

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

New Quick Adjusting Parallel Bench Vise, with screw clamp. Strictly first-class. Machine made. 4 1/2 size ready. Price \$10.50. Address J. Thomson, 9 Spruce Street, N. Y.

Railroad Supplies. Manufacturers' Supplies and Polishers' supplies. Send for catalogue. Greene, Tweed & Co., New York.

For Sale.—A Beam Engine, condensing; 34 inch cylinder by 48 inch stroke; Sickle's cut-off; now developing 300 horse power by card. Flywheel, 20 feet diameter by 36 inch face. Can be seen running at the Brooklyn City Flour Mills, Jewell Milling Company, foot of Fulton Street, Brooklyn, N. Y.

Wanted.—A large Drill Press. Address James Cuddy, Forty-third Street, Pittsburgh, Pa.

JORDAN IRON AND CHEMICAL WORKS. 117th and 5th Sts., Brooklyn, N. Y. June 8, 1882. H. W. Johns Mfg Co., 87 Maiden Lane, New York.

GENTLEMEN: We take pleasure in testifying to the admirable fireproof qualities of your Asbestos Roofing. At a fire which occurred at our works, May 26 last, our Roofing resisted the action of the flames after the wood-work on which it rested was almost or entirely destroyed.

We have found the roofing to be very durable where there is much walking upon it. Respectfully yours.

JORDAN IRON & CHEMICAL WORKS. J. H. Kolb, Superintendent.

"Abbe" Bolt Forging Machines and "Palmer" Power Hammers a specialty. S. C. Forsaith & Co., Manchester, N. H.

List 28, describing 3,600 new and second-hand machines, now ready for distribution. Send stamp for same. S. C. Forsaith & Co., Manchester, N. H., and N. Y. City.

Cotton Belting, Rubber Belting, Leather Belting, Soapstone Packing, Empire Packing. Greene, Tweed & Co., New York.

Lehigh Valley Emery and Corundum Wheels are acknowledged to be the safest, freest cutting, and most durable wheels in use. Write for prices, stating sizes you use. L. V. E. W. Co., Leighton, Pa.

American Fruit Drier. Free Pamphlet. See adv., p. 390.

72" Independent 3 Jaw Chucks, \$42; 48", \$36; 24", \$30. Warranted best in the world, and sent on trial. American Twist Drill Co., Meredith, N. H.

Ball's Variable Cut-off Engine. See adv., page 389.

Fire Brick, Tile, and Clay Retorts, all shapes. Borgner & O'Brien, M'Frs, 23d St., above Race, Phila., Pa.

Drop Forgings of Iron or Steel. See adv., page 389.

For best Portable Forges and Blacksmiths' Hand Blowers, address Buffalo Forge Co., Buffalo, N. Y.

Paragon School Desk Extension Slides. See adv. p. 389.

Brass & Copper in sheets, wire & blanks. See adv. p. 388.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 15,000 Crank Shafts, and 10,000 Gear Wheels, now in use, the superiority of their Castings over all others. Circular and price list free.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dujeon, 24 Columbia St., New York.

Diamond Tools. J. Dickinson, 64 Nassau St., N. Y.

Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 388.

Draughtsmen's Sensitive Paper. T. H. McCollin, Phila., Pa.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 388.

Something new and interesting in Stemwinding Permutation Locks. See adv. of D. K. Miller Lock Co., p. 389.

Sewing Machines and Gun Machinery in Variety. The Pratt & Whitney Co., Hartford, Conn.

Wanted.—Orders—Penfield Pulley Block Co., Lockport, N. Y.

Catechism of the Locomotive, 625 pages, 250 engravings. Most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for catalogue of railroad books. The Railroad Gazette, 73 B'way, N. Y.

Steam Pumps. See adv. Smith, Vaile & Co., p. 388.

Patent Key Seat Cutter. See page 388.

Wanted a Superintendent; a thoroughly capable man who understands the malleable iron business and is competent to manage the manufacturing department. State experience, reference, and salary expected. Address "Malleable," P. O. Box 332, Pittsburg, Pa.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Bostwick's Giant Riding Saw Machine, adv., page 372.

Small articles in sheet or cast brass made on contract. Send models for estimates to H. C. Goodrich, 66 to 72 Ogden Place, Chicago, Ill.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill.

The Berryman Feed Water Heater and Purifier and Feed Pump. I. B. Davis' Patent. See illus. adv., p. 373.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's adv. p. 372.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 374

4 to 40 H. P. Steam Engines. See adv. p. 372.

First Class Engine Lathes, 30 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Cope & Maxwell M'g Co.'s Pump adv., page 353.

Supplee Steam Engine. See adv. p. 357.

Ice Making Machines and Machines for Cooling Breweries, etc. Pietet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 3083, New York City.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 342.

Pure water furnished Cities, Paper Mills, Laundries, Steam Boilers, etc., by the Multiford System of the Newark Filtering Co., 177 Commerce St., Newark, N. J.

Agents Wanted.—None but intelligent and energetic need apply. Must furnish good recommendations, or no notice will be taken of applications. Exclusive territory given. Agents are now making from \$10 to \$15 a day. Address, for terms, The Infalible Coin Scale Co., 267 Broadway, New York City.

Improved Skinner Portable Engines. Erie, Pa.

Jas. F. Hotchkiss, 84 John St., N. Y.: Send me your free book entitled "How to Keep Boilers Clean," containing useful information for steam users & engineers. (Forward above by postal or letter; mention this paper.)

Steel Stamps and Pattern Letters. The best made. J. F. W. Dorman, 21 German St., Baltimore. Catalogue free.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Combination Roll and Rubber Co., 27 Barclay St., N. Y. Winger Rolls and Moulded Goods Specialties.

Presses & Dies (fruit cans) Ayar Mach. Wks., Salem, N. J.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free.

The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

NEW BOOKS AND PUBLICATIONS.

DIE ANNA-LISE. A German Play, by Hermann Hersch. With an interlinear translation and directions for learning to read German. By Prof. Charles F. Kroeh. New York: D. Appleton & Co.

The second part of Kroeh's German course. The plan of the course is eminently reasonable; and in carrying it out the author keeps always in mind the immediate requirements of the beginner. We have seen nothing better calculated to secure easy, rapid, and intelligent progress in learning to read German.

DIE ASPHALT-STRASSEN. Von E. Dietrich, Berlin, 1882. Commissions-Verlag von Julius Bohné. 8vo, 207 pp. \$2.50.

Professor Dietrich's book describes very fully the crude materials, the manner of preparing the roadbed and footpath, the cleaning and repair of asphalt streets, with all the tools and machinery illustrated.

THE SILK WORM: BEING A BRIEF MANUAL OF INSTRUCTIONS FOR THE PRODUCTION OF SILK. By C. V. Riley, M.A., Ph.D., U. S. Entomologist. Washington: Government Printing Office.

In this second edition of Professor Riley's Silk Worm Report (Special Report No. 11, Department of Agriculture), the author says that every year's experience with osage orange as food for silk worms confirms all that he has said of its value. For eleven consecutive years he has obtained the best quality of silk from a race of worms fed on this plant (osage orange, *Machra aurantiaca*). The tests made at the recent silk fair at Philadelphia showed that a larger yield of silk was obtained from worms fed on osage orange than from mulberry fed worms.

INSECTS INJURIOUS TO FOREST AND SHADE TREES. By A. S. Packard, Jr., M.D. 8vo, paper. pp. 275.

This Bulletin, No. 7 of the U. S. Entomological Commission, is intended to give a brief summary of the little that is known of the habits and appearance of insects injurious to American forest and shade trees. There is a vast amount of necessary work to be done in this department of entomology; and Mr. Packard's compilation seems to be well suited to interest tree owners and others in taking part in the work, at least so far as to report observations and send specimens to the entomologists of the department.

CONVERSATIONS ON THE PRINCIPAL SUBJECTS OF POLITICAL ECONOMY. By William Elder. Philadelphia: Henry Carey Baird & Co. 8vo, cloth. pp. 316. \$2.50.

The author belongs to the American school of political economists whose views of the disputed questions of social and commercial affairs are more apt to be determined by the facts of history and the requirements of our national life than by the theories of closet philosophers or the interests of British trade. The discussions of International Trade and the beneficial influence of the protective development of home industries may be heartily commended to our legislators and voters.

COMPARATIVE NEW TESTAMENT. Philadelphia: Porter & Coates.

A good idea well carried out. The King James version of the New Testament and the new revision are arranged in parallel columns, the most convenient form possible for comparison and reference. The type is large and clear. The volume contains a history of the revision; the readings preferred by the American committee; notes, etc.

FIRST LESSONS IN GEOLOGY. By A. S. Packard, Jr. Providence, R. I.: Providence Lithograph Company. 8vo, paper. pp. 127.

Discusses in a popular way the action of water in earth sculpture and in moving materials; the geological action of heat; and sketches in a hasty manner the varying aspects of America during the several geological periods. It is intended to accompany the "Chautauqua Scientific Diagrams," to which it constantly refers. The illustrations should be in the book to make it generally useful.

RELATORIO DA ADMINISTRAÇÃO GERAL DAS MATAS relativo ao anno economico de 1879-1880. Lisboa. Imprensa nacional, 1881. pp. 298. 4vo.

In addition to numerous statistics and other valuable tables contained in this volume, we have a series of colored plates, 16 in number, in which are shown the isothermal lines and the geological formations of Portugal, as also the regions where different species of pines, oaks, and other trees abound.

BRIGHT FEATHERS; OR, SOME NORTH AMERICAN BIRDS OF BEAUTY. By Frank R. Rathbun. Auburn, N. Y.: Published by the Author. Parts II., III., and IV. Each \$1.

The birds illustrated in these numbers of Bright Feathers are the rose-breasted grosbeak, the American goldfinch, and the summer warbler, giving in each instance male and female. Progressive improvement is shown in the coloring.

DIE ELEKTRISCHE BELEUCHTUNG UND IHRE ANWENDUNG IN DER PRAXIS; VON DR. ALFRED VON URBANITZKY. Mit 85 Abbildungen. Wien, Pest, Leipzig. pp. 215. Small 8vo. Price \$1.00. "THE ELECTRICAL ILLUMINATION AND ITS PRACTICAL USE."

This little book, which forms volume 95 of Hartleben's chemico-technical library, devotes but little space to the historical development of electric lighting, and after discussion of when and where electric illumination will pay proceeds at once to describe every known form of electrical machine; the Gramme, Buegin, Siemens, Brush, Weston, Wallace-Farmer, Guelcher, Schuckert, Edison, etc. The secondary battery is also described. All the forms of lamps are also described, and the methods of dividing the current. In the appendix the cost of electric lighting is given.

DER PRAKTIISCHE EISEN- UND EISENWAAREN-KENNER. Kaufmännische-technische Eisenwaarenkunde, von Eduard Japing. Wien, Pest, Leipzig. pp. 568. Small 8vo. "THE PRACTICAL CONNOISSEUR OF IRON AND IRON WARE."

This forms volume 97 of the above series. It is intended as a hand book for dealers, importers, and consumers of iron ware. It is illustrated with 98 wood cuts. Price \$1.50.

REVISTA GENERAL DE MARINA. Tomo X., Cuaderno 4°. Abril, 1882. Madrid, 1882.

The number and excellence of the scientific publications received from Spain show an encouraging advance in this direction.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

Were new our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) O. F. H. asks how to bend half inch iron pipes into a coil 12 inches in diameter. Would it have to be heated? How many square feet heating surface should a coil boiler have for an engine 2 inches by 2 inches, with 80 pounds steam, and 300 to 380 revolutions per minute? Would it run a boat 13 feet long, 2 1/2 feet beam, 6 inches draught, with a 1 foot propeller, 5 1/2 miles an hour? A. For your coil boiler you will have to heat the pipe, which should be extra strong, to a full red, and carefully draw it to the curve you require. You will scarcely be able to manage more than six to eight inches at once. Your engine, at your statement, figures three-fourths of one horse power. It would have to turn the propeller 12 inches in diameter, 300 revolutions per minute, to accomplish 5 miles per hour, allowing 50 per cent slip. We think you would fail in the speed, from the relative size of engine and propeller, and certainly in the coil boiler. Fifty feet of half inch pipe would be equivalent to three-fourths of a horse power; this will make 17 turns in your coil of 1 foot in diameter. You would have to inject the water as fast as it would be required. This looks well theoretically, but works badly in practice.

(2) A. E. B. asks: What can we use to make netting or seines waterproof? A. See "Waterproofing," page 83, vol. xlv.

(3) R. B. C. asks if a piece of hard steel is tempered to yellow, cooled, the surface brightened and drawn to the same color again, is the tool of the same temper as it was the first time it was drawn to yellow. I am told the steel is not any lower in temper if the operation is often repeated, and dispute the idea. A. Steel hardened and temper drawn to a straw color only will not be effective in hardness perceptibly, if it be polished and redrawn to a straw color only once. But if the operation is repeated several times, a change can be noticed. If the drawing be carried to the brown or deep straw color each time, the change in hardness will be still more perceptible.

(4) A. W. M. writes: I have a portable engine for thrashing purposes and farm use; but it stands idle for six or seven months in the year. 1. Is there anything to put in the boiler to prevent it from rusting? A. If you lay up your boiler in the early part of winter, when it would be liable to freeze, you may put into the boiler three or four quarts kerosene oil, after putting out all fire, and while the boiler is hot; then

draw off all the water and as much of the oil as will run off, then close up the boiler tight so that no air can get in. Clean all the flues and put the boiler in a dry place in the barn or tool house, if it is a portable one. When you are ready to put it into use again, fill it full of water, get up steam, and blow out any oil that may be left in the boiler through the safety valve. Do this outside of any building. The handling of kerosene oil around a fire is dangerous at any time. If you can prevent the boiler from freezing you can do nothing better than to close up tight and full of boiling water and let it stand until you need it again. It will not rust inside. You can take care of the outside by cleanliness, oiling, and shelter. Oil is really better outside of a boiler than upon the inside. 2. Would crude petroleum or common coal oil answer the purpose? Has hard or lime water any other bad effect on a boiler other than to scale it? A. Lime water does no harm to a boiler other than covering the flues and shell with scale.

(5) G. R. A. asks: 1. Is there any way to drill holes in plate glass? A. Can be done with a hard drill and spirits of turpentine—a tedious and uncertain process, and only for small holes. A diamond drill is much better and cheaper, if there are many holes to drill. If large holes are wanted, from a quarter inch to one inch or larger, prepare a piece of thin tubing of brass or copper, of the required size of hole, of 1 or 2 inches in length, with a small spindle and grooved pulley attached, something after the style of the watch maker's bow drill. Fasten upon the plate of glass, at the point to be drilled, a ring of metal or wood for a guide to keep the tubular drill in its place, until the cut is started sufficiently to steady the cutter. Lay the glass plate horizontally, and work the drill perpendicularly with the bow, using one hand to steady the upper end of the drill stock. Feed emery (about No. 90) and water into the open end of the tube as fast as required. In a very short time you will cut a disk out of the plate. 2. Where to get a book containing information of steam engines and machinery, giving rules for reckoning power and speed of same, also sizes of boilers, amount of heating surface and steam space required for same? A. Burgh's "Pocketbook of Practical Rules for the Proportions of Modern Engines and Boilers." 3. How is the speed of gearing reckoned? Do you take the mean diameter of each, i. e., to center of teeth of each cog, and reckon same as pulleys? A. In planning gearing to work together, the diameters of the pitch lines are always considered; but in laying out the teeth, it is often found that the required number of teeth do not exactly match on a given pitch line. In this case, one or both of the assignments may be varied to make the teeth match. In laying out speeds for general machinery the computations are made by the relative number of teeth in the various wheels. Divide and multiply the same as you would the diameter of pulleys, using the number of teeth in place of the diameters of the pulleys.

(6) F. C. T. asks (1) what I can use as a flux while brazing cast iron? A. Cast iron can be brazed with brass by using borax rubbed upon a slate with water and a little caustic soda. Have the surfaces clean either by file scratching or grinding; rub the ground borax and soda well between the surfaces; tie the pieces closely with wire, and place the brass solder upon the top, so that it will not melt until the iron is hot enough to take it. A better solder can be made by melting ordinary brass with one-sixth of its weight of block tin, and pouring it slowly into water, which will separate it into granules that are very convenient for use. 2. Whether I should use common brass or brazing solder? I have tried borax, but it won't do. It all runs off the iron as soon as it becomes liquid, and acts like water thrown on a greasy surface, and the brass acts the same way as soon as it melts. It will not sweat into the joint at all, but run off to the fire. What is the matter? A. Silver solder or coin is still better, but expensive for large work. Heating the work quickly will melt the solder before the iron is hot enough to receive it, when the solder will roll off.

(7) M. J. S. asks: How can I make a thermostatic bar, so that I can regulate the heat in an incubator and maintain it at about 100°? A. Take a strip of sheet steel and a strip of sheet brass, about one inch wide and one-thirty-second of an inch thick, and from one to two feet long. Tin one side of each and bind the tinned sides together; heat and solder the pieces together with pure tin. Take off the wire binding, and screw one end fast inside of the incubator. This will be your thermostatic bar, having a considerable range, according to its length. The free end can be attached to a delicate shutter, which will operate as a ventilator; or to close and open the warm air passage, as you may find best upon trial. If you find the above combination not strong enough, you may make the pieces a little thicker, but the range will also be smaller. A glass rod or strip of plate glass and a bar of zinc about two feet long, with one end of each clamped together, the other ends fastened about one inch apart, have a great range, and have been used very successfully as a registering thermometer—their difference of expansion being greater than any two metals.

(8) E. E. M. writes: Considerable anxiety in this part about the "Wells comet." Would you please inform me through inquiry column of the SCIENTIFIC AMERICAN, when the above comet can be seen with the naked eye—where, and the exact time of night? A. The "Wells comet" does not show as well as expected. It has only been seen with the telescope, close to the horizon on the sun's track just after sunset. It may show up brighter after it passes its perihelion.

(9) A. S. asks: Can you recommend some apparatus or beer faucet to prevent beer becoming flat in the keg after tapping if not drawn off in a short time? A. Where such beverages cannot be drawn off within a few hours after tapping it is best to tap from barrels in the cellar by means of an air pressure pump and connecting tubes. There are several patented faucets in the market. See our advertising columns and Hints to Correspondents.

(10) T. C. H. asks: Is all lead pipe manufactured by hydraulic pressure? A. As a rule it is. There may be cases in the country where the drawn lead pipe cannot be obtained, that short pieces are made by hand.

(11) J. F. writes: 1. My friend says that the center of a shaft does not turn; I say it does. Which

is right? A. Every physical part of any solid body turning upon an axis or center, moves; but the axis or center being an imaginary line only, is not supposed to turn. There is a quibble in the argument, which we think you will be able to divide with your friend. 2. How long does it take the planet Jupiter to make a revolution around the earth? A. The earth revolves to the same relative position in regard to Jupiter and the sun, in about 398 days. 3. How long does it take Venus to make a revolution around the earth? A. Venus does not revolve around the earth, but swings apparently like a pendulum across the heavens as it revolves around the sun in an orbit inside the earth's orbit. It becomes evening star, or comes to the same position in regard to the sun and earth, every 584½ days.

(12) L. N. S. asks how to keep steam boiler from corroding. I have seen in your paper a prescription for that purpose, but have forgotten what it was. The boiler is new, and I want to keep it clean. A. If you are using clear hard water, your boiler will become coated upon the inside with lime. Blow off daily, at least one cock. Clean out by washing and scraping once a month, or once in two months if there is but little incrustation. Put into the boiler a day before cleaning about one quart of tanner's liquor or a strong decoction of tan bark, oak, or hemlock per horse power. If this is not to be had then use one half pound caustic soda or potash to the horse power. Dissolve the soda or potash in water, and pump it into the boiler through the usual channel, as also for the tanners' liquor. The day's boiling will dissolve and crack off the scale, so that the boiler can be readily washed out. If you are using water that is considered soft, such as creek or river water, you may not need one-half the above quantity, or possibly nothing but thorough washing out every two or three months.

(13) C. W. P. asks: Will you inform me through the columns of your valuable paper, the SCIENTIFIC AMERICAN, wherein English steel comes into competition with American, and in what particular lines of manufacturing it does so most successfully? A. We do not think that English steel now holds a successful competition against American steel, especially in the grades that are much used. The vast increase in the American steel trade during the past few years, the ingenuity displayed in economizing machinery and labor to meet the increasing demand, have brought prices low enough to command the market. Our machinery, tool, and heavy spring steel is now fully equal in performance to the English, and ranges from 10 to 20 per cent less in price. The only kinds of foreign steel that have little or no competition here are the "Mushet steel," which is an alloy, and cannot be worked except in the forge and upon the grindstone; it is very tough, and is growing in favor for rough work; and the fine kinds of spring and Swiss steel, much used for clock and watch springs, graters, and very small turning tools. More skill is required in the working, hardening, and tempering tools than falls to the lot of most machine shop blacksmiths. It is not advisable to put into the shop two or three brands of tool steel that requires to be often reworked and tempered. Take the advice of some large dealer in steel as to the kinds of steel sold for various uses; you can generally rely upon it.

(14) M. L. S. writes: I wish to devise a large cog wheel to be operated by a smaller wheel and a crank turned by hand. The large one to have attached to it a draw and rope, which will lift 1,000 pounds, from a depth of 500 feet. The machine to be worked by one or two man power. Please inform me what must be the circumference, weight, and number of cogs in large and small wheels. A. A man can exert upon a crank 15 inches long, or a swing of 30 inches, a lifting power of 30 pounds for ten hours with occasional rests. With the above crank, a pinion of 6 inches diameter at pitch line, working in a wheel of 6 feet diameter and winding drum of 1 foot diameter, a man will hoist 1,000 pounds from a depth of 500 feet in one hour and forty minutes. If you make a double crank for two men, you can make the drum larger so as to accomplish the task in one hour. Make 18 teeth in pinion; 216 teeth in the large wheel, 2 inches face for both. Cannot give the weight without making a detail drawing. You should decide as to the kind of rope you will use before you lay out the wheels. A hemp rope will have to be 1¼ inch or 1½ inch diameter for safety for such a load. The one foot drum would have to be 20 feet long to wind up 500 feet, unless you double up, which is injurious. If you can make the drum 3 feet diameter and 7 feet long, and put in a pair of intermediate gears to increase the power three times, you will have a more proportionate machine. The first pinion may be 4 inches, geared into a 12 inch wheel, and the 6 inch pinion into the 6 foot wheel. With this combination, the faces of the first and second should be 2 inches and the third and fourth should be 3 inches for safety. If you use wire rope, the drum should not be less than 4 feet diameter, wire rope five-eighths inch diameter, which would require the drum to be only 30 inches long. In this case you must increase the ratio of power in the gearing to suit the diameter of drum.

(15) R. L. M. asks: Can you inform me if there is any way of testing cutlery while purchasing without injury to the looks? If so, what is it? A. An examination of general appearance, in workmanship, temper, character of edge, etc., are generally sufficient to enable a buyer to form a fair opinion of such goods. We know of no chemical or other special test applicable. 2. Also, can you give me a good receipt for silver plating? A. You will find good silver plating formulae, etc., in SUPPLEMENT, No. 310.

(16) F. and T. ask: Would a steam launch, 16 feet in length, 4 feet 3 inches breadth of beam, and 2 feet deep, be a safe craft for two men to use in and about the inlets near Rockaway and Long Beach, and would she be able to make the trip from this city? What weight, including boiler and engine, would she carry? What power would be required to get the greatest speed practical in such a craft? Would we require a license to run her? A. We should consider the boat too small to be efficient with steam power. You would require a licensed engineer to run the boat, and probably the boat would have to be inspected and licensed.

(17) P. S. M. asks: Would the immersion of the lower end of a lightning rod in a leaching cesspool, which always contains more or less water, make a good ground connection? The cesspool receives the waste from the house, and, therefore, the water is somewhat greasy. Would such greasy nature interfere with conduction? A. The lower end of the rod should be attached to a metallic conducting surface that has an area of at least eighteen superficial feet in contact with water or moist earth. The mere insertion of the rod in the liquid, say for four feet, is, therefore, not a proper earth connection. Allowing the rod to be three-quarters of an inch square such insertion would only give an area of a little more than one superficial foot in contact with the liquid, instead of eighteen feet as required.

(18) A. W. says: I have been trying to draw water from a well with one inch gas pipe. It is 18 feet from elbow to the water, and the pipe rises 3 feet in the first 300 feet, and falls 36 feet in the next 700 feet. I filled the pipe from the highest point and then plugged it, and opened both ends at once, and it ran about twenty minutes and then stopped. I can draw water through it with a Douglass pump, but it will not flow. Is 15 foot fall too little to overcome the friction in 1,000 feet of pipe; or what is the matter? A. The friction in the long length of pipe is too great for the pressure, when it acts as a siphon. With the pump you have nearly double the pressure to force the water through the pipe. It may be there is an air leak in the pipe, which would soon stop the operation of a siphon.

(19) H. D. B. asks: Can you please tell me which is the fastest steamboat in the United States, where was it built, what line does it belong to, and how fast does it go? A. We know of no faster steamer than the Mary Powell, a fine passenger vessel now running daily on the Hudson River, between New York and Rondout. This boat, we believe, realizes an average of twenty-two miles an hour.

(20) H. and S. ask how the mould boards of plows are tempered so as to leave them in their proper shape, or rather to keep them from springing while tempering. A. Steel mould boards should be annealed before hardening, and receive their final fit, so that there should be no hammer-hardened surfaces or bending strains in the steel when it receives its heat for hardening. They must be dipped plumb, so that the water will touch both sides of the plate even, or at the same time, and not quickly, but rather slowly, with the point end down. If they spring, in spite of these precautions, you can heat the plates to about 300° Fahr., and clamp them quickly to a former of the proper shape, and cool them with warm water. This will not draw the temper materially, and works well where accuracy is required. It is supposed, of course, that you use a low grade of steel, and do not draw temper. If you use oil instead of water for hardening, the same precautions apply.

(21) G. J. R. asks: Does steel get larger or smaller in hardening? A. It gets both larger and smaller; in fact, so erratic is its nature under various forms, and the variety of ways of heating and hardening, that nothing but a careful study and trial of the articles that you wish to harden will give you any exact knowledge of its tendencies. For instance, a ring die for punching boiler plates made of Krupp steel and fitted into its socket, say 2 inches or 2½ inches diameter, will not enter after hardening by about the one-hundredth of an inch. A 2 inch pipe die of English steel shrinks a little over one-hundredth of an inch upon the inside. As a general principle rings shrink and solids swell. Blocks cut from hammer-drawn flat steel are found to swell across the grain and shrink with the grain.

(22) A. M. S. asks: 1. What is the best method of quickly and thoroughly removing scale from steel forgings after annealing in wood or charcoal fire? A. Treat your forgings to a bath of hydrochloric (muriatic) acid and water, one part acid to eight or ten parts water, for from one to three or five hours, according to requirement of surface and strength of acid bath. If the work is small, a stone jar answers well. Use the mixture continuously, adding acid and water as may be required. If your work is large, you can swab the work over with a stronger acid, as is done with sulphuric acid upon cast iron. 2. Also of removing oil after "burning off" in tempering? A. For removing oil, dip the tempered work in a hot solution of caustic soda, then in boiling water, and dry quickly.

(23) H. H. B. asks: 1. What is the best thing I can use on rubber belting to prevent slipping? I have been in the habit of using castor oil and rosin, but I find that it causes the rubber coating on the pulley side of the belt to peel or strip off. My belts run where the temperature is high and full of hard coal gas. An ordinary leather belt will rot out in a very short time when run in this same hot room; but we bought a second-hand belt that was saturated with some sort of oil, so much so that it dripped from it for months; and it is in a good state of preservation to-day after four years' hard work. A. Use no oil of any kind upon rubber belting. Rub the belt with a piece of beeswax. It is the best for both leather and rubber belting. It does not require to be piled on; a little occasionally will make even a loose belt do large duty. 2. Is there any common oil that I can soak my lacings in to preserve them, as they rot out in about two months now? A. The only proper oil for lacings is that used by the tanners in dressing the leather, which is "neat's foot oil." Your lacings will keep well by wrapping in strong brown paper, and putting in a close drawer out of the influence of light and air. 3. What works can you recommend for the study of electricity, beginning at the first principles? A. "Ganot's Physics," "Prescott's Electricity and the Electric Telegraph," "Gordon's Electricity," also back number of the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT.

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

E. A. W.—It is a variety of chalcedony. If found in any considerable quantity and in large clear pieces it can be used for making articles of ornament, such as clocks, vases, etc.

COMMUNICATIONS RECEIVED.

On the Liver Fluke. By R. W. S.
On the Explosion of a Sawmill Boiler. By H. J. B.
On Thunderbolts. By E. F. D.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were
Granted in the Week Ending

May 30, 1882,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 261 Broadway, corner of Warren Street, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Addressing machine, Belknap & Robillard	258,544	Door hanger and pulley, C. W. Pierce	258,597
Adzes, die for making, W. Evans	258,570	Door or window frame, C. H. Willson	258,539
Alkaline solutions obtained in the manufacture of soda, purification of, E. Carey et al.	258,850	Door spring, M. C. Mohr	258,791
Amalgamating gold and silver ores, apparatus for, W. Hamilton	258,578	Drill. See Rock drill.	
Anaesthetics, administering, Cooper & Dennis	258,632	Dustpan, W. N. Clark et al.	258,631
Animal trap, C. S. Hensley	258,647	Eccentric, adjustable, J. B. Barrois	258,693
Annunciator, electrical, F. E. Fisher	258,735	Egg tester, T. H. B. Sanders	258,311
Anvil and vise, combined, J. J. Glover	258,855	Electric individual signal apparatus, C. E. Buell	258,627
Axle box, car, J. O. Scott	258,813	Electric individual signaling apparatus, C. E. Buell	258,625
Axle, carriage, A. E. Smith	258,680	Electric machine, dynamo, E. J. Houston	258,648
Baseboard, adjustable, C. H. Willson	258,837	Electric machine, dynamo, H. J. Müller	258,864
Battery. See Galvanic battery.		Electric machine, dynamo, W. S. Parker	258,800
Bed bottom frame, Thompson & Wells	258,613	Electric switch board and plug, D. Dewar	258,561
Bed bottom, spring, W. L. Phillips	258,555	Elevator. See Mail elevator.	
Bed, folding, E. M. Bement	258,847	Elevator gate, automatic, B. C. Vanduzen	258,827
Bell, gong, R. Meshane	258,787	Elevator safety apparatus, C. W. Baldwin	258,691
Bicycle, M. G. Crane	258,559	Elevator safety apparatus, self-acting, J. McCarron (r)	10,127
Billiard cue, H. A. Bowne	258,702	Engine. See Rotary steam engine. Steam engine. Traction engine. Wind engine.	
Bit stock, W. A. Ives	258,764	Envelope, D. Lubin	258,861
Blackboard and map case, combined, A. C. Elliott	258,635	Envelope for ice cream, etc., non-conducting, M. T. Fussell	258,640
Board. See Base board. Electric switch board.		Exercising apparatus, J. M. Laffin	258,773
Blow mould board. Telephone exchange switch board.		Expansion joint, J. J. Moss	258,794
Boat plug, G. A. Leavitt, Jr.	258,775	Express signal call, H. S. Stix	258,820
Bolt and key fastener, combined, W. White	258,833	Fan, G. Brueck	258,708
Bookcase, E. R. Young	258,844	Fan, automatic, T. Heaton	258,753
Boot and shoe crimping machine, J. W. D. Field	258,734	Fan, fly, T. A. Martin	258,755
Boot or shoe holding jack, E. Bertrand	258,686	Farm gate, G. I. Bynn	258,624
Boring machine, V. Cox	258,716	Feathers for bedding, apparatus for preparing, G. A. & G. W. Sammet	258,607
Bottle washing machine, K. Hofmann	258,579	Fence, barbed, J. & W. M. Brinkerhoff	258,706
Box. See Work box.		Fence, portable, D. B. Wagner	258,830
Bracket. See Roofing bracket.		Firearm, breech-loading, F. Hummel, Sr.	258,759
Brake. See Car brake. Carriage brake. Vehicle brake.		Firearm, magazine, W. H. Elliot	258,731
Brick burning kiln, J. Johnson	258,583	Flask. See Dentist's flask.	
Brick compound, fire, E. A. Martin	258,661	Flatiron heater, I. R. Angell	258,689
Brush case, blacking, A. L. Seabury	258,815	Forging carriage bolts, machine for, G. & J. T. Golcher	258,641
Buckle, E. A. Cooper	258,715	Forging hammers, machine for, W. Evans	258,569
Bureau, etc., G. F. Richardson	258,604	Frame. See Bed bottom frame. Car frame. Door or window frame.	
Burner. See Lamp burner.		Fruit picking implement, C. Allen	258,846
Button, B. Fischer	258,853	Furnace. See Locomotive furnace.	
Can. See Creaming can.		Galvanic battery, J. Kiedler	258,557
Car brake, automatic, D. Torrey	258,615	Gamepiece and method of exhibiting the same, J. Storck	258,821
Car coupling, J. M. Bailey	258,541	Gas, apparatus for the manufacture of combustible, E. Langen	258,774
Car coupling, J. C. Blocher	258,848	Gate. See Elevator gate. Farm gate. Self-opening gate.	
Car coupling, P. M. Bracelin	258,550	Glassware, ornamentation of, F. Rhind	258,808
Car coupling, S. Bray	258,704	Globe for electric and other lights, glass, J. D. Mulier	258,735
Car coupling, E. W. Grant	258,746	Glove fastening, J. Woodiska	258,842
Car coupling, H. G. H. Reed	258,807	Grain binder, C. Young	258,687
Car frame, Brant & Harris	258,703	Grinding mill, G. & A. Raymond	258,867
Car, railway, J. Patterson	258,594	Grinding mill, G. K. Smith	258,817
Car unloaders, nose casting for, G. W. Rolph	258,606	Grinding or polishing wheel, C. V. Hunt	258,760
Carding engines, mechanism for operating different combs of, P. Laffin	258,656	Hair fronts, forming wave, J. B. McCarthy	258,662
Carding machine top flat, W. E. Whitehead	258,620	Halber, E. Barnard	258,543
Carpets, tumbling reel for cleaning, T. A. Naylor	258,796	Handle. See Adjustable handle. Saucepan handle.	
Carriage brake, W. R. Mortimer	258,793	Hanger. See Door hanger. Plumber's pipe handle. Shaft hanger.	
Carriage curtain fastening, W. H. Weaver	258,831	Harrow, E. P. Lynch	258,732
Carriage top clamp, B. B. Noyes	258,798	Hatchets, die for making, W. Evans	258,568
Carrier. See Cash carrier.		Heater. See Flatiron heater.	
Case. See Book case. Brush case. Check case. Packing case. Sample exhibiting case.		Hoisting, stand frame for, W. S. Blunt	258,543
Cash carrier, automatic, W. S. Lamson	258,584, 258,585	Holder. See Rein holder. Sash holder. Shade holder. Spooling machine bobbin holder.	
Chain, drive, D. O. McKernan	258,863	Hook. See Whiffletree hook.	
Chair. See Opera chair.		Hoop cutting machine, barrel, J. B. Pike	258,804
Check case, J. S. Crane	258,717	Hosiery, method of and apparatus for exhibiting, J. M. Kennard	258,767
Chuck jaw, reversible, C. Macdowell	258,733	Hot and cold air register, R. S. T. Cissel	258,629
Churn, W. D. Leavitt	258,658	Hub fastener, N. Clark	258,557
Cigar, T. S. Luby	258,781	Ice machine, G. W. Stevens	258,632
Cigar box catch, J. E. Margott	258,788	Ice, manufacture of, W. W. Dusenbury	258,566
Cigar lighter, E. A. Parker	258,799	Ice marker and plow, J. B. Fischer	258,637
Clamp. See Carriage top clamp. Rope clamp.		Insulating material for electrical conductors, F. Borel	258,549
Cloak, reversible, H. F. Binnsell	258,697	Jack. See Boot or shoe holding jack. Lifting jack. Painter's jack.	
Clock bell, G. W. & A. C. Sanford	258,609	Jewelry tool, W. B. Atkinson	258,690
Clock dial, J. R. Payson, Jr.	258,801	Jewelry catch, P. A. Leimbach	258,776
Clocks, electric motor for, L. H. Speller	258,812	Joint. See Expansion joint. Universal joint.	
Clothes bars, folding, J. S. Gourley	258,745	Kiln. See brick burning kiln. Limekiln.	
Clothes pin, J. T. Haskins	258,644	Kitchen cabinet, W. R. Craig	258,851
Clothes pounder, C. & T. Hamshaw	258,643	Lamp, W. Scott	258,678
Clutch, friction, O. E. Wait	258,686	Lamp burner, W. L. Horne	258,758
Coffee pot, J. McAnespey	258,786	Lamp cap, miner's, H. F. Pearce	258,802
Colander and fruit press, combined, L. Brownlow	258,707	Lamp, electric arc, C. A. Hussey	258,581
Collar fastening, horse, A. B. Robinson	258,677	Lamp, electric arc, R. J. Pratt	258,805
Coop, chicken, D. E. Davis	258,715	Lamp, electric arc, E. Thomson	258,684
Corset, W. S. Allen	258,622	Lamp, electric incandescent, E. Berliner	258,546
Cotton gatherer, hand, B. F. Lamb	258,657	Lamp, electric incandescent, J. H. Guest	258,747
Cotton gin brush cylinder, E. Van Winkle	258,613	Lamp stand, T. Garceau	258,571
Cotton gin condenser, Burdine & Brewer	258,849	Lamp support, H. Raupp	258,674
Coupling. See Car coupling. Thill coupling.		Latch, gate, P. J. Winn (r)	10,128
Crabber reaper and detacher, C. W. Heisley	258,754	Lathe tail stock, turning, A. Hyde	258,582
Creaming can, E. B. Clement	258,714	Lathe, watchmaker's, D. L. Pettipierre	258,669
Crib, convertible, J. W. Barton	258,694	Leather scouring, setting, or glassing machine, F. A. Lockwood	258,659
Cultivator, T. C. Dodsworth	258,724	Lemon squeezer, A. Schlappach	258,812
Cushion. See Vehicle cushion.		Lifting jack, J. Church	258,556
Damper regulator, automatic, J. W. Funck	258,639	Lighting rod coupling, W. B. Munn	258,590
Dentist's flask, E. H. Locke	258,858	Limekiln, J. Druceker	258,725
Desk, school, G. Dinsmoor	258,721	Link, attachment, J. M. Dodge	258,722
Detachable handle for utensils, Neider & Grossmann	258,591	Locomotive furnace, T. A. Buckland	258,739
Detector. See Time detector.		Locomotive recorder, A. L. Pouget	258,672
Diaphragm, separating, G. B. Whiting	258,835	Locomotive sand distributor, P. B. Viele	258,828
Disinfecting apparatus for water closets, H. Blackman	258,689	Loom warp-stand mechanism, T. B. Rider	258,605
Ditching machine, F. Piégeon	258,596	Lubricating journal, G. Kratz	258,655
Door hanger, W. F. Berry	258,547	Mail elevator, J. W. Paine	258,668
		Manrel, expanding, J. G. Pope	258,598
		Manger, C. H. Willson	258,638
		Measure, earthenware liquid, J. W. Young	258,845
		Meat for transportation, packing, C. E. Denny	258,719
		Mechanical movement, J. A. Juhm	258,653
		Mechanical movement, J. H. Osborne	258,593
		Metal tubes and pipes, machine for making, S. Fox	258,740
		Mill. See Grinding mill. Roller mill. Windmill.	
		Mail packer register, G. L. Williams	258,836
		Milling cutter blank, M. G. Crane	258,560
		Motion, device for converting reciprocating into rotary, J. W. Chamberlain	258,712
		Motive mechanism or gearing, O. N. Eaton	258,728
		Motor. See Steam motor.	
		Mowing machine, C. W. Cheney	258,555
		Mug, shaving, P. H. Leonard	258,777
		Musical instrument, mechanical, O. H. Neecham	258,667
		Naphthalene into a form for carbureting manufacturing, Livesey & Kiedler	258,778
		Neckwear shield and fastener, A. Komp	258,769
		Oil tank protector, W. J. Hall	258,749
		Opera chair, folding, A. W. Adams	258,688
		Organ coupler, J. R. Lomas	258,780