

Business and Personal.

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For Sale, Machine Shop and Foundry. Address, Wagoner & Matthews, Westminster, Md.

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Wanted, a Machine to make a flat flour barrel hoop out of black ash timber; also, any Machinery that will decrease the cost of making Flour, Fruit, or Lime Barrels; also, a Machine to shave a flat hoop ready for the barrel. Address P. O. Box 2533, Buffalo, N. Y.

Good Words for the "Gardner"—From Powers & Weightman. Philadelphia, January 6, 1873. B. B. Waggener, Secretary, No 1306 Chestnut St., Philadelphia. Dear Sir:—At the gas explosion which occurred at our store, No. 56 Maiden Lane, New York, on the 31st of December, the Gardner Fire Extinguishers procured from you were used to great advantage. Powers & Weightman.

To Machinists and Manufacturers in want of a prompt, energetic man of long experience to take charge of work, or act as Agent. Address Carrier, 98 P. O., Philadelphia, Pa.

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For the Best Circular Saw Mills and Steam Engines, Stationary and Portable, of all Sizes, apply to the Mansfield Machine Works, Mansfield, Ohio.

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Circular Saw Mills, with Lane's Patent Sets; more than 1200 in operation. Send for descriptive pamphlet and price list. Lane, Pitkin & Brock, Montpelier, Vermont.

First Class Bed and Platen Printing Presses to order on short notice by Sullivan Machine Company, Claremont, N. H.

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

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For 2, 4, 6 & 8 H.P. Engines, address Twiss Bro., New Haven, Conn.

English Patent—The Proprietors of the "Heald & Cisco Centrifugal Pump" (triumphant at the recent Fairs), having their hands full at home, will sell their Patent for Great Britain, just obtained. A great chance for business in England. Address Heald, Cisco & Co., Baldwinville, N. Y.

For the best Presses and Dies and all Fruit Can Tools, apply to Bliss & Williams, 118 to 120 Plymouth St., Brooklyn.

American Boiler Powder, for certainty, safety, and cheapness, "The Standard anti-incrustant." Am. B. P. Co., Box 797, Pittsburgh, Pa.

Scale in Boilers. I will Remove and prevent Scale in any Steam Boiler, or make no charge. Send for circular. Geo. W. Lord, Philadelphia, Pa.

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.

Dobson's Patent Scroll Saws make 1100 strokes per minute. Satisfaction guaranteed. John B. Schenck's Sons, 118 Liberty St., N. Y.

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

Boynton's Lightning Saws. The genuine \$500 challenge. Will cut five times as fast as an ax. A six foot cross cut and buck saw, \$6. E. M. Boynton, 80 Beekman Street, New York, Sole Proprietor.

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

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

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

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

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

For Steam Fire Engines, address R. J. Gould, Newark, N. J.

Brown's Coal Yard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro. 414 Water St., N. Y.

Millstone Dressing Diamond Machine—Simple, effective, durable. For description of the above, see Scientific American, Nov. 27th, 1869. Also, Glazier's Diamonds. John Dickinson, 64 Nassau St., New York.

Belting as is Belting—Best Philadelphia Oak Tanned. C. W. Army, 301 and 303 Cherry Street, Philadelphia, Pa.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

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

The Berryman Heater and Regulator for Steam Boilers—No one using Steam Boilers can afford to be without them. I. B. Davis & Co.

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

Gatling guns, that fire 400 shots per minute, with a range of over 1,000 yards, and which weigh only 125 pounds, are now being made at Colt's Army, Hartford, Conn.

Electro Gold and Silver Plater on all metals, of 12 years' experience, is open for an engagement. Address S. C., 99 Union Street, Newark, N. J.

Hand Brick Machine—Parties building a machine that will re-compact the brick after moulding and partially dried, will please address the Editor of this paper, Box 773, New York City. Send circular.

Notes & Queries

- 1.—V. asks: What is the cause of the scale which is found on malleable iron castings?
2.—C. asks if there is anything better than wax to fill cracks in wood previous to varnishing; if so, what is it?
3.—H. L. B. asks: How can I remove paint (in pinhead spots) about a year old, from plate glass windows?
4.—H. L. B. asks how to make the carmine stamp ink used on a ribbon stamp for canceling purposes.
5.—C. asks: How can I case-harden part of an object, such as the face of a hammer head, and leave the rest soft?
6.—J. B. B. asks: What varnish or composition will make cloth waterproof without causing it to be stiff and sticky, or to lose its color?
7.—C. asks: Can corundum be used for grinding on a wheel, like emery, and is it better than emery for grinding steel and iron?
8.—A. M. J. says: I would like to know what cement, if any, there is that will stop the leakage of crude petroleum from iron tanks which are caulked and riveted.
9.—J. E. F. asks how to preserve and stuff birds, and how to dress their feathers, which get spoiled in killing.
10.—L. H. W. asks: How can I temper small pieces of steel wire, 1-16 of an inch in diameter and less and 1 inch long? I wish to temper 100 at a time.

ANSWERS TO CORRESPONDENTS

G. G. S. asks: What is the present variation of the magnetic meridian from the true meridian? What is its variation at different times since 1750? Is it still moving westward, and has it been so through that entire period, or has any change from the west to east taken place? If so, when did it occur? Answer: The information desired can be obtained from the United States Coast Survey Report. The variation is still moving westward and has been continuously since the date given. The exact variation at the given locality can be determined at any time by any surveyor who understands his business thoroughly. Apply to the nearest one.

A. H. S. says: I intend to build a residence next spring, and desire to make the house warm and rat proof, if it can be done without too much expense. I proposed to fill every space between the studding with brick and mortar, leaving space of 1/2 inches for room for plastering. I am recommended to fill spaces with dry sand or dry ashes sifted fine. If I fill with brick, I must haul them, by team, 8 or 9 miles, while sand may be obtained within half a mile at trifling cost. Which had I better use for my purpose? Will not sand rot wood work, even if put in dry? Will the small nails used to nail on the lath be sufficient to sustain the pressure of the sand, the studding being 15 or 16 feet high? It is suggested that sand would stifle any fire that might start by closing around it, thus rendering building much safer. Answer: There is danger of the outside boarding becoming open by shrinking and warping, in which case the sand will run out through the open joints or laps. Dry sand has been used for deafening between floors to the extent of four inches in thickness, but a special boarding is put in to receive it, so as not to bring the weight upon the plaster; the result in this case as to dry rot has not been determined. But timber encased in plaster and in iron has developed a very dangerous rot in this city. Your safest plan will be to interlath between the studs and plaster one good coat, if you do not wish to incur the expense of brick filling. But you had better fill in at the end of your floor joists with brick, so as to cut off the connection of the floor spaces with the wall spaces, and so prevent the passage of wind or rats into the floors.

S. J. H. asks: Why does not a top fall when spinning, the same as when it is not spinning? Answer: The principle is, in some respects, similar to that of the

gyroscope. Consult Peck's "Mechanics for Schools," etc. We will endeavor to find space and time to translate it into less purely mathematical language at some future time.

E. O. McC. asks: How far can water be drawn on a perpendicular, with a fire engine? Answer: Probably not 30 feet. 33 1/2 feet is the highest that a column of water can be supported by ordinary atmospheric pressure.

J. V. H. N. says: I have a little turbine wheel with which I run my printing presses. It is situated in my second story. The manufacturer stated that I would lose no power by placing it there, provided I made a draft tube of the discharge pipe, by inserting its end in a tub of water and making it air tight. I had the discharge pipe made siphon like at the lower end. The query is: Do I lose power by the siphon arrangement; and, if it is not perfect, would I lose power by the water and tub arrangement, and if so, how much? If I lose power by either arrangement, I should like to know, for in that event I would place the thing in my cellar. Answer: Any arrangement by which you make a complete seal of the lower end of the discharge pipe against the ingress of the air, and thus retain the tube full of water, will be effective with a properly constructed wheel, provided that it is not placed at a greater height above the discharge opening than that due the pressure of the atmosphere, and provided that the arrangement does not impede the flow of the water. If the seal is imperfect, head is lost and also a proportionate amount of power, by the entrance of the air.

J. F. asks which will be most effective, a circular saw with 45, or one with 26 teeth, in cutting pine board. Answer: The size of saw or speed of its periphery should be given. We cannot give a definite answer as the question is asked. At one speed, the teeth might be set too close if 45 in number, and at other speeds, they would be too far separated if 26 were used.

O. K. asks if it is advisable to drive a 4 1/2 feet burr millstone with a quarter twist belt from the engine shaft to the spindle, and how wide must the belt be. Answer: We do not like quarter turn flat belts, but properly arranged, and with plenty of length, they sometimes do well. Try a 5 inch belt, if you have good distance between the stone and the line shafting.

J. P. W. says: I have lately put into my shop a ventilator 14 inches square and about 14 feet long, extending from the ceiling overhead, 7 feet out of the roof. I have a hood at the top to cover it, which can be raised any distance, from 2 inches to 3 feet: but it will not draw. A current of air sets downwards most of the time. What is the trouble? Answer: We presume that an equally large volume of air rises through the chimney or elsewhere, where the upward draft is more powerful.

T. I. F. asks: In making the driving or band wheel of a common horse power larger, to increase speed, what proportion in length ought the levers to be, to make any gain in favor of the team, if any, as the larger the circuit the slower is the speed? Answer: Increasing the size of the band wheel in the horse power machine will increase speed of driven pulley at the expense of the driving force, which will diminish in similar proportion. No alteration for the purpose of regaining the lost advantage will be successful except by sacrificing the speed gained.

O. N. asks: Which end foremost will a log, thirty feet long and twenty inches in diameter at one end, tapering to a point at the other, tow easiest in water? Answer: The log will move more easily with its sharp end foremost. The principal resistance in propelling properly formed bodies in water comes from the friction between the surface of the body and the water. In the case of a blunt log or a blunt vessel, the resistance is increased by the piling up of the water in front. If the log is moved sharp end first there is no front piling of the water, but the latter is divided and swings away sidewise with little or no resistance, like the pendulum of a clock.

T. R. L. says: Last summer I noticed on the grass of my lawn a circle or ring of a bluish or ash color, about 8 inches wide and 10 feet in diameter. Upon examination I found that each blade of grass composing the circle was covered on both sides with a kind of mildew, which, when undisturbed, was of the bluish color; but when rubbed between the fingers, it became black. The grass was about 4 inches long, and when the mower was run through it, this substance rose in a cloud and was blown away. On another part of the lawn, there was another portion of a circle, about one half. As I never saw one before, can you let us know what caused it, and why it assumed the circular form? Answer: It would be impossible to give a positive answer without some of the substance for microscopical examination. But it is very probable that a mushroom would have been found in the center of the circle, and that the "mildew" was caused by a scattering of the myriad spores of the fungus.

E. A. N. says: A discussion has arisen between myself and an old experienced engineer relative to some trouble that I am having with the feed pipe of the engine that I have charge of. The bends in the heater last but a very short time, and I have had to renew the whole pipe from the pump to the check valve (some parts of it several times) in the last twelve months. The tank is round, and about 8 feet in diameter at bottom, and just taper enough to hold hoops; it is between 8 and 9 feet high and is raised 9 feet from the ground. The pipe from the tank to the pump is one inch gas pipe. The pump has a solid plunger 2 1/2 inches in diameter and the pipe that troubles is 1 inch gas pipe. The old engineer contends that the pipe is large enough, and that the water contains some mineral that injures the iron when heated; I say that the pipe is entirely too small, and I suggested to him that the pressure of the tank greatly assisted the atmosphere in promptly filling the vacuum produced by the pump, while the heat communicated to it (the water) would expand it and thus, having the pressure in boiler to contend with, would create great friction. In proof of my position, I called his attention to the stand pipe (which is 1 1/2 inch gas pipe from the check valve to the boiler) and is seemingly as sound now as when put in. Will you give your views on the subject? Answer: We think the pipe too small altogether, unless the pump runs very slowly indeed. If the trouble arises from oxidation by anything dissolved in the feed water, it should be easily detected.

D. M. says: I have a brick building covered with tin, with a parapet roof; and from some defects in putting on the tin, it leaks badly, especially during very heavy rains. The mechanic blames the tin, and the tinner the mechanic. I think both are to blame. Please advise me whether I had better tear off the roof or not. I had the parapet roof to secure safety from fire from buildings a short distance off. It may be best to change the roof from a parapet. Answer: Do not alter the parapet, but insist upon the tinner's making the roof tight. He should find the openings in it and solder them tight; and if the parapets are of brick, as we presume they are, he should take paint skins and cement the joint

where the tin enters the brick work. Most likely the fault lies here.

O. H. asks: What power for each square inch of water passing through pipes from an elevation of 400 feet a distance of five miles could be obtained? I am desirous of this information, as my farm is about the above distance from the water works, and the water pipes to supply the city are more than half the distance down in the streets; and if I could convey the water the distance named, it seems to me I should have, with a five or six inch pipe, a power to cost less than to build a steam engine of ten horse power. Answer: Every ten gallons of water, under the head indicated, is capable of developing about a half horse power, if used in an ordinary water wheel of small size. The pressure will be likely to vary immensely from that due the head with the greater or less amount of water used in the city, and the friction of the pipes will cause considerable loss. The power actually derived from the source referred to will be probably but a small proportion of that due the head, but we cannot undertake to say how small that friction may be. We should anticipate that steam power would be cheaper than water power, and also more reliable, under such circumstances.

I. P. H. asks: When was the game of chess invented, and by whom, and in what country? Who is the standard authority on such games? Are there any reliable books on tactics, and whose is best for beginners in that art? Can you inform me where Balearn is located, as I cannot find it on any of the maps? I think it is in the Austrian empire or near it. Answer: The game of chess is said to have been invented in India 5,000 years ago. Staunton and Hoyle are the standard authorities. Professor S. F. Baird has published directions for taxidermists in the Report of the Smithsonian Institute for 1856. Balearn is the German name for Bavaria.

J. asks for a simple method of detecting explosive oils, and states that his neighbors use a burning fluid of which the vapor escapes through a burner. He believes a good refined coal oil to be preferable to this fluid, whatever the latter may be. Answer: A perfect test for mineral oil was described on page 341 of our last volume, under date November 30, 1872. J.'s letter is one of many asking for instruction on practical matters which come to us every day, answers to which have been already published in our journal. Better evidence of the continued usefulness of the SCIENTIFIC AMERICAN could not be adduced.

C. H. says: On December 13, about sunset, there was a bluish light, apparently about the size of a common barrel, at a considerable height in the air. It traveled westward, and would not have been noticed by many but for the tremendous noise, which jarred the earth and made the windows rattle. It continued roaring all over the sky for several minutes. What was it? Answer: If the blue light had been invested with a tail, it would be easy to account for the phenomenon; but wanting that appendage, science fails to offer a satisfactory solution.

W. H. C. says: I have had an argument with a friend, who takes the position that the sails of a ship, being the first part seen as she approaches, is not a proof of the rotundity of the earth. He argues that the circle of the earth's circumference is too great, and approaches too near a straight line to produce this result within the distance that a ship can be seen with the unaided eye. How is this? What is the rotundity of the earth per mile? Answer: Eight inches.—How far can a large ship be seen on a smooth sea? Answer: About 17 miles, if the masts are 200 feet high.—Suppose a straight line, 50 miles long, to touch the circle of the earth at the center of the line, how far would each end of that line be from the circle? Answer: About 417 feet.

R. H. M. says: We have two flue boilers, each of the following dimensions: 16 feet long, 4 feet diameter, with 48 three inch tubes; the grate surface is 5 feet by 4 feet. They are said to be of fifty horse power each. We have also two other boilers, each 16 feet long, 4 feet 6 inches diameter; one has 64 three inch tubes, the other, 62. The grate surface is 5 feet by 4 feet 6 inches; said to be of 70 horse power each. On the last named boilers our working pressure is 80 pounds; we very frequently find great difficulty in keeping up this pressure, with only one hundred horse power of work on our engine. The length of steam pipe is barely 50 feet, consumption of fuel, 6 tons best soft coal, in twenty hours. What I desire to know is this: Is the estimated power correct according to dimensions given, allowing the usual percentage (which I believe is 15 per cent) for condensation, etc.? Is the consumption of fuel out of proportion to the amount of work obtained? And is the grate or fire surface sufficient? Answer: Good builders of steam boilers usually allow twelve feet of heating surface per horse power, and, with good engines and boilers, it is sufficient. Five hundred and sixty pounds of coal per hour, with a good engine and boilers, should give at least 120 indicated horse power; and with the best engines and boilers in the market, 100 horse power should be obtained with a consumption of one half the amount of coal given by our correspondent. The proportions of the boilers described seem to us good. Examine the engine and the setting of the boilers. There is a serious defect somewhere.

C. F. W. says: In estimating the power of antifriction cams, I take it for granted the law is the same as for an inclined plane, namely, as often as the height is contained in the length the power is doubled; but in my case the length of the plane is 6 inches, the height 3 inches, and when used, both planes work at the same time, but the height is double, making 6 inches. Is there, or is there not, any power gained besides what is gained by the lever to work the same? Answer: The relation of force exerted to resistance overcome, in the whole combination, can be determined by multiplying the force exerted by the distance over which it moves in its own direction and dividing by the distance traversed by the table of the press. The result gives the resistance which may be overcome, whatever the intermediate mechanism, and provided there is no friction.

M. D. K. asks: 1. What is the highest speed attained in printing cards, circulars, etc., and what is the name of the press? 2. How can I ascertain the power of a toy steam engine? 3. Is there an illustrated dictionary of mechanical terms published? 4. How are colored lithographs made, and are all the colors printed at one impression? Answers: 1. About 1,000 per hour, by the Gordon press or some one of its modifications. 2. Toy steam engines are generally too small for the ordinary formula to accurately represent. Set your engine to work raising a weight, and remember that force sufficient to raise 33,000 pounds a foot high in a minute is a horse power. 3. Consult a bookseller. 4. Each color on a lithographic print is produced by a separate impression.

A. A. D. asks whether the power of a hydraulic press is doubled or quadrupled by the use of two or four small pumps, which inject the water into the large cylinder, instead of one; or, if not, whether the effect of two or four of such small pumps would simply equal to the effect of one larger one, the diameter of b