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"Wrinkles and Recipes" is the best practical Handbook for Mechanics and Engineers. Hundreds of valuable trade suggestions, prepared expressly by celebrated experts and by correspondents of the "Scientific American." 250 pages. Elegantly bound and illustrated. A splendid Christmas gift for workmen and apprentices. Mailed, post paid, for \$1.50. Address H. N. Munn, Publisher, P. O. Box 772, New York city.

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The Allen Fire Supply Co., Prov., R. I., give special attention to the manufacture of small articles in metal.

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A Mech. Engineer by education, who is a competent draftsman and designer, and has some practical experience, wishes employment. Best References. Address M. E., Jamaica Plain, Mass.

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Wanted—The address of Metal Shawl Strap Handle and Belt Buckle M'rs. F. Turner, Frankford, Pa.

Solid Emery Vulcanite Wheels—The Original Solid Emery Wheel—other kinds imitations and inferior. Caution—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, New York.

Wanted—Machines for Knitting Fancy Worsted Webs suitable for berders. H. E. Millingham, 39 and 41 East Broadway, New York.

Wanted, to trade a fine new C. F. Breech L. Shot Gun, new system, for a small St. Engine. Address A. Franke, Wapakoneta, O.

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For best and cheapest Surface Planers and Universal Wood Workers, address Bentel, Margedar & Co., Hamilton, Ohio.

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Steel Castings, from one lb. to five thousand lbs. Invaluable where great strength and durability are required. Send for Circular. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Use Yocom's Split-Pulleys on all Shafting, same appearance, strength and price as finished Whole-Pulleys. Shafting Works, Drinker St., below 147 North Second St., Philadelphia, Pa.

Boult's Paneling, Moulding and Dovetailing Machine is a complete success. Send for pamphlet and sample of work. B. C. Mach'y Co., Battle Creek, Mich.

Patent Scroll and Band Saws, best and cheapest in use. Cordesman, Egan & Co., Cincinnati, Ohio.

Our new catalogue of drawing materials will be sent on receipt of 10c. Add. Keuffel & Esser, New York.

Fine Castings and Machinery, 96 John St., N. Y.

Hotchkiss Air Spring Forge Hammer, best in the market. Prices low. D. Friable & Co., New Haven, Ct.

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For best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay, Brooklyn, N. Y.

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Peck's Patent Drop Press. Still the best in use. Address Milo Peck, New Haven, Conn.

All Fruit-can Tools, Ferracute Works, Bridgeton, N. J.

American Metaline Co., 61 Warren St., N. Y. City.

For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, 470 Grand Street, New York.

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For best Bolt Cutter, at greatly reduced prices, address H. B. Brown & Co., New Haven, Conn.

Diamond Tools—J. Dickinson, 64 Nassau St., N. Y.

Temples and Oilcans. Draper, Hopedale, Mass.

Shingles and Heading Sawing Machine. See advertisement of Trevor & Co., Lockport, N. Y.

Notes & Queries

J. H. P. can make a cement for mending rubber boots by following the directions given on 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, should 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.—O. C. will find a recipe for a waterproof whitewash on p. 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 muckage 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 his rubber 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. R. 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 find 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. 409, 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 engines 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 to run a fan for a cupola. Which would require the most power, to increase the pulley on the main shaft or to use a countershaft, to get the same speed? A. To use a countershaft.

(3) H. C. S. asks: Is there any non-conductor that 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 steel is 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.

(5) N. H. C. says: R. R. & G. E. say that cut nails are made from bars of iron rolled into widths of 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.

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A tubular boiler, used to furnish steam to heat a 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 deposits from boilers.

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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 line with a theodolite, and called it N. 14° E. Recently 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 sun.

(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 1/4 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 without causing bad drafts in the room. 2. What kind 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 redstone? A. The Belleville, 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 coils.

(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 linseed 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 an 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 upon ornamental brackets, and tied together with a 1 1/4 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 feet long. 3/4 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 a good bushing for steam governor valves? A. We have known both hard brass and good cast iron to be used with satisfactory results.

(36) S. H. B. says: I want to build a skiff of common poplar planks about 3/4 x 16 inches wide and 16 or 18 feet long. The boat is to be about 4 1/2 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 text book 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 height when the damper is closed; and when the damper is open, the water in one leg of the tube is depressed 7/10 of an inch, and in the other leg is raised 1/10 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 x 8 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 following 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 twin screw, 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. It 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 washboards. We have seen lightly built cedar boats, about 7 1/2 feet long and of 4 1/2 feet beam, drawing 8 or 9 inches 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 wheat should such rocks grind (making good flour) 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, while similar 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 200 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 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 electrotypist'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 rancho. 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 drainage 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 process 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 tartaric acid.

(58) G. D. asks: How can I make a first quality hard soap from lye from ashes 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

of very pure ether. Cut your rubber into small pieces and dissolve it in 34 ozs. hot naphtha, by constant agitation; add to this the shellac in a very fine powder, and heat the whole with constant stirring until the shellac is dissolved.

(61) J. H. C. asks: I racked a barrel of cider off twice and then attempted to fine it with isinglass. 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 steam under 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 too short for economical working.

(65) F. W. F. says, in reply to H. J. S., who asks 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 tons when you say the same force. Do you not? Some weeks ago I asserted that a cotton press with a box 2 x 4 x 10 feet, containing 80 cubic feet, would require but 1/2 of the power that is needed by one 2 x 5 x 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 pressure, or half the original force, or half of 100 tons. We are sorry, however, if our answer influenced you at all in making the assertion that a press with a follower 2 x 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 side by side.

(66) C. L. C. says, in reply to W. A. R.'s query as to the breaking weight of a bar of iron 10 1/2 inches long, 1/2 inch wide, and 4 inches deep, supported at one end only with weight applied at other end: Let l=length=10 1/2 inches, d=depth=4 inches, b=width=1/2 inch, W=weight required to break the beam, and c=constant=2,400 lbs. Thence we have, for the shearing strain, S, at the point, a b: S= d^2 in inches x b in inches x constant

$$S = \frac{d^2 \times b \times c}{4 \times \text{length in feet.}}$$

$$W = \frac{d^2 \times b \times c}{4l} = \frac{16 \times 0.5 \times 2400}{35} = 5485.7 \text{ lbs.}$$

This weight may only bend or ripple the beam, as the constant is the average breaking weight of a bar of iron 1 inch square and 1 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 = 5485.7 x 2 or 10971.4 lbs.

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 the 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 first blow; but the blows are repeated until 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 1/2 oz., powdered gum myrrh 1 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 ecalcomanie varnish: For preparing a fastening varnish for sticking the pictures to the object, take 5 ozs. Canada balsam (frequently called balsam 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 sheila 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. Sulphur of iron is valueless.—A. M. S.—The boot lining is dyed 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.—Your ferrotype plate is probably coated with a fine variety of japan varnish.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, 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 I. 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 half 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 hives 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.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

January 25, 1876,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions such as Abdominal supporter, Air compressor, Amalgam for teeth, Animal matter, Bag, travelling, etc., with corresponding patent numbers.

Main table listing inventions such as Boxes, nailing, Brick walls, cleaning, Brush, bit, Can nozzle, etc., with corresponding patent numbers.

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA, January 28 to 31, 1875.

Table listing Canadian patents such as 5,612.—H. A. E. Lefort et al., Montreal, P. Q. Watchman detector, 5,613.—J. L. Massie, Cowansville, P. Q. 1st extension of No. 4,237. Heater, etc.

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DISSOLUTION—CHIPMAN, HOSMER & CO.—The partnership heretofore existing between N. P. Chipman, A. A. Hosmer, C. D. Gilmore, J. C. Smith, and E. W. Anderson, has been dissolved. E. W. Anderson will continue the business at his offices, 637 F St., Washington, D. C.—Washington, Jan. 26, 1876.

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