

RECENTLY PATENTED INVENTIONS.

Engineering.

BOILER FURNACE.—Thomas J. Grosh, Savanna, Ill. The exterior cylindrical shell of this furnace has an inverted cone-shaped lower end forming a water compartment within which is the fire box, water flues in the inner surface of the sides and top of the shell extending within the combustion chamber, while a sleeve connects the top of the fire box with the removable cover of the shell, and a filling tube extends through the sleeve to deliver fuel to the fire. The water flues have their ends expanded and calked in the top and sides of the fire box, and the boiler is designed to be very effective, while avoiding all possibility of leakage at the tubes.

VALVE GEAR FOR STEAM ENGINES.—Thomas M. Pusey, Westchester, Pa. Within a casing mounted to turn and driven from the main driving shaft is a wing mounted to oscillate, and acted on by steam leading to the casing from the steam chest, while springs press on opposite sides of the oscillating wing and a shaft carrying the wing has a crank arm connected with the sliding valve for the inlet ports of the engine. The construction is simple and durable, and the valve is designed to utilize the steam to the fullest advantage.

VALVE FOR HYDRAULIC MACHINERY, etc.—John W. Cabot, Boston, Mass. The valve body, according to this improvement, has connected cylinders with an inlet and outlet, and exhaust, in combination with two apertured valve seats, one between the inlet and outlet and the other between the outlet and the exhaust, apertured valves burning on these seats, and so arranged that when one opens the other loses. No gaskets, soft packing rings, etc., are employed in the valve, which is arranged to take up all wear and prevent leakage, so that, without any especial adjustment or attention, the machinery in connection with which it is used will stand motionless at any desired position without requiring additional hydraulic pressure.

STEAM BOILER AND WATER HEATER.—Thomas C. Andrews, New York City. This boiler comprises several sections, one on the other, secured together, with a central heat compartment and a hot water chamber around it in each section, all communicating, while there are communicating water return chambers exterior of the hot water chambers. The construction is designed to afford low pressure steam if desired, or hot water, for house warming purposes, in the most efficient manner.

Railway Appliances.

CAR COUPLING.—Arthur F. Nesbit, Milton, Pa. An arm having a projecting lug extends vertically into the link recess of the drawhead and rests against shoulders, while a lever fulcrumed on the drawhead carries the pivot for the upper end of the arm, the lug on the latter engaging the under side of the lever. The device is of simple and durable construction, the coupling taking place automatically as the cars come together, while the uncoupling may be effected either from the side or top of the car.

CAR COUPLING.—George S. Gaines, Corona, Ala. This is an improvement on a formerly patented invention of the same inventor, where swinging fenders were used to guide an arrow-head coupling link between the pin and a spring-bearing plate, to hold the link in coupled position. By the improved construction, the fender plate is rigidly held in the drawhead, and the rear end of the link is allowed free lateral play, while the apex or bent edge of the fender is arranged slightly in advance of the pin, and the link head is guided to pass the pin and engage the yielding spring plate.

Mechanical.

CARPENTERS' SQUARE.—Harry M. Stocking and Eugene L. Vroom, Castleton Corners, N. Y. This is a separable square, its arms being readily taken apart to pack the tool in small space, while it is of the exact shape of a one-piece square when its arms are locked in position. The locking mechanism is so located that it is not visible, and cannot interfere in any way with the use of the square, and this mechanism can be operated by a nail, the shank of an awl, etc.

CAM.—Giacomo Parcho, Sierra City, Cal. This improvement consists of two cam arms, each having a half hub, one of the arms having a slot extending on both sides of the half hub and adapted to be engaged by a tongue extending to both sides of the half hub of the other cam arm. The cam thus constructed may be conveniently and securely attached to a shaft without disturbing the other cams, or removing the shaft from its bearings.

GUIDE FOR STAMP MILLS.—Edmund Major, Terraville, South Dakota. This is an improvement on a formerly patented invention of the same inventor, providing for quickly and conveniently adjusting the several parts to take up wear, and without removing the blocks. The invention consists of a keeper adapted to be fastened to a girt or rail formed with downwardly and outwardly inclined sides, a flange being held adjustably on the keeper.

BUTTON TURNING MACHINE.—Martin Woods, Newark, N. J. A hollow drive shaft capable of endwise and rotary movement has at one end an interior beveled surface and is connected at the opposite end with a clutch, a spring bearing at one end on a fixed support and at the other end against the clutch, while a shaft turning in the hollow shaft has at one end a chuck with a conical surface to engage the beveled surface of the hollow shaft, a lever being connected with the clutch, by the manipulation of which the drive shaft is carried into frictional engagement with the chuck. The machine is very simple, works rapidly, and the cutting tool may be conveniently sharpened.

Agricultural.

BROADCAST HAND SEEDER.—Harm H. Franzen, Golden, Ill. The seed is carried in a bag suspended by a strap from the shoulder of the operator, and from one side of the bag at its bottom extends a telescopic sowing spout, in the outermost section of

which are barriers to deflect and scatter the seed as it leaves the spout, there being also in the rear section of the spout a valve to control the quantity of seed delivered. The spout is turned or thrown from side to side to throw out the seed with force, and scatter it over a large area. The spout may be removed when going to or coming from the field, and the whole device takes up but little room.

ANIMAL HOLDER.—Oliver M. Kelso, Rock Rapids, Iowa. This is a cheap and convenient device for fastening together the feet of a hog, sheep, calf, or other animal, holding them comfortably and so the animal will not be injured. A bar with reduced rounded portions fits against the legs, and sliding yokes span its reduced portions, the yokes embracing the legs of the animal, here being sliding clamping pieces on the yokes, and fastening devices to secure them in position.

Miscellaneous.

KITE.—John W. Davis, New York City. This is a strong and collapsible kite, which may be folded in small space and carried on shipboard, and to be connected with lines so that it can be steered to carry a life line ashore or to drag a spar, buoy, or other article to the shore. On opposite sides of the center of the kite are secured bridle comprising several cords having their attached ends in alignment, flying lines being secured to the free ends of the bridles, and the kite has cross ribs, with a separate steering line secured to a cross cord connecting two of its projecting ribs.

STONE SEPARATOR.—James Cornelius and Edmund R. Collins, Brooklyn, N. Y. This is an improvement in machines for extracting stones from clay, that the clay may be cheaply and easily worked to produce a fine article in the way of porcelain, tile, and similar materials. The clay-feeding machine has a discharging nozzle, in which screens are held and adapted to move transversely, so that one screen follows and replaces another, the screens having inwardly extending stone-removing flanges.

TICKET PRINTING APPARATUS.—Albert R. Abbott, Boston, Mass. This is an apparatus designed to print all kinds of tickets, number them consecutively, and count the total of all the tickets issued as well as the total of each especial kind. The apparatus is more especially designed for use in heater ticket offices, on railroads, etc., enabling the operator to at once print and issue a ticket to any point or for any seat, and preserve a complete record of all the tickets thus issued.

BANK CHECK, ETC.—William T. Doremus, Flatbush, N. Y. This is an improvement on a formerly issued patent of the same inventor, providing an improved form of bank check, draft, or other like money order, to prevent changing, altering, or raising the instrument, which is made with spaces, numerals, and lines so arranged as to prevent fraud when filled out. A stub-like extension has spaces in each coupon division to contain a separate figure of the series in regular order, facilitating the writing of the signature under proper numerals, and serving as a readily discernible check on the amount.

TROUSERS HANGER.—Adolph Feiner, Lexington, Ky. Two body strips are arranged parallel and adapted to slide independently, and removably connected thereto are tabs constructed to received buttons and arranged in pairs, the tabs of each pair having a hinge connection. The device is simple and inexpensive, and can be quickly applied in such manner as to support the trousers to give to them the most desired shape.

CLOTHES PIN.—John B. Lockwood, Helmville, Montana. This pin consists of two pivoted members, one end forming a handle and the other a clamping jaw, there being a cam surface on the outer face of one handle section and a latch pivoted to the handle of the opposite section. The pin may be quickly and conveniently locked upon or unlocked from a line by using only one hand.

CAKE CUTTER.—Anders A. Soderberg, Boston, Mass. A frame carrying two rollers is designed to be run over the dough of which the cakes are to be made, the rollers being each armed with part cutters, whereby one part of each cake is cut by one roller and the other part by the other roller. The device is designed for both bakers' and family use.

Designs.

PATTERNS FOR TEXTILE FIGURES.—Jean Pierre Gelas, St. Etienne, France, has obtained three patents for designs, of which the leading feature of one is a button-like figure consisting of intersecting band-like figures, each composed of parallel strands, giving a ground work of hatched appearance. Another her design has intersecting right-angled band-like figures, the middle portions being given a twisted columnar appearance, and the background having a wavy surface. In her third design, band-like and strand-like figures are produced in low relief, and are given a broken or plaid-like appearance, serving as a background for the strands and bands.

ORNAMENTATION OF GLASS.—William L. Pilkington, St. Helen's, England. In the surface of the glass oblique, parallel V-shaped grooves intersect and divide the surface into rectangular figures, in each of which is a depression, the four walls of the depression converging to a common center.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

THE AMERICAN GLOSSARY OF ARCHITECTURAL TERMS. By Geo. O. Gamsey. Chicago, Ill. Large 8vo, cloth. Price \$2.00.

The definitions are concise, and the illustrations are printed on the left hand page and definitions on the right hand page. The work is undated, and we regret to say unpagged, but we learn from the preface that it is the third (1892) edition. The work makes no pretence to being a fine art volume, but is a thoroughly practical work for the

use of students, builders, and architects. On the whole, it bears companion with Parker's Glossary of Architecture.

THE CELESTIAL PLANISPHERE. Price \$3.00.

THE CELESTIAL PLANISPHERE HAND BOOK. Compiled and edited by Jules A. Cowlas. Chicago: Poole Bros. 1892. Pp. xiv, 110. Price \$2.

It is difficult to imagine how astronomy could be studied under more favorable auspices than with this planisphere and the very elegantly illustrated descriptive hand book accompanying it. The planisphere is of the usual type, except that, a skeleton screen being used, almost the entire sky area is uncovered. This in itself is a distinct advantage. Special scales for measuring polar distances and declinations accompanying the planisphere. The book and planisphere together give an admirable popular presentation of the heavens, and the two used as companions will, we are sure, meet with much appreciation. We feel that they can be warmly recommended to the public who are interested in distant worlds.

KASMAL IDIOMA. Gramatika uti Nove Prata Kiamso Orba. Da José Guardiola. Paris: Garnier Hermanos. 1893. Pp. 97.

The above is the title in the new Orba tongue of a little grammar for beginners in Sr. Guardiola's rival to Volapuk. The translation of the above title is "Universal Idiom. Grammar of a new language called Orba. By José Guardiola." The work marks a new attempt to create a universal language for use in commerce and for travelers. The author has not studied Volapuk. He therefore starts upon an unprejudiced basis. He aims at the production of a melodious language, trying to cut out all disagreeable sounds. Twenty-one of our letters suffice for his alphabet. Simplicity has been selected as the author's guiding star. One conjugation, undeclined nouns, the use of prepositions for the oblique cases are characteristic features. Less than three pages comprise the necessary syntax. The text of the book is in Spanish, and the treatment of the subject is remarkable for its scope and style.

Any of the above books may be purchased through this office. Send for new book catalogue just published. MUNN & CO., 361 Broadway, New York.

SCIENTIFIC AMERICAN BUILDING EDITION.

FEBRUARY, 1893, NUMBER.—(No. 88.)

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1. Elegant plate in colors, showing a very picturesque dwelling at St. David's, Pa. Floor plans and perspective elevations. An admirable design. Mr. N. Trumbauer, architect, Philadelphia, Pa.
2. Plate in colors showing a residence at Bridgeport, Conn. Two perspective views, one interior view and floor plans. Messrs. Longstaff & Hurd, architects, Bridgeport, Conn. An excellent design.
3. A model dwelling at Holyoke, Mass., erected at a cost of \$6,000 complete. Perspective views and floor plans. H. W. Coolidge, architect, Holyoke. A pleasing design.
4. A cottage erected at Cranford, N. J., at a cost of \$5,000. Floor plans, two perspective views, etc. F. W. Beall, architect, New York.
5. The First Baptist Church recently erected at Warberth Park, Pa., at a cost of \$6,000. A unique design in the Gothic style of architecture.
6. A residence recently erected at Bridgeport, Conn., at a cost of \$5,900 complete. A picturesque design. Perspective elevation and floor plans. Mr. C. S. Beardley, architect, Bridgeport.
7. An elegant residence recently erected at Newton Highlands, Mass. Perspective view and floor plans. Cost complete \$6,472.
8. An attractive design for a suburban dwelling at Holyoke, Mass. Perspective elevation and floor plans. Messrs. Gardner, Pyne & Gardner, architects, Springfield, Mass.
9. A row of model dwelling houses on West Sixty-eighth Street, New York City. An exquisite design. Floor plans and perspective.
10. A cottage at St. David's, Pa., recently erected at a cost of \$5,100 complete. Floor plans and perspective elevation. Messrs. F. L. & W. L. Price, architects, Philadelphia.
11. Views of the extensive red sandstone quarries at Potsdam, N. Y., together with views of various public and private residences built of Potsdam red sandstone.
12. Perspective and floor plans for an architect's residence at Buffalo, N. Y.
13. Miscellaneous contents: Architecture under brick—Architecture and the phonetic arts.—The housing of workers.—Concrete roofs.—Roman temples.—An automatic perspective machine, illustrated.—Drake's Columbus drinking fountain.—Sleigh bells.—A planing machine requiring little room, illustrated.—An improved side and roofing tile, illustrated.—An improved spring hinge, illustrated.—An improved hand planer and jointer, illustrated.—To darken oak.—An improved automatic water gate, illustrated.

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The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(4668) G. E. J. asks how construct a bell circuit so that he can place a bell at each end of the line, and ring up from either end on the same circuit, using an open circuit battery. A. You can arrange an open circuit bell to be rung at either end of the line by employing two wires, placing one bell, one battery and one push button in each wire, and using the ground for return in either case. 2. Please explain how to construct an electric telephone receiver for private use. A. You will find electric telephones described in SUPPLEMENT, Nos. 575 and 142.

(4669) A. H. writes: Please inform us what the standard rule is as to the number of cubic feet to a ton of ice. A. Solid ice is 38½ cubic feet to the gross ton, or 34½ cubic feet to the net ton. Ice in storehouse packed solid 42 cubic feet and 38 cubic feet respectively per ton.

(4670) P. F. D. asks what the process is for tinning or whitening small articles of brass. A. Immerse the brass articles, previously made perfectly clean, in a solution, boiling hot, of

Ammonia alum.....17½ oz.
Boiling water.....12½ "
Protochloride of tin.....1 "

When properly whitened, wash in hot water.

(4671) J. C. A., Jr.—A good cat in your cellar or garret would probably soon rid your house of rats and mice, but if you prefer trying some other means, we would suggest baiting the rats and mice for a few days in one place, and afterward placing a trap of approved construction in that place, when you will probably be able to clear the house.

(4672) J. McR. asks: What is my best plan to erect building for storing stone lime to prevent slaking? A. Lime if to be stored for any length of time should be packed in tight barrels in a dry atmosphere or as soon as drawn from the kilns, and placed in a building that if made for the purpose should stand entirely clear of the ground, with a clean wind sweep under it and so arranged that the storage room can be opened free to the air when dry, and closed when the atmosphere gets moist or in rainy weather.

(4673) J. K.—You cannot operate a single incandescent lamp to advantage with storage batteries, and primary batteries are out of the question. Any storage battery that would operate a single incandescent lamp would furnish current enough for a series of lamps. Primary batteries require continual attention, and the light produced by them is expensive.

(4674) S. P. asks: 1. What is the usual way to fix railings, grills, etc., in concrete, in brick, or stone? What materials are used, how mixed and applied? A. Lead is generally used for fastening railings to stone. Holes drilled from 3 to 4 inches deep. Spuds or posts roughened at bottom, lead poured and calked when cold. Pure Portland cement makes a good fastener for bricks, stone, or concrete, only requiring a little deeper setting, say 5 or 6 inches for stone and 6 to 8 inches for brick and concrete. The Portland cement should be mixed thick and driven in with a tamping. 2. Is there anything that can be applied to wood to make it impervious to water under pressure say of 150 pounds per square inch, as water pipes for instance? A. Wooden water pipes can be made impervious to water by immersion in hot asphalt for a few minutes and the asphalt drained out. Hot paraffine may also be used, but does not penetrate the wood as well as asphalt. 3. Suppose I wish to convert decimals of small denomination as 0.0001265 into the metric system, as equivalents, what should I call it? I find nothing lower than a millimeter. A. The reduction of a decimal value of any unit into a metric unit is made by multiplying the decimal by the ratio of the metric value to the primary unit value; so if your decimal is of one inch, your multiplier will be 25.4 x 0.0001265 = 0.0032131 of a millimeter. 4. What is lapping and how is it done? It is a finish I am told after grinding fine work in machine, etc. Are there any books on grinding and lapping published? A. Lapping is truing a surface on a flat wheel, which may be of metal charged with fine emery, or on the flat side of an emery wheel. See "Hand Book for the Artisan, Mechanic and Engineer," by O. Byrne, \$5 mailed. It has a full description of polishing and lapidary work.

(4675) C. K. F. writes: 1. In a book by T. O'Connor Sloane he tells how to make a Lalande-Chapron battery. He takes an empty tomato can, places a quantity of oxide of copper on a layer of iron borings, clippings, etc., on the bottom of the can; a porous cup is then placed in the inside of the jar filled with a 10 per cent solution of caustic soda, a zinc placed inside of this. He says the battery will give electromotive force 0.75 of a volt. How long do you think such a battery would last? Do you think it would pay to make some? Would it give the E. M. F. named above? Would it do as well to omit the porous cup and fill the can with the solution and suspend the zinc plate from the cover? Does a battery of this type emit any fumes or smell while at work? Do you think it would work? A. The porous cup or some equivalent is necessary in the battery as described, only to keep the zinc from touching the iron. An iron wire gauze cup might be used if the zinc were kept from contact therewith by blocks of wood. It gives a low E. M. F. 0.50 to 0.75 volt, has rather low resistance, but is not what is known as a strong battery by any means. It will last quite long and is excellent for open circuit work. The battery emits no fumes. 2. We made a motor of the Siemens type armature and wound for a series motor. It would not run when connected as a series machine on one large cell of the ideal storage type; when we connected it as a shunt, it ran very fast. We have 6 coils No. 20 A. W. G. on armature, and No. 18 on field magnet; the armature is made up of iron washers with one-half pound of wire. Can you give explanation? A. Your motor, we presume, was of too high resistance for your battery. It ran on lower E. M. F. when connected in shunt.

(4676) J. J. K. writes: A says that the sharp cracking sound heard in steam pipes when steam is turned on in the morning is caused by the water remaining in the pipes, which is the condensed steam of the night previous. B contends these sounds are produced by the rapid expansion of the pipes in consequence of the steam rushing through them, and that the water produces only a low gurgling sound, which may be heard at any time steam is turned on. A. The cracking or hammering in steam pipes is made by the surging of the water of condensation from the steam. It may be water that has remained over night in the pipes if they have not been thoroughly drained, or the water condensed in cold pipes, which condenses the steam very fast when first turned on. The hammering may also occur at any time by neglect in properly providing for the drainage of all the pipes in the supply and return as well as the coils or radiators. The mere passage of the steam only causes a whistling noise, and the expansion and contraction of the pipes causes no noise whatever, unless a very great length of pipe drags on a solid fastening or support.

(4677) J. R. P. asks how to mend glass jars. A. The Pharmacist recommends the following as a proved recipe: "Take 1 ounce of Russian isinglass, cut it in small pieces, and bruise well, in order to separate the fibers, then add 6 ounces of warm water, and leave it in a warm place that the isinglass may dissolve, which will require from 24 to 48 hours. Evaporate this to about 3 ounces. Next dissolve 1/2 ounce mastic in 4 ounces of alcohol, and when this is ready, transfer the isinglass from the evaporating dish to a tin can (an empty ether can will be found convenient), heat both solutions, and add the mastic solution to the isinglass in small quantities at a time, shaking the can violently after each addition. While still hot strain the liquid through muslin cloth and put up in 1/2 ounce bottles. This cement is very valuable, and articles, such as mortars, graduates, etc., mended by it have been in use for years, and, in fact, seem to be stronger than they were originally." From the "Scientific American Cyclopaedia of Receipts, Notes and Queries."

(4678) E. P. W. asks: What horse power engine would it take to drive a pump forcing water into a cylinder under a pressure of one thousand pounds to the square inch, the cylinder having an opening or discharge pipe of 1/2 inch in diameter, the opening of 1/2 inch to be open all the time and the pressure to be maintained at 1,000 pounds? A. You will require 12 horse power for maintaining the pressure as stated.

(4679) J. J. O'B. asks: Is hot air pumped into a boiler with an air compressor of any economical aid in doing the work with steam? Is it not dangerous to continually pump hot air into a boiler? Is it feasible to do the work with steam and hot air mixed in proportion of two to one—two of steam and one of hot air? If so, is there any economy in it? The working pressure is to be 100 pounds a square inch. A. There is no economy in pumping air into a boiler to use with steam. It costs more to compress air than the work it returns. There is no danger, and it is feasible, to use aerated steam in any desired proportion. The only economy ever claimed was the saving of the latent heat of the steam that the air displaced, but it costs more than the heat expended in compressing the air by a steam-driven compressor.

(4680) S. E. B. asks: Is there any foundation for the oft-advanced theory that burning zinc (in small pieces occasionally) in soft coal heaters will remove soot from stove pipes and chimneys? If not, is there any way to keep them free except by taking them down? A. There is a possibility that the zinc in oxidizing and passing through vertical pipes and chimneys deposits a coat of white oxide upon the surface, which may detach the soot that is afterward deposited and cause it to fall, when it may be readily cleaned out. We have no evidence that the soot is burned or destroyed by the zinc. We know of none but the old way of cleaning that is reliable.

(4681) J. C. W. writes: Please explain the following: During the present cold spell, many of the water pipes in our dwelling houses have been frozen, and singularly enough the hot water pipes were often closed than the cold ones, where hot and cold water were in use. Upon inquiry I find that this was not in isolated cases, but very generally, and in many instances the hot and cold pipes lie together. A. The heating of the water expels the air, which is often seen to sputter from the hot water faucets. Water without air, or from which air has been expelled by heat or otherwise, freezes slightly easier than aerated water.

(4682) G. W. R. asks how wide Behring Strait is at its narrowest point, and also the depth of the Strait at this point. A. Behring Strait is 60 miles wide. A small island is in the Strait 40 miles from the Alaska shore. Water of the Strait 25 fathoms deep.

(4683) F. K. H. writes: I would like you to please give me an answer why a bell worked on one wire, a galvanized wire, the wire three blocks distance, and I use the ground for return, have got six cells of battery. At the end of the line where the bell is, the current is so strong it can hardly be held in the month, and when the wires are touched to the bell it does not ring. I know that it is not the fault of the bell, because when it is connected direct from the battery it rings. A. Probably the difficulty with your electric bell is that its resistance is too great, or that you have not sufficient battery power to overcome the resistance of both the line and bell.

TO INVENTORS

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., OFFICE SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

February 7, 1893,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions with patent numbers. Includes: Acid, making nitric, O. Guttman; Air compressor, hydraulic, A. W. Walker; Aluminum and forming alloys thereof, electrically reducing, T. L. Willson; Animal trap, G. Andrews; Anti-rat trap, L. Herman; Artificial board, J. E. Eaton; Axle box, J. M. Smith; Bag or pouch, F. M. Turck; Barrel filling apparatus, P. H. Shumway; Bear trap, anti-friction, F. Beckman; Bearing plates, manufacture of center, C. T. Schoen; Bed, A. F. Conant; Bed, O. G. Franks; Bicycle, F. Sweetland; Bicycle gear, W. Mahoney; Bicycle lock, E. Byusse; Bicycles, combined coasting pedal and lock for, W. G. Fay; Board, See Artificial board; Game board; Bobbin winding machine, C. S. Mar ball; Boiler, See Ceramic boiler; Steam boiler; Wash boiler; Furnace gas producing furnace, steam, O. W. Ketchum; Bookcase, revolving, W. F. Berger; Book for bookkeeping, G. D. Thomas; Boots or shoes, making, G. W. Day; Boring machine, C. F. Hotchkiss; Bottle, A. L. Straus; Bottle stopper, E. Hutter; Bottle stopper, J. Lamborn; Bottle stopper, G. W. Gardner; Bottle washing machine, L. A. Ensigner; Bottles, tool for finishing the necks and mouths of, C. H. Beach; Box, See Post office lock box; Brake, See Car brake; Bridge gate, safety draw, Hoeftler & Chapman; Brush, blacking, T. Haswell; Buckle, J. Barkley; Buckle, J. N. Faust; Buckle, A. E. McClure; Burr wheel, R. W. Gormly; Button fastener, centrifugal, A. Washlin; Button fasteners into the eyes of buttons, machine for threading, A. W. Ham; Button, suspender, Staylor & Schnur; Cabinet, parcel, H. B. Taylor; Calking strip, metallic, F. W. Fincher; Can tap and filler, oil, N. Hardoin; Car and air brake coupling, combined, J. C. Smith; Car brake, M. E. Ellsworth; Car brake, M. E. Stahr; Car buffer, T. L. McKean; Car coupling, M. J. A. House; Car coupling, J. H. Brown; Car coupling, H. C. Buhoup; Car coupling, G. Eklund; Car coupling, J. Joes.

Table listing inventions with patent numbers. Includes: Car coupling, J. C. McEwen; Car coupling, W. F. Richards; Car coupling, W. F. Starkey; Car coupling, M. E. Wallace; Car couplings, unlocking lever for, J. Timms; Car roof covering attachment, A. N. Monteer; Car sand box, street, E. F. De Witt; Car signal, J. G. Tomlinson; Car ventilator, Bancroft & Hawcroft; Car wheel, W. J. Willits; Cars, automatic coupling for steam and air pipes for railway, J. E. Marble; Cars, heating and ventilating railway, J. J. Burwell; Cars, switch for electrical tram, M. Immisch; Carbon, arc light, J. McLaughlin; Card, playing, F. Ames; Carding engine, F. A. Flather; Carding engines, apparatus for grinding flats of, J. Jones; Carriage machine spring presser, J. D. Stanwood; Case, See Bookcase; Cash and parcel carrier apparatus, E. A. Owen; Cash recorder, A. J. Walters; Casket handle, J. McCarthy; Casting ingots, apparatus for, T. Kaye; Cement, B. Dreyfuss; Cement, E. C. Greney; Chair, See Dental chair; Folding chair; Reclining chair; Suspended chair; Chair, A. Vose; Chair pad, Totman & Wheeler; Charm of other article of jewelry, watch chain, Stahl & Klipper; Chenille cutting machine, Lovell & Grundy; Clasp, I. Coe; Cleaner, See Flue cleaner; Clip, See Insulator clip; Clock, alarm, E. B. Winger; Clock, electric, J. H. Dyson; Clock, pocket, J. H. Thomas; Clothes pounder, G. Seger; Clutch, C. K. P. Okles; Clutch mechanism, T. Griswold, Jr.; Coat collar supporter, W. P. Culver; Coffee or tea pot, G. W. Goodwyn; Coin actuated machine, W. A. Smith; Coin meters, W. C. Greney; Combination lock, J. D. Craig; Continuous kiln, P. L. Youngren; Conveyor, M. Garland; Core bar, F. L. Clark; Cork cutting machine, Rote & Landis; Corn product, A. G. G. G. G.; Corn machine, B. Hall; Coupling, See Car coupling; Car and air brake coupling; Pipe coupling; Thill coupling; Coupling gauge, Hazlehurst & Cole; Crane, Jib, E. W. Taylor; Crank shaft, C. K. Longencker; Cross, See Cross; Cultivator, double shovel, Hinkle & Gaither; Culvert, C. B. Davis; Cup, See Paint or varnish cup; Curing iron heater, electric, S. B. Jenkins; Cutter head, T. B. Reese; Damper, rotating apparatus, F. J. St. Mary; Dental chair, A. P. Gould; Dental engine, A. P. Gould; Dental engine, ankle attachment, S. P. Sharp; Dental use, surgical forceps for, C. E. Blake, Sr.; Desk, adjustable, S. J. Reynolds; Diarrhoea, A. V. Jones; Die stock, B. Thayer; Dies for producing designs on soft metal, making, B. F. Kelsey; Door check, G. W. Wright; Door hanger, J. W. Conchar; Door opening, J. E. Mueller; Door spring, G. W. Wright; Door spring and check, G. W. Wright; Draughtregulator, P. W. Cornwell; Draw bars, manufacture of, J. Green; Drawing, testing and correcting free-hand, A. K. Cross; Drift, V. C. Byrne; Driving mechanism, J. V. Motter; Drying in vacuum, apparatus for, E. Donard; Dye, blue black azo, T. Diehl; Dye, brown, Gnehm & Schmidt; Dye, violet-blue induline, Schmid & Mohler; Edges, making pure carbonic acid, E. Jenkens; Eiders, gravity dog for game, Tarrant; Electric lock, Moyer & Rhodes; Electric machine, dynamo, Parrot & Reiglier; Electric switch and door lock, combined, J. H. L. Holcombe; Electrical machine, bipolar, T. H. Hicks; Elevator, See Elevator; Emery wheel dresser, W. W. Brisbane; Engine, See Dental engine; Gas engine; Rotary engine; Steam engine; Traction engine; Extractor, See Bottle stopper extractor; Butter extractor; Extremities of and apparatus for making, J. E. McCarty; Fan, T. F. Davis; Fan, G. W. Fowler; Fan, G. W. Kirkman; Fan, vehicle, M. H. Tripp; Fence, J. E. Kline; Fence wire, E. C. G. G.; Ferro-ferric and ferric oxides, apparatus for producing, Crosley & Jones; Fertilizer or insecticide distributor, D. J. Manning; File cases, temporary binder for, A. Dom; File cases, temporary binder for, A. Dom; Firearm magazine, A. W. Savage; Fire escape, P. A. Burgess; Fire kindler, A. Johnson; Flue cleaner, P. A. Burgess; Fluid meter, Kent & Price; Fly catcher, G. D. Horton; Folding chair, E. C. G. G.; Fracture apparatus, J. F. Rowley; Fruit picker and pruning implement, combined, J. H. Griswold; Funnel, A. Gersdorff; Furnace, See Boiler gas producing furnace; Desulphurizing furnace; Smoke consuming furnace; Furnace, M. W. Keene; Furniture fastening, S. H. Stiggleman; Gauge, See Coupling gauge; Game apparatus, C. Trudgen; Game board, G. H. Monks; Garment fastener, E. Bernstein; Garment hook, G. B. Mershon, Jr.; Gas, apparatus for the manufacture of, J. B. Archer; Gas, apparatus for the manufacture of, J. Askins; Gas engine, J. S. Biggar; Gas, making pure carbonic acid, E. Jenkens; Gas manufacturing, J. B. Archer; Gas meter, T. F. Downey; Gate, See Bridge gate; Railway gate; Gearing, chain, E. J. Garrard; Generator, See Steam generator; Glass batch mixer, D. Fugh; Glass, L. L. G. G.; Governor, L. P. Lochmann; Grand stand, P. F. Cuplin; Grease, etc., composition of matter for removing, B. Eham; Gridiron, electrically heated, W. Mitchell; Guns, ejector mechanism for drop-down, J. Ross; Gyroscopic weight holder for cabinet, J. E. Whitney; Hame staple, C. A. Nelson; Hand power attachment, F. M. Foster; Handle, See Casket handle; Hanger, See Door hanger; Harness tool, J. Cunningham; Harrow, N. W. Beck; Harrow, W. W. Green; Harrow tooth holding device, J. G. Stowe; Harvester reel, A. Rekart; Hat trim softening device, W. Mitchell; Hay rack, A. H. Parker; Heated vessel, electrically, S. B. Jenkins; Heated vessel, electrically, W. Mitchell; Heater, See Hot water heater; Water heater; Heel plate, H. E. Van Benschoten; Hides, machine for treating, Pullman & Smith; Hod elevator, E. J. Garrard; Hoisting machine, C. Smith; Hook, See Garment hook; Hook and eye, C. E. Barnes; Hooks and eyes, machine for carding, J. W. Granger; Hooks and eyes, machine for manufacturing, J. W. Granger; Hook, See Garment hook; Machine for making garment, R. C. Manville; Horse power, J. Dages; Horsehoes nails, manufacturing, W. W. Miner; Hose holder, L. F. Pearson; Hot water heater, mantel, T. Holland; House, J. L. Comly; Ice making apparatus, M. Hart; Ice making apparatus, L. Pusey; Ice plow tooth fastening, J. G. Bodenstein; Insulated magnetic coil, T. E. Morford; Insulating electric conductor, T. E. Morford (r).

Table listing inventions with patent numbers. Includes: Insulation of dynamo armatures, T. E. Morford; Insulator, A. R. Lane; Insulator, W. V. Garrard; Iron, See Gridiron; Smoothing iron; Soldering iron; Iron, apparatus for the purification of cast, A. P. G. Rollet; Jack, See Window jack; Knitting fabric, W. Zlock; Knitting fabrics, W. Zlock; Knitting machine cam cylinder, R. Kirkpatrick; Knitting machine needle, R. Kirkpatrick; Knitting machines, extra thread feeding device for, L. N. D. Williams; Knitting machines, needle picking device for circular, W. Diebel; Lamp, duplex electric arc, C. E. Scribner; Lamp, electric arc, W. E. Freeman; Lamp socket, E. R. Elliott; Lamps, windless for lowering or raising street electric, C. R. Eddy; Last, E. C. G. G.; Last boring machine, D. C. Robhun; Latch, C. P. Herrmann; Lathe, A. Catchpole; Lathe tool and support, W. L. Cheney; Lawn sprinkler, J. Jett; Lock, See Bicycle lock; Combination lock; Electric lock; Lock, M. Higgins; Look for metallic plates, W. H. Brooks; Loom, circular, A. H. Soret; Loom fringe attachment, K. Engsborg; Loom, swivel, B. Haycock; Loom, automatic stop motion for, Smith; Lubricator, W. Garrison; Lubricator, T. Poore; Lubricator, C. Tregoning; Lubricator, E. E. Witter; Lug, supporting, G. H. Drake; Mangle, S. Wiggins; Map or chart stand, adjustable, J. H. Kaufman; Mapping or drawing lands, apparatus for, J. F. D. Schrader; Match, C. M. Bowman; Match lighter, automatic, R. Kraus; Matchbox, method of and device for making, C. M. Bowman; Measuring instrument, electrical, E. G. Will; Measuring machine, wall paper, S. G. Lundy; Mechanical movement, W. Robinson; Mechanical movement, electro, E. Gray; Medicated vapors, apparatus for administering, J. Conestable; Spung; Medicine case sprayer, M. Rosenblatt et al.; Metal balls, apparatus for manufacturing, G. Taylor; Metal bending machine, E. Partyka; Metal heating device, electric, W. Mitchell; Metal spinning apparatus, E. Folte; Metal, process of and compound for coating, W. Mild; Metals, refining, A. P. G. Rollet; Metals, separating, J. J. Crooke; Meter, See Fluid meter; Gas meter; Milk coagulating product, C. P. Eyre; Milk, process of and compound for coating, W. Mild; Moulding machine, machine for centrifugally treating, O. B. Peck; Motor, See Spring motor; Mower or reaper cutting apparatus, W. S. & W. S. Elliott, Jr.; Mowing machine cutter bar, M. C. Sooter; Musical instrument, A. V. Jones; Musical instrument, J. F. Luscomb; Musical instrument, mechanical, F. Pietschmann; Nut lock, J. L. Hayward; Nut machine, M. F. High; Oil burner, B. Roberts; Oil burner, See Oil burner; Padlock, permutation, J. A. Halden; Pall, butter, L. Daugherty; Paint or varnish cup, G. W. Davis; Pans, implement for lifting, Watkins & Bayless; Patterns on woven fabrics, product leaf metal, F. Lehmann; Pen, See Pen; Pencil, See Pencil; Pew back etc., W. H. & C. Roehr; Piano, W. P. Haines; Piano action, F. A. Guth; Picture mat cutting device, E. L. Gaylord; Pipe, See Tobacco pipe; Pipe, See Pipe; Pipe wrench, W. J. Walker; Pipes, double testing plug for soil, J. F. McCartney; Planter, grain, O. F. Yarbrough; Planter, seed, Learmonth & Beltman; Plaster, furrow closing attachment for corn, A. W. W. Piller, parallel, Vonhaus & Becker; Plow, W. H. Ammons; Plow, F. B. Rowland; Post office lock box, F. R. Riddell; Pot, See Coffee or tea pot; Pottery clay for, W. M. B. Wer; Power, See Horse power; Power, electrical transmission of, C. S. Bradley; Printing machine, bed and cylinder, J. Brooks; Printing machines, doctor-blade for fabric, G. Crompton; Pump regulator, W. S. Smith; Pump, See Pump; Pumping apparatus, portable, D. Noble; Rack, See Hay rack; Railway gate, automatic, F. A. Curtis; Railway gripping device, cable, R. A. McCauley; Railway rail brace, W. E. Williams; Railway signal, electric, D. M. Lytt; Railway switch, W. & G. E. Thurlie; Railway tracks, device for preventing spreading of, A. H. Newpher; Railway trolley, electric, B. & A. Kochs; Railways, inclosed conductor for electric, F. C. Perkins; Reclining chair, machine for, W. H. Lytt; Recorder, See Cash recorder; Refrigerator car, D. W. Rordan; Register apparatus, autographic, Grimes & Harter; Regulator, See Draughtregulator; Pump regulator; Rein button, J. T. Swartz; Retouching device, A. S. Harry; Rolling and bending metal into spiral forms, machine for, W. D. Eynon; Roofing, paving, etc., composition for, D. A. Wray; Rotary engine, A. D. Belling; Salt manufacturing apparatus, J. Runciman; Sash balance, E. L. Bullock; Sash balance, F. P. Johnson; Sash fastener, A. Barton; Sawmill carriage setting device, J. H. Dodds; Sawmill carriage, mechanism for operating, E. A. Reese et al.; Sawmill carriages, mechanism for operating, J. N. Ritchey et al.; Scale beam, L. G. Woolley; Scalper, A. Van Camp; Screw cleaning device, W. F. Stevens; Sealing device, bottle, M. N. & E. P. Lynn; Sealing device, bottle, E. P. Lynn; Seeder, broadcast, E. H. Grafunder; Sewer, merchandise, F. Towle; Sewing machine attachment, R. A. Sheppard; Sewing machine, book, D. M. Lytt; Sewing machine, tension device, G. F. Ruby; Shears, W. B. Clarke; Shelf, hanging, C. W. Edgerton; Ship, steam, C. Harris; Shock binder, C. S. Unruh; Shutter fastener, L. M. Froberg; Signal, See Car signal; Smoke consuming furnace, W. Arnesman; Smoothing iron, electrically heated, S. B. Jenkens; Snap and buckle, D. W. Simmons; Soda fountain, A. Schier; Soldering iron, electrically heated, S. B. Jenkins; Spark arrester, B. Maxwell; Spinning frame separator mechanism, E. Whitum; Spool holder, E. C. Jenkins; Spring, See Door spring; Medicine case spring; Spring motor, D. H. Smith; Sprinkler, See Lawn sprinkler; Sprinkling device, Schneck & Ellis; Square, bevel, A. Hets; Stand, See Washstand; Staples, device for holding metallic, W. J.rown; Starch and cattle food, making, A. Bebr; Steam boiler, A. G. G. G.; Steam engine, G. Smith; Steam generator, A. Langton; Steam muffler and heating apparatus, combined, C. E. Healy; Steamtrap, F. A. Littlefield; Steamer, chain, E. L. & E. A. Pfeifer; Steering wheel, T. Johnson; Stenograph, T. C. Beaumont; Stone breaker, A. J. Gates; Stopper, See Bottle stopper; Store service apparatus, A. A. Calle; Stove firepot and stoker, D. Brazier.