

Business and Personal.

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

Dry Steam for best Lumber Dryer, and best House Furnace. Circulars free. H. G. Bulkeley, Cleveland, O.

Wanted—Address of parties who mould and finish small iron castings. E. C. Bidwell, Savannah, Ga.

Mechanic's best tool yet; strikes 12 in. Circle. Calliper and Dividing one, of Steel, by Mail, 75 cts.; 2 pair, \$1.40. Barnes, 15 Ash'n'd Place, Boston, Mass.

Situation wanted by a practical Brass worker and finisher, capable to take charge of works. No objection to go West. Box 75, Lawrence, Mass.

Wanted—Aman of Experience or ability to handle two heavy Valuable demonstrated inventions. Address Harper, 1623 N. 17th street, Philadelphia, Pa.

Pleasure Steamer for Sale, Cheap. Carries 10 persons comfortably. L. T. Burnham, Waltham, Mass.

Makers of Steel Bar Bells, address, with prices, F. S. Boynton, La Porte City, Iowa.

Wanted—Partner in a number of valuable patents. Patent right salesmen and manufacturers, address, for 30 days, J. E. Garside, Hennepin, Ills.

A valuable patent for sharpening planing or other machine knives without removing them from the cylinder, or cylinder from the machine, for sale. Address J. J. Grant, Greenfield, Mass.

R. R.—In Broughton's Oil Cups, it matters not whether Oil be thick or thin. They can be graduated in a moment to suit all purposes. For particulars, apply to the manufacturer, H. Moore, 48 Center St., N. Y.

Steam Yacht for Sale 60 ft. long 25 horse engine. Beautifully fitted up. Address H. L. R. 40 West 18th St. New York.

Steam and Water Packing Manufactured by The Manhattan Packing Mfg Co., 15 Frankfort St., N. Y. This Packing is superior to any in the Market.

No inconvenience is ever felt in wearing the New Elastic Truss which retains the Rupture, night and day, till cured. Sold cheap by the Elastic Truss Co., 683 Broadway, New York.

Buy Boults' Pat. Molding and Dovetailing Machine, for all kinds edge and surface molding. Battle Creek Machinery Company, Battle Creek, Mich.

Best Steam Fire Engine or Hook & Ladder Signal Lamps. Apply to White Mfg Co., Bridgeport, Ct.

A Condensed Treatise on Silicate or Soluble Glass just published and mailed free on receipt of \$1. L. & J. W. Feucht wanger, 55 Cedar street, N. Y.

Chemicals of all kinds for all trades made to order at our own Laboratory by addressing L. & J. W. Feucht wanger, Chemist, 55 Cedar street, N. Y.

The Olmsted Oiler is the best; it is self-righting, strong and cheap. All Hardware and Tin Houses have it.

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

Buy Gear's New Emery Grinding Machine, Boston, Mass.

Key Seat Cutting Machine. T. R. Bailey & Vail.

Portable Hoisting and Pumping Engines—Ames Portable Engines—Saw Mills, Edgers, Burr Mills, Climax Turbine, Vertical and Horizontal Engines and Boilers; all with valuable improvements. Hampson, Whitehill & Co., Newburgh Steam Engine Works, Depot 38 Cortlandt Street, New York.

Lathes, Planers, Drills, Milling and Index Machines. Geo. S. Lincoln & Co., Hartford, Conn.

Scale in Steam Boilers—How to Remove and Prevent it. Address Geo. W. Lord, Philadelphia, Pa.

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

Gear, Boston, Mass., sells the latest Improved Machinery.

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

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

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

Stave & Shingle Machinery. T. R. Bailey & Vail.

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.

Fine Machinery Oils.—We take pleasure in calling attention of our Manufacturing readers to E. H. Kellogg's advertisement in another column, and saying that we believe his claims in regard to fine Engine, Spindle, and Signal Oils are fully justified by the facts, and that parties who try his goods will not have cause to regret it.

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.

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

Bookkeepers should try the Olmsted Patent Bill File and Letter Clip. They are admirable for all papers. Save their cost in one day's business. Sold by all Stationers. J. H. White, Newark, N. J., Sole Manufacturer.

To sufferers from batteries that get out of order on Burglar Alarms, etc., the Leclanche Battery Co., 40 West 18th st., New York, guarantee these batteries to last one year without any attention.

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

For Sale—3 Pat's at less than half their value, two for Impr'ts in advertising Lanterns, one for Impr'ts in Envelopes, by S. Kuh, Jefferson, Iowa.

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

Catalogue on Transmission of Power by Wire Rope. T. R. Bailey & Vail.

Bolt Makers, send for descriptive cuts of Abbe's Bolt Machine, to S. C. Forsyth & Co., Manchester, N. H.

Mills for Flour, Feed, Paint, Ink, Drugs, Spices and all other purposes. Ross Bros., Williamsburgh, N. Y.

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

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

The Best Smutter and Separator Combined in America. Address M. Deal & Co., Bucyrus, Ohio.

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

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

Gauge Lathe for Cabinet and all kinds of handles, Shaping Machine for Woodworking. T. R. Bailey & Vail, Lockport, N. Y.

For Sale—An interest in a well established, profitable manufacturing business, capable of great enlargement, for which personal assistance and additional capital is wanted, to the amount of from ten to thirty thousand dollars. The goods made are in extensive permanent demand, the machinery used is simple, and the right of manufacture exclusive. Any active man or company desirous of securing a good and substantial business and first rate article for manufacture, will find this a bonafide opportunity. Address F. C. Beach, Box 773, New York City.

Engineering and Scientific Books. Catalogues mailed free. E. & F. N. Spon, 446 Broome St., N. Y.

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

Cabinet Makers' Machinery. T. R. Bailey & Vail.

2 to 8 H.P. Engines, Twiss Bros. N. Haven, Ct.



J. E. R. should try to blue his steel articles by the process mentioned on p. 107, vol. 26.—C. H. D. will find a method of making bone phosphate detailed on p. 343, vol. 26.—R. W. should read the answer on p. 362, vol. 25, for a good black dip for metal articles.—E. C. M. will find a description of the horticultural fertilizer on p. 401, vol. 28. It should be phosphate of ammonia, not biphosphate.—D. E. is informed that the published accounts of phospho-bronze do not mention the proportion of phosphorus, which can doubtless be ascertained by experiment.—H. J. H.'s query as to the names of the steam engine is incomprehensible.—T. A. C. can find the proper weight of ball proportioned to length of lever for a safety valve by applying the formula on p. 106, vol. 25.—S. H. W. should read some elementary work on chemistry, and had better advertise for the other information.—J. T. L.'s query is a trade matter; he should consult an engineer.—We are obliged to G. & C. for their correction; the mistake was not ours.—P. P. can bronze cast iron by using the process described on p. 58, vol. 26.—B. L. B.'s equation is a catch; the answer may be either 18 or 2, as the data are not properly expressed.—W. B. J. will find the needed information as to mold for plaster ornaments on p. 138, vol. 29.

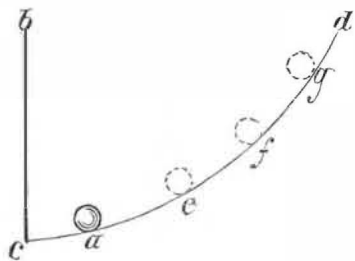
E. F. L. asks: Would two steam boilers of equal capacity, one an upright and not walled in, the other a horizontal and return tubular, walled in, each having thirty-three feet of smoke stack, do the same work with the same coal? Which would be the most economical, and what per cent will the one save over the other, and why? Answer: We suppose the horizontal boiler would be the most economical, because it would be better protected against loss of heat.

G. D. asks: Does it require more force to bring a moving body to rest than it does to give it the motion? I should say not; yet it would seem to be so, if I rightly understand your reply to J. B. T., page 77 of the current volume. I reason that if an engineer can jump from his engine at the rate of 15 miles an hour, it makes no difference, so far as his relation to the engine is concerned, whether it is in motion or at rest. If the engine is moving west at the rate of 15 miles an hour and the engineer jumps east with the same velocity, when he strikes the earth he will be motionless. Is not this so? I think J. B. T. mistaken in thinking that "engineers, etc., invariably jump in the direction of the moving train." It is true that they face in that direction, but they usually jump with a swinging backward motion, making the head and body move as rapidly as possible in the direction opposite to the train. If an engineer jumps backward with a velocity of ten miles an hour, and the train is moving in the opposite direction at the rate of 25 miles an hour, he strikes the earth with the velocity of only 15 miles an hour, the force of which can easily be resisted by an ordinary man. Active base ball players frequently fall without injury when running with a speed of from 19 to 20 miles an hour. Answer: It is true that it takes no more force to stop a moving body than is required to impart the motion to it; but the question of time plays an important part in many cases. We will try and make this plain, by a few simple illustrations. Suppose a train is moving at the rate of 30 miles an hour, and strikes against something which stops it instantly. Now if a man were standing up in that train, facing to the rear, the effect would be the same as if he were to jump with a velocity of 30 miles per hour; and on our correspondent's theory, he ought to remain standing and uninjured. On the contrary, we know that he would perform a few involuntary somersaults, and the chances would not be very favorable for his escaping with his life. This is because, though just as much force was brought to bear to stop his motion as had been used in producing the motion, there was an amount of work stored up that required time as well as force to overcome it. A train moving from a station starts slowly, and gradually acquires speed, so that the passengers are not much affected by the increasing velocity. But if the train started abruptly at a speed of 30 miles an hour, couplings would break, passengers would be thrown in all directions, and general havoc would be the result, for the same reason as before, that time is required to impart a rapid motion to a body, if it is to be done without shock. We might multiply these illustrations to any desired extent. Suppose we have a fly wheel with a heavy rim and crank attachment, and that a man working on this crank makes the wheel revolve at a high velocity. Now let him try to stop it suddenly, and he will find that the power stored up in the wheel is sufficient to lift him off his feet, and throw him to some distance. The case instanced by our correspondent, of base ball players, will also serve as an illustration. Probably one of these players rarely runs faster than at the rate of 18 miles an hour, and so many accidents have happened at first base by the difficulty of stopping suddenly without injury that the rules have been amended, and a player on reaching first base does not have to hold it, but may run over it and cannot be put out, until the ball has been returned to the pitcher. Our correspondent is right in remarking that persons jumping from a moving train face in the direction of the motion, and hold back. Some years ago, a man in Schuylkill Haven used to excite the admiration of all who saw him by jumping from a train which was moving at the rate of 25 miles an hour. He may still display his agility and nerve, for aught we know, although it must be confessed that this proceeding was somewhat risky. His plan was to go to the rear platform, place his feet on the buffer and his hands on the rail, leaning back as far as this position would allow. When he reached the place where he desired to stop, he would jerk his hands and feet simultaneously, and reaching the ground in an upright position, would walk off to his work with an unconcerned air. We are not relating this incident to induce our readers to go and do likewise. If they are very desirous of experimenting let them try it on a street car, where the only results of

failure will be a few bruises and the derision of the bystanders. We once knew a man who jumped from a canal boat, in a direction contrary to that in which it was moving. He made some miscalculation, apparently, for, instead of landing gracefully on his feet, his head collided with the ground, and he went home a wiser and a sadder man. We think there is one case in which a person could jump backward from a moving train, if everything were propitious. Let him start at the front end of a platform car, and run backward fast as the train was moving forward; then he could jump with safety. But a slight miscalculation might disarrange the experiment.

W. H. M. says: In your answer to M. C., in No. 8, Vol. 29, you say: Multiply the diameter of the cylinder by the decimal .7854; is this not an error? Should it not be the square of the diameter? Do you deduct anything for friction? 2. What books should a young man read so as to get a good idea of machinery in general, and about what would they cost? Answers: 1. It should be the square of the diameter, of course. In calculating the indicated horse power of an engine, no deduction is made for friction. We endeavor to avoid mistakes of this character, and will thank our readers to point out errors whenever noticed. 2. Appleton's "Dictionary of Mechanics," price \$20.00, will give you a good general idea of machinery. Spon's "Dictionary," now in course of publication, by the same author, is later and more complete.

C. H. A. says: Suppose a ball, a, to be revolving around an axis, b, say 60 times a minute; is it possible to draw a curve, from c to d, such that its tangent shall be at right angles to the resultant of the forces of gravitation and centrifugation acting on the

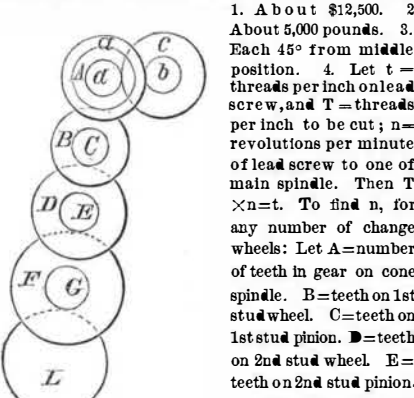


ball at whatever point of the curve the ball shall be placed, say at e, f, or g, the number of revolutions being constant? Answer: The curve is a parabola, with vertex at the lowest point. We would be glad to receive a solution of this problem (which is quite simple) from some of our readers.

R. L. asks: Can a correct test of the strength of a bridge be made from a model, one inch to the foot and in exact proportion to one of full size? Answer: Small models are generally stronger, in proportion to their size, than the actual works.

F. P. says: In constructing a pair of scales, as sensitive as possible, (1) is there any rule as to the relative length of beam, and chains or threads to which the cups are attached? 2. The two holes being made at each end of the beam, and a straight line drawn, how far above the line in the center of the beam should the pivot be, to make the most sensitive results? Will the scales be more sensitive with the pivot just as near the line as the beam will equipoise than if the pivot were farther? 3. Will the knife-edged pivot be as delicate a mode as any? 4. A friend says that the index above the pivot must be of a certain length and weight to make the scales sensitive. I contend the index is merely a pointer and has nothing to do with the sensitiveness. Which is right? Answers: 1. This does not affect the sensibility. 2. By placing the pivot as close to the center of gravity of the beam as is practicable, the sensibility will be increased. 3. Yes. 4. You are right.

N. H. T. asks: 1. What is the cost of a first class locomotive? 2. What number of pounds strain will it produce in a rope or chain fastened to some immovable body? 3. In what position should the cranks of a double engine be placed, to act to the best effect, they being keyed on to the shaft at right angles to one another? 4. Give a rule for compound gearing used on large engine lathes with four change gears. Answers:



1. About \$12,500. 2. About 5,000 pounds. 3. Each 45° from middle position. 4. Let t = threads per inch on lead screw, and T = threads per inch to be cut; n = revolutions per minute of lead screw to one of main spindle. Then T x n = t. To find n, for any number of change wheels: Let A = number of teeth in gear on cone spindle. B = teeth on 1st stud wheel. C = teeth on 1st stud pinion. D = teeth on 2nd stud wheel. E = teeth on 2nd stud pinion. F = teeth on 3rd stud wheel. G = teeth on 3rd stud pinion, etc. L = teeth in wheel on lead screw. Then if N = number of revolutions of lead screw to one of cone spindle, N = (A x C x E x G x I x K) / (B x D x F x H x J x L). And if M = number of revolutions of main spindle to one of cone spindle, n = N x M. To find M, a = teeth in wheel on cone spindle, b = teeth in 1st wheel on back speed shaft. c = teeth in 2nd wheel on back speed shaft. d = teeth in wheel on main spindle. Then m = (a x c) / (b x d). The accompanying engraving will probably make the rules clear.

F. E. H. asks: What would be the average difference in weight of a loaded freight car and one unloaded? Answer: Weight, nine tons empty, nineteen tons loaded.

A. K. asks: 1. Would it pay to own and run a grain separator where coal is cheaper than wood? Coal is \$8 per ton at the bank, distance to be hauled from 2 to 13 miles. 2. How much coal would be consumed by a 20 horse power engine in a day's work of 12 hours? Answers: 1. We think so. 2. Probably between 1,500 and 2,000 lbs.

W. H. L. asks: How can I get a grease spot from a book? Answer: Apply refined benzine with a sponge or rag, to the grease spot.

H. F. U. asks: What shaped nozzle will send the longest and most solid stream from a fire engine, ceteris paribus? Answer: The nozzle which has the form of the contracted vein, (see article on "Efflux of Steam," page 113, current volume.)

A. K. asks: How much of an inch square must a steel bar be made, to support a weight of 9,000 lbs. the bar to rest on supports 2 inches apart? What are the formulas, if weight or the distance of the supports be increased? Answer: The amount of cross section will depend upon the form, and the distribution of the weight. We will give you two rules for a steel bar, and you can assume different depths, weights and distances between supports, to find the various widths required under different circumstances. 1st. If the weight is suspended at the center the width of the bar in inches is equal to the clear span in feet multiplied by the weight in pounds, divided by the square of the depth in inches multiplied by 1,000. 2nd. If the weight is uniformly distributed, the width of the bar in inches is equal to the length of clear span in feet multiplied by the weight, divided by the square of the depth in inches multiplied by 2,000.

A. B. asks: Why is it that a saw heats on the rim in sawing hard timber, when in soft timber it runs very well? 2. Ought a circular saw to be hollowing on the log side, or perfectly straight? Answers: 1. Yoursaw is undoubtedly what saw makers call open on the rim, or possibly it may not be in proper line with the carriage; generally board circular saws are lined with the front or cutting portion a little nearer to the carriage than the back part of the saw, in order to prevent the teeth cutting or scratching the timber; this causes the saw naturally to incline towards the log and bear against the guide. The harder the timber, the more resistance it requires to keep the saw in proper position; consequently the greater friction, in sawing hard than soft timber, causes it to heat on the rim. If it is more open at the rim than in the body of the saw, the least amount of heat expands it, and causes it to heat still more. 2. A saw should be flat on the log side, and not hollowing. It had better be a very little full or convex on the log side, but in no case so much as to permit any portion of the plate to touch the timber.—J. E. E., of Pa.

L. S. says: I noticed in your answer to J. H., page 133, current volume, your recommendation to use Davies' "Algebra" and Legendre; but you will find that although they were the best in your day and mine, they are far behind Robinson's "Algebra," especially his "University Algebra," and Greenleaf's "Geometry," which, on examination, you will find very practical. However, the Legendre style (which they follow) never satisfied me. There is none of that solid reasoning found in Playfair's "Euclid" or Potts' "Geometry." The latter is an English work reprinted in New York. Answer: We are quite familiar with the works you mention, and mentioned the most suitable text books, according to our judgment. At the same time we are glad to receive the opinion of others. In an article recently published we have intimated that it was of more importance how the subject was studied, than what text book was used.

N. D. H. asks: In building an engine to propel a boat with twin screws, would friction gear work to more advantage than cog wheels? The latter are often used on such boats on the Western canals, and make a rumbling and disagreeable noise, and are liable to get out of order. Answer: Friction gear will work very well, if properly constructed. It is well to have V shaped grooves in the wheel or pinion, having V shaped projections on the other.

D. asks: 1. How can I make chloroform, and how is it administered to make a person sleep one hour? 2. How is acidulous mineral water made? 3. How is lemon syrup made? 4. Whose work on chemistry would you advise me to get, that is, whose is the most complete? Answers: 1. Chloroform is made by distilling a mixture of alcohol and chloride of lime. It is administered by means of a saturated sponge or handkerchief placed over the mouth of the patient, but we would advise you in no case to attempt to experiment with reference to its anesthetic properties, as serious results might follow. Its administration should be left entirely to an experienced physician. 2. By charging water, with which the proper chemical ingredients have previously been mixed, with carbonic acid gas. 3. By mixing lemon juice or citric acid with sugar syrup. 4. As an elementary work, Roscoe's or Bloxam's.

J. P. asks: Is there any method of preparing cloth or thin leather so as to render it impermeable to air without destroying its pliability? The ordinary rubber cloth is not, and I am told cannot be made, thoroughly air tight. Answer: We should judge that the cloth, from which what are known in England as mackintoshes are made, might serve your purpose. This cloth is prepared by coating two sheets of cloth on one side only with india rubber varnish and then pressing the varnished sides together by means of rollers so as to make one sheet. Thin leather might be treated in the same manner.

R. C. asks: 1. What is the difference between gold-bearing quartz and common quartz? 3. How is gold separated from quartz? 5. Does common sand contain gold; if so, about how much to a bushel of sand? 4. What are crucibles made of? 5. How can I separate brass? 6. What work on chemistry is the best? 7. How is phospho-tungstic acid made? Answers: 1. No difference, except that one contains gold and the other does not. If gold is present, it can generally be detected by the eye. 5. Gold is generally separated from quartz by crushing and grinding the rock into a fine flour; then by means of water the quartz is washed away, leaving the heavier gold in the vessel. There are other methods of separation. 3. Common sand does not contain gold. 4. Crucibles are made of black lead or graphite, also of clay. 5. By heat. 6. One of the best is Bloxam's. 7. We do not know what our correspondent means unless it be a mixture of phosphoric and tungstic acids.

J. H. K. says: I have an orchard of apple trees about 15 or 20 years old. For the last two or three years I have been greatly troubled by the ravages of the canker worm; and unless a stop is put to them, I shall probably lose the trees in a year or two. Please inform me if there is a remedy. Answer: The female of the canker worm is fortunately without wings, and is obliged to crawl up the trees to lay the eggs. If you can prevent this, you can put a stop to the depredations of this insect plague. Various methods have been devised for this purpose, such as the application of tar either directly to the bark itself, or on strips of cloth, paper, etc. wound around the trunk. Melted india rubber has been recommended in England, but we should think tin troughs filled with cheap oil, fixed to and encircling the whole trunk, near the ground, would be a good plan. This plan indeed has been tried with success on a small scale. When the worms are on the leaves, showering with a mixture of whale oil soap in water (1 lb. soap to 7 gallons water) will kill the worms without injuring leaves or fruit. See Dr. Harris on "Insects Injurious to Vegetation."

F. T. H. asks: What will take nitric acid stains from cloth? Answer: Try strong ammonia or hartshorn. Apply with a small piece of sponge or cloth and afterwards wash the place with water.

J. C. M. asks: How are grass and bouquets crystallized, so that they preserve the same form and color? Answer: What you mean is probably that the grasses or flowers are covered with some crystalline salt. This might be done by dipping them into a sprinkling upon them a strong warm solution of sugar or alum, letting each portion crystallize before the next is applied.

I. C. asks: Will a suction pump work satisfactorily in supplying water taken from a well about 200 feet distant horizontally, with a perpendicular rise of say 22 or 23 feet? If so, what should the size of the pipe be, to cause the least outlay of labor in using the pump? Would it be preferable to lay the pipe according to the contour of the ground, or go to the additional expense of laying it nearly as regular in ascent as practicable, by deep cutting? Answer: A pipe one inch in diameter will answer, and it will be just as well to lay it according to the contour of the ground. The pump must be kept well packed, and will work satisfactorily, except that it will probably be a laborious operation for any one to furnish the requisite power. A small hot air engine, working a pump placed at the well and forcing the water to the house, is quite often employed in cases of this kind.

J. S. P. says: In your issue of July 19, C. M. P. says: "I have devised a machine which will grind a perfect lens of any size or shape." I should like to know how his machine is made, if he has no objection to publishing a description of it. I should like also an explanation of Professor Boyle's experiment which you referred to in the same paragraph. I don't understand how a polisher moving in cycloid curves can correct a spherical surface. Can you give a fuller description of Boyle's machine, or tell me where I can find such a description? Answer: A spherical refracting or reflecting surface must be converted into a paraboloid of revolution, before it will converge parallel rays to the same focus. This correction is accomplished by hand in the following manner: A disk of wood coated with pitch or rosin is worked with rouge in strokes across every diameter of the lens. The glass rests on an optician's post around which the operator walks, continuing the motion until the radius of curvature of the central part of the lens has been sufficiently shortened, so that the section curve becomes a parabola. Mr. Clark, who uses this method, makes the final correction by placing the lens over a paper disk marked with numbered concentric circles at intervals of a quarter of an inch; then, with his forefinger dipped in rouge, he rubs the glass gently in zones, guided by the numbered circles on the paper beneath. From time to time the glass is tried upon a star; wherever the zones are long focus, the touches are light; where they are short, the finger is pressed on hard. The machine for local correction, which Clark says works too rapidly for his use, moves the local polisher to and fro, and at the same time turns the lens gradually, so that the polisher traces hypocycloid curves of greater or less extent upon the glass. The finger, as it instantly detects a particle of grit, is not so likely to scratch the surface as the machine. The touch of the skilled optician as, with his forefinger dipped in rouge, he wipes away the superfluous glass, finds a curious parallel in that of the phobos, or burrowing mussel, which tunnels into granite with its soft foot, aided only by the abraded particles of the rock itself.

J. M. says, in answer to J. G., who asked how to solder broken files: They can be soldered with a common spirit lamp and blowpipe with common tinner's solder, after first cleaning the broken parts with muriate of zinc.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated.

P. S. H.—It is blue clay, a silicate of aluminum. If it burn white, it might be of value to the potters, in the manufacture of earthenware.

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 Hot Air Engine. By F. O. C.
On the Pulsometer. By E. D. W.
On the Patent Right Question. By W. F., and by C. H. A.
On a Device for Saving Fuel. By R. F.
On Interchangeable Parts. By B. F. S.
On the Million Dollar Telescope. By X. P. M.
On a Word to Apprentices. By F. H.
On the Manifestation of Energy. By W. D.

Also enquires from the following: P. R.—H. J. H.—B. L.—J. M. S.—C. de A.—A. B. C.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.

Correspondents in different parts of the country ask: Where can a magic lantern, for home use, be obtained? Where can machinery for making cheese boxes be had? Where are small rubber articles made? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.

[OFFICIAL.]

Index of Inventions

FOR WHICH

Letters Patent of the United States

WERE GRANTED FOR THE WEEK ENDING

August 19, 1873,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions granted, including Air, carbureting, E. F. Van Houten, Air, etc., cooling, L. Schulze, Alarm, till, G. L. Geiger, Anchor for securing cores, Z. Ellis (r), Animal matter, drying, C. C. Coe, Annunciator, C. H. Greenleaf, Annunciator, electrical, A. Storer, Auger, earth, W. H. Salyer, Bale tie, cotton, F. Cook.

Main table of inventions with columns for inventor names and patent numbers. Includes entries like Balinghay, wire tie for, G. L. Laughland, Ballot box, J. Gamber, Beer on draft, preserving, J. W. Moore, Bell pull, A. L. Swan, Bellows, W. Picher, Boats, folding frame for, W. M. Ducker, Bolt for safe doors, etc., W. Hall, Boot heel screw, W. Ackerman, Boot, plowman's, Walker & Brown, Boot sole edges, burnishing, J. Beasley et al., Boot sole edges, burnishing, J. Beasley et al., Boot sole edges, finishing, C. M. Chase, Boot sole edges, trimming, R. C. Lambert, Boot lift punching, G. W. Ellis (r), Borer for sampling cotton, E. A. Clark, Boring machine, earth, J. Burns, Bottle stopper, L. Rhoades, Braking hoist, self, W. Hart, Brick machine, W. Cole, Bridge, ferry, C. J. Atkins, Bung, self-venting, C. F. Spencer, Button fastening, C. H. Reid, Can for oil, etc., J. R. Cole, Can, preserve, J. K. Chace, Cane juice with sulphur, treating, W. G. Billu, Car coupling, D. C. Camerer, Car coupling, F. J. Seybold, Car coupling, J. Temple, Car, dumping, J. Hughes, Car, dumping, J. Hughes (r), Car lamp, J. E. Cross, Car railroad, J. C. Wards, Car truck, railroad, G. Dixon, Car trucks, kingbolt for, Murray & Lamason (r), Carriage top, J. H. Snyder, Chair, self-reclining, G. Niderkorn, Chair splints, making, J. B. Poe, Chuck, T. B. Almond, Churn dasher, reciprocating, T. Earle, Clamp, L. Feely, Clothes line holder, W. Cooke, Clothes wringer, centrifugal, H. Rosamyer, Jr., Condenser, H. A. Towne, Cotton lint room, fireproof, R. R. Warren, Crib, W. B. Carpenter, Crimping clamp, P. A. Schoellhorn, Cultivator, A. C. Smith (r), Cultivator, corn, N. G. Blauser, Cutter head, A. H. Shipman, Digger, potato, S. W. Tyler, Door closing apparatus, H. F. Shaw, Drawers, men's, E. L. Clossie, Dressmaker's marking gage, M. Blauvelt, Eaves trough fastening, W. W. Hammond, Engine, portable steam, Schiedler & McNamar, Engine, rotary steam, O. Adams, Engines, regenerating steam in, F. M. H. Motard, Equalizer, three horse, T. Hoadley, Fertilizer, A. F. Andrews, Fiber from felt, removing, J. T. Waring, Fire place, W. Lossie, Firkin, C. Alford, Fluting machine, E. M. Deey, Fork, horse hay, S. B. Bowen, Furnace, boiler, S. A. Ford, Furnace for smelting ores, E. Balbach, Jr., Furnace grate, W. B. Le Van, Furnace grate, J. Withington, Furnace grate bar, A. Rawson, Furnace, soldering, W. S. Potwin, Gage, micrometer, A. Bonnaz, Gage board, G. Wentz, Gas apparatus, railway car, J. B. Olney, Gas machine, air, P. Wernl, Gas machine pulley, E. F. Van Houten, Gate, automatic, J. S. Folt, Gate, automatic, J. E. Strong, Generator, steam, H. P. Wright, Glass furnace, W. Leighton, Jr., Grain binder, A. Philippi, Grain steaming apparatus, Eberts & Pitts, Hammers, die forming, J. Yerkes, Harness coach pad, A. Gilliam, Harrow, W. D. Summers, Harvester, O. Billings (r), Harvester, J. H. Elward, Harvester, J. H. Elward, Harvester, J. H. Elward, Harvester, J. H. Elward, Harvester, S. Luce, Harvester, W. Wallace, Harvester wheel and axle, B. G. Turner, Hats and caps, dyeing felt, J. T. Waring, Hay tedder, T. J. & G. M. Clark, Heater, water, L. S. Mead, Hinge, E. Boileau, Hook, cant, F. Mansfield, Hook, cant, R. Whittier, Hook, fish, B. F. Allen, Horses from cribbing, preventing, A. Stilwell, Horseshoe nails, forging, F. H. Richards, Hose, etc., testing engine, P. Noyes, Hose, hydraulic, E. A. Street, Ice cream, jellies, etc., mold for, E. M. May, Jack, hoisting, J. H. Churchill, Kettle spout, tea, J. Ash (r), Lamp, J. Kirby, Jr., Lamp, advertising, F. R. Warner, Lamp extinguisher, F. C. Wireman, Lamp, hanging, G. Bohner (r), Land marker, G. W. Betts, Latch, reversible knob, C. Moody, Lathes, turning, J. P. Luther, Lathes, centering device for, H. Gray, Lathing, metallic, T. O'Callahan, Leather work, seam for, C. Keniston, Level, pendulum, A. C. L. Delsarte, Lithographic stone, Moore & Bagger, Lock, combination, A. D. Hoffman, Log turner, C. Van Vleck, Loom, J. Zurcher, Lumber, machine for edging, W. G. Caldwell, Mallet, A. Holbrook, Match sticks, making, F. Zais (r), Medical compound, P. H. Steenbergen, Metal bars, bending, S. Holmes, Milk, preserving, L. F. Kirchoffer, Mill, rolling, Stephens & Cooper, Millstones, dressing, W. Farrow, Millstones, dressing, L. Randolph, Molding machine, H. B. Smith (r), Mortar mixer, C. Pierce, Motor for driving machinery, A. N. Proctor, Mowing machine, W. S. Stone, Nut and bolt fastening, Antill & Sloan, Nut and bolt fastening, P. F. King, Ovens, reel for, A. Crumble, Paint compound, F. A. Stall, Panels, machine for raising, F. D. Green, Panier, J. S. Colby, Pantaloons stretcher, L. Kaltenbacher, Paper bags, making, G. Dunham, Paper tubes, making, T. J. & J. T. Jones, Pipe coupling, L. T. Scofield, Pitman, O. F. Thomas, Plane, match, C. G. Miller, Planter, seed, B. Kuhns (r), Plow, J. Marr, Plow, F. H. Starke, Plow coupling, T. L. Thrasher, Plow, wheel, L. W. Richardson, Power apparatus, foot, E. & H. Harding, Press, steam cloth, Dennis & Weston, Presses, mold or box for brick, J. McKenna, Propeller, screw, D. Freed, Pump, T. C. H. Kraus, Pump piston, W. C. Culbertson, Pump rod attachment, H. H. Locke (r), Purifier, middlings, Hunter & Whitmore, Purifier, middlings, Hunter & Whitmore, Railroad rail, W. W. Alter, Railroad rail joint, J. L. Hudson, Railroad rail joint, W. L. Linsley, Railroad water tank, J. Morton (r), Railroad water tank, J. Morton (r), Rake, horse hay, Lufkin & Allen, Rake, horse hay, B. Morse, Roads, construction of, E. Chadwick, Roofing, sheet metal, Hegeler et al., Roofing, tile, D. Swain, Sash holder, T. Weaver, Saw, Luppert & St. Pierre, Saw hanging, J. E. Merritt, Saw teeth, setting, G. W. Bugbee, Sawing machine, A. Xander, Sawing machine, W. H. Shugart, Sawing machine, edging, E. Tarrant (r), Screw driver, J. H. Davis, Sewing machine, H. A. Blanchard, Sewing machine, E. A. Goodes, Sewing machine, Rayer & Lincoln, Sewing machine bobbin holder, Barnes & Mesick, Sewing machine hemmer, F. Caswell, Sewing machine motor, B. C. Chambers, Sewing machine shuttle, J. B. Secor, Sewing machine table, J. Benner, Sewing machine table, E. A. Jeffery, Shaft bearing, Bird & Sullenberger, Shingle bands, notching, C. E. McGregory, Shrinking metal bands, W. Carr, Sieve, grain, L. D. Carpenter, Smoothing iron, A. S. Mann, Spark arrester, W. D. Farrand, Spoke machine, A. McNeill, Steering apparatus, C. A. Seavey, Steering apparatus, H. F. Shaw, Stock shed, portable, D. H. Yeizer, Stone, machine for cutting, P. H. Hopkins, Stoves and furnaces, grate for, J. J. Richardson, Suspender, B. J. Greeley, Table, extension, C. Rieger, Table leaf support, E. W. Perrin, Telegraph sander, H. Van Hoevenbergh, Thill couplings, clamp for, M. Taylor, Thrashing machine conveyor, C. D. Decker, Tobacco, hook for hanging, M. N. Strong, Tool receptacle, L. L. Lamb, Trap, fly, J. R. Johnson, Trap, steam, Perkins et al., Umbrella, J. McAuliffe, Valve, automatic regulating, G. L. Kitson, Valve and cut off, rotary, W. S. Bartis, Vehicle, E. D. Weller, Vehicle pole, H. Schmidt, Vehicles side bar, F. I. Flowers, Veneer, G. W. Swan, Voting apparatus, legislative, J. A. Criswell, Wagon, dumping, D. D. Smith, Wagon, market, J. Tamkins, Sr., Washing machine, E. W. Bowen, Washing machine, D. B. Dorsey, Watch case centers, making, J. C. Duerber, Whip socket fastener, W. W. Richardson, Whip socket fastener, W. W. Richardson, Wire pointing machine, F. H. Aiken, Wire to hammer dies, feeding, W. H. Dayton, Wood pulp making, S. B. Zimmer, Wool, pulling, J. Watteau.

VALUE OF PATENTS And How to Obtain Them. Practical Hints to Inventors.

PROBABLY no investment of a small sum of money brings a greater return than the expense incurred in obtaining a patent even when the invention is but a small one. Large inventions are found to pay correspondingly well. The names of Blanchard, Morse, Bigelow, Colt, Ericsson, Howe, McCormick, Hoe and others, who have amassed immense fortunes from their inventions, are well known. And there are thousands of others who have realized large sums from their patents.

More than FIFTY THOUSAND inventors have availed themselves of the services of MUNN & Co. during the TWENTY-SIX years they have acted as solicitors and Publishers of the SCIENTIFIC AMERICAN. They stand at the head in this class of business; and their large corps of assistants, mostly selected from the ranks of the Patent Office: men capable of rendering the best service to the inventor, from the experience practically obtained while examiners in the Patent Office: enables MUNN & Co. to do everything appertaining to patents BETTER and CHEAPER than any other reliable agency.

HOW TO OBTAIN Patents.

This is the closing inquiry in every letter, describing some invention which comes to this office. A positive answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

How Can I Best Secure My Invention?

This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct: Construct a neat model, not over a foot in any dimension—smaller if possible—and send by express, prepaid, addressed to MUNN & Co., 37 Park Row, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure often saves the cost of an application for a patent.

Preliminary Examination.

In order to have such search, make out a written description of the invention, in your own words, and a pencil, or pen and ink, sketch. Send these, with the fee of \$5, by mail, addressed to MUNN & Co., 37 Park Row, and in due time you will receive an acknowledgment thereof, followed by a written report in regard to the patentability of your improvement. This special search is made with great care, among the models and patents at Washington, to ascertain whether the improvement presented is patentable.

Rejected Cases.

Rejected cases, or defective papers, remodeled for parties who have made applications for themselves, or through other agents. Terms moderate. Address MUNN & Co., stating particulars.

To Make an Application for a Patent.

The applicant for a patent should furnish a model of his invention if susceptible of one, although sometimes it may be dispensed with; or, if the invention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a draft, or postal order, on New York, payable to the order of MUNN & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents.

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Caveats.

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Reissues.

A reissue is granted to the original patentee, his heirs, or the assignees of the entire interest, when, by reason of an insufficient or defective specification, the original patent is invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention.

APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed, and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

- 26,202.—PAPER PULP.—J. B. Falser et al. November 5.
26,329.—BOOT TIPS.—N. Silverthorn. November 12.
26,564.—CARRIAGE TOP PROP.—G. Cooke et al. Dec. 10.

EXTENSIONS GRANTED.

- 25,183.—NAIL MACHINE.—Daniel Dodge.
25,191.—PAPER BAG MACHINE.—W. Goodale.
25,199.—FEEDING PAPER TO PRESSES.—R. M. Hoe.

DESIGNS PATENTED.

- 6,803.—BAND SAW FRAME.—L. M. Collins, Lebanon, N. H.
6,804.—GLASS GOBLET.—J. H. Hobbs, Wheeling, W. Va.
6,805.—GLASS DISH.—J. H. Hobbs, Wheeling, W. Va.
6,806.—SEAL PRESSES.—C. A. Mathieson et al., N. Y. city.
6,807.—SAFETY STIRRUP.—R. Reniff, Bloomington, Ill.
6,808.—GASALIER.—J. F. Travis, New York city.
6,809.—GAS BRACKET.—J. F. Travis, New York city.
6,810.—OIL CLOTH.—J. Barrett, New York city.
6,811.—CARPET.—J. Dornan, Philadelphia, Pa.
6,812 to 6,818.—OIL CLOTHS.—J. Hutchison, Newark, N. J.
6,819 to 6,823.—CARPETS.—C. A. Righter, Philadelphia, Pa.
6,824.—CARPET.—J. T. Webster, Philadelphia, Pa.

TRADE MARKS REGISTERED.

- 1,410.—COTTON GIN.—Gullett Gin Mfg Co., Amity City, La.
1,411.—FERTILIZERS.—M. J. Solomons, Savannah, Ga.
1,412.—PACKED OYSTERS, ETC.—Wentz et al., Baltimore, Md.
1,413.—SELECTED NAILS.—J. Coyne, Pittsburgh, Pa.
1,414 to 1,415.—FANON AND DRY GOODS.—E. Flaxland & Co., Paris, France.
1,416.—WINES, ETC.—S. McCullagh, London, England.

SCHEDULE OF PATENT FEES:

Table listing patent fees: On each Caveat \$10, On each Trade-Mark \$25, On filing each application for a Patent (17 years) \$15, On issuing each original Patent \$20, On appeal to Examiners-in-Chief \$10, On appeal to Commissioner of Patents \$20, On application for Reissue \$30, On application for Extension of Patent \$50, On granting the Extension \$50, On filing a Disclaimer \$10, On an application for Design (3 1/2 years) \$10, On an application for Design (7 years) \$15, On an application for Design (14 years) \$30.