor. Please give us your opinion. A. If the coal cakes, either plan will answer.

(15) E. S. E. says: A practical railroad engineer sometimes dashes water into the furnace, with the result that the sulphur and offensive gas came out in the form of pure white steam. The great draft would make the furnace able to bear a constant jet of water. Can you give any reason why it would not serve as an extinguisher of the objectionable smoke, which now issues from the locomotives? A. The injection of steam into a firebox has been applied for the object proposed. with partial but not complete success

(16) H. P. O. asks: Of what use is the air receiver on a double-acting steam pump? A. It increases the suction and makes it more uniform. A friend says that steam at any temperature can be tested by applying a thermometer. I say the thermometer will not indicate the latent heat of steam, or steam above 212°. Who is right? A.

1. We have two shafts sunk to a vein of coal, and a level driven from one to the other, a distance of 1,100 yards. The one shaft ventilates the other. The upcast shaft stands 100 feet higher on surface than the downcast. My boss says that, if there is 10 lbs. per square inch on the mouth of the downcast shaft, there must be the same on the top of the upcast. I say: No, there is not the same removed? A. We have never met with this in our

A tubular boiler, used to furnish steam to heat amount; for I assert that there is an amount of the pressure lost by friction in traveling. Which are you in favor of? A. You are right. 2. Is the current the same in each direction? A. No.

> (17) J. D. B. asks: Is there any difference etween the American screw gage and the American wire gage? A. Yes, and the American wire gages of various makers differ.

(18) C. B. R. says: Sometime since a black. mith was forging a large piece of iron, when some of the sparks came in contact with a piece of old lightning rod that was near the forge. At the instant of contact, there was a loud explcsion, and a flash of fire by which an old man, sitting by, was severely burned. A part of the rod was turned blue and smelt strongly of sulphur. The explosive substance, whateverit was, seemed to come from the surface of the iron, which was a solid piece. It vas on a clear day without any atmospheric disturbance. What caused the explosion? A. The spark was doubtless a globule of melted iron which, being thrown against the rod by blows from the hammer, naturally enough scattered in various directions. It is possible, also, that the rod was wet at the time.

(19) E. A. W. asks: Can you inform me how to place a chair on a table arranged to have endwise, sideway, and up and down motion, so that the chair will not partake of the motion of the table? A. It cannot be done.

(20) J. A. K. asks: A friend has made a kiln of bricks which are well burnt, but are easily broken, and are too soft to stand the test of time. What will make the best wash or coating for these bricks when exposed to the weather? A. If the bricks are soft and easily broken, they are not well ournt, and you will find it very difficult to treat them with any preparation that will enable them to take the place of well burnt brick. Linseed oil may prevent them from absorbing as much water as they otherwise might, and this will cause them to last a little longer.

(21) H. K. Sr. asks: 1. What is the best speed for a grindstone 5 feet in diameter, to grind plows? A. Run your stone at 300 revolutions per minute. 2. How many horse power should an engine have to drive such a grindstone? A. About horse power.

1. Can you give me a good recipe for hardening plow mold boards? A. To 4 gallons of water add saltpeter 1 oz., sal ammoniac 1 oz., and salt ¼ lb. 2. Does "Wrinkles and Recipes" contain such information? A. Yes.

(22) E. T. H. asks: 1. I want to make a nagnet to place in a fire alarm telegraph circuit. The circuit is composed of about 6 miles of wire, with 15 stations. Of what size shall I make my magnet? A. Make the coils of copper wire, and let the resistance be 25 or 30 ohms for each magnet. 2. In a late number of your paper, Mr. Sawyer says that it requires 10 cups of Grove's cells to heat a fragment of platinum wire. In a former number, in an illustrated description of an hydroelectric lamp, the illustration shows only 1 small cup. What is the smallest amount of battery power required to heat platinum wire to a red heat? A. That depends upon several circumstances. A single cell of bichromate battery (without porous cup) will heat from a quarter to half of an inch of No. 46 platinum wire to a white beat.

(23) H. C. E. asks: 1. Of what diameter should a steam whistle be for a boiler 30 inches in diameter by 48 inches high? A. About 2½ inches. 3. Of what kind of metal should it be made? A. Use a good composition, say copper 80, tin 16, zinc

1. Are spur wheels used for connecting propeller shaft to engine shaft? A. Yes, sometimes. 2. Is a shaft of patent cold rolled iron 11/2 inches in diameter strong enough for a propeller 18 inches in diameter, the shaft being 7 feet long? A. It is rather too small in diameter.

(24) A. H. T. says: I have constructed a Jamin magnet, but have failed in magnetizing it on account of its peculiar shape and form, not having been able to apply the electro-magnet to the surface of the steel ribbons. Wishing to construct a magnet of great power, I ask your advice now I am to proceed in magnetizing it. What power of battery, and what form of magnet am I to use? A. We think you should be able to charge it with a bar electro-magnet. Two or three large sized cells will magnetize the latter strongly if the coils are properly constructed.

(25) I. H. C. says: How can I make a battery that will give one a small shock? A. It will require a number of cells to give much of a shock. A small electro-magnetic induction apparatus, of en termed a medical machine, will suit vou bet ter. For its construction, see almost any school book on natural philosophy.

(26) A. H. asks: 1. What amount of electricity is meant by 0.02 of a weber, and how is it ascertained? A. The weber is an electrical unit by means of which electricians are enabled to convey definite information regarding the strength of a current. Its magnitude is such that the unit of electromotive force, called a volt, divided by the unit of resistance, an ohm, equals one weber: 0.02 of a weber is the strength of current usually employed on telegraph lines to work the ordinary Morse relays. 2. Does the consumption of materials in a battery vary inversely as the resistance of the circuit? A. Yes, aside from local action in the battery. 3. What relation do they sustain in that respect? A. The less the resistance, the greater the action, 4. Would it be economical to insulate the return wire of a short telegraph line? A. No.

(27) T. C. M.says: In a sheet copper vessel, the sulphate of copper solution, after being allowed to stand for a few weeks, has deposited a hard. greenish coat, which prevents the working of the battery of which it forms a part. How can it be experience, and are at a loss to give the information asked for without more definite knowledge of the fact. Is there not some other reason for the exhaustion of battery power?

- (28) H. M. says: Forty years ago a surveyor laid down a line due north with a compass 25 years ago another surveyor examined the same ine with a theodolite, and called it N. 14° E. Becently a third has examined it, and pronounced it N. 17° E. Can the discrepancy between the two last be explained without inferring error in one or other of them? They are both astronomical surveys. The last surveyor asserts a change in the magnetic meridian. Please explain what that means, and its bearing on this case. A. The magnetic meridian is the line in which a freely suspended magnetic needle places itself when in equilibrium. There are but comparatively few places where the astronomical and magnetic meridians coincide. The latter varies from year to year, but the reason for this does not seem to be definitely ascertained. There are also slight daily variations These are generally supposed to be caused by the
- (29) S. R. says: I have made a trough battery to generate a current for an electric light. The cell or trough is 24 inches x 9 x 9, and the plates, copper and zinc, are dipped into the acid. 1. Will 14 inch apart be enough to separate the plates? A. Yes. 2. Will slips of baked wood, covered with a solution of shellac and rubber, do to separate the plates with? A. Yes. 3. What should be the size of the conducting wires? A. No. 14 copper wire will answer. 4. How can the wires be connected to the plates? A. By solder. 5. Would such a battery be good for the purpose? A. Not very. 6. Will lead pencils do for the carbon points? A. Yes.
- (30) M. C. asks: 1. What is the best method of ventilating a private house? A.Do not let your furnace man use the smoke flues of the rooms for heating flues, but provide a fireplace and flue for each room independent of the heating flues, and keep said fire flues partially if not wholly open. Provide a strip of plank 3 inches wide, of the same thickness as the lower sash of the windows and of a length equal to their width; raise the lower sash, put this strip under it horizontally and bring the sash down upon it: the fresh air will now enter the room at the meeting rails of the sashes with out causing bad drafts in the room. 2. Whatkind of furnace will be most serviceable for heating such a house? A. The best kind of heater is a hot water furnace, the next best is a steam furnace and the worst is a hot air furnace.
- (31) J. H. F. asks: Which is the most durable red stone? A. The Bolleville, N. J., brown stone is a very durable stone; the Connecticut brown stone is of the finest grain and most uniform quality.
- (32) C. H. R. says: In trying Mr. Edison's experiments, as shown in your paper of December 28, I find I can get all the results which you state can be obtained with an ordinary relay; and in addition I find that, by putting this relay in circuit (battery is a five cup Callaud), letting the armature rest on the core, and grasping the negative post of the relay with a pair of pliers in the left hand, and breaking circuit at same post with wire held in right hand, I get a shock, and a spark precisely like that from the magnet, as in Mr. Edison's experiments. By making the hand wet, the shock seems greater. A shock and spark can be got by touching any part of the post or pliers; and by a quick motion, the sensation is much like a magneto-electric pulsation. A. The shock is caused by the extra current which arises from the induction of the battery current on itself in the coils. This current and the so-called etheric force are generally supposed to be identical. Possibly your magnet is not insulated from the surrounding
- (33) H. O. says: Having just fitted a house with black ash, will you kindly inform me of the best method of finishing it? Varnish will not do and French polish is too expensive. A. Give it a coat of shellac, and then a good coat of boiled lineared oil.
- (34) J. and J. T. say: We are building a church, and a dispute has arisen about the proper shape of the elliptic ceiling. Please decide for us. The building is 50 feet x 32, with 12 feet posts. How far down on the post should the elliptic begin, and how high above the posts should it be in the middle? The strength of construction is with us a very important part. A. Your plan is defective in respect both to strength and to hearing. With a ceiling so low, you would do better to adopt open timbered roof. You would require only three trusses; let the tie of these trusses consist of a beam 5 feet long at each end, supported upor ornamental brackets, and tied together with a 11/4 inch iron rod; let the principal rafters over these ties be arched from the projecting ends of the tie beams, and ornamented back of the arch; bring down an iron pipe from the point of the arch to cross the tie rod and fall below it and carry a chandelier; at the junction of the pipe and rod. secure one to the other, and cover the connection with an ornament. An arched ceiling is likely to cause an echo.
- (35) O. A. Jr. asks: In a steam boiler whose shell is of 38 inches diameter, with a 23 inch flue running through it, 8 feetlong. 16 of flue being in the grate and the balance in the firebox, how much effectual heating surface will there be? A. As ordinarily reckoned, the effective heating surface would be the surface of the flue in contact with the products of combustion, and half the remainder of the surfaces which these products heat.

What compound makes agood bushing for steam governor valves? A. We have known both hard brass and good cast iron to be used with satisfactors results

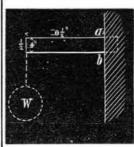
- (36) S. H. B. says: I want to build a skiff of common poplar planks about ¾ x 16 inches wide and 16 or 18 feet long. The boat is to be about 4½ feet wide, with two sets of rowlocks. I want it to run as fast as possible. Will you please state the way to build such a skiff? A. Probably some of our readers, who have constructed similar boats, can give our correspondent more useful information than any we can furnish. If so, we would be glad to hear from them.
- (37) S. A. H. asks: What is the compressibility of air? In a tube of 1 square inch area and 1 inch deep, placed vertically, and closed at the upper end, how far would 15 lbs. pressure, plus the atmosphere, force water? A. If the temperature of the air is kept constant during the compression, the pressure varies inversely as the volume. You will find the principles relating to the expansion and compression of air in any modern textbook on physics.
- (38) O. T. says: I have a bent glass tube inserted into the flue leading to a boiler chimney. The tube is filled with water to a certain hight when the damper is open, the water in one leg of the tube is depressed $\frac{7}{10}$ of aninch, and in the other leg is raised $\frac{7}{10}$ of an inch. The chimney is 100 feet high. Will you please give me a rule to obtain the velocity of the draft in the flue in feet per minute? A. We could not give you a formula from these data alone that would be very reliable. You will find considerable information bearing on the subject in Spon's "Dictionary of Engineering," vol. I, article "Anemometers."
- (39) F. M. T. says: I am about to construct, of oak, a boat as follows: 56 feet long, of 8 feet beam, and 3 feet 6 inches draft. Diameter of propeller is to be 3 feet 6 inches, driven by two engines each of 7 x8 inches stroke, by steam at 100 lbs. pressure. Approximately, what speed will I obtain from her? A. If the boiler furnishes plenty of steam, you may reasonably expect to realize a speed of between 7 and 8 miles an hour in smooth water.
- (40) A. H. N. says: I am about building a boat of the fellowing dimensions: 11 feet long, 2 feet 9 inches wide, to draw about 1 foot water. I wish to propel her about 3 miles per hour by means of a twinscrew, to be worked by hand. Please tell me the diameter, pitch, number, and size of blades necessary for such screws? A. Use propellers of as large diameter as you can conveniently attach, each with three blades. The pitch can be determined by dividing 400 by the number of revolutions per minute, which latter should be as large as can be obtained without introducing complicated gearing. This allows for a slip of a little more than 30 per cent.
- (41) G. F. McI. says: Would it be safe and practicable to feed a boiler from the top with cold or hot water? A. lt would be practicable, but not advantageous.
- (42) A. C. asks: What is the best way of building a float for fowling purposes, large enough to hold two men, for use on salt water where there are waves from two to four feet high? A. It would be a good plan to make the boat very broad in proportion to its length, either decked over entirely with the exception of wells for the occupants, or provided with wide swashboards. We have seen lightly built cedar boats, about 7½ feet long and of 4½ feet beam,drawing 8 or 9inches with two passengers, catrigged, with center boards. Such a boat would stand a very heavy sea when the mast was unstepped.
- (43) R. I. C. says: I have a mill with a 40 horse engine driving a pair of 4 foot burrs. How much wheatshould such rocks grind (making good dour) per day? A. The data are hardly sufficient for a good guess, and we would prefer to hear from you what you are doing. Perhaps some of our readers who have similar mills will also be kind enough to send us some account of their performances.
- (44) J. V. S. asks: How is it that minus multiplied by minus gives plus, and plus multiplied by minus gives minus? A. According to the views of modern analysts, it is a conventional rule or definition. In many works on algebra, an attempt is made to demonstrate the principle, but it is generally faulty, and must be so, if the other view is the correct one. A good illustration of the modern treatment of the subject may be found in the chapter on "Negative Quantities," in Todhunter's "Algebra."
- (45) J. L. W. says: We have many driven wells in Hamilton, Ohio, and find that the common gas pipe will not last more than a year in some, whilesimilar pipes have been in wells for a number of years, and are still good. Even the galvanized pipe will not stand in places. The soil is gravel and clay: can you explain the cause? A. If the water has an acid reaction, you cannot prevent this corrosion. In such a case, use pipes lined with lead, tin, or porcelain.
- (46) L. H. J. asks: What number of Callaud cells is necessary to run a telegraph line of 3 miles, ground return, using two instruments of low resistance? A. Twelve, if the grounds are good.
- (47) R. F. asks: Why is it that the telegraph cable operators at Heart's Content, Newfoundland, can tell what messages are passing over the French cable that lands at the islands of St. Pierre and Miquelon, the cables being at least 800 miles apart at their nearest points? A. They cannot do so.
- (48) C. E. A. says: I have tried the experiment of connecting my telegraph machine with an alarm clock (for the purpose of making the sounder go like the hammer bell in the clock) to wake me up. I connected one wire from the machine to the bell, and the other with the brass frame of the clock, to which, of course, was con-

nected the hammer which strikes the bell. When the hammer strikes, it completes the circuit, on the same principle as a telegraph key and thereby make the sounder click; but it did not work at all. I have on an ordinary current, so that, when the operator at the other end calls me, it wakes me up. A. The arrangement is very simple and ought to work. Perhaps you have not made the connections properly. Test them by connecting a wire across from the wire leading to the frame with the one leading to the bell, and see if the armature of the instrument will respond.

- (49) P. L. S. asks: What kind of gas comes from sewers? A. It consists principally of sulphuretted hydrogen and carbonic acid gases.
- (50) A. C. H. asks: When the zincs of a galvanic battery are amalgamated with mercury, and then exposed to the atmosphere for some days before using them, does the mercury evaporate from the surface of the zinc? I notice that zincs under such circumstances lose their bright silvery appearance and become dull and leaden looking. A. No. The mercury remains there, and, if the zinc is brushed, will appear bright and silvery.
- (51) J. H. S. asks: 1. What is the best way of renewing the strength in a carbon plate used in an electrotyper's battery? A. A carbon plate in a battery has no power capable of being renewed. You must renew the acid when your battery becomes weak. 2. What will prevent a deposit of copper from sticking on a brass plate? A. Cover the plate with black lead.
- (52) G. V. says: A friend of mine owns a pasture of several thousand acres in Texas. There is no water on the premises except a pond. In dry seasons the pond gets dry; and the distance of the nearest running water being about four miles, it causes much trouble on the ranche. He is spending a great amount of money in having holes dug in the ground in different parts of the pasture, and thinks he will get water if he only goes deep enough. Is this so? A. Perhaps he will. Water was obtained in the Sahara desert by means of driven pipes.
- (53) J. E. asks: I want a place in which to keep fresh fish, packed in ice, in barrels or boxes. What would be the best plan for a building, 12 feet square and 7 feet high, so that the fish would keep for 6 days in hot summer weather? A. The ice should be kept as much as possible in a solid mass. Construct a small ice house about 8 feet cube, and provide a basement under it in which to keep the fish. The whole should be tight like an ordinary ice house, say with the frame 10 inches thick and filled in with sawdust. But ventilation and drain age should be provided; and if a current of air should be made to enter at the top and to descend through the ice and out through the basement by artificial means, it would be better.
- (54) F. & S. ask: How can we color glue white? A. Boil the glue in a little water and add a small quantity of alum finely pulverized; allow to stand all night and then separate from the precipitate of organic matter, etc. The Cologne glue is made from offal that has been treated with chloride of lime after the usual process of liming, and is thereby bleached. It is pale but very strong. Commonly there is no acid used in the pracess of manufacture of glue, except those (lactic, butyric, propionic) that constitute the active principle of the oak-bark liquor used to remove the last traces of lime from the materials before boiling. In the manufacture of fine glue from bones, large quantities of hydrochloric acid are used.
- (55) J. C. F. asks: Is there any kind of white composition or cement that will render a wooden vessel impervious to rain and water, so as to keep butter or lard sweet? A. Use melted paraffin.
- (56) C. J. H. says: 1. On p. 268, vol. 33, you give a recipe for making ink. How shall I manipulate the ingredients? A. Boil the galls (finely pulverized) in the water for about 2 hours, occasionally adding water to supply the loss by evaporation; then add the sulphate of indigo, and finally the spices. Keep the whole for about two months in a wooden or glass vessel, which should be occasionally shaken. Then strain into bottles for use. 2. Is the sulphate of indigo used as it is sold in the shops, or should it be neutralized? If it is to be neutralized, how should it be done? A. The indigo may be obtained, already prepared, from any dealer in drugs. It is sometimes called indigo carmine.
- (57) G. A. H. asks: In your issue of January 15, you state in an article headed "Spiritual Photography" that a solution of sulphate of quinine on a background will be invisible to the eye, and will yet appear on the exposed plate. What strength of solution is necessary? A. Use a strong solution of the sulphate with a little tartaricacid
- (58) G. D. asks: How can I make a first quality hard soap from lye from sshes and tallow, with other ingredients to harden it? A. The fats, oils, etc., are saponified by boiling with caustic lye for some time. A sufficient quantity of common salt is then added to precipitate the soap from its alkaline solution; the soap is then pressed to remove superfluous moisture and to give it form, and finally dried. Most of the common yellow soaps usually contain resinous bodies, sand, borax, etc., in their composition.
- (59) P. A. K. asks: How can kerosene stains be taken out of carpets? A. Sprinkle good dry pipe clay over the spots and pass gently over it a hot iron. Allow the clay to remain some time in contact with the carpet, and then remove by means of a good stiff brush. Repeat the operation if the first trial proves ineffective.
- (60) C. M. D. asks: What quantity of ether should be used to dissolve 3 ozs.shellac and 1 oz. india rubber? A. India rubber is so slightly soluble in ether that to dissolve the quantity of rubber you mention would require an immense quantity

(36) S. H. B. says: I want to build a skiff for mere the hammer which strikes the bell. When for common poplar planks about ¾ x 16 inches the hammer strikes, it completes the circuit, on pieces and dissolve it in 34 ozs. hot naphtha, by the same principle as a telegraph key and thereby the same principle as a telegraph key and thereby make the sounder click; but it did not work at all, to run as fast as possible. Will you please state I have on an ordinary current, so that, when the

- (61) J. H. C. asks: I racked a barrel of cider off twice and then attempted to fine it with ising-glass. After standing three weeks I again drew it off, and found the isinglass at the bottom, like mud, but the cider is not as clear as before. Is a quantity of the isinglass held in solution, and will it eventually fine down? A. It will probably clear after some time. You added too much gelatin.
- (62) T. A. H. asks: 1. Is not immersion in steamunder heavy pressure one of the steps in the process of vulcanizing india rubber? A. No. 2. What amount of heat will india rubber or gutta percha, vulcanized or not vulcanized, endure when immersed in steam or water, without deterioration of its strength or elasticity? A. Caoutchouc melts in the air at a temperature of 392° Fah., with partial decomposition. It is reasonable to suppose that steam above that temperature would accomplish the same result.
- (63) R. N. B. asks: Are there any adhesive properties in Irish moss? A. Yes, when it is converted into jelly.
- (64) S, C. says: I have a side wheel steamer with a low pressure engine of 35 inches diameter and 9 feet stroke, cutting off at 12 inches travel of piston. It runs at 30 revolutions per minute. A vacuum occurs on the steam side of the piston when the piston has traveled 4 feet of the 9. Is there not a loss of power, and therefore of fuel, by this arrangement? A. If the engine exerts sufficient power, we do not see any objection in the arrangement, on account of the pressure in the cylinder falling below that of the atmosphere, as long as the positive pressure on the piston is less than the back pressure. It is possible, however, that the steam is for other reasons cut off tooshort for economical working.
- (65) F. W. F. says, in reply to H. J. S., who sks as to pressure for compressing bales of cotton: In your issue of January 15, you say: "About half the pressure" or "same force." I think that you mean one half of 100 tuns when you say the same force. Do you not? Some weeks ago I asserted that a cotton press with a box $2 \times 4 \times 10$ feet, containing 30 cubic feet, would require but \(\frac{1}{2} \) of the power that is needed by one 2 x 5x 8 feet containing 80 cubic feet. Am I right? A. In the query referred to, the language is that of our correspondent H. J. S. We understood that the expression "half the pressure or same force" meant that there would be half the original psessure, or half the original force, or half of 100 tuns. We are sorry, however, if our answer influenced you at all in making the assertion that a press with a follower 2 \times 4 would only require half the power of one with a follower 2 x 5, each compressing alike. Pressure is one thing and power is another, as we have frequently pointed out. Thus, in question 14, p. 43, when the bales were placed one on top of the other, the pressure required would be only half as great; but it would require to be exerted over twice the distance in the same time, to produce the same effect as when the bales were placed
- (66) C. L. C. says, in reply to W. A. R.'s query as to the breaking weight of a bar of iron



10½ inches long, ½ inch wide, and 4 inches deep, supported at one end only with weight applied at outer end: Let l=length =10½ inches, d=depth=4 inches, b=breadth=½ inch, W=weight required to break the beam, and c=constant=to 2,400 lbs.

Thence we have, for the shearing strain, \hat{S} , at the point, ab: $S = \frac{d^2 \text{ in inches} \times b \text{ in inches} \times \text{constant}}{4 \text{ times length in feet.}}$

... $W = \frac{d^2 \times b \times c}{4l} = \frac{16 \times 0.5 \times 2400}{3.5} = 5485.7$ lbs. This weight may only bend or cripple the beam, as the

constant is the average breaking weight of a bar of iron 1 inch square and I foot long, supported at both ends and loaded in the middle. If the weight is equally distributed along the whole length of the beam, W will=54857×2 or $\frac{d^2 \times h \times c}{2l}$

To derive the full strength, the beam must be so secured as to prevent lateral motion, which would tend to buckle the bar before the maximum strength was reached.

- (67) E. H. S. says, in reply to J. D. H., who inquires how to thicken stove patterns: It can be done by first waxing the pattern, then taking strips of muslin cut to a proper width and laying them on the pattern, so that the edges will just meet, then pressing them into all depressions, and again waxing over. This may be repeated until the required thickness is reached. I have frequently tried this and never failed.
- (68) W. E. C. says, in reply to J. M. S., who inquired as to the cause of bursting his main valve when steam is turned on: I burst a 4 inch valve once in the same way, and there was no ice in the pipe. Steam turned into a pipe containing water comes in contact with the water, a portion of the steam is condensed, and a vacuum is formed, drawing the water back. The steam pressure again thrusts it forward until it arrives at the end of the pipe or valve; and the water, being nearly a solid substance, strikes the valve with nearly the same force as a mass of iron driven with the same velocity. Of course the valve is not broken at the

water nearest the steam is heated. This also is the cause of thumping in steam pipes used in heating buildings. An outlet for the water destroys part of the force of the blow, although there is danger then if steam is turned on too suddenly.

(69) D. L. says, in reply to J. R. A., who asked how to cure cracked heels in horses: Take powdered gum camphor ½ oz., powdered gum myrrh1 oz., sulphuric acid 1 oz., spirits of turpentine 1 oz., and lard 1 pint. Mix thoroughly, and rub on the affected limbs once a day. Wash the legs with soapsuds, and wipe dry before using. To prevent the affection, keep your stable and lot clean, and be sure that your horse is well groomed.

(70) H. S. J. says, in reply to J. M. H. Jr., who asks for a recipe for decalcomanie varnish: For preparing a fastening varnish for sticking the pictures to the object, take 5 ozs. Canada balsam (frequently called bals um of fir) and 1 oz. each of alcohol (90 per cent) and spirits of turpentine; mix thoroughly, and let stand a few days. For finishing, use white dammar varnish, or a varnish made of bleached sheilac 2 drachms, dissolved in 10 ozs. stronger alcohol.

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

X. X. Y.-All the specimens contain iron, but not in paying quantity.—J. S. B.—No. 1 is quartz sand, no emery or corundum. Sulphuret of iron is valueless.—A. M. S.—The boot lining is dved with aniline green. -F. M. M. -The water is hardly entitled to the name of mineral, inasmuch as many natural waters contain as much mineral matter of a similar character, and are not supposed to be of a medicinal character.-R. F. A. ferrotype plate is probably coated with a fine variety of japan varnish.

COMMUNICATIONS RECEIVED.

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

On the Witch Wand. By C

On Eating Quails. By C. W. On an Electric Shock. By J. C. On Capital Punishment. By C. W. E. On a Psychological Phenomenon. By A. Y. M. On Poisonous Plants. By H. H. On Bank Robberies. By M. On Consumption. By J. R.
On Aerial Navigation. By E. R.
On Restoration of Life. By C. F. S.
On Puget Sound. By G. W. B. On Thoughts on Astronomy. By W. C. Also inquiries and answers from the following: S. H. L. Jr. –J. P. M. –C. V. B. –D. M. N. –C. J. M. –C. F. E. –J. K. –B. L. –H. T. –A. H. T. –F. T. –T. W. –J. B. –G. P. –J. C. D. –F. K. –N. T. W. –J. J. -P. S.-G. D.

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.

Enquiries 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 balf 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: "Where can bives of bees be obtained? Who sells small engines? Who sells rotary rock drills? Who sells an ice-making machine, capable of making 2,000 lbs. per day? Whose is the best railroad tie? Where can rubber-coated duck, etc., cloth 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.]

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SCHEDULE OF PATENT FEES.

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