Business and Personal.

The Charge for Insertion under this head is \$1 a Line.

Wanted—The address of parties who can make first class small iron castings and do Galvanizing. Address C. L. T., P. O. Box 773, New York.

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Wanted—A full set of Pail Machinery Address, with price, V. W. Kelly, Genoa, Ottawa Co., Ohio Address Gear, Boston, Mass., for Machinery Catalogue.

The discomfort caused by Rupture can be ustantly relieved and soon permanently cured by wearng the newly invented Elastic Truss, which holds the rupture securely night and day, even during the most violent exercise. Worn with great comfort, it should not be removed till a cure is effected. Sold cheap. Very durable. It is sent by mail by The Elastic Truss Co., No. 683 Broadway, N. Y. City, who send Circulars free on application.—New York Independent, April 24, 1873.

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Boiler for Sale—Six horse, upright tubular, 30 in. diameter, 6 ft. high, 32 two in. flues, with gauges and cocks complete. All in perfect order. New, February, 1872. Trump Bro's, Port Chester, N. Y.

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The Ellis Vapor Engines, with late improvements, manufactured by Haskins Machine Company, Fitchburg, Mass.

For the best and cheapest small portable Engine in market, address Peter Walrath, Chittenango, N.Y. For Circular Saw Mills, with friction feed works, and Stationary Engines, address Wm. P. Duncan

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Drawings, Models, Machines—All kinds made to order. Towle & Unger M'g Co., 30 Cortlandt St., N. Y. 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.

A Rare Opportunity is offered to Manufac-turers of Agricultural Implements, to purchase the Pat-ent and a complete Set of Patterns, including Power and Jack, for a Small Threshing Machine, with Eighteen Machines completed and ready for work. For particulars, address Mansfield Machine Works, Mansfield, Ohio.

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Royalty — Manufacturers and Inventors, have your Machinery, &c., made in the west for western use. Extra inducements offered by Doty Manufacturing

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Brick Machines. Averages 40 m per day. Fully guaran teed. For sale cheap. John Cooper Engine Manufac turing Company, Mount Vernon, Ohio.

Buy First & Pryibil's Bandsaw machines which are more used than any other in the country Also, Shafting and Pulleys a specialty. 467 W. 40th St.

Hand Fire Engines, Price \$500 to \$2,000. Also, over 800 different Style Pumps for Tanners, Paper Mills, and Fire Purposes. Address Rumsey & Co., Seneca Falls, N. Y., U. S. A.

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Damper Regulators and Gage Cocks—For the best, address Murrill & Kelzer, Baltimore, Md.

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

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

Tree Pruners and Saw Mill Tools, improvements. Send for circulars. G.A.Prescott, Sandy Hill, N.Y. Brown's Coalyard Quarry & Contractors' Apparatus forholstingand conveying material by iron cable,

W.D. Andrews & Bro. 41 4 Waterst. N. Y. Steam Fire Engines, R.J. Gould, Newark, N.J.

Cabinet Makers' Machinery. T.R.Bailey&Vail. Boring Machine for Pulleys—no limit to apacity. T. R. Bailey & Vail, Lockport, N. Y For Sale Cheap—Six Horse Power Portable Engine, mounted on truck, good as new; been used only two months. Address N. Abbott, Mansfield, Ohio.

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.

40 different Bandsaw machines, 60 turning and improved oval lathes, shaping, carving and mould ing machinery, for sale by First & Pryibil, 461 W. 40th St., New York City.

For best Presses, Dies and Fruit Can Tools, Bliss & Williams, cor. of Plymouth & Jay, Brooklyn, N. Y. Gauge Lathe for Cabinet and all kinds of handles. Shaping Machine for Woodworking. T. R. Bailey

Tool Chests, with best tools only. Send for reular. J. T. Pratt & Co., 58 Fulton St., New York.

To Let—For Manufacturing purposes—a brick building 126250, with Water power 36 H.P. day and night on Morris Canal and Midland R.R., and but a short distance from the D. L. & W. and Erie R.R. Address Box 6704, New York Post Office.

Shafting and Pulleys a specialty. Small orders filled on as good terms as large. D. Frisbie & Co. New Haven, Conn.

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

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

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

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

Machinists—Price List of small Tools free Gear Wheels for Models, Price List free; Chucks and Drills, Price List free. Goodnow & Wightman, 23 Cornhill, Boston, Mass.

Gauges, for Locomotives, Steam, Vacuum Air, and Testing purposes—Time and Automatic Re-cording 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,

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

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

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

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 Mercht's M'f'g 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, 22 Broad way, N. Y., or Box 1809.

Parties desiring Steam Machinery for quarrying stone, address Steam Stone Cutter Co., Rutland, Vt



A. P. asks: Is there an invention for extracting watery matter from meat for the purpose of preserving the meat?

S. A. says: We have serious difficulty in drying glue in making petroleum barrels during hot southerly winds in summer. Can you tell us of any preparation that will facilitate the drying of glue and not injurethe oil?

A. E. S. says: I tried to make ink by following the recipe given in a recent number of your paper but as soon as I put in the bichromate of potash, the water and coloring separated, and no amount of gum would make them unite again. Why did I fail?

U. E. asks: What are the cause of and remedy for the cracking of taps, etc., when in process of hardening in water? Oil will not always make them hard enough. The same trouble occurs with cutters, which crack and split off from the outside circle. It is usually accompanied with a report, especially in the

C. E. asks: Can you give me a reliable approximation of the horse power required to drive the different kinds of cotton machinery, namely, opening and lapping machines, cards, drawing, coarse, interme diate, and fine speeders, ring spinning, mule spinning, spooling, warping, slashing, weaving, etc.?

D. T. asks: What is the best process for imitating Russia leather?

R. C. K. desires to know the difference of strength, for farm purposes, in ashes made from white wood and from oak, maple, and birch.

J. H. P. asks for a formula for determining with accuracy the contents of a barrel or cask when only

S. A. T. asks for a recipe for a dead black for making a " black board " on white pine.

S. A. T. says: I should like a recipe for naking hard soap for toilet use. say about 25 lbs. quan tity, colored and perfumed.

W. H. R. asks: Can magnesium be obtained in a finely comminuted state If so, where and at what price, and how are its characteristic qualities af-

W. F. H. asks for the best method of cleaning empty cider barrels so that they will b wanted for use in the next fall.

J. H. W. asks: 1. If 100 gallons of proof spirit are mixed with 100 gallons of water, what will be the degree below proof and what the gravity? 2. How many gallons of water are required to reduce 100 gallons of spirit of 60 above proof to a spirit 20 below proof? 3. Is there a rule for reducing a high proof liquor with one of lower proof?

B. L. B. asks: Is the temper of steel knives mpaired by cuttin apples or other fruit? If so, why?

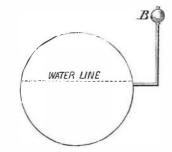
B. L. B. says: I have noticed that my varnish (gum shellac and alcohol), after standing a while in tin cups, becomes of a dark muddy color. Does the tin

J. W. K. asks: Would there be any advan tage in using dry sponge as a filling for waterproof life preservers, rafts, etc.? Could sponge itself be made wa terproof, so as to retain the buoyant properties of dry sponge?



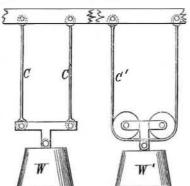
J. B. asks how to prevent food, put in a cupboard newly painted inside and grained outside, from tasting of paint. Answer: Wait till the smell has passedaway, which will be when the paint, varnish, etc. are thoroughly dry.

E. J. M. says: Near here was a high pressure steam boiler, with a low water indicator attached, as represented below. During a cold snap, the little globe marked B was found filled with ice, and a piece was broken out. It puzzles us to know how the globe could have been filled with water, when there was nothing to prevent its flowing back to the boiler as fast as condensed. One says the pipe, being only % inch diameter, filled up and froze first. There's the rub, as how didany more pass, so as to fill the globe? A friend says that he took the indicator down, and that there was nothing in the pipe at all, neither ice nor anything else. Answer: With a small pipe, the water would not be able to circulate within and to allow of the entrance of steam or air to displace it. The pipe should be made at least %, and straightfrom B down to the lower end.



J. B. D. says: 1. I heard some gentlemen have an argument about the rainbow. P. K. D. says the bow is in the clouds because God put it there, that all the nations of the earth might know that it would not be destroyed by water again. I contend that it is the sun shining on the rain, reflecting on the clouds, because the bow always shows in the opposite direction from the sun. The bow shows more plainly on the sky than on the clouds. I havenever seen a bow in the south or north. I once saw a very tall tree fall into a river. The water splashed up about 40 feet high, and came down in a fine sprinkle; there was as fine a rainbow shown as ever I saw. 2. I have heard it said that the machinery of a water mill ran 25 per cent faster in the night than in the day time. The water appeared to be the same. What was the cause of it? 3. I want to know the cause of the knocking in an engine. One engineer says it is in the cross head, another says it was an up and down or side knock in the wrist. Answers: 1. The cause of the rainbow is that supposed by our correspondent. The rays of light from the sun, reflected and refracted by the transparent rain drops, are brought to the eye in such a manner as to cause the beautiful colors that characterize the rainbow. The center of the curve, the sun, and the eye, are always in one line. Hence a rainbow can-not be seen at midday. The moon sometimes causes a rainbow to appear. The physical conditions necessary to produce the rainbow may have first occurred as stated in the Scriptures. Scriptural truths and the truths of nature never conflict, although our interpretation of the former often creates an apparent contra diction. 2. We do not know what is the cause of the nhenomenon noted. 3. We cannot guess, but a good engineer should be able to determine by examination.

G. C. H. says: W W' represent two weights of equal heft and size; one is suspended by two wire ropes, C C, the other by one continuous rope C', passing under pulleys with smooth flat faces. Some assume that these methods of suspension are equally strong others assert that the continuous rope will break quick er at A, than the two ropes, C C, for reason that the con-



tinuous rope is straining apart between the two pulleys Which is the strongest, if there be any difference? An swer: There would be no difference in the amount of strain on the rope, and one would be just as likely to part as the other, if the ropes are equally strong. The tension on C' must be equal throughout, at A as well as elsewhere, and equal to that on each part of C.

J. B. P. says: A circular sawing machine, run by one or two men with cranks, has two light balance wheels, 29 inches in diameter. Would there be gain, or loss, by placing a large balance wheel beneath the floor, connected by a belt with the machine? If such a change is advisable, what size and weight of wheel wouldbe necessary? We use an 8 inch saw. Answer: We should not anticipate a gain, and the friction of the added apparatus would cause loss of power.

R. & S. say: We are running an engine 7 inches x 12, cutting off steam at half stroke, and running 175 revolutions per minute; we use a 20 horse power boiler, and carry 70 lbs. of steam. Please state how manylbs. of steam we should carry to give one half of the power as described above, and also how we should run the engine to produce its full power. Answer: Answered in part on page 257 of our current volume. Probably 40 lbs, steam would give about half nower. It can only be determined with certainty by the indicator of dynamometer.

E. says: One of our workmen from England gave us the following recipe for removing scale from hollers. Is there anything injurious to the iron or ob jectionable otherwise? 8 lbs. gum catechu, 3 lbs. black lead, 6 lbs, crystals sods. Answer: The mixture would do no harm, probably, unless when used in excess; the decomposition of the gum should produce vegetable acids. Let us know, if it succeeds, what kind of water you have, and the nature of the scale.

F. O. C. says: 1. I claim that in order to get perfect combustion, you must not admit any more air under or through the fire than it will consume, for if you do, it will tend to deaden the fire, and to lose the heat that you would get if only the right quantity were admitted. A friend claims that it does not matter how much air you admit to the fire, and that all the difference is, that the fire roars under my arrangement and not under the other; but still, he says, the fire is burning just as well as at first. 2. My friend says the classics are the foundation of everything in the matter of learning. I say they are not; and that, if a great part of the time spent on them were devoted to mathematics, mechanical drafting, drawing, natural philosophy and some other practical studies, there would be many less drones in the battle of life, and that we should have many more young men ready and willing to work. Many a father and mother will work to stuff their children with Latin, French and German; and when the parents drop by the way, dead, the children find their stay is gone. S. My friend says the Christian Sabbath was not changed from the seventh to the first day of the week till a number of centuries after Christ, and that by the Pope. I claim that Christ changed it when He arose from the dead, and that that day was in reality our Sabbath, and that it has been so regarded by historians ever since that time; and that nowhere in the New Testament, after the death of Christ, can you find it mentioned as any other than the first day of the week. 4. On page 251 of your current volume, the directions for making sealing wax do not say what the proportion of shellac should be. 5. A book on astronomy says that light moves 288,000 miles per second; I claim that it is from 188,000 to 192,000. Which is right? Answers: 1. Were it possible to reduce the temperature of escaping gases to that at which they en-tered the furnace, your friend would be correct. Actually, however, he is wrong. It is, however, found usually necessary to supply about twice the quantity of air required to combine with the fuel, in order that complete combustion may take place. The excess causes some loss, but it is not so serious as would be the loss from incomplete combustion, were a less quantity supplied. About 12 pounds of air per pound of fuel would be sufficient, could time begiven it to find and unite with every atom of fuel. It is, however, necessary to supply usually 24 pounds, although in some cases of forced draft the quantity has been brought as low as 18 pounds. 2. To a man of fortune, or to the man who proposes to devote his life to study, we should say that his education would be incomplete did it not include a knowledge of the classics. To the man of business, to the working man, or to any one who must depend upon his own intelligence, energy and education for support and for success in life, we should commend a thoroughby practical, technical course of study. Were we desirous of fitting a son for a high position as a workman, and to take a valuable position as superintendent of a manufactory, we should send him to some such school as the Industrial School at Worcester, Mass. If he aspired to excellence as a professional mechanical engineer, we might give him a higher course of study in such a school of engineering as that of the Stevens Institute of Technology, at Hoboken, that of the Massachusetts Institute of Technology, in Boston, or that of the Sheffleld school, at New Haven. To make him a good civil engineer, we should go to a special school of engineering like that at Troy, N. Y. The necessity of such schools has long been seen by us, and in answer to the rising demand they are springing up all over our country. Their success is one of the most encouraging signs of the times. 3. Your friend is about right. The change, how-ever, was a gradual one, beginning with the time of Constantine the Great, in the fourthcentury. 4. Six ounces 5. You are right.

E. W. G. says: 1. I have two engines run ning a circular saw mili. They have cyliaders 8x22, set about 5 feet apart and connected by a crankon each end of shaft. The boller is an upright tubular. The steam pipe is 2 inches, about 30 feet from boller to near the cylinders; then it branches to each steam chest with 1% inch pipe. The question is: Is this 2 inch pipe large enoughfor the main pipe, and the 1½ inch for the branch-es? 2. The regulator valve is about half way along the es? 2. The regulator valve is about hair way along the main pipe; would it be better nearer the engines or the boller? 8. My steam gage shows 10 lbs. when at rest, and we usually run the engines at 60 lbs. by it. Do we really have 60 lbs., or only 50 lbs.? Is there any way of adjustingthe gage? Answer: 1. We should make the main pipe about 2% inches diameter, and perhaps 3 inches, if the engine were running at high speed, and the branches 2 inches. 2. The regulator should always be as near the cylinder as possible. 3. Probably 50 lbs. Have the gage tested if you would be safe.

L. P. C. says: I would like to know how large a round chimney would be required for a boiler with 38 three inch tubes. In other words, ought the chimney to contain the same number of inches in its area as the sum of theareas of the tubes? Answer: The chimney is usually made of somewhat less cross area than the collective cross section of the tubes. A common proportion, when natural draft is employed, gives the area over bridge wall one eighth the area of grate, one ninth through the tubes, and one tenth in the chim-

H. B. B. says: I have a saw mill with 54 inch saw; the engine is of 11 inches bore x 4 feet stroke. There is a drum of wood 12 feet in diameter, connecting with counter shaft, on which is a small drum, 22 inches in diameter, and a large drum about 3 feet in diameter. I use two cylinder boilers, no flues, \$4 inches in diameter and 24 feet long, and have considerable trouble in keeping up steam, with wood sometimes partly wet. The smoke stack is of iron, 26 inches diameter and 30 feet long What kind of grate surface should I have to burn saw dust and wet wood? Would a blast of air or steam help it? Which is best of the two, and at what point and in what way should it be applied? How many revolutions per minute should the saw make cutting soft cvpress timber, and how much feed should there be to each revolution? Answer: Run the saw about 60? revolutions per minute. There are many devices for burning wet saw dust and spent tan bark, few of them satisfactory, however. A blast must be used to burn them on ordinary grates, but it is better to make special furnaces for with large area of grate, and with provision for drying them before burning, and allowing considerable air to enter above the grate.

S. B. E.asks: What injury, if any, would there be in oiling locomotives and other machinery with hotoil, say at boiling point? Which lens would be best for a miniature buil's eye lantern with very small flame, plano-convex or double convex? Answers: 1. There should be no injury to the machinery from the high temperature, unless where the parts are case hardened. But hot of has less body than cold, and would be less valuable as a lubricant. Using hot oil would compel running journal brasses quite slack, to prevent binding and overheating in consequence of expansion with the heat. 2. Plano-convex, with plane side toward th cource of light