AN OLD CONCERN RE-ESTABLISHED.

Horace Waters & Son, dealers in musical instruments in this city, made an assignment not long ago to secure their creditors. Mr. Waters, Sr., after thirty years' experience; hopes, by enterprise, economy, and fair dealing, to re-establish his business and to retain his old customers. To this end, he has opened a store a No. 40 East 14th St., and acts as agent for a number of leading musical instrument manufacturers.

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.

The best results are obtained by the Imp. Eureka Turbine Wheel, and Barber's Pat. Pulverizing Mills. Send for descriptive pamphlets to Barber & Son, Allentown, Pa.

Steam Tug Machinery, Engines, Boilers, Sugar Machinery. Atlantic Steam Engine Works, Brooklyn, N.Y.

Walrus Leather, Solid Walrus Wheels; Wood Wheels covered with walrus leather for polishing. Greene, Tweed & Co., 18 Park Place, New York.

Slate. Barrel, Keg, and Hogshead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

We will rent whole or part of third story in our building, with power for light manufacturing. Size, 40 x 80 feet · has 25 windows and power elevator. Located on N. Y Central Railroad. Rome Revolver and Novelty Works, Rome, N. Y.

Milling attachments for Lathes. W. Main, Piermont, N.Y.

Improved Blind Staples. B. C. Davis, Binghamton, N.Y.

Trout sure to bite. Cir. free. Hill & Co., Lawrence, Mass.

H. W. Johns' Asbestos Liquid Paints are strictly pure linseed oil paints, and contain no water. They are the best and most economical paints in the world.

A party owning, free of debt or other incumbrance, in an excellent location, a new, neat, and substantial factory, fitted with needful power, machinery, tools, patterns, and materials, and in successful operation, manufacturing an entirely new, first-class sewing machine, for which a first-class patent has just been allowed, of which he is sole owner, desires entirely reliable parties of ability, experience, and cash, to take charge of the manufacturing and sales departments in a partnership or stock company Best references exchanged. Address P. O. Box 343, Chicago, Ill.

Wanted—Machinist, with small capital, to invest in a good business, to take charge as foreman of a foundry and machine shop Apply to or address W. B. McKeldin, Athens, McMinn Co., East Tenn.

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

For Stationary or Portable Engines, Circular Saw Mills, Grist Mills, and Mill Machinery, good and cheap, address the old manufacturers of Cooper Mfg. Co., Mt. Vernon, O.

H. Prentiss & Co., 14 Dey St., New York, Manufs. Taps, Dies. Screw Plates, Reamers, etc. Send for list.

For Screw Cutting Engine Lathes of 14, 15, 18, and 22 in Swing. Address Star Tool Co., Providence, R. I.

The Horton Lathe Chucks; prices reduced 30 percent. Address The E. Horton & Son Co., Windsor Locks, Conn.

Lincoln's Milling Machines; 17 and 20 in. Screw Lathes. Phœnix Iron Works, Hartford, Conn.

Boilers ready for shipment. For a good Boiler send to Hilles & Jones, Wilmington, Del.

Shaw's Mercury Gauges, 5 to 50,000 lbs.; accurate, reliable, and durable. T. Shaw, 915 Ridge Ave., Phila., Pa.

A Cupola works best with forced blast from a Baker Blower. Wilbraham Bros., 2,318 Frankford Ave., Phila.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Forsaith & Co., Manchester, N. H., and 213 Centre St., New York. Specialties.—Bolt Forging Machines, Power Hammers, Combined Hand Fire Engines and Hose Carriages, new and 2d hand machinery. Send stamp for illustrated catalogues, stating just what you want.

Linen Hose.—Sizes: 1½ in., 20c.; 2 in., 25c; 2½ in., 29c. per foot, subject to large discount. For price lists of all sizes, also rubber lined linen hose, address Eureka Fire Hose Company, No 13 Barclay St., New York.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N.J.

The Lathes, Planers, Drills, and other Tools, new and second-hand, of the Wood & Light Machine Company, Worcester, are being sold out very low by the George Place Machinery Agency, 121 Chambers St., New York.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

American Fruit Drier Mfg. Co., Chambersburg, Pa.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J.

Vertical Burr Mill. C. K. Bullock, Phila., Pa.

Eclipse Portable Engine. See illustrated adv., p. 414.

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

Vertical Engines. F. C. & A. E. Rowland, N. Haven, Ct.

Excelsior Steel Tube Cleaner, Schuylkill Falls, Phila., Pa

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Pulverizing Mills for all hard substances and grinding purposes. Walker Bros. & Co., 23d & Wood St., Phila., Pa.

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

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Machine Cut Brass Gear Wheels for Models, etc. (new list). Models, experimental work, and machine work generally. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIENTIFIC AMERICAN of this week.

We have opened a sample depot for American goods, and wish to negotiate with manufacturers seeking Spanish markets. We shall be glad to receive catalogues, price lists, and samples of American products. Address Herrero Hermanos, Cadiz, Spain.

Downer's Anti-Incrustation Liquid.—J. W. Hamburger, Wholesale Furniture Manufacturer, Hester and Elizabeth Sts., New York, says: "Your Boiler Liquid is a success. I am using hard well water, but your Liquid prevents the formation of scale, and my tubes are clean. I shall continue to use it, and heartily recommend it to others." A. H. Downer, 17 Peck Slip, New York.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St., N.Y. Wm Sellers & Co.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever

Best Power Punching Presses in the world. Highest Centennial Award. A. H. Merriman, W. Meriden, Conn.

Deoxidized Bronze. Patent for machine and engine journals. Philadelphia Smelting Co., Phila., Pa.

Having enlarged our capacity to 96 crucibles 100 lb. each, we are prepared to make castings of 4 tons weight. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Milling, Profiling, Cam Cutting, Revolving Head Screw Machines. Pratt & Whitney Co., Hartford, Conn.

Hand Fire Engines, Lift and Force Pumps, for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N.Y., and 93 Liberty St., N. Y. city, U.S.A.

NEW BOOKS AND PUBLICATIONS.

ORIGIN, PROGRESS, AND DESTINY OF THE ENGLISH LANGUAGE AND LITERATURE. By John A. Weisse, M.D. New York: J. W. Bouton. 1879. 8vo, pp. 701.

If not the first, certainly the most thorough and comprehensive, study of the origin, development, and verbal structure of English speech that has ever been made by scientific methods. In its preparation Dr. Weisse has studied with singular acuteness and patience the vocabularies of typical British writers in every age from the year 597 to the present, tracing the origin of the words used, and the varying percentages of words drawn by different writers in successive ages from the different sources — Anglo-Saxon, Gothic, Danish, Swedish, German, Dutch, Flemish, Welsh, Cornish, Scotch, Irish. Armoric, Greek, Latin, French, Italian, Spanish, Portuguese, Russian, Arabic, Hebrew, and Armaic—all of which have fed the grand stream of English speech. Contrary to popular notions, English as at present spoken is, in its vocabulary, about three-quarters Græco-Latin and one quarter Gotho-Germanic or Anglo-Saxon. In other words but one-quarter of the words in use by English writers and speakers have come from the latter family of languages, and the tendency is and has been steadily toward the increasing of the percentage of Græco-Latin words. As to the destiny of the English language, Dr. Weisse believes with De Candolle that in a century or so it will dominate the world. The English speaking peoples are a multiplying, colonizing, conquering race. Already they command nearly half the world's commerce, though numbering but one-fifth the world's population. They have more books and newspapers than all the rest of the world, and more inventors and inventions. In directness, compactness, and simplicity of grammatical structure, English speech surpasses all other languages—properties which make it everywhere the language of the telegraph—and it only needs rectification as regards its spelling to be suitable for universal adoption. Dr. Weisse's book is a mine of curious and valuable information, and has made its mark as one of the few great works of the age.

MAGNETIC VARIATION IN THE UNITED STATES. By J. B. Stone, Ph.B., C.E. New York: 1878. 12mo, pp. 139. Price $1.50.

Every practical surveyor will appreciate the advantage of a compilation of the recorded facts in relation to the variation of the compass throughout the United States. This Mr. Stone has been at great pains to make, and to supplement his tables with such information as will enable the surveyor to determine easily the allowance that must be made in any case for the difference in variation between any dates. There is added a brief account of the nature of terrestrial magnetism, the various theories as to its origin, its change in intensity, and duration, and the progress of magnetic observation. The book may be had of Mr. Stone, Boonton, New Jersey.

GRAPHICAL COMPUTING TABLE. By Lieut. William H. Bixby, U. S. A. New York: John Wiley & Sons.

It would be impossible to say, without a wide and varied series of practical tests, whether this ingenious table is a curiosity merely, or an instrument of great practical utility. The credit of its construction is given to Lalanne, French Inspector General of Bridges and Highways. It certainly enables one to arrive at the results of many complicated mathematical operations almost by simple inspection. If we had much of that sort of work to do we should not hesitate to undertake the mastery of its use. The time and labor spent on its preparation surely ought to bring some practical return. Young office workers may do well to give it a trial. The errors are said to be within one half of one per cent.

REPORT OF NEW YORK STATE SURVEY FOR 1878. James T. Gardner, Director. Albany: C. Van Benthuysen & Sons.

The field work of the past year was principally upon that part of the central belt of triangles from Albany westward, lying in the counties of Oneida, Madison, Onondaga, Oswego, Cayuga, Wayne, Seneca, and Yates. The measurements embraced an area of about 2,000 square miles, in one of the most wealthy and populous parts of the States, containing two important cities and nearly two hundred villages and hamlets. Every one of these towns was found to be misplaced from one to two miles on all existing maps.

PLASTERER'S MANUAL. By K. Cameron. New York: Bicknell & Comstock. pp. 53. Price 75 cents.

A practical little handbook describing the tools and materials used in plastering, the appearance and action of different limes and cements, methods of making and applying mortar, and giving, in small space, a large amount of information useful to plasterers. Both publishers and author have done their work well.

AN EXPOSITION OF CREATION. By Rev. Joseph Gross. Philadelphia: William Syckelmoore. pp. 135. Price 40 cents.

Mr. Gross is an aged clergyman who sticks to Genesis, literally. Genesis is right; geology clashes with Genesis, therefore geology is wrong. The logic is good. The usual custom is to assert that Genesis means what it does not say; then build up a scheme of geology resting more on imagination than on fact; then say that geology and Genesis agree. Mr. Gross is guilty of no such folly. He does not know much about geology, further than that it does not agree with a literal interpretation of Genesis i. and ii. His major premise being, to his mind, unassailable, his conclusion is inevitable. Geology and Genesis cannot be harmonized without mutual destruction. He rests on Genesis.

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.

We renew 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.

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.

(1) G. M. writes: I want to make an engine, 6 inches stroke and 4 inches diameter, of brass. How large should the ports and exhaust be, and how can I make the cores for the same? A. Steam port ⅜x2½ inch, exhaust ⅝x2½ inch. Consult a moulder on other points.

(2) W. W. asks: Does the upturning of virgin earth (not marshy districts) from 1 to 20 feet deep, and filling up hollows, produce malaria in any form? A. No, not in a healthy region. Still if any one in the neighborhood should afterwards suffer from an illness which the attending physician was too ignorant or too lazy to discover the cause of, the patient would probably be told that he was a victim of malaria. Malaria appears to be a convenient verbal pack-horse for a wide range of medical ignorance.

(3) G. H. O. asks (1) for a recipe for a preparation for sealing bottles that is insoluble in alcohol. A. Soften glue in cold water and melt it in the water bath to form a very thick paste. To this add good glycerine in quantity equal to the dry glue taken, and continue the heating to expel as much of the water as possible. This may be cast on a marble slab to cool, and melted for use as required. This is not soluble in alcoholic liquids. 2. Is there any liquid as good as alcohol, but cheap, for preserving insects, snakes, etc.? A. Alcohol is one of the best; a solution of arsenious acid may be employed for insects.

(4) J. S. B. writes: I contemplate putting in an engine to run my presses and heat the office. About two effective horse power will be required, and the office is about 20x40, 9 feet high. 1. Will either of the engines of the following dimensions do the work, and which will be the best? One is, cylinder, 3½x6 inches, 250 revolutions per minute, boiler of the locomotive style, diameter 23 inches; length of furnace, 23 inches; width of furnace, 18 inches; height of furnace, 16 inches; number of tubes, 18; diameter of tubes, 2 inches; length of tubes, 41 inches. The other is, cylinder, 4x6 inches, 240 revolutions per minute; boiler upright; diameter, 24 inches; height, 60 inches; number of tubes, 26; diameter of tubes, 2¼ inches; length of tubes, 36 inches; grate surface, 207 square feet. A. Use the larger engine, 4x6. 2. Will it be necessary to place the boiler below the level of the heating coils? A. No, you can use a trap to return the water to the boiler. 3. Will it be of any use to attempt to utilize the exhaust steam? A. Utilize it by heating the feed water.

(5) C. L. H. asks for some method of keeping moulding clay moist for some length of time. A. Mix a little glycerine with the water.

(6) C. E. A. asks what cement to use for fastening mineral specimens to woods—as in making mineral caskets. A. Good glue or sealing wax answers very well. Thick solution of shellac in alcohol or in a hot aqueous solution of borax will also answer the requirements.

(7) E. A. R. asks how to preserve natural flowers. A. The fresh leaves are spread and pressed into a suitable dish with alternate layers of fine, thoroughly dry sand, as hot as the hand can bear. When the sand has cooled they may be removed, smoothed, and dipped for a few moments in clear French spirit varnish, and allowed to dry in the air. By many melted white wax is preferred to the varnish. This latter must not be too hot. The dried leaves are dipped in the melted wax, drawn several times over the edge of the vessel to remove excess, and hung up until the film of wax is thoroughly cooled and hardened.

(8) H. T. N. writes: I have a marine barometer and do not understand exactly what effect the atmosphere has on it to foretell rain, snow, or wind, etc. I have asked others that have them; they differ, and appear to know no more than myself. Please give rules by which the changes are indicated. A. High winds and storms are usually preceded by a sudden falling of the mercury. The approach of fine weather is indicated by the rising of the mercury. The rising of the mercury in winter indicates frost; in frosty weather it indicates snow; while its fall indicates a thaw. In sultry weather coming thunder is indicated by the falling of the mercury. When the height of the mercury alters slowly, the kind of weather indicated will continue for a long time. If it falls, it will be foul; if it rises, it will be fair. Fluctuations in the mercurial column indicate changeable weather. These rules may be relied on in a general way. No positive rules can be given.

(9) W. H. D. asks: What will color charcoal and tallow a dark red—a good permanent dye? A. We know of no satisfactory method of dyeing charcoal red. Perhaps the admixture of a small quantity of red ocher or Berlin red with the tallow would answer the requirements.

(10) J. S. writes: I am engaged to some extent in brass casting, using old metal almost exclusively. I am unable to make sound castings, and desire some information. It is not the fault of the moulds, as I have no trouble with new metal. The trouble seems to be a sort of white scum of oxide which forms very rapidly, which, going into the mould with the metal, makes the castings porous and rotten. A. Stir the molten metal well with a stick of green wood, and sprinkle the surface with a little dry argol and sal-ammoniac before pouring.

(11) C. T. E. asks: 1. What are the ingredients and quantities for manufacturing black and brown hair dyes? A. See p, 348, Cooley's "Cyclopedia of Practical Receipts." 2. What is the best method of preparing violin rosin? A. Moisten the powdered rosin thoroughly with turpentine spirits, agitate with about ten parts of water, and boil the milky liquid for an hour. Filter dry, and fuse the residue at a gentle heat.

(12) J. C. W. writes: In the May 10th number of the SCIENTIFIC AMERICAN, under "Notes and Queries," W. A. B. asks how to procure powdered silver such as is used in the Righi telephone. You suggest a mechanical process. I beg leave to offer the following, which is mainly an old chemical method, and may or may not answer the requirements of W. A. B.: Make a solution of nitrate of silver by dissolving the crystallized salt in pure distilled water, and of such strength as that about 60 grains shall be in one gallon of the water. By making the solution stronger or weaker, more or less coarseness of the powder will result. After solution is made immerse in it a strip or strips of clean copper sheet, and set the whole aside for about 24 hours, when the silver will have been precipitated upon the strips of copper in a finely divided metallic state. I am inclined to the opinion that frequent or constant agitation of the liquid will produce a better result than if the precipitation is allowed to proceed undisturbed, but cannot say positively that it will. After the action is completed shake or agitate the vessel so as to detach the loosely adhering coat of silver from the copper strips, and having removed the latter, collect the silver by filtering the liquid through paper, rinsing all the precipitate into the filter. After the water has passed wash the precipitate with water containing one or two per cent of aqua ammonia until all the copper (or cupric nitrate) is removed from the silver powder. Any accidental chloride of silver will be thus removed also. Then let the water drain out of the filter until it ceases to drip, when a continuation of the washing may be resumed, using strong alcohol. This will displace most of the water. After this wash out the alcohol with stronger ether or ether containing no water, then expose the filter (opened freely to the air) to a warm temperature, avoiding the approach of flame, for fear of setting fire to the ether. The precipitate will dry rapidly and may be easily rubbed to a fine soft metallic powder by passing through a fine sieve.

(13) S. M. L. writes: 1. I wish to construct a wheel seven inches in diameter and two inches thick. The wheel runs diametrically, one half in vacuum and one half in open air. The wheel sits horizontally, the shaft being vertical. The distance between bearings is about five inches. What is the smallest sized iron or steel shaft I could use with safety? I estimate the side pressure to be about 210 lbs. A. 9-16 inch. 2. If a tube be placed in water, and the air exhausted from the tube, the water will rise about 30 feet. If a turbine wheel were placed in the tube, about on a level with the surface of the water, would the water exert a force on the wheel equivalent to a fall of 30 feet in open air, supposing the weight of the water above the wheel to be taken off? A. No. 3. Is there any safe rule for estimating the horse power of turbine wheels under a given pressure, and the number of revolutions they will make, and the amount of water they will pass, in a given time? A. Turbine manufacturers have such rules. 4. Can you name a good reliable history of the attempts to invent perpetual motion machines, one which gives sketches and descriptions of the most important plans that have been devised by inventors? A. "Perpetuum Mobile, or Search for Self Motive Power," by H. Dircks.

(14) C. A. S. writes: In the SCIENTIFIC AMERICAN, page 230, volume 38 (April 13, 1878), is given a process for copying tracings by the aid of photography. It is claimed that this process will give a copy in dark (deep blue) lines on a white ground. I have repeatedly tried the process, over and over again, but have not yet succeeded in getting the result desired. The best result I can get is a copy of dark blue lines on a nearly equally dark blue ground, the ground being only a shade lighter than the drawing, however long I may leave the paper exposed to the light. Will you please inform me what the trouble is? A. Potassium ferrocyanide produces in solutions of the ferrous (proto) salts a bluish white (nearly white) precipitate, which by absorption of atmospheric oxygen speedily acquires a distinct blue color. The remedy is obvious—shorten the time of exposure to the air, dilute the solutions employed somewhat, and wash thoroughly immediately after exposure.

(15) R. V. H. asks: How can I make a silvering solution so I can apply with a cloth and have a silver plate? I have a recipe but it rubs off with the hand. The recipe is as follows: 2 drachms nitrate of silver; 4½ drachms water; 1 drachm sal ammoniac; 4 drachms each chalk and soda. A. The silver deposited in this manner is a mere wash and cannot be expected to stand much handling. A better wash than the one referred to is prepared as follows: Dissolve ½ ounce silver nitrate in a small quantity of water, warm, agitate this with about

1-3 ounce of pure hydrochloric acid, and let the precipitate subside. Wash this (silver chloride) several times, by decantation, with hot water. Dissolve ¼ lb. of potassium cyanide in soft water; add this gradually (warm) to the precipitate until the latter is completely dissolved, and dilute the solution to one gallon. Dip the articles (brass or copper) to be silvered in strong hot potash solution, rinse in water, scour with a brush and fine pumice, rinse again and dip in the cyanide bath. If a dark deposit is obtained, add more water to the bath; if it coats slowly, add more silver chloride. As the silver is gradually abstracted more of the chloride must be added. If properly silvered the work will admit of polishing. A trace of grease or dirt on the work will spoil the deposit. Cyanide of potassium is very poisonous, and care should therefore be taken to avoid introducing it, through cuts or otherwise, into the system.

(16) T. A. writes: I am thinking of getting a condensing steam engine, and have been told that this kind of engine takes some 20 to 30 times more water (for condensing purposes) than would a non-condensing engine. Could I use two wells for this purpose, by running the condensed steam (water) to the second well, and then the next day use this same water for condensing purposes again; and then running it to the first well again, and so back and forth, using the same water over and over again day after day; and if so how much water would be actually lost or evaporated each day, say in a 12 hours' run with 50 horse power engine? A. Your mode of using two wells will answer if they are of sufficient capacity to give time for one to cool off while using water from the other. The water should, in cooling, be reduced in temperature about 40 degrees. If your boiler and engine are tight, the loss would probably not exceed 5 per cent. But is a condensing engine necessary in your case, and if so, why?

(17) O. E. writes: I want to make an electro-magnet capable of lifting 1 ounce ¼ of an inch. 1. What size and length of wire and core ought I to use? A. Make the cores 1½ inch long, ½ inch in diameter, wind them with 6 or 8 layers of No. 20 covered wire. 2. What battery and conducting wire will be best, circuit about 15 feet? A. If for continued use, use two or three cells of gravity battery. If used occasionally, one cell of Grenet or Bunsen would do. For conducting wire use No 16. 3. How should I fasten the wire to the core? A. The wire is not fastened to the core. For method of making magnets and full particulars as to proportions, resistance, etc., see SCIENTIFIC AMERICAN SUPPLEMENT No. 182, article on Electro-Magnets, illustrated by over 50 cuts.

(18) E. C. B. writes: In a recent query, C. R. H. asks if it is possible for a number of persons to move a table by electricity by placing their hands upon it, without pressing upon it? You simply answer "no." Now I would like an explanation. I have been one of seven who moved a table in this way, it going around the room in a circle. We placed the legs in saucers. Time to start about twenty minutes. If it is not the electric current, what is it? A. Muscle generally, sometimes muscle combined with a vacuum formed in the palms of the hands of some of the table movers.

(19) H. G. A. S. asks: Will you be kind enough to tell me what about is the total strain on a 7⅓ octave piano? A. A 7 1-3 octave large concert grand, of Steinway & Sons' make, bears a total strain of 66,000 lb. Parlor grands of the same make average 30,000 lb. strain each; and upright pianos, having also three strings to each note, from 20,000 to 25,000 lb., according to size; the square grand pianos, 7 1-3 octave, being partly 3 stringed to each note, about 20,000 lb; 7 octave square pianos, two strings to each note, about 16,000 lb. each. 2. Some thorough work on tuning and temperament? A. The only standard work, in which tuning and temperament are most scientifically treated, which we know of as translated into the English language, is "Professor Helmholtz's Toue Sensations."

(20) C. R. N. writes: 1. If there be a small aperture in a steam boiler, say one half inch in diameter, will the steam exert a greater force to displace a plug driven into it having a square end than if the end were sharp and tapering; if so why? A. No, the pressure acts upon the total area of the opening. 2. Which has the greatest power with an equal force applied, a crank or an eccentric, the throw being equal? A. An eccentric is simply a crank.

(21) E. A. W. asks: 1. Can a circular saw be made to revolve so rapidly that it will not cut? A. No. 2. Which is the better conductor, a rapidly revolving saw or one at rest, or, in other words, will lightning strike one sooner than the other? A. We think there would be no difference. 3. Which will run easier, a wheel with boxing much too large for spindle, or one having boxing that fits the spindle neatly? A. Well fitted boxes best; the shaft is then always in proper line. With slack boxes it generally would be out of line.

(22) J. T. E. asks: 1. What is the striking force of a pile hammer falling twenty-two feet, weight nineteen cwt.? A. 35½ tons. 2. What will prevent water from foaming in steam boilers? What causes it to foam? A. There are many causes for foaming, and different remedies are accordingly required. Often a little oil forced into the boiler will check the foaming temporarily.

(23) J. H. B. asks: 1. Can a current water wheel be made that can be used successfully for running a flouring mill, and if so what is the plan for such a wheel? A. Yes. 2. Can the motion of machinery propelled by such a wheel be governed, and how? A. By a proper mill wheel governor. 3. What should the quantity and velocity of a current of water be to produce a 25 horse power? A. Consult a good millwright or engineer as to the special conditions of your case.

(24) E. M. asks (1) if it would be advisable to have small pump exhaust into boiler chimney. A. It would be a mere question of convenience. 2. Why is a siphon indispensable to a steam gauge? A. To interpose between the steam and the diaphragm of the gauge a short column of water, which prevents the heat of the steam from affecting the gauge.

(25) A. L. G. asks if expansion joints can be used with success in a line of steam pipe one hundred and twenty feet long. We have a great deal of trouble in keeping our unions tight; the steam is used for heating purposes, one line of piping 120 feet, one line of waste pipe 120 feet long, which enters a steam trap. A. Yes, with entire success, if you put in enough of them and it is properly done.

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

C. A. J.—It is chalcocite or copper glance, with malachite—a valuable ore of copper if found in sufficient quantity. The per cent of copper in it can only be determined by a quantitative analysis.—A. S.—The so-called ore consists chiefly of iron sulphide, bronze powder or Dutch gold leaf (brass), sheet metal clippings, and mercury. Evidently an attempted imposition.—E. J. L.—The gravel consists chiefly of quartz and mica, Some of this may prove auriferous.—No name.—The specimen contains much silica, iron, and lime. It may prove useful for the manufacture of bricks, cheap pottery, etc.—E. B. S.—Quartz pebbles.—W. M. B.—The object is a fossil one of the extremities of the internal bone or shell of a *Belemnite*, a cephalopod which was very abundant during the Cretaceous Period, to which the green sand of your State belongs. The animal was allied to and much like the cuttle fishes and squids of the present day. The portion you send is what the scientists call the *phragmocone*, and was divided into deeply concave air chambers (which you may see by holding a specimen up to the light), and these were connected with each other by a tube. It was originally exceedingly delicate, and owes its preservation in its present hard state to the infiltration of calcareous spar.

COMMUNICATIONS RECEIVED.

On a Mathematical Discovery. By J. C. M.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

May 20, 1879,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Adjustable bracket, E. T. Starr (r) 8,723
Advertising tablet, J. E. Phillips 215,665
Air compressor, J. B. Pitchford 215,540
Air, purifying, circulating, etc., A. J. Chase 215,572
Album, J. Kena. 215,524
Amalgamating ores, apparatus for, J. H. Rae 215,672
Animal trap, T. G. Rice 215,480
Apple corer and cutter, Gunn & Mendenhall 215,605
Arches and floors, apparatus for supporting centers for masonry, W. Erwin 215,595
Assayer's self-calculating sample and button weigher, J. S. Phillips 215,477
Awning, E. C. Cook 215,437
Axle box, car, J. H. Covel 215,506
Bag holder, C. A. Bikle 215,502
Bale band tightener and tier, S. H. Gilman 215,451
Bale tie buckle, T. J. McCaffrey, Sr. 215,529
Bales from presses, ejecting, S. H. Gilman 215,450
Banjo, R. McManus 215,647
Barrel crozing machine, T. McKeever 215,646
Base and cap plate, R. Miller 215,533
Bed, S. J. Daily 215,579
Bed bottom, F. D. Kennedy 215,631
Bed bottom, E. L. Matteson 215,588
Bed bottom, spring, B. Schapker 215,482
Bed bottom, spring, P. Williams 215,702
Beehive, Byrd & Perkins 215,569
Beer casks, regulating pressure in, F. Fehr 215,596
Beer cask washer, F. Fehr 215,597
Beer, making, Meller & Hofmann 215,679
Belt, electric, C. R. Kruger 215,637
Belt fastener, Budlong & Talcott 215,567
Belt fastener, A. Loehner 215,470
Berth, sleeping car, F. C. Hills 215,618
Blotting sheet, B. B. Hill 215,520
Bolt blanks, manufacture of, W. E. Ward 215,494
Boot and shoe heel, B. Bradshaw 215,563
Boot and shoe seam, J. Jory 215,460
Boot and shoe seams, covering stay for, C. D. Wood 215,706
Boot and shoe uppers, crimping, S. Moore 215,534
Boot rack, H. C. Macdonald 215,641
Boot treeing machine, J. E. Crisp 215,440
Bottle stopper, W. H. G. Savage 215,682
Bottle stopper fastener, A. W. Porter 215,668
Bracelet, M. Kayser 215,461
Bracket, A. D. Judd 215,523
Brake shoe clamp, J. Taylor 215,691
Brick, etc., maker, H. Guthrie 215,606
Bridge, R. Hoover 215,522
Bucket, butter and egg, G. J. Cook 215,576
Butter package removable casing, G. J. Record 215,674
Butter print, J. R. Kinerson 215,633
Button hole guard, G. W. Prentice 215,541
Calendar support, Pruyn & Hyatt 215,669
Car coupling, J. G. Baader 215,552
Car coupling, W. H. Maple 215,644
Car coupling, I. R. McCormick 215,645
Car coupling, G. H. Wilson 215,497
Carding engine, R. F. Barker 215,501
Carpet lining, H. B. Meech 215,648
Carriage bow, F. D. Parry 215,476
Carriage wheel wrench, N. R. Pratt 215,479
Carriages, safety trace catch for, C. Reinhold 215,678
Caster, pepper and salt, W. B. Dean 215,441
Centrifugal machine, S. Baxendale 215,428
Cereals, prepared, L. S. Chichester 215,573
Chain link, C. W. Levalley 215,469
Check marker, bank, C. B. James 215,624
Cheese boxes, machine for reducing the height of, E. D. Perkins 215,538
Child's chair and carriage, D. Gleason 215,601
Cider press, M. P. Schenck 215,483
Clay, purifying fire, W. T., C. M., & W. T. Christy, Jr. 215,434
Cloak blanket, C. A. Hodgman 215,619
Clock case, S. C. Spring 215,708
Coal deliverer, A. B. & T. C. Davis 215,510
Collar fastening horse, Moore & Cameron 215,652
Colter and jointer, G. Dodge 215,587
Cornet, W. C. Fietz 215,598
Corset, E. W. Bigelow 215,560
Corset bone pocket, W. A. Nettleton 215,655
Cot and bed bottom, spring, E. Olmsted 215,475
Cotton gin, W. S. Reeder 215,676
Crank, automatically and positively adjustable, W. H. Clark 215,435
Curtain fixture, W. C. Sharp 215,484
Desk, school and other, R. T. Hoffman 215,620
Distance instrument, W. Allderdice 215,500
Door hanger, G. L. Waitt 215,697
Door, screen, T. Crane 215,439
Drill jar, S. E. Hughes 215,622
End gate, wagon, C. Beecher 215,430
End gate, wagon, C. H. Comstock (r) 8,720
Evaporating and calcining alkaline solutions, apparatus for, H. L. Orrman 215,659
Fan, automatic, A. W. Lozier 215,327
Fence, C. Camp 215,570
Fence, F. E. Fish 215,599
Fence post, J. Frazier 215,447
Feuce post, G. Swenson 215,490
Fertilizer distributer, S. S. Morton 215,535
Firearm, breech-loading, W. R. Finch 215,445
Firearm, magazine, P. Bergersan 215,557
Firearm, revolving, Cook & Rider 215,507
Firearm hair trigger, E. A. F. Toepperwein 215,695
Fire engine, hand and horse power, A. S. Walbridge 215,698
Fire lighter for engines, C. E. Thompson 215,492
Flue boiler, vertical, J. Strang 215,489
Fog horn, Bucknam & Langrehr 215,483
Fruit drier, Hammond & Stevenson 215,608
Gauge for applying lace to goods, J. A. Denais 215,584
Gas burner, H. B. Stillman 215,546
Gas, utilizing tar and coke dust in the manufacture of, H. A. Branch 215,564
Gate, J. H. Christopher 215,574
Gate, O. C. McCarty 215,530
Gate, W. W. McKay 215,531
Gems, device for exhibiting, L. P. Jeanne 215,626
Glass for etching, mode of placing designs upon, E. Pollard 215,667
Glass presses, device for attaching plungers to, J. C. Gill 215,516
Glove and shoe buttoner, S. F. Howland 215,612
Glove, corn husking, E. F. Rate 215,542
Grain binder, W. R. Baker 215,553
Grain binder, Ross & Parker 215,680
Grain binder, C. B. Withington 215,704
Grain separator, Swift & Lyon 215,690
Grave protector or shield, D. Davis 215,582
Grinding mill, J. T. Obenchain 215,656
Gun lock, T. Duncan 215,580
Hame, W. T. Ramey 215,673
Harness, F. D. Thurman 215,693
Harrow, D. I. Corker 215,577
Hay rake and tedder, J. A. Brown 215,565
Hay rake, horse, Kramer & Miller 215,635
Headlight, signal, M. Nicholson 215,656
Heel plate, T. T. McNish 215,532
Hemp, flax, etc., dresser, T. Tebow 215,692
Honey knife, Hetherington & Bingham 215,616
Hoop planer and pointer, J. Dobbins 215,512
Horse detacher, Slyh & Carpenter 215,685
Horse power, J. H. Elward 215,444
Horses, soaking boot for, J. D. Pierce 215,666
Horseshoe weight, A. D. Adams 215,550
Hub, wagon, W. C. Tucker (r) 8,719
Hydrant or stand pipe, Greathead & Martindale 215,603
Injector, L. Schutte 215,544
Insect destroyer, L. S. Schank 215,683
Insulating and protecting telegraph conductors, M. M. & R. P. Manly 215,643
Journal, lubricating, F. B. Torrey 215,696
Lamp, W. H. H. Stineman 215,688
Lamp, electric, C. F. Brush (r) 8,718
Lamp, student, H. L. Coe 215,506
Lantern, J. Gillig 215,449
Latch and lock, H. H. Daniels 215,580
Lathe, wood turning, W. Enoch 215,594
Lead and crayon holder, J. Hoffman 215,521
Lead, solution for electrolysis of, N. S. Keith 215,463
Leather burnisher, C. D. Wood 215,705
Leather stretcher, J. H. Leddy 215,640
Lock, L. A. Merriam 215,649
Lock, N. Petre 215,664
Locomotive exhaust mechanism, Baird & Stirling 215,427
Marking tool, fountain, C. E. Wheeler 215,549
Mash heater, J. Hayden 215,455
Meat tenderer, J. P. Davies 215,511
Middlings separator, W. & N. Thayer 215,491
Milk cooler, R. Aucutt 215,426
Millstone driver, W. Patterson 215,662
Moth box, H. Weidenbusch 215,700
Mowing machine, W. E. Budd 215,566
Necktie, H. Heath 215,517
Nut lock, J. Smith 215,686
Oil cup, A. D. Kilborn 215,632
Oil, freezing and pressing paraffine, F. M. McMillan 215,471
Ore roaster, horizontal rotary, Blythe & Morey 215,562
Oven furnace, G. Grieve 215,604
Oysters, preserving, K. L. Jewell 215,628
Packing for piston rods, etc., L. Katzenstein 215,629
Packing, metallic piston, W. A. Boyden (r) 8,717
Padlock, C. H. Beebe 215,429
Paddlewheel, feathering, C. F. Winsor 215,703
Paper bag machine, W. C. Cross 215,578
Paper cutter, gauge for, G. L. Jaeger 215,623
Paper, machine for uniting, Carr & Bicknell 215,506
Pattern plate for draughting garments, adjustable, E. V. Reaford 215,613
Pavement, street, Waite & Peck 215,493
Permutation lock, Duncan & Alden 215,591
Pianoforte tuning pin, W. Siedersleben 215,486
Pile, protecting wooden, Garratt & Lynch 215,600
Pillow, bolster, mattress, etc., T. S. Sperry (r) 8,722
Pill maker, compressed, J. H. Gill 215,452
Planter, seed, J. M. & S. B. Heiges 215,614
Planter, seed, E. C. Strange 215,689
Planters, marker for corn, J. H. Simkins 215,684
Plow, J. W. Klineline 215,634
Pocketbook, satchel, etc., handle, Messer & Jenks 215,650
Post office cabinet, S. Hower 215,621
Pressure regulator, fluid, J. B. West 215,496
Printing press, J. M. Jones 215,459
Propeller pump, single, G. Norton 215,474
Propeller, vibrating, J. W. Brown 215,433
Pump, force, N. Legros 215,468
Punching machine, J. F. Milligan 215,651
Punching machine, J. L. Pearson 215,663
Railway ditching machine, D. Horrie 215,611
Railway frog, F. C. Weir 215,548
Railway gate, automatic safety, W. C. C. Rouse 215,681
Rail joint, C. Fisher 215,446
Railway tie, H. Reese 215,675
Railway tie and chair, D. C. Cregler 215,509
Railway tracks, flange plow and ice cutter for, C. W. Colony 215,575
Railway, wire rope, C. F. Dodge 215,586
Reflector, I. P. Frink 215,448
Refrigerator car, C. F. Jauriet 215,625
Rocking chair, F. Herrmann 215,519
Rocking chair, folding, I. N. Dann 215,581
Rod end splitter, G. M. Peters 215,539
Ropes, coil holder for, W. S. Hanford, 2d 215,609
Rubber cutter, F. Bayliss 215,556
Sad iron, Stamour & Machette, Jr. 215,545
Safety bolt, W. Brenton 215,503
Saw cleaner, cotton gin, R. S. Munger (r) 8,721
Saw cleaner for cotton gins, G. H. Mulkey 215,654
Scales, calculator for weighing, H. H. Ham, Jr. 215,607
School and hall seat, F. W. Mallett 215,842
Sewing machine, J. Keith 215,462
Sewing machine, glove, H. P. Henriksen 215,615
Sewing machine, zigzag, W. F. Warnock 215,699
Sheet metal shells, tool for drawing, J. S. Palmer 215,536
Shirt, T. M. & E. Denham 215,442
Shovel, H. L. Graves 215,602
Siphon exhaust, A. P. Storrs, Jr. 215,488
Slate, J. M. Dodge 215,443
Sled runner, W. H. Coffman 215,436
Sleigh, C. T. Chase 215,571
Sleigh bell strap, A. A. Bevin 215,569
Sole pricker and trimmer, J. S. Turner 215,547
Spark arrester, D. J. Timlin 215,694
Spectacle show box, J. J. Bausch 215,555
Spinning machine boss or shell roller, R. Kelly 215,464
Spoons, die for making, T. Shaw 215,485
Spur, J. S. Brown 215,504
Stamp, hand canceling, J. T. A. Lewis 215,526
Steam boiler and furnace, M. N. Laufenburg 215,466
Steam boiler flues, fire stop for, C. S. Dean 215,583
Steam boiler, sectional, F. H. Purinton 215,670
Steam generator for cooking, Young and Boots 215,498
Stone, paneling, T. B. Jackson 215,457
Stove leg, C. M. Morris 215,472
Stove, oil, Graves & Babcock 215,454
Stove, parlor oven, J. A. Lawson 215,467
Stump extractor, E. Farnsworth 215,513
Tacking machine, magnetic, Copeland & Brock 215,438
Target, W. H. Broden 215,431
Telegraph, printing, G. L. Anders 215,551
Telegraph switch board, J. H. Bunnell 215,568
Tent, C. W. Hobbs 215,610
Thrashing machine, H. A. Higgins 215,617
Tobacco machine, plug, G. S. Myers 215,473
Tongs, gaveling, F. M. Woods 215,707
Top, spinning, W. H. Jones 215,458
Toupee, N. Helmer 215,518
Toy detonator, W. H. Reiff 215,543
Toy wagon, W. S. Reed 215,677
Trough filler, W. J. Lankford 215,639
Truck, car, H. S. Zink 215,499
Tug loop, hame, M. S. Bettice 215,558
Type writer, M. M. Bartholomew 215,554
Vacuum brake, F. W. Eames 215,592
Vacuum brake noise muffler, F. W. & E. D. Eames 215,593
Valve, M. Morton 215,653
Valve, G. F. Pottie 215,478
Vehicle side spring, Gage & Benedict 215,515
Vehicle spring, J. S. Graves 215,453
Vehicle spring, C. E. Stone 215,487
Vehicles, stay for spring, G. Peirce 215,587
Vise for holding marble or stone while being cut, J. L. Ferguson 215,514
Wagon brake, W. De Ray 215,585
Wagon brake lever, J. H. Jenner 215,627
Wagons, spring raiser for, C. C. Bishop 215,561
Wash board, T. Kehoe 215,630
Wash boiler, J. O'Brien 215,657
Washing machine, D. Aldrich 215,425
Washing machine, W. A. Dolman 215,588
Water closet, porcelain, R. H. Watson 215,495
Water closet valve, P. White 215,701
Water elevator, Paine, Brighty & Pulner 215,660
Water lifter, Lawrence & Strawbridge 215,525, 215,639
Water pipe, J. F. C. Rider 215,481
Wells, temper screw for oil, W. H. Downing 215,589
Wind engine, L. G. Kregel 215,686
Windmill, M. W. Palmer 215,661
Windmill, J. Steiner 215,687
Wreath maker, A. C. Kendel 215,465
Wrench, H. P. Hood 215,456
Wristlet, C. L. Quosbarth 215,671

TRADE MARKS.

Alterative, aperient, and tonic medicine, J. R. Dennis & Co 7,344
Axes, H. S. Smith & Co 7,320
Baking and yeast powders, Taylor Mfg. Co 7,317, 7,318
Base balls, L. H. Mahn 7,339
Bitters, Mette & Kanne 7,340
Boots, Stevenson & Slingluff 7,330
Boots and shoes, Helming, Wolf & Co 7,346
Certain medical compounds, R. C. Knox & Co 7,329
Cigars, B. F. Beckman & Co 7,307
Cigars, Sanderson & Horn 7,324
Cigars, L. Hirschhorn & Co 7,347
Cigars, cigarettes, and smoking and chewing tobacco, M. Jacoby & Co ..... 7,311 to 7,316
Clover machines, Hagerstown Agricultural Implement Manufacturing Company 7,327
Coal, Whitebreast Coal and Mining Company 7,321
Coffee and spices, E. Adelsdorfer & Co 7,339
Cough sirup, W. M. Caterson 7,325
Flour, A. H. Mojarrieta & Co 7,341
Ground pepper, Burns & Byram 7,343
Kid gloves, W. F. Foster 7,336
Lager beer, F. Hollender 7,310
Lead pencils, The Eagle Pencil Company 7,350
Liniments, J. C. Nichols 7,342
Lubricating oils, Eclipse Lubricating Oil Co ..... 7,331 to 7,334
Malt liquors, W. Edmonds, Jr., & Co 7,335
Medicinal preparations for malt, Dukehart & Co 7,308
Medicinal preparation for the cure of coughs, consumption, etc., Fisher & Fairbanks 7,345
Pocket cutlery, John Russell Cutlery Company 7,349
Printed cards, tags, and labels, New York Label Publishing Company 7,348
Sausage meat and sausages, H. Goldsmith 7,309
Shirts, undershirts, drawers, etc., W. Cohen & Co 7,326
Smoking and chewing tobacco, B. Leidersdorf & Co. 7,337
Soft (sugar, Matthiessen & Wiechers Sugar Refining Company 7,322
Toilet soap, C. S. Higgins 7,328
Violin strings, P. & J. Turner 7,319
Waterproof hats, H. M. Sawyer 7,323

DESIGNS.

Cast iron posts, Wiard & Pettit 11,204
Handkerchiefs, A. Tilt 11,203
Pistol handles, W. H. Bliss 11,202

English Patents Issued to Americans.

From May 23 to May 27, inclusive.

Bag machine, E. Stanley, New York city.
Boot machinery, J. S. Turner, Rockland, Mass.
Eye shade, O. M. Holmes, Boston, Mass.
Fences, Washburn & Moen Mfg. Co., Worcester, Mass.
Grain elevator, A. W. Lanphere, New York city.
Motive power, T. M. Fell, Brooklyn, N. Y.
Motor, B. T. Babitt, New York city.
Pens, J. M. Josias, New York city.
Printing presses, G. W. Woodside *et al.*, Phila., Pa.
Printing presses, W. H. Golding, Chelsea, Mass.
Propulsion of ships, R. H. Tucker, Wiscasset, Me.
Rubber shoe machinery, T. Bayliss, New York city.