

I won't lose more than my trouble. I will try to circulate them and get my money back if possible."

The following is gratifying to any who feel interested in the education and mental improvement of the young: "I cannot express to you what amusement your paper gives to my boys, nor what interest it awakens and fosters in them. The subscription is from their purses, and they prefer your weekly to any other they have received."

A Chicago friend writes as follows: "I have been burned out in the great fire (October 9, 1871), to the tune of ten thousand five hundred dollars, besides suffering many consequent inconveniences resulting from my losses, but I can go hungry a whole day and be merry; yet if I fail to get the SCIENTIFIC AMERICAN at its proper time, my equanimity is disturbed and I become a piece of broken machinery, "out of gear." I hope you will see to it that my paper is sent from your office as early as possible after it is printed."

SCIENTIFIC AND PRACTICAL INFORMATION.

THE RECENT ECLIPSE.

One section of the English expeditionary party in India chose Bekul, on the western coast of the Madras Presidency, as the point of observation. The chief results are published, and the existence of radial lines, well marked and distinct, in the corona is now established. These seem to demand our acknowledgment of the existence of forces extending outwards from the center of the sun. Their exact position and narrowness, says Mr. Proctor, force this conclusion upon us.

PYROLIGNEOUS ACID.

Professor Cox, State geologist of Indiana, has recently experimented with pyroligneous acid, and claims that his results give us some new light on its nature and constituents. The acetic acid of the drug stores is usually derived from crude pyroligneous acid, and the latter has thus been erroneously spoken of as an impure acetic acid; but in the experiments of Professor Cox, acetic acid burned, steadily but not rapidly, with a reddish purple flame full of scintillations, while the pyroligneous acid of commerce boiled away without sparkling. In another experiment, the Professor found that the vapor of pyroligneous acid extinguished the flame of burning paper, while that of acetic acid left it undisturbed, but did not itself ignite.

These facts do not appear to us to show that the two acids are different in their natures, as it is well known that acetic acid will burn, and that when diluted with water, as in pyroligneous acid according to the usual theory, it will not.

A RESISTING MEDIUM IN SPACE.

The retardation of Encke's comet, amounting to about two and a half hours in its period of three and a half years, has been frequently cited as a proof of the existence of a medium in space, of sufficient weight to resist a body of such extreme tenuity as a comet. This explanation of the mystery of space has been objected to by Professor Asaph Hall, who gives his reasons in the following words: "So far as the motions of comets have been determined, the evidence is against the theory of a resisting medium in space. Thus far, the observations of the planets lead to the conclusion that their motions are in strict accord with the law of gravitation; and in the disputes about the acceleration of the mean motion of the moon, no one has thought to seek its cause in a resisting medium, but much more probable causes are at hand. Encke's comet, therefore, stands alone in the strange anomaly in its motion which the calculations have shown. If it be proved that the diminution of the periodic time actually exists, this anomaly must be considered as a peculiarity of Encke's comet, and its cause must be sought for in something which distinguishes this comet from all others. It was early pointed out, by Olbers, I think, that this comet moves through those regions where the zodiacal light is seen. Possibly, also, the numerous meteoric streams which are moving around the sun, and which are closely connected with the orbits of some of the comets, may exert an influence on their motions."

BALANCING SLIDE VALVES.

A correspondent states that it is the common practice, with western engineers, to calculate only the areas of ports, in estimating the pressure upon slide valves with a view to balance them. We can scarcely credit this statement, and think our correspondent must be mistaken. If the faces of valve and seat are fitted steam tight, the entire pressure will be the product of the entire area of bearing surface and ports, in inches, multiplied into the pressure per square inch maintained in the steam chest. This, multiplied into the coefficient of friction existing between the surfaces, will give the force required to move the valve under such pressure when unbalanced. Practically, there are few valves that are perfectly fitted, or that remain so if properly fitted at first. Any sure method of balancing slide valves for general use should therefore provide for experimental adjustment.

THE SUN'S EFFECT ON THE MAGNETIC NEEDLE.

It was observed by D. Müller that the variation of the magnetic needle pursued its regular course till the commencement of the recent eclipse. It then began to retrace its steps until it reached its minimum declination at 1 h. 58 m., which was the instant of totality. After that moment, the ascending motion towards the west recommenced, and continued until the needle regained the exact position it had occupied when the eclipse began.

LE GÉNIE INDUSTRIEL.

We regret to learn that the journal of the brothers Armeingaud, published under the above title, is discontinued.

Forty volumes have been issued during the twenty years of its existence, and it had till lately an extended circulation and a justly acquired celebrity; but the recent disastrous war on French soil has paralyzed so many industries and impoverished so many mechanics and manufacturers that its publication became no longer a source of profit to its esteemed proprietors and editors, who look hopefully for the resuscitation of mechanical and industrial science in France at no very distant date.

WILL YOU FAVOR US?

Will subscribers to the SCIENTIFIC AMERICAN, who have duplicate copies of No. 1, 2, or 3, of this volume, or others who do not preserve their numbers for binding, re-mail back to this office what they are willing to spare?

At the commencement of the year, we printed several thousand more copies of each number than we had subscribers for, and as many as we anticipated a demand for; but subscriptions have come in so much faster than we expected that the first three numbers are nearly exhausted. The publishers will be obliged to any of their patrons if they return all or either of the above numbers. Address SCIENTIFIC AMERICAN, New York.

A GOOD MONTH'S WORK.

Since the first of last January up to February 5th inst.—a little over one month—201 United States patents have been issued to inventors whose specifications and drawings were prepared at the office of the SCIENTIFIC AMERICAN. This number, as large as it is, does not include a considerable number obtained through this office in foreign countries.

Death of Mr. Joseph B. Lyman.

Mr. Joseph B. Lyman, lately deceased, was for the last four years of his life agricultural editor of the New York Tribune, having previously filled a similar position on the New York World, and having edited at one time *Hearth and Home*. He had traveled much in many parts of the United States, and was thoroughly acquainted with agriculture in all the localities he had visited. Among the many friends who mourn his untimely death are most of the eminent men in journalism and agriculture on this continent.

THE submarine telegraph cable from Florida to Cuba, as we noted some time ago, was supposed to have been injured either by the bites of the sea turtles, or of some kinds of fish; and we now learn that in China a similar difficulty has been experienced in consequence of the attacks of a minute crustacean. This is so small as scarcely to be perceptible to the naked eye, but can be readily defined under the microscope. Various breaks have been satisfactorily referred to the agency of these animals, which had embedded themselves in the gutta percha. It has become necessary, therefore, to envelop the cables in certain localities with an external supplementary layer of metallic wire, in order to prevent injury in this manner.

PATENT INFRINGEMENT SUITS.—Francis and Loutrel *versus* Mellor and Rittenhouse, and the same *versus* Godfrey & Co., for infringement of plaintiffs' patents for making printing rollers of glue, glycerin and sugar. Judge McKennan, in the United States Circuit Court at Philadelphia, has rendered a decision adverse to the claims set up by Francis and Loutrel, and holds that they are not entitled to any broad claim as the first users of these ingredients, but are limited to the proportions substantially as described in their specifications.

MR. THADDEUS HYATT, formerly of this city, and the inventor of the glass covered gratings now so commonly used, has patented some new improvements connected with buildings, having for their object to render them fireproof. As a substitute for iron beams and brick arches for floors, he proposes wrought iron tubes, placed side by side. Other improvements consist of hollow bricks filled with plaster of Paris or alum, or other mixtures, which, like them, hold considerable water. Wire laths covered with similar compounds are also suggested, together with plasterings of the same materials.

THE experiments on beet root sugar made at the Amherst (Mass.) Agricultural college, during the past year, have been so successful that it is intended to ask the Legislature now in session to grant a charter to a company contemplating the manufacture on an extensive scale. They ask ten years immunity from taxation on account of the experimental nature and public importance of their enterprise. We hope the Legislature will grant the charter as asked for, and thus encourage a new industry in the old Bay State.

THE business address for the American Road Steam, George W. Fitts, inventor, illustrated in No. 6, is: American Road Steamer Company, 24 South Front street, Philadelphia, Pa.

Examples for the Ladies.

Mrs. Amelia Coutant, Brooklyn, N. Y., has had her Wheeler & Wilson Machine since June, 1869; has, besides other sewing, made 836 pairs of pantaloons, making as high as seven pairs a day, besides doing her own household work. She was self-taught, and has broken but two needles of the original dozen.

Miss Adelaide Perry, Bloomington, Ill., says: We have had our Wheeler & Wilson Machine in use eleven years without repairs, and it runs as well as the day it was bought. Last year I earned with it \$485.85, besides doing the sewing for a family of eight persons, and considerable other work.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Valve Refitting Machinery, sold by C. F. Hall & Son, sole manufacturers of the only original Patent Machines. Office, 21 Murray Street, New York.

Nickel Plating without Battery. A new, superior, and infallible mode, for sale by W. F. Wuterich & Co., Harlem R. R. Building, White, near Elm Street, New York.

1000 Tuns Grindstones on hand—J. E. Mitchell, Phila., Pa.

New Castle, Nova Scotia & Ohio Grindstones—Mitchell, Phila.

Patent Self-acting Horse Holder for Sale. State Rights. Very simple. Can be attached to all kinds of vehicles. Will give them a vast preference. Saves life, property, &c. Address Abm. Quinn, 280 Marcy Avenue, Brooklyn, L. I.

For Sale—At 89 John St., Brooklyn, N. Y., one Trip Hammer and several portable Forges and Bellows.

Portable Mulay Saw Mill, that may be run profitably by the power of a Thrashing Engine. Manufactured by Chandler & Taylor, Indianapolis, Ind. Send for circular.

Daniel's Planer I want a good Second Hand or New one, to plane 24 feet long, for cash. C. Kratz, Evansville, Ind.

3 Power Presses, average weight 1000 lbs. Price \$175. Will make a washer at one stroke. J. E. Coxeter Winchester, N. H.

Wanted, a Second Hand Daniel's Planer. Parties having one to sell, address Centerville & Co., Box 704, New London, Conn.

The N. Y. Manuf'g Co., 21 Courtland St., N. Y., buy, sell, and manufacture Patented articles. Illustrated Catalogue, 48 pages, free.

To Barrel Manufacturers—Wanted a position as Superintendent, by a man who thoroughly understands the manufacture of Barrels by machinery. First class reference. Address Barrels, 1333 North 19th Street, Philadelphia, Pa.

Patent Rotary Engine; for all purposes, two to one hundred horse power; equal to any, for less price. Send for particulars and price list to John A. Lighthall, Beekman & Co., corner Inlay and Verona Streets, Brooklyn, N. Y.

Wanted—A machine for stuffing Horse Collars with straw. Address A. J. S., Pendleton, S. C.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, \$4 00 a year. Advertisements 17c. a line.

Best and Cheapest—The Jones Scale Works, Binghamton, N. Y.

Save your Boilers and Save Fuel. Use Thomas's Scale Dissolver, price 5c. per lb., in barrels 500 lbs. Remit to N. Spencer Thomas, Elmira, N. Y., and will ship by cheap freight.

New Pat. Quick and easy way of Graining. First class imitations of Oak, Walnut, Rosewood, &c. Send stamp for circular. J. J. Callow, Cleveland, Ohio.

Foot Lathes and Castings for small Engines. E. P. Ryder, 232 Plymouth St., Brooklyn, N. Y.

The "Railroad Gazette" will be sent three months for \$1.00. Address at 72 Broadway, New York.

Sperm Sewing Machine Oil, in Bottles, Cans, and Barrels. W. F. Nye, New Bedford, Mass.

L. & J. W. Feuchtwanger, 55 Cedar St., New York, Manufacturers of Silicates, Soda and Potash, Soluble Glass, Importers of Chemicals and Drugs for Manufacturers' use.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Edson's Hygrodeik is the best Hygrometer in use. Send for circular. Geo. Raymond, Fitchburg, Mass., Gen'l Agent for United States.

We will remove and prevent Scale in any Steam Boiler, or make no charge. Geo. W. Lord, 232 Arch street, Philadelphia, Pa.

Rubber Valves—Finest quality, cut at once for delivery; or moulded to order. Address, Gutta Percha & Rubber Mfg Co., 9 & 11 Park Place, New York.

Hydraulic Jacks and Presses, New or Second Hand, Bought and sold, send for circular to E. Lyon, 470 Grand Street, New York.

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

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

For Hand Fire Engines, address Rumsey & Co., Seneca Falls, N. Y. Over 800 different style Pumps for Tanners, Paper Makers, Fire Purposes, etc. Send for Catalogue. Rumsey & Co., Seneca Falls, N. Y.

Grist Mills, New Patents. Edward Harrison, New Haven, Conn. "Practical Suggestions on the Sale of Patents." Send for circulars. W. E. Simonds, Hartford, Conn.

Standard Twist Drills, every size, in lots from one drill to 10,000, at 1/2 manufacturer's price. Sample and circular mailed for 25 cents. H. E. Towle, 176 Broadway, New York.

Taff's Portable Hot Air Vapor and Shower Bathing Apparatus—Address Portable Bath Co., Sag Harbor, N. Y. Send for Circular.

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

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St., Brooklyn. Send for Catalogue.

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

Presses, Dies, and Tanners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For 2 & 4 Horse Engines, address Twiss Bros., New Haven, Ct.

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

Vertical Engines—Simple, Durable, Compact. Excel in economy of fuel and repair. All sizes made by the Greenleaf Machine Works, Indianapolis, Ind. Send for cuts and price list.

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., N. Y.

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

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

To Ascertain where there will be a demand for new Machinery mechanics, or manufacturers' supplies, see Manufacturing News or United States in Boston Commercial Bulletin. Terms \$4.00 a year.

Burnett's Cocoaine dresses the hair perfectly, without greasing, drying, or stiffening it.

## Notes & Queries.

- 1.—PURIFICATION OF ZINC.—How can old zinc be made pure, or nearly so?—E. M. D.
- 2.—APPLICATION OF GUTTA PERCHA.—How is the gutta percha, which surrounds the helices in most telegraph instruments, put on?—E. M. D.
- 3.—GALVANOMETER.—How can I construct a cheap and effective galvanometer for galvanic electricity?—E. M. D.
- 4.—CLEANING BRONZE.—Will some of your readers give me a receipt for cleaning bronze chandeliers, etc?—T. E. L.
- 5.—SCENE PAINTING.—What kind of paint, that will not rub off, is the best to use for painting scenery?—Q. R.
- 6.—CEMENT FOR CAST IRON.—How can I make a cement or stopping cracks in cast iron pots, to make them water tight?—C. C.
- 7.—MEASURING ALTITUDE BY BOILING WATER.—Is there any way to tell the elevation above the sea, by the boiling point of water, with the aid of a thermometer?—F. A. C.
- 8.—GALVANIZING SMALL IRON CASTINGS.—I want to know the cheapest and simplest way of effecting this.—J. E.
- 9.—BREAKING UP OLD IRON.—I would like to know the best method, to be operated by one man, of breaking up old car wheels.—W. L.
- 10.—SPEED OF SHAFT.—How many revolutions per minute is it safe to run a shaft containing two cast iron arms, 20 inches long, and 4 inches square? As the work is to be done by the speed, it is a question as to how fast it is safe to run it.—W.
- 11.—POLISHING WOOD.—Will some one of your correspondents inform me how to construct a polishing wheel to polish boards of both hard and soft lumber?—W. M. H.
- 12.—STEAM ENGINE CONSTRUCTION.—If two engines are set quartering, so that they both work on one crank, will one eccentric do to work both valves, and do it as well as one eccentric to each valve?—M. H. A.
- 13.—VOLTAIC PILE.—Will some correspondent please inform me how to make a cheap voltaic pile?—T. F. G.
- 14.—GINGER BEER.—Will some one give me a receipt to make ginger beer, that will keep good for a month, and also, the best mode of fermenting, filling bottles, corking, tying, etc?—F. L. C.
- 15.—PRESSURE IN STEAM BOILER.—Which make the greater pressure on a steam boiler, steam of one hundred pounds to the square inch, or hydrostatic pressure of one hundred pounds to the square inch? Which strains the boiler most?—D. R. R.
- 16.—BORING CONICAL CYLINDER.—How can I bore out a hole in a cylinder 40 inches long, tapering truly from end to end, 12 inches in diameter at one end, and diminishing one eighth of an inch in the 40 inches? I am to do the job with ordinary tools of a machine shop, on a lathe with a boring bar 10 feet long.—J. F. W.
- 17.—VARIATION OF THE COMPASS.—Will some one please inform me, through the SCIENTIFIC AMERICAN, what the variation of the compass is, this year, at Portsmouth, N. H., and whether, and how much a year it is increasing or decreasing?—F. A. C.
- 18.—RINGING GOBLET.—Will some reader please inform me what is the cause of a goblet ringing when the wet finger ends are rubbed on the upper edge of the glass?—W. H. R.
- 19.—DIVIDING A CIRCLE BY RADII.—Is there any method, other than the tedious one by repeated trials, of dividing a circle into a given number of equal parts, when the number is a large prime number, say 61 or 73?—R. C. W.
- 20.—HARDENING IRON BY ROLLING.—Can thin—say one sixteenth inch—iron be cold rolled as hard and elastic as if hammer hardened? And if so, what kind of rolls should be used? Would a roll of large diameter, and a flat, movable bed do?—W. S. H.
- 21.—HYDRAULIC CEMENT.—Will some one kindly furnish, through your columns, a formula for manufacturing hydraulic cement, and a description of the stone used for that purpose?—J. A. T.
- 22.—METALS UNDER STEAM PRESSURE.—Which of the metals, iron, steel, brass, copper, or any other, excepting gold, that will resist the action of steam, will expand most when immersed in steam, say at 100 pounds per inch?—J. A. T.
- 23.—GASOLINE.—Will some of your readers please answer the following questions? What are the chemical constituents of gas evaporated from gasoline? Is it explosive when mixed with common air, and, if so, in what proportion? What is the cost per 1000 feet, not counting interest etc., on machinery? An early answer will oblige.—J. A. G.
- 24.—SAND IN DRIVE WELL.—I have a four inch drive pipe well, 75 feet deep. There is a rock bottom at a depth of 81 feet. When opened, an abundance of water was freely pumped; but having no use for it he pump stood a week or so, at the end of which time pumping was resumed, but little water came. The cause was found to be no less than ten feet of solid sand in the bottom of the pipe. Will some of your readers tell me how to get the sand out?—W. L.

## Answers to Correspondents.

**SPECIAL NOTE.**—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 100 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

- S., of Tenn.—The largest steam hammer in the world is, we believe, the 100 ton hammer at Krupp's steel works in Prussia.
- FRICION PULLEY.—Will a friction pulley with six inches face have as much friction power as one twelve inches face with the same pressure? Answer: If similarly constructed, yes.
- RUBBER PACKING TO PREVENT FRICTION.—The device described by J. W. S. is neither new nor patentable.
- CEMENT FOR SHEET IRON AND RUBBER PACKING.—Let J. M., query 8, January 20, 1872, try a white lead paint on the iron. Leather or rubber can be glued on to an iron surface thus prepared.—D. B., of N. Y.
- VOLUME OF HYDROGEN.—To W. W., query 1, February 3, 1872: One ounce of hydrogen measures 22,371 cubic inches.—D. B., of N. Y.
- BENDING GAS PIPE.—This may be done by filling the pipe with molten resin. When the resin hardens, bend the pipe, and it will retain its round form. Remove the resin by heating.—W. H. R., of N. J.

WATERPROOFING COTTON CLOTH.—H. W. U., query 3, January 20, 1872, is evidently not a steady reader of your journal. Many recipes for this purpose have been given, and two new ones appear on page 105, current volume.—D. B., of N. Y.

A. D. N., of O.—Increasing the diameter of cylindrical boilers increases the strain resulting from steam pressure upon them, directly as the increase of diameters.

M. H. B., of Mass.—Your queries cannot be answered properly in any space we can give you in this column. You ought to obtain a good work on the steam engine, and read it for the information you seek.

SAW MILL GEARING.—To T. B., query 13, January 20, 1872: The weight of the saw has nothing to do with the question. You have to counterbalance the lower end of the pitman only. Therefore lay the pitman in a horizontal position and weigh the end which connects on the face plate, including the wrist pin; and you have the weight to counterbalance.—F. B.

FACING OIL STONES.—Your correspondents, who have written on this subject, have not yet described the best way of doing it. I go to a foundry and take any flat casting from which the scale has not been removed; by rubbing the stone on it, as on a board with emery, I can true an oil stone in one fourth the time needed for any other method, and I have tried them all.—J. E.

PRESERVING NATURAL FLOWERS.—R. A. L., query 1, February 10, 1872, should dip the flowers in melted paraffin, withdrawing them quickly. The liquid should be only just hot enough to maintain its fluidity, and the flowers should be dipped one at a time, held by the stalks and moved about for an instant to get rid of air bubbles. Fresh cut flowers, free from moisture, make excellent specimens in this way.—D. B., of N. Y.

COPPER DIP.—S. D. R., query 2, February 10, 1872, is informed that sulphate of copper is soluble in four times its weight of water at 60°, and that this proportion furnishes the strongest pickle. A coating of the required thickness may be produced by dipping the articles several times.—D. B., of N. Y.

R. M. C., of Mass., says: "I would like to inquire, through your paper, if there is any way to bleach ivory, and if so, how it is done?" Answer: Ivory is bleached by exposure to sunlight. For piano makers and others, it is prepared by first sawing it into thin sheets or plates. These are placed on suitable frames, under glass, and exposed to light for several months. The frames are of peculiar construction and patented. They are so arranged as to shift, thus reversing the exposure of the ivory, so that both sides may be duly acted upon by the light.

C. G., of N. J.—It is probable that the draft of your chimney is insufficient. The gases you detect, by smell, as escaping therefrom are certainly deleterious. It may be also that you use a damper between the fire chamber and chimney to regulate combustion. This would be wrong, and sure to result in the forcing of gases out into the room. The damping should be done at the throat of the stove, never in the uptake. If the stove is not made so that this can be done, it is not fit for use.

COLORING BAND FOR HOUSE'S TELEGRAPH.—Reply to R. I. H., query 6, page 90. The coloring band of the House printing telegraph is a common narrow silk ribbon, saturated with a mixture of lamp black, ivory black, sweet oil, and turpentine. The ink sold for hand stamps answers the purpose very well. Electro-chemical telegraphic paper may be prepared in several ways. Bain used a solution of yellow prussiate of potash in water, to which was added two parts nitric acid and two parts ammonia. With an iron style, this gives a dark blue mark on the passage of the electric current. Another formula consists of one part iodide of potassium, 20 parts starch paste, and 40 parts water. This gives a brown mark which, however, is not permanent, fading out in a few hours.—F. L. P., of N. Y.

STEAM ENGINE FOR SAW MILL.—I would say to NEMO, query No. 16, of January 20th, that it is very doubtful if he can ever obtain "satisfactory results" in running a circular saw mill with a ten horse power thrasher engine. He might increase the size of his mandril pulley, and run his engine faster, but even then he would lack in steam making capacity. He had better not attempt it at all, but procure a portable muley mill. They are made especially for engines of that class; can be run with one half the expense, and are said to do nearly or quite as much as a stationary muley.—A. D. N., of O.

SAFETY GUNPOWDER.—Would it not be an infinite saving, to property holders in cities and to insurance companies, if a plan could be invented to make gunpowder perfectly safe from explosion, so that the merchant's house and stock and the surrounding neighborhood and human life would be perfectly protected?—INVENTOR. Answer: Any plan for making gunpowder in explosive, while in stock, will meet with general approval.

AIR PRESSURE AND SUCTION.—P. D. asks how to prove that the pressure of the air, and not suction, raises the water in a pump. Let him take a straight lead pipe forty or more feet long, fill it with water, and plug both ends tight. Then, holding it perpendicularly, let him immerse the lower end in a pail of water and remove that plug. After all the water that will has drained from the pipe, let him replace the plug; and, on examination, he will find water enough remaining in the pipe to fill it to about thirty-two feet above the water in the pail. Then ask any unbeliever to explain why the water did not all run out. After he has done it satisfactorily on the suction theory, then ask him to explain why it would all run out if the upper plug were removed?—M., of Mass.

COMPOUND GEAR FOR SCREW CUTTING.—Some time ago R. H. S. asked for a simple rule for cutting threads by compound gearing. Since that time I have anxiously waited, and still wait, for such a rule. Many of your correspondents don't seem to know what compound gearing is, and give rules for simple gearing, and such rules as would be of very little use to a practical machinist. Imagine a machinist being ordered to cut a three eighth set screw two inches long for an engine ready to go out, and attempting to find his gear by the rule given by C. F., of N. Y., while, in reality, he need only multiply the number of threads in the leading screw and the number of threads to be cut by the same number. For instance, the screw is 6, and he wants to cut 8. Multiply by 3, which gives 18 and 24, or by 3½=21 and 28, or by 4, which gives 24 and 32; any of these pairs will cut the required thread. By this method, you can see that in a few seconds many sets can be found to cut the required thread without the use of pencil or chalk. Even if he wants to cut 8½ threads, or any bastard thread, the rule holds good, and is what I call a practical rule for single gears. L.—J. P. M. C.

SAW FILING.—In query 7, Jan. 27, C. M. B. wants to know how to file a cut off hand saw. I find by the practical use of said tool (which any one who pretends to file a saw should not be without) that the saw should be filed as follows: Put the saw into the clamp with the handle to the left hand always; run a file lightly across the teeth, as this will keep it straight, and give the filer a chance to see clearly the points of each tooth, which is necessary to a good job. Take the file and commence at the point of the saw, holding it (the file) at an angle of about 30° by lowering the right hand, and about 15° towards the handle of the saw. The file is to be so held as to file the front side of the tooth that is set from him and the back side of the one that is set towards him; and the point of the tooth should be but a trifle forward of the middle of the base. A saw to do nice work should have the least possible set in it, and must be a good tool in every respect. I have had over twenty years practical experience in the use of the saw, and have filed many saws in shops where I have worked; and I do not recollect ever having a fault found with one that was filed in this way. It is my experience that this is the only right way. When he has filed one side, he will see that he must reverse the saw in the clamp to file the other side. In filing in this way, the front edge of the tooth will be the thinnest.—A. D. W., of Mass.

## Practical Hints to Inventors.

MUNN & CO., Publishers of the SCIENTIFIC AMERICAN have devoted the past twenty-five years to the procuring of Letters Patent in this and foreign countries. More than 50,000 inventors have availed themselves of their services in procuring patents, and many millions of dollars have accrued to the patentees, whose specifications and claims they have prepared. No discrimination against foreigners; subjects of all countries obtain patents on the same terms as citizens.

### How Can I Obtain a Patent?

As the closing inquiry in nearly 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 New York, 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.

### Caveats.

Persons desiring to file a caveat can have the papers prepared in the shortest time, by sending a sketch and description of the invention. The Government fee for a caveat is \$10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & Co., 37 Park Row, New York.

### 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.

### Re-issues.

A re-issue 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.

A patentee may, at his option, have in his reissue a separate patent for each distinct part of the invention comprehended in his original application by paying the required fee in each case, and complying with the other requirements of the law, as in original applications. Address MUNN & Co., 37 Park Row, for full particulars.

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Foreign designers and manufacturers, who send goods to this country, may secure patents there upon their new patterns, and thus prevent others from fabricating or selling the same goods in this market.

A patent for a design may be granted to any person, whether citizen or alien, for any new and original design for a manufacture, bust, statue, alto-relievo, or bas relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornament, pattern, print, or picture, to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture.

Design patents are equally as important to citizens as to foreigners. For full particulars send for pamphlet to MUNN & Co., 37 Park Row, New York.

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All business committed to our care, and all consultations, are kept secret and strictly confidential.

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