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Dickinson's Patent Shaped Diamond Carbon Points and Adjustable Holder for dressing emery wheels, grindstones, etc. See Scientific American, July 24 and Nov. 20, 1869. 64 Nassau St., New York.

Five different sizes of Gatling Guns are now manufactured at Colt's Armory, Hartford, Conn. The larger sizes have a range of over two miles. These arms are indispensable in modern warfare.

The Berryman Manuf. Co. make a specialty of the economy and safety in working Steam Boilers. I. B. Davis & Co., Hartford, Conn.

Gauge Lathe for Cabinet and all kinds of handicrafts. Shaping Machine for Woodworking. T. R. Bailey & Vail.

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All Fruit-can Tools, Ferracite, Bridgeton, N. J. For Steam Fire Engines, address R. J. Gould, Newark, N. J.

Always right side up—The Olmsted Oiler, enlarged and improved. Sold everywhere.

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

Peck's Patent Drop Press. Milo Peck & Co., New Haven, Conn.

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Hydraulic Presses and Jacks, new and second hand. E. Lyon, 470 Grand Street, New York.

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Spur and Bevel Wheels and Spindles, of great durability, cast to order by Pittsburgh Steel Casting Co. All work warranted.

The Berryman Steam Trap excels all others. The best is always the cheapest. Address I. B. Davis & Co., Hartford, Conn.

Gauges, for Locomotives, Steam, Vacuum, Air, and Testing purposes—Time and Automatic Recording Gauges—Engine Counters, Rate Gauges, and Test Pumps. All kinds fine brass work done by The Recording Steam Gauge Company, 91 Liberty Street, New York.

Absolutely the best protection against Fire—Babcock Extinguisher. W. W. Farwell, Secretary, 407 Broadway, New York.

For best Presses, Dies and Fruit Can Tools, Bliss & Williams, 118 to 120 Plymouth St., Brooklyn, N. Y.

Boring Machine for Pulleys—no limit to capacity. T. R. Bailey & Vail, Lockport, N. Y.

The best Lubricators, Oil Cups, Gauge Cocks, and Oil Cans, are "Broughtons." Circulars sent on application to H. Moore, 41 Center Street, New York.

R. H. Gillmore, Keokuk, Iowa, wants best carriage gate, to be operated from carriage.

Lathes, Planer, Shaper, Shafting, 30 Boilers, Engines and Stock of Machine Shop, for sale very low. Henry McCollum, Long Island City, N. Y.

Arrangements are being made to manufacture a small oscillating engine for the use of farmers and others requiring a little power, but whose limited means and knowledge of the Steam Engine prevent them from buying the more expensive and complicated machines. Agents are wanted now to sell models made under the same patent. E. P. Ryder, 19 Ann St., New York.

For Sale—A set of the Patent Office Reports (mechanical) from 1847 to 1869, inclusive—50 vols.—price \$65. T. Bradburn, bookseller, 29 Ann Street, New York.

A Superior Printing Telegraph Instrument (the Selden Patent), for private and short lines—awarded the First Premium (a Silver Medal) at Cincinnati Exposition, 1872, for "Best Telegraph Instrument for private use"—is offered for sale by the Merch's Mfg and Construction Co., 50 Broad St., New York. P. O. Box 6865.

Williamson's Road Steamer and Steam Plow, with rubber Tires. Address D. D. Williamson, 32 Broadway, N. Y., or Box 1809.

Steel Castings "To Pattern" from ten lbs. upward, can be forged and tempered. Address Collins & Co., No. 212 Water St., N. Y.

Notes & Queries

A. P. asks how to temper steel dies and punches.

F. E. C. says: How can I make translucent cloth for hotbed frames?

E. F. S. asks how to prevent soft metals such as tin, lead, etc., from clogging files.

W. M. asks: When and where were bolting machines first introduced for bolting flour?

S. A. L. asks: What kind of leather is generally used in making blacksmith's bellows?

M. C. asks: Can a card be saturated with phosphorus and preserved for use, and will it be flexible?

P. R. R. asks: Can any of your readers describe a process for tempering steel springs by compression?

A. L. asks: What is the best wood to make insect cabinets of, and what is the best form for the same?

W. H. H. asks: Can you tell me how to make a pickle for taking sand off castings, such as small gear wheels, etc.?

J. F. A. wishes to know with what material he can coat the inside of tin cans, to prevent ink and other fluids from being affected by the tin.

E. D. R. asks: What is the best method of mixing fresco colors, and what ingredients are used to make them now freely and cover well?

C. M. asks: How can the glue joint between the back and sides of a violin be undone without injuring the instrument or spoiling the varnish?

E. B. asks for a recipe for making dextrin or a substitute for the same, say 50 lbs. at one time. He wants to use the dextrin for sticking purposes.

W. S. B. asks: What is meant by summer and winter strained lard oil? What process does the lard go through to keep it from congealing?

C. B. asks if there is any method of toughening or preparing wax for flower making so that it will not be liable to soften in warm and harden and crack in cold weather.

J. D. asks for a recipe for a waterproof liquid cement, to be used for putting patches on bags, in the place of thread. It would be very useful to thousands of farmers.

G. M. D. says: How can I mark or print letters and figures on metal that has been finished and plated with silver? I have seen such work, but cannot tell how it is done?

A. P. asks: Will the power of a 10 horse engine drive a machine or machinery 100 feet away from the engine as easy as it would 10 feet away? The machinery is to be driven by a belt or belts from the line shafting.

N. J. J. asks: What kind of fish would be best to raise in a lake one mile in diameter? The water is eight feet deep, and the lake has no visible inlet nor outlet. The water is at all times bright and clear and has an agreeable taste.

J. R. says, in regard to R. and W.'s query about the balance wheel: Supposing that W. is right, will he be kind enough to explain the action of the gyroscopic governor, illustrated and described on page 134 of the current volume of the SCIENTIFIC AMERICAN?

C. E. C. says: Can some one give instructions for annealing gold so that it can be conveniently worked into rings, drawn into wire, etc., without cracking? I am often troubled with gold coin and good scraps, which are as brittle as cast iron.

J. C. K. asks: What is the best preparation for setting the thimble skein on axles? I use the drops of paint heated over a slow fire to the consistency of a batter. Is there anything better? In large wagon factories, how do they cut out the hub for the thimble box?

G. D. N. asks: Is there any work published treating wholly or in part upon electro-magnetic motors? Where can it be obtained? Is vulcanized rubber or dentist's hard rubber a conductor of electricity? What is the necessary size of a battery to ring a bell? It must be active for a month.

P. L. says: We use equal parts of first quality clay and ground brick in the manufacture of our retorts for distilling phosphoric acid; and yet they sometimes crack over the heated furnaces. We manufacture them in a warm room, fire the kiln with care, and subject all to the same charges, heat of flame, etc. What is the cause of our trouble?

D. H. E. says: I have lost the sliding weight to my platform scales, commonly called the P. The lever is graduated from 0 to 100 lbs. In half pound notches, and there are additional weights, 100, 200, 300, and 400. There is a cup at the end to put shot in to keep the balance; but it has been emptied also, otherwise I could easily put on the platform U. S. standard weights and make my new lead P. of the right weight. Please tell me how to get it to the proper weight.

H. A. B. asks: What proportion of burnt clay should be mixed with quicklime to form a hydraulic cement? The lime is to be measured before slacking, the clay after ginding. Should the clay be burned in a very hot fire and how long should it be exposed to the heat? Or soft magnesian limestone and American chalk, which would make the best lime, and what would be the relative quality of each?

J. R. has read Professor Young's lecture on our present knowledge of the sun, and asks for explanation on the following point: The professor asserts that a contraction of the volume of the sun, equal to 240 feet of its diameter, would account for all the heat it gives off. "If we freeze a pall of water, it gives off heat while it is freezing, but the thermometer will indicate no fall of temperature, until it is all frozen." The greatest density of water is at a temperature of 39° Fah.; and if it becomes colder, it expands, in contradiction to the fact quoted by Professor Young. How is this?

J. R. asks: What are the limits of expansion in an engine provided with an ordinary D valve in the steam chest? The admission of steam is cut off by a plate valve (sliding over the opening which admits the steam into the steam chest). The D valve is connected in the same way as in an ordinary engine; the plate valve, however, is worked by a crank pin of a wheel which makes twice as many revolutions as the shaft of the engine. The main valve has 1-16 of an inch lead and 1/2 inch outside laps. The steam port and the said opening are 1/4 of an inch wide and both valves have 2 1/2 inches throw.

D. F. says: We use what is called a gas pump in our oil well to draw gas up through the large casing between it and the tubing. What will be the difference in the amount of vacuum created by a ten inch cylinder and by a fourteen inch? They are piston pumps. How many lbs. per square inch would the vacuum be for each pump? They would both be acting on a tight vessel.

T. K. B. says that polished steel becomes in a mannerscaly, after being hardened, by the cold air striking it. "I use soap to coat the steel with, still it does not overcome the difficulty perfectly. I am told there is a liquid for coating steel, while heating it, in such a manner that the cold air does not strike it. I would be obliged to you or some of your readers for a process better than the soap."

ANSWERS TO CORRESPONDENTS

T. P. says: In your answer to F. E. D. as to fitting up cones so that the band will be equally tight on all the pulleys, you say that the sum of the diameters of all the pulleys will be the same. In my experience I find that steps in cones made all the same will not do. Please explain. Answer: For crossed belts the sizes will be the same. This is what we stated. Read the reply more carefully.

M. J. B. says: Please state which is the most perfect book on mineralogy, and where it can be obtained. What is the price of it? Answer: Get "Dana's Mineralogy" of your bookseller.

E. A. P. sends a description of parhelia and asks for explanation. Answer: This phenomenon was explained, on page 182 of our current volume, as due to floating crystals of snow or ice in the air; and the same explanation would apply in the present case. The prismatic effects at noon were probably not so fine as they would have been with the sun nearer the horizon.

A. G. F. says: I have occasion to run a hydraulic press at a distance of 250 or 300 feet from the power which runs the pumps. Can I not dispense with the shafting, place the pumps near the engine and use an enlarged pipe for connecting the pumps with the cylinder of the press, without material loss of power? Can I use a pipe 250 or 300 feet long, and if so, what should be the relative increase of size of pipe for 300 feet over the size required for 10 feet? Answer: You can dispense with the shafting and set your pumps near engine, using a pipe to conduct the water. You need not increase the size of the pipe. The supply of water is so small that an enlargement of the pipe is unnecessary for so short a distance as 300 feet.

J. F. C. says: 1. What convexity should a pulley have to allow a belt to run and adhere to its best advantage? 2. Is it best to run a thin and broad belt or a thick and narrow one? 3. Is it best to run one broad belt of sufficient capacity to convey the power of the engine; or would it be better to divide it and run two of half the width each? Answer: 1. One half inch to a foot in breadth of face. 2. A thin belt up to a breadth which will render it unmanageable. 3. That would depend upon the amount of power to be transmitted. For a thirty horse power engine, we should use a single belt of full width, if certain that it would be kept properly laced or otherwise well secured to take even strain across its full breadth.

A. T. Z. says: I have a turbine water wheel of 16 horse power driving a run of stones. Upon the top of the upright shaft of water wheel was a pinion 16 inches diameter and 2 inches pitch, with iron teeth, driving one of 2 feet diameter with wooden teeth on the stone spindle, giving proper speed to stones, but making a jarring noise in the teeth and shaking the building. Thinking the pitch too large for the diameter of wheels, I made, very correctly, new patterns, with 1 1/2 inches pitch and the same diameters as before, but found them work no better. Can wheels of above sizes be made to drive a run of stones and work smoothly? If so, what is the cause of the trouble with mine? Answer: We are inclined to think that your trouble is due to want of proper balance of your turbine. Wheels of the sizes mentioned can no doubt be made to run smoothly.

W. H. M. asks: If a pump of 2 inches diameter has a stroke of 3 feet, what amount of water in cubic inches does it draw, and what is the rule for finding the same? Answer: To find the area of a circle, multiply the square of the diameter by the decimal .7854. To find the cubic contents of the cylinder, multiply the area by the length. In your example 2x2x.7854x36=118 cubic inches of water and a little over, for each stroke.

H. R. asks: Can you inform me of what materials the elastic rollers used on printing presses are made? Answer: Glue and molasses. Increase the quantity of glue to make a stiff roller; you will need this in hot weather.

M. M. T. asks how glass becomes porous, if it ever is so. Answer: All glass is more or less porous. Some coarse bottle glass is so much so that it will not insulate for electrical purposes.

J. F. C. says that G. T. P. can make the best red seal wax by mixing 1 lb. shellac, 1 lb. Venice turpentine, 1/2 lb. chalk and 1/2 lb. English vermilion.

H. P. has an aquarium made of a wooden frame and glass sides, and wants a cement to make it watertight. Answer: Mix equal quantities of dry white lead and red lead in a paste with mastic varnish. Use as soon as mixed.

W. E. A. says: I have a plan for taking water through the surface condenser of a marine engine by which the motion of the vessel is made to perform the duty of the circulating pump now used. Is there, to your knowledge, any thing of the kind in use? Answer: The plan has been often suggested and more than once tried in various forms. Success has not been met with in any case in such a degree as to lead us to anticipate its general adoption.

C. E. C. asks how to mend rubber boots. Answer: See page 155 of our volume XXVI.

J. H. W. says: I have seen it stated somewhere that the workmen in deep mines were entirely unaware of the occurrence of the severe shocks of earthquake which were felt last fall in California; and, as so many theories have been promulgated to account for these phenomena, I have been expecting some of the scientists to base—if this statement be correct—a more probable theory upon it. If true, it would indicate, of course, that these disturbances are created upon or very near the surface, and the old doctrine of internal commotion (gaseous or otherwise) causing upheaval of the crust, a doctrine still held by many, would be untenable. Answer: The statement that the workmen in deep mines were unaware of the shocks and undulations taking place on the surface would require the concurrent testimony of numerous witnesses before any scientific men would put any confidence in it. It sometimes happens that, owing to great geological faults and fissures, the earthquake waves are not propagated over small districts of country; they remain like islands in the raging sea. This fact has several times been noted, but in such cases there is no motion either on the surface or in mines. That there should be wave motion on the surface and none at a moderate depth below, is in the highest degree improbable; on the contrary, animals living in caves and holes are the first to perceive the shock, and often give note of an approaching earthquake by rushing to the surface.

J. E. M. asks: Does heat or cold affect the power of a magnet; also whether the movement of a piece of steel would be more rapid towards a strong magnet than towards a weak one, provided the same piece of steel be placed at the same distance away from each? I think that the stronger magnet would attract a larger piece of steel than the weaker one; but under the above named conditions, the movement of a piece of steel would be just as rapid towards the weaker as towards the stronger one. Am I right or wrong? Answer: Alternations of heat and cold, sudden contraction or expansion, and percussion are decidedly injurious to the strength of a magnet; and we should say that a powerful magnet would attract a given piece of steel towards it more rapidly than a weak one. Better try the experiment.

F. G. asks: How can I make a good and cheap electric battery? Answer: You can buy a battery cheaper than you can make one, but if you wish to try your hand at the business, we can recommend what is called Daniell's pattern as being easy of imitation. Make yourself a copper cup of the capacity of a pint measure, and a second cup, holding a gill, out of sole leather. In the copper cell, put a mixture of eight parts of water and one of oil of vitriol, saturated with blue vitriol, and pour some of the acid water without the copper into the leather cup. Cast a solid cylinder of zinc and amalgamate it; plunge this into the inner leather cup and connect it by a copper wire soldered to it with the outer cups. Several of these cups would constitute a battery. Now read about it in your school philosophy, and you will learn what further to do.

H. R. asks: 1. Is there any glue or substitute for the same that will stand exposure to wet weather? Answer: Take cacahout, 15 or 20 grains, chloroform, 2 fluid ounces; dissolve and add 1/2 ounce powdered mastic.

M. H. asks: What is the best way to fasten felt or any similar material to zinc? Answer: Try painting the zinc with a thick coat of white lead; let it dry and then use stiff hot glue.

F. W. D. says: Please enumerate the various colors of which white is composed, and the order in which they must be painted upon a circular disk, so that, when properly revolved, it will present a white surface. Answer: Divide your disk radially into five equal parts, and paint each of these with the seven colors of the solar spectrum, namely, violet, indigo, blue, green, yellow, orange, red. Put these colors on radially. Paint a black bull's eye in the center of the card, and blacken the circumferential edge. Revolve rapidly, and you will see only a grayish white instead of the colors.

F. C. asks if the borax treatment for preserving meat is detrimental. Answer: No.

J. H. J. Your plan for steam engine is old. Watercolors are used for theatrical scenes.

A. P. should send his volumes for binding to our office. Charge, \$1.50 per volume.

A. C. asks: 1. Who designed and built the Thames tunnel (England)? 2. Who designed and built the Great Eastern? Who launched her? Answers: 1. Sir Mark Isambard Brunel. 2. Isambard Kingdom Brunel, son of the former. Built by John Scott Russell & Co.

Z. asks how to preserve natural flowers with wax. Answer: Take paraffin, melt it and dip the flowers in very carefully.

D. F. T. says, in reply to O. K., who asks if it is advisable to drive a 4 1/2 feet millstone with a quarter twist belt from the driving shaft to spindle: From experience, I should say no, unless you use a long belt. Your belt should be 9 or 10 inches if you want it to do any work. [In our reply to O. K., we originally advised a long 8 inch belt. The figure was by mistake, printed 5 inches.—Eds.]

J. B. T. asks for a recipe for bluing gun barrels. Answer: See page 10 of our volume XXV.

W. T. B. says in answer to D. F. W., who asked how to cut a crack in a bell clean, to stop the discordancy: I have used a circle of common soft Russian stovepipe iron, run at a velocity of 5,000 revolutions, to cut teeth in a large saw. I could do it very quickly, but the under side of the saw was so hard that it could not be filed. It would cut the whole length of a twelve inch flat file in 1 1/2 minutes.

J. W. K. encloses a mineral specimen found in limestone, and a black mineral, and asks what they are. Answer: The black mineral is very soft bituminous shale. The other is flint.

B. O. M. asks how to bronze cast iron brackets. Answer: Read Byrne's "Practical Metal Worker's Assistant."