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The "Catechism of the Locomotive," 625 pages, 250 engravings. The theory, construction, and management of American Locomotives. Sent post paid, on receipt of $3. H. P. Stein, RR. Gazette, 73 Broadway, N.Y.

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Manufacturers desiring a full description and statement of the mechanical construction and working, and of the merits of the lately patented adjustable calendar and almanac, illustrated in the "Scientific American" of February 12 last, may obtain the same by addressing the Inventor and Patentee, David J. Miller, at Santa Fé, New Mexico.

Waggener's Improved Trial-Balance Book—Invaluable to Book-Keepers. Saves time: systematizes the work: prevents errors. Now in general use. 12 mo's form—No. 1, 500 acc'ts, $1.80: No. 2, 1,000 acc'ts, $2.70: No. 3, 2,000 acc'ts, $4.50. 6 mo's form—No. 4, 500 acc'ts, two periods of 6 mo's, $2.25: No. 5, 1,000 acc'ts, two periods of 6 mo's, $3.15. Sent postpaid. Catalogue free. D. B. Waggener & Co., Publishers, 420 Walnut St., Phila'

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Round Thread Hose Couplings and "Controlling Nozzles" are the best in use. E. M. Waldron, Prov., R.I.

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Amoskeag Steam Fire Engine, first class, for Sale. Is in excellent order throughout. Has two 8x10 cylinders, rotary pump (wholly composition), steel waist boiler with copper tubes, 6 in. suction, and plays four 2½ in. streams. Price $1,200, warranted. Address S. C. Forsaith & Co., Manchester, N. H.

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$1,000 for any Churn ahead of "The Prize." A. B. Cohu, 197 Water Street, New York.

A Clear Field—Small capital ensures heavy percent. Territory, etc. Liquid Vent Co., Kansas City, Mo.

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Wanted—Universal Milling Machine, Brown & Sharp M'f'g Co., Providence, R. I., make preferred. Address, giving price, cash, Wm. E. Lewis, Cleveland, O.

Sash and Door Factory, Planing Mill, &c., for Sale. See advertisement on page 172.

Painters & Grainers—Send for descriptive Catalogue, & Sample of first class & quick Graining. Executed with my new perforated Metallic Graining Tools. 40,000 in daily use. J. J. Callow, Cleveland, Ohio.

Wanted—Every Machine Shop to send for one of Gardiner's pat. centering and squaring attachments for Lathes. On five days' trial, to be returned at our expense if not satisfactory. 700 one inch shafts centered and squared up per day. Price $35. R. E. State & Co., Springfield, Ohio.

Family Dish Drainer—Shop right deed and patterns, $10 per year. J. R. Abbe, Lawrence, Mass.

Yocom's Split-Collars and Split-Pulleys are same appearance, strength, and price, as Whole-Collars, and Whole-Pulleys. Shafting Works, Drinker St., below 147 North Second Street, Philadelphia, 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.

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.

$1,000 for any Hand Saw Mill equal to A. B. Cohu's, 197 Water St., New York.

A Valuable Patent for Sale to the highest bidder. Smith's Improved Awl, for sewing leather without bristles. For Cut and description, see Scientific American of July 31, 1875. Address Sylvester A. Smith, Letts, Louisa Co., Iowa.

Best Line Shaft, Pulleys, Dead Pulleys, Couplings, etc., in the country. Catalogue free. A. B. Cook & Co., Erie, Pa.

Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., U. S. A.

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

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph &c.

Hotchkiss & Ball, Meriden, Conn., Foundrymen and workers of sheet metal. Fine Gray Iron Castings to order. Job work solicited.

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.

Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass.

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.

For 6 1st class Shapers and other tools, new and 2nd hand, address E. P. Bullard, 43 Beekman St., N. Y.

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

All Fruit-can Tools, Ferracute W'ks, Bridgeton, N.J.

Notes & Queries

A. P. will find an answer to his query as to a ball dropped through the earth, a vacuum being maintained in the hole, on pp. 138, 250, vol. 31.—D. O. F. will find the description of a method of putting a black enameled finish on cast iron on p. 208, vol. 26.—H. L. M. will find directions for polishing handles, etc., in the lathe on p. 138, vol. 26.—C. H. S. will find directions for preparing corn cobs for kindling on p. 325, vol. 26.—C. W. B. can mend his rubber boots by the method described on p. 203, vol. 30.—J. M. will find directions for making friction matches on p. 75, vol. 29.—S. T. is informed that there is no safe way of tampering with the natural change of color in the hair.—J. P. C. will find that the proper speed for a circular saw is given on p. 163, vol. 34.—C. B. R. will find directions for producing white enamel on iron on p. 362, vol. 32. This also answers H. W. P.—F. D. can remove rust from his steel tools by following the directions given on p. 56, vol. 33.—M. J. M. is informed that we cannot recommend a boiler scale preventive, as we do not know what is the injurious element in his water.—A. J. P. will find a solution of the wheel difficulty on p. 298, vol. 31.—D.C. can clean his tarnished plated goods by the method described on p. 251, vol. 33.—W. A. will find directions for making corn starch on p. 154, vol. 30.—H. B. L. will find full directions for soldering cast iron on p. 251, vol. 28.—H. B. C. will find full directions for bronzing cast iron on p. 11, vol. 33.—F. H. L. will find an article on the strength of cast and wrought iron at different temperatures on p. 43, vol. 30.—W. T. R. will find directions for cleansing mercury on p. 131, vol. 30.—F. W. D. will find directions for making a silver-plating solution, for use with a battery, on p. 362, vol. 31.—I. B. & S. should apply to a toy manufacturer.—A. J. G. should read our article on the horse power of engines, published on p. 33, vol. 33.—C. D. F. is informed that we are unable to calculate the horse power of boilers from the dimensions and pressure. No trustworthy formula for such a calculation has ever been laid down.—J. McE. will find directions for building a refrigerating room on p. 251, vol. 31.—B. H. Jr. is wrong in trying to remove hair from his face.—J. V. B. will find directions for producing a green bronze on brass on p. 51, vol. 33.—J. V. B. will find directions for polishing meerschaum on p. 155, vol. 31.—H. M. H. will find directions for making rubber cement on p. 119, vol. 28. The construction of an aquarium is described on p. 80, vol 31.—F. J. will find directions for transferring engravings to wood on p. 138, vol. 30.—W. K. P. must use olive oil and white phosphorus for his phosphorus and oil lamp.—A. M. G. will find the required tables as to temperature and pressure of steam in Box's "Treatise on Heat."—W. R. M., H. G., H. H., E. H, G. A. B., W. & S., and many other correspondents who ask us to recommend books on industrial and scientific subjects should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) E. W. H. says: In a recent number of the SCIENTIFIC AMERICAN appears an article under the head of "The New Phase of Electric Force." I tried the experiment, using a telegraph sounder. I arranged the wires so that the armature vibrated. I now fastened a wire to the armature, but could obtain no sparks. I used three cups of Bunsen battery. What is the matter? A. Try again.

(2) C. S. says: Please give me a formula for preparing a solution to electroplate zinc with copper. I have tried the usual cyanide of copper solution, with the peculiar result of first throwing down copper, which in a few moments turns to a bright yellow, like brass. What is my trouble? A. Dissolve ¼ oz. sulphate of copper for every pint of water; add ammonia till all precipitate is re-dissolved, forming a deep blue solution, then add solution of cyanide of potassium till this color quite disappears. Add ammonia and cyanide whenever required. When these are deficient the anode becomes coated with a blue powder. About two Grove or Bunsen cells will be required.

(3) E. B. asks: Can steel knives be silver plated without putting some other metal on first? A. No, not so that the coating will adhere properly.

(4) J. G. asks: 1. What size of wire is fine enough to wrap the electro-magnet of a Morse sounder? A. No. 18 will be found a convenient size. 2. How many feet will it take? A. Use 20 or 25 feet. 3. Is it necessary to cover the silver plate of a Smee battery with platinum? A. Yes, to get the best effect. 4. How is the Léclanché battery arranged? A. Manganese and carbon in the porous cell, the latter closed with pitch, and a zinc rod in the outer cell. Use a solution of sal ammoniac for the excitant.

I made a marine telescope for use in water, but I cannot see much, as the water is muddy. Can I arrange a lamp inside it, and how? A. Some form of electric light might be used.

I made a phosphorus lamp, according to your directions, but it will not work. I boiled sweet oil, and poured it in the bottle on a small piece of white phosphorus. What was the trouble? A. Warm the bottle slightly by holding it in the hands or by placing it in a warm place, away from the fire, for a short time: then expose the oil to the air by opening the bottle.

(5) S. G. says: If oxygen and nitrogen are properly compounded, will they form an atmosphere that will sustain life? If so, why cannot they be used in sea diving? A. You propose merely to supply artificial air. There is no advantage in this, as common air may be pumped into the bell from above, or already stored there under pressure.

(6) A. S. G. says: I have observed some points in experimenting with a small induction coil which seem peculiar, and I shall be glad if you can assist me to an explanation of them. With the current from a quart Grenet, the secondary sparks will leap nearly ⅜ inch when the battery is in its best condition. Of course, sparks pass freely between wires from the secondary poles, when brought within striking distance; a point which troubles me is that sparks are freely given off from one secondary pole when no circuit is made. A. The case is one of inductive action, and is observable with all high tension electrical apparatus. 2. Another peculiar phenomenon is that the primary current gives quite severe shocks. When the circuit-breaker (magnetic) is operating (no connection between the secondary poles) upon pressing a moistened finger on the thumb screw which governs the distance of the platinum point from the vibrator, and another on either of the thumb screws of the battery, a current is felt, very similar to that from a medical coil, when the bundle of wires is pushed about half in. A. The shock is occasioned by the extra current. This is produced by the induction of the battery current upon itself, hightened, also, by the reaction of the magnetism in the core.

(7) C. I. H. asks: What is the matter with my battery? I have 4 cups (bichromate of potash) and I get a stronger shock with 2 cups than with 4. I use an induction coil; the wires are No. 36 and No. 20. Are these sizes right? A. If the wire of your primary coil were a little larger, we think you would obtain somewhat better results. It is quite likely that bad connections cause most of your troubles.

(8) D. G. asks: 1. What is meant by a drop forging? Is there any way of driving hot iron (wrought) into molds to produce given forms, such as are difficult to forge? A. Yes. Drop forgings are forgings driven into a mold or form by a drop hammer. 2. What is cast cast steel? Has it greater strength than iron, or is it simply harder? A. Cast cast steel is a casting made of cast steel. It is much stronger than wrought iron, and is soft. 3. How does it compare with cast steel? A. It is cast steel of fair quality. 3. Is malleable iron strong enough to do good service with a thread and nut, or will it pull in two too easily? A. It is strong enough if sound.

(9) N. L. C. asks: Why does cider made from sound apples in a hand press, and carefully bottled in clean bottles, have, year after year, a bitter taste? A. If it is as you say, we can give no reason.

(10) L. B. says: I am framing a barn, and I want to raise it with a pair of pulley blocks with 1¼ inch Manilla rope and a gin pole. The bents will consist of one beam 36 feet long, 9 x 9 inches, 2 posts 20 feet long, 9 x 9 inches, 2 posts under the beam 16 feet long dividing the 36 feet into three equal spaces, and three girths 5 feet 6 inches in each space. 1. Will a pair of pulley blocks that will carry that size of rope be strong enough? A. Yes. 2. How large will I want the guy ropes to steady the pole, and how many are necessary? The blocks are what they call four fall. A. Provide four guy ropes, placed at equal distances around the pole, and so placed that the strain when the load is on will be borne by two at once; 1¼ inch ropes will do for these. 3. Could I raise a barn that way by using a span of horses to pull with? A. Yes; but if you are shorthanded you had better raise your frame by single stick, which is now quite frequently practised. Set up a corner post and brace it both ways in its proper position; then set up the next post and brace it, putting the girt in its place at the same time; so proceed with the third post and girt; then put in your 36 feet beam and last girt, and set the remaining corner post. You will probably find this plan attended with less labor, and with less danger from accidents, than that of raising by bents. The heavy sticks may be raised by a pole and single pulley, if required.

(11) W. H. K. asks: Can a person's beard be permanently destroyed without injury to the skin? A. Try the following: Make a strong solution of sulphuret of barium in warm water; and when required for use, mix it into a paste with powdered starch and apply immediately. In about 10 or 15 minutes, or sooner if much smarting occurs, the paste should be removed by means of warm water.

(12) S. D. asks: Please inform me what will cleanse brass shells, used in breech-loading guns. A. We suppose you refer to the blackish carbonaceous crust formed on the surface of the shells, often to a considerable thickness. Try benzine or benzole, and finish with dilute nitric acid applied with a piece of cloth.

What will clarify or bleach chicken oil? A. There is no chicken oil sold in the New York market. Send a sample of what you wish clarified or bleached.

(13) A. P. D. asks: Will hard water do to use in an aquarium? A. Yes.

(14) H. S. asks: 1. I have been trying for some time to obtain flowers of any desired color. Where can I find the explanation of the meaning of color, and the conditions under which a given color is present? A. The information asked for is to be partly found in a *resume*, published in the "Quarterly Journal of Science" (Vol. XL., 1873, p. 451), of an investigation by H. C. Sorby on this subject. He found that the most important coloring substances met with in plants are insoluble in water, but soluble in bisulphide of carbon. He also made a series of determinations of the amount of coloring substances by obtaining solutions of the same tint, but of different depth. The total number of the fundamental coloring substances of plants isolated in this manner is about 12; for their names and properties see "Proceedings of the Royal Society," Vol. XXI, p. 442. 2. If I mix two different colors or paints I get a color different from the two. Now if I, by some means, extract one of the colors, would I not get the two colors separately again? A. Yes. 3. Can I not extract something from any color so as to change the original colors? A. Yes. 4. I have the impression that black is no color and white is all colors. Is this so? A. Black is the absence of color, and white is the mixture of all the spectrum colors. 5. I have been trying to make a plant digest certain substances through the aid of a galvanic battery. Has this ever been tried? I know it to be possible, for I have obtained such results. A. What are the results spoken of?

(15) F. C. B. asks: How can I make an ink for stamping buckskin and chamois leather, that will not smear? A. From the nature of the material it is a somewhat difficult matter to get a perfectly clear and legible impression from any hand stamp of ordinary description, no matter what kind of ink is employed. If a ribbon stamp, however, be employed, and an ink of sufficient fluidity, a clear imprint may be obtained without difficulty. It is requisite that the print should not be handled until the ink has sufficient time to dry. This drying, it is hardly necessary to add, will be much accelerated by a moderate warmth.

(16) G. C. says: I tried the following for nickel plating: "Take 4 parts nitrate of nickel, 4 parts liquid ammonia, 150 parts water, and 50 parts sulphate of soda." I could not get the nitrate of nickel, but was told that sulphate of nickel was the same thing, and I used it. It quickly made a thin coating of nickel, but I could not get it any thicker, as the solution crystalized and covered the articles and the anode all over with crystals ¼ of an inch thick. The anode was granular nickel in a cotton bag. Can you tell me the reason of that? A. The following is recommended highly: 2½ parts sulphate of nickel and 1 part sulphate of ammonia, dissolved in enough water to keep the solution just below the point of saturation. This will diminish the tendency to crystallize. Use two or three Bunsen cells to start with; a single Smee cell will answer for the main deposit.

(17) J. E. B. asks: What are the solvents of pure asphalt? A. Asphalt is the term given to solid bitumen. The bitumens differ in the facility with which they are attacked by solvents. Most of them are in great part dissolved by ether, mixtures of ether and alcohol, turpentine, the essential oils, benzole, naphtha, etc.

(18) C. F. L. says: Our town authorities are talking of supplying the town with water by a pump or water ram, from a stream 1,000 feet distant to a hill 115 feet high, thence from a reservoir by pipe, 800 feet, to the streets, and up and down the streets, 2,000 feet more or less. The town is from 80 to 100 feet below the hill. Will pipes from the reservoir under that head be sufficient to put out fire, or would it be better to attach a large force pump to one of the water wheels and force the water through pipes to different parts of the town? A. The town of Rahway, N. J., and several other places are provided with what is said to be a very economical and effective system of water supply. It consists of a stationary engine supplying a certain number of millions of gallons of well water per day, at a certain pressure agreed upon, and which is at all times sufficient to force the water to the upper stories of the houses in the most elevated sections of the town. This is known as the Holly system, and would probably suit you better than any other. In case of fire the pressure is maintained at its maximum by means of the control obtained through the stationary engine. Write to Holly Manufacturing Company, Lockport, N. Y.

(19) M. O. R. says: I am about to build an engine 6 x 8 inches. I intend to have the steam ports ½ inch wide and 2 inches long, and the exhaust port 2 inches wide and 2 long. Will the ports be long enough for the engine? A. Make your steam ports ⅝ wide and 3 inches long, and the exhaust port 1¼ wide by 3 inches long.

(20) J. W. Jr. says: In one of your back numbers you say that the scent of the hay flower can be made of the bark of the marie. Please give me the directions. A. The plant is one newly discovered, and we have no description of it at hand. The statement that it may be employed as a source of the perfume "new mown hay" is made by a French perfumer.

1. What preparation is put on the sensitive plate for an instantaneous photograph? A. No photograph is actually instantaneous, although the time of exposure may be reduced to a very small fraction of a second. There must be a slide attached to the camera front, so arranged as to give a very brief exposure. Use a neutral new 30 grains bath, a bromo-iodized collodion just old enough to work, a plain iron developer, and a lens giving a strong bright image. Give a very brief development and see that the image is strongly and evenly illuminated. A collodion containing 5 grains ammonium iodide and 3 grains ammonium bromide to the ounce works well. 2. What substance is put on the sensitive plate after it comes out of the came-

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