The Great Electric Light Suit.

In the case of the Edison General Electric Co. vs. the Sawyer-Man Co. and the Westinghouse Electric cently erected a complete plant at the foot of Thirtycandescent electric lights covered by the following:

through the glass, and from which receiver the air is exhausted, for the purposes set forth."

of the injunction were overruled.

The court, among other things, holds as follows:

patent laws to a monopoly for the term of the patent of the patent system. They do not lose that right merely because they may have joined in a combination with SCIENTIFIC AMERICAN of August 6, 1892. others holding other patents securing similar monopolies, which combination may, when judicially examined in the proper forum, be held to be unlawful.

We do not feel justified in assuming upon the facts in the present suit that the use which the complainants propose to make of the injunction will be such as to promote any other monopoly. When it shall be made to appear that some one, to whom in fairness and good conscience these same complainants should sell their lamps, has been arbitrarily refused them, save upon oppressive and unreasonable terms, it will be time to consider whether the complainants should be allowed to continue in possession of the injunction.

"The injunction order appealed from should be modified so as to cover only lamps made in infringement of the second claim of the patent, the other claims not having been infringed according to the adjudication of the circuit court or of this court. It should also contain a provision reserving the right to the defendof the particular case to the owners of electric light ments being rubbed with arsenic and lemon juice be plants which were installed before the rendition of the fore being used. interlocutory decree of the circuit court sustaining the validity of the patent."

A Pulverizing Mill Plant in Brooklyn, N. Y.

Co., the U. S. Circuit Court of Appeals has granted an ninth Street, Brooklyn, for the purpose of showing the an artificial prognathism. In Indo-China and Japan injunction prohibiting the defendants from making in- Griffin roller mill to those interested in the kind of a girl on her marriage paints her teeth with a black work it will do. This embraces the pulverizing of all "It is the combination of carbon filaments with a kinds of ores, phosphates, cements, carbon, foundry receiver made entirely of glass and conductors passing facings, plumbago, and other hard and refractory substances. The mill is installed to grind in ordinary way up to 100 mesh, and beyond this point and up to 250 The objections of the defendants against the grant mesh a system of air separation is connected, thus exgroes have their upper incisors extracted, in order to hibiting a plant in actual operation with a range from 30 to 250 mesh, the product of the mill being delivered, "The present complainants are entitled by the finished, and of any mesh desired. The company express a willingness to grind samples for any one desirof the manufacture and sale of the lamps made under ing to judge of the quality of the work and the adit. The right to this monopoly is the very foundation vantages of this method of grinding. A full illustrated description of the Griffin roller mill appeared in the

Teeth Mutilation.

Dr. Magitot, of Paris, has published an interesting account of the mutilation of the teeth practiced by various savage tribes. One variety, which is chiefly met with on the coasts of Africa and the west coast of New Guinea, consists of the breaking of a portion of the incisor by means of a knife and a piece of wood, and is performed between the ages of twenty and twenty-five. The custom of extracting the two central incisors is found in both hemispheres. According to Zerate, it has been practiced in Peru from time immemorial, where it is inflicted on conquered tribes as a sign of slavery. In Africa it has been observed on the Congo, among the Hottentots and the Batoxas. The mutilation by filing has for its exclusive center the Malayan Archipelago, whence it has spread to the adjoining islands. It is a religious act, which is celebrated with great festivities at the age of puberty, but this only by ant to move hereafter for the vacation, suspension, or the Mohammedans. The degree and character of this modification of the injunction upon proof of specific filing vary with the habits of the family or caste. The instances of refusal upon the part of the complain- operation is performed by an expert, the Tukang panants, or either of them, to supply the lamps of the gur (filer), by means of a chisel, three bricks, two files, patent upon terms reasonable under the circumstances a small saw, and a pair of cutting nippers, the instru-

> It is the fashion among some tribes on the Senegal River to extract the upper temporary incisors in girls Munn & Co., 361 Broadway, New York.

when quite young and to manipulate the chin, so that The Bradley Fertilizer Company, of Boston, have re- it is drawn forward and the lower incisors are made to protrude so as to overlap the upper lip, thus producing varnish. However, as this operation requires time and money, it is only practiced by the wealthy class. Livingstone reported that among the Kafirs a child whose upper teeth erupted before the lower ones was regarded as a monster and killed. On the Upper Nile the neavoid being sold as slaves, because of the loss of value brought about by this mutilation. Among the Esquimaux, as described by the Abbe Peritat, in some regions there exists a custom of transversely cutting off the upper incisors, the object of this being, according to local tradition, to prevent the human chin looking like that of a dog.—Lancet.

A Word to Mail Subscribers.

At the end of every year a great many subscriptions to the various Scientific American publications expire.

The bills for 1893 for the SCIENTIFIC AMERICAN, the SCIENTIFIC AMERICAN SUPPLEMENT, and the ARCHI-TECT'S AND BUILDER'S EDITION of the SCIENTIFIC AMERICAN are now being mailed to those whose subscriptions come to an end with the year. Responding promptly to the invitation to renew saves removing the name from our subscription books, and secures without interruption the reception of the paper by the

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RECENTLY PATENTED INVENTIONS. Engineering.

STEAM GENERATOR.—Pierre A. Chatenet, Paris, France. This invention consists principally of a tubular casing closed at its ends and adapted to be heated, the casing being connected with a water charging device arranged to spray in the water in a finely divided state, while a tube open at its inner end is held in the casing to form a narrow annular space for the passage of the vapor, as it is heated by the wall f the casing, to the open inner end of the tube. highly heated dried steam is passed from the inne tube to a steam-receiving vessel or to the engine,

SUBSTRUCTURE. - Samuel A. Oliver, Houston, Texas. This is an improvement in suh structures designed to form supports for bridge piers and similar uses. Combined with the main structure is an inclosing caisson for its lower portion, a filling between the caisson and the main structure, and an inclined protecting plate for the top of the caisson. This substructure is designed to be conveniently erected and strong, amply protected against the action of water, and so built that the protective part of it may be easily renewed when necessary.

Railway Appliances.

CAR COUPLING. - Michael Werner, Allegheny, Pa. In this device the coupling hook is pivoted in the drawhead, and has a tail and lip projecting down through and into a base slot, and a top extension projecting into an upper opening, a transverse shaft carrying a finger to engage the tail piece, while the ends of the shaft have each a crank at the side of the car, by which the shaft may be rocked to effect an uncoupling. The device may also be operated from the top of the car, and the coupling is entirely automatic as the cars come together. This coupling is very simple and inexpensive, and may be for the ordinary form of link and pin coupling.

CAR COUPLING.—Levi W. Houghton, Bath. Me. This coupling is designed to be readily anplied to drawheads of the ordinary construction, and is arranged for automatic coupling. The invention consists of arms mounted to swing and adapted to support the coupling pin, with an arm for moving the swinging arms, and supported on the drawhead, to be engaged by a like arm on the opposite drawhead of the approaching car.

DRAW BAR ATTACHMENT.—Wilber B. Orton, Nickerson, Kansas. This invention relates to lugs to take the thrust or pull of the drawhead or drawbar spring when a car is pulling or backing up. The lug plate forming the spring pocket has in tegral vertical solid lugs for receiving the thrust of the spring followers, the lng plate also having other novel features of construction to make the lags strengthen the draught timbers.

SPIKE.—Emma A. Streeter, New York City, N. Y., and Bradford W. Nichols, Herkimer, N, Y. This is an improved double-shanked spike the shanks being straight and parallel sided, with

rear sides, and the head having a lateral flange on the front side. This spike is designed to be employed whereveran ordinary spike may be used, and especially in laying railroad rails, the dual shanks holding so that the spike cannot be canted from side to side, and will not be loosened by the vibrations of the rails.

Mechanical.

Power Transmitting Mechanism.-David C. Frazeur, New Market, N. J. A shaft journaled in a suitable supporting frame carries a drive wheel or fixed gear, while on the shaft is mounted a tubular shaft having one or more toothed wheels arranged to mesh with the teeth on and traverse the periphery of the drive wheel, an internally toothed rim being formed on the peripheral edges of the toothed wheels. The invention also includes other novel features, the mechanism being designed to impart increased velocity and power to a rotary shaft with which it is connected,

Ball Cock.—Gaylord S. Hunter, Pawtucket, R. I. This is an improvement in hydraulic safety valves, such as are used for automatically shutting off the supply of a tank of any kind. It has a casing held in the wall of the tank, and when the water rises to the required height it lifts a float and tilts a lever to close the valve firmly upon its seat. The construction is such that, if the float or lever should be broken, the head of the water would close the valve. The device may be adjusted to automatically shut off the supply at any time, and it is designed to keep itself clean from rust or scale.

LAST. -Arthur M. Leighton, Port Towesend, Washington. This is an adjustable cobbler's last, automatically adjustable to closely fit any size of boot or shoe, no matter whether it has a pointed or wide toe. A reach bar having a locking notch connects the toe and heel sections of this last, a spiral used when the opposing drawhead is only adapted spring wound around a portion of the bar bearing against the heel section. When the last is placed in a boot or shoe the several parts are expanded by the spring, which is released by pressing a catch on the outside, the last then completely fitting the boot or shoe, ready for the workman.

Agricultural.

PLOW.—Frederick S. Moore, Hanford, Cal. This plow is especially adapted for use in vineyards and orchards. The beam is pivoted to the forward part of a share-carrying frame, a short distance from its inner end, in which is a longitudinal slot, while an angle lever fulcrumed on the frame has on its inner end a pin working in the slot of the beam, there being between the handles a rack with which the upper end 'of the lever engages. With this construction the draught may be quickly and easily changed from right to left by the plowman, so that the near or off horse of two or three horse team can walk in the furrow, and so throw the shares of the plow closer to a tree or vinc than would otherwise be possible.

HAY SLING.—James M. Kellogg, Bozeman, Montana. The carrier of this device consists of a its points similarly beveled on opposite front and pole from which is projected a series of ropes terminat-

ing at their outer ends in rings or loops, and all adapted simple and durable bit support, conveniently adjustfor attachment to a trip mechanism, a back rope having both ends secured to the pole being also connected with the tie rope of the trip mechanism. The hay or straw may be carried by this device from the delivery spout of a thrashing machine to the place where a stack is to be formed, the load not being dumped or spilled out except as it is placed in the desired position.

BRANDING TOOL. - John R. Todd, Glenrock, Wyoming. This implement consists of a tube with pointed ends, in which slides a plunger, while there is an adjustable gauge on the tube. The pointed end of the tube is plunged into an animal, and then a tag previously placed in the tube is driven inward through the tube by the plunger, the tag being left in the flesh under the hide after the tube is withdrawn. The tag cannot afterward he removed without mutilating the animal, being found in the beef only as it is marketed.

BICYCLE TIRE.—George R. Bassett, New York City. This is a pneumatic tire on which is a tread piece, with two separate cushions between the wheel rim and tire, and a fibrous envelope around the cashion rings and between the tread piece and pneumatic tire. The improvement forms a detachable shoe, readily removable, partly or entirely, when desired, and preventing injury to the inner pneumatic tire.

BICYCLE ATTACHMENT.—Allen Marthens, Pittsburg, Pa. This is a simple device for automatically locking the steering fork, and which may be readily released when necessary to bring the steering wheel under the complete control of the driver. A spring lock normally engages the fork to hold it from rotation in its sleeve, the lock having a vertical arm held from lateral movement, while a laterally movable swinging bearing member is carried by the fork and engages the lock rod, and an operating lever engages the bearing.

CARRIAGE BRAKE.—Philippe Brailly, Bellaire, Ohio. The brake beam of this device is journaled in vertical bearing blocks resting upon a transverse spring, in connection with which are an operating rope and guide pulleys, a winding drum, foot levers, pitmen, and intermittent gripping devices, forming a brake readily operated by foot power, and in which all the operative mechanism is concealed from view and protected from the elements. The connection of the body with the rear springs is also simplified, and the several parts of the brake mechanism are automatically returned to their normal position after the brake is

CURRYCOMB.—George W. Neuls, Kane, Pa. The body and teeth of this implement are made entirely of wood, and the grain of the wood runs lengthwise with the teeth, the latter being so tapered that they will be thoroughly effective without producing undue irritation, and without tearing or cutting the hair. The comb is so made as to be very durable and inexpensive, means being provided for attaching the handle to the body in a very solid manner,

BRIDLE.—Alexander and Louis Hasselbauer, New York City. This invention provides a its construction is such that the oil placed in the upper

able to properly fit the animal's head without the use of buckles or similar fastening devices. It consists of a single endless strap doubled upon itself and formed into two cheek sections and throat latch sections, bitsupporting loops being formed at the juncture of the lower ends of the side sections, while a slide or ring connects the throat latch sections above the bit loops, above which also is a nose strap, and a slide or ring connects the upper crossed ends of the cheek and throat latch sections,

COMBINATION TICKET.—Martin Ralph, Queens, N. Y. This ticket has a central continuous web, sufficiently strong to hold the tickets together, but which may be readily torn asunder when necessary, the tickets being separate upon the web, and the loss of time necessary to cut apart being thus saved. The improvement is applicable for railway coupon tickets, or for price or tag tickets, the tickets being provided in the latter case with fastening pins.

LETTER Box.—Oliver P. Johnston and Calvin M. Gates, Butte City, Montana. This is an improved mail box for the reception of letters, papers and other mail matter, to protect the contents from the weather and keep them from the reach of unauthorized persons. The casing has at its top a letter slot and an opening to receive papers, etc., and a pivoted cap covers the slot and the opening. At one end of the casing is a door, fastened by a basp and lock.

ELEVATOR.—Lucas M. Kuehn, Wabasha, Minn. This is a device more especially designed for use on large ice boxes and other receptacles, for conveniently elevating and depositing blocks of ice or other articles in the receptacles. It consists of a frame adapted to be raised and lowered on which is mounted to swing a platform that may be automatically tripped to move into an inclined position to deliver the elevated article into the desired place.

SHIFTING DEVICE FOR ELEVATORS. James Flemming, Buffalo, N.Y. A simple and durable device is provided by this invention, more especially designed for grain elevators used to load or unload vessels, and arranged to conveniently shift the elevator leg, to hold it in contact with the grain, The leg is pivoted at its upper end to the frame, while a swinging arm pivoted to the frame engages at its free end the back of the elevator leg, a counterweight, holding the free end up against the leg, novel means being provided for operating the swinging arm.

Gun.-Robert A. Steinert, Washburn, Wis. The breech of this gun has a transverse recess in which is mounted a sliding breech-block carrying a epring-projected firing pin engaged by a detent, a cam or incline on the breech being adapted to retract the pin, for which there is also a releaser adapted to release the pin when the breech block reaches its inner or closed position, or which may be moved into inactive position. The construction is simple and durable, and arranged to securely lock the cartridge in place for firing and at the same time actuate the firing pin.

OIL FILTER.—Oskar Lindberg, Helsingborg. Sweden. This is a sectional filter, which may he readily taken apart, cleaned and put up again, and portion percolates through various layers of filtering material and strainers, reaching the bottom thoroughly cleansed of all impurities. The filter has a series of valves whereby the flow of oil may be stopped at any desired point in the length of the filter.

HOT WATER HEATER.-Micheal E. Herbert, St. Joseph, Mo. In this heater, all the walls of the fire box constitute a water space, the grate also consisting of water tubes, and a series of drop tubes being arranged in the path of the discharge of the products of combustion, affording a great amount of surface for the absorption of heat. The construction is designed to be economical in fuel and a rapid heater, and the different parts are so arranged as to be light of weight, easy to handle, and quickly connected together, masonry being dispensed with in the setting up. It is designed also to thoroughly burn the smoke and gases, and to be easily cleaned.

LAMP CHIMNEY COVER PLATE.-James H. Hunt, Massillon, Ohio. This is a plate of non-combustible material, preferably mica, with a central aperture of less diameter than the lamp chimney. and fitting over its top, another plate sliding in guidee being adapted to increase or diminish the draught. The device is designed for attachment to any kind of chimney, and by adjusting the pressure until the flame stopssmoking a compact, even and denselight is produced, of much greater volume than the same pressure will produce with the plate removed.

CHIMNEY RACK.—Nehemiah H. Brown Norwich, N. Y. This is a show rack for supporting the chimneys so they will be well displayed to view and readily accessible. It consists of a rotating cone having pins set at an angle in its side, a base and shaft supporting the cone.

RACK FOR HATS, ETC.—Howard U. Ackerman, North Indianapolis, Ind. This device has a wall board with enlarged openings for the passage of pins and their lugs, and the rack comprises a series of brackets each formed with hooks and connected by rods to each other to form a shelf.

SASH-CORD FASTENER.—Margaret J. Hufman, Ashland, Pa. This device consists of a box or casing to be secured in the upper ends of the stiles of each window sash, the box having an open outer side, a slot in its outer edge at the top, and pins, a hinged cover, and a double latch. When it is desired to remove the sash from the window, it is pulled ou of its guideways, the lid of the box is swung, and the cord readily removed from the casing, so that the sash is disconnected, and can be moved away as may be desired.

CASH RECORDER AND DRAWER .-Lloyd M. Mills, Grand Rapids, Mich. This is a machine arranged to print on a tape a record of all sales made, and also print on a tape a detachable ticket indicating the individual sale. The device has a suitable casing in the bottom of which slides a money drawer, the locking bolt of which is connected with a lever. By the use of ten keys the operator can record any sale from one cent to a hundred dollars, the recording tape remaining inside the locked casing, and a corresponding coupon for each sale being cut off by a springpressed knife.

BOOK OR COPY HOLDER. - Barney Gardinier, Chippewa Falls, Wis. This is a simple device to support copyor a book at a distance above a table, in such position as may be desired. The device is capable of quick and convenient manipulation, and when not in use may be folded to occupy but a small

AUTOMATIC ADVERTISING DEVICE. Theodore B. Hafertep, Chicago, Ill. An exhibitor for use in public conveyances is provided by this invention. It consists of an endless band supported to move iongitudinally on a bracket frame projecting from the side or roof inside the vehicle, the band carrying ad vertisements in series, and motion being communicated to it from the car axle, so that when the car is moved in either direction all the advertisements on the band will be brought into view.

DISINFECTING APPARATUS.—Emil and Salomon Taussig, New York City. The graduated discharge of a disinfecting fluid in places needing such treatment is the object of this invention. The device is simple and inexpensive, and can be automaticall v actuated to allow the escape of the fluid, which is retained from discharge by hermetically sealing the containing vessel above the fluid that will flow from below when the partly established vacuum produced by such sealing is broken, and air admitted to equalize pressure of the atmosphere above the fluid and at the point

ELECTRO-THERAPEUTIC PROCESS AND APPARATUS .- Joshua M. Wardell, Cadillac, Mich. This invention provides a process and an implement to facilitate injecting a fluid into the vaginal canal, and then applying an electrical current to and disseminating it through the fluid.

Designs

Spoon.-J. S. Rathbone, Mystic, Conn. The handle of this spoon has a configuration and ornamentation representative of the golden rod, and inclosing a bust-like figure of Washington, while the bowl is ornamented by a shield.

Another design for a spoon by the same inventor also utilizes the golden rod in a similar manner, but the handle has on the front a different bust-like figure and on the back a shield, while in the bowl is a representation of an eagle.

SCARF PIN.—John G. Brokaw, Somerville, N. J. The head of this pin is an oval ring having ornamental appendages, a disk representing ar eye, another disk showing a heart, and intermediately a representation of clasped hands, while a laterally curved bar is arranged on one side of the oval ring.

Note.-Copies of any of the above patents will be furnished by Munn & Co., for 25 cents cach. Please send name of the patentee, title of invention, and date

NEW BOOKS AND PUBLICATIONS.

THE CALIFORNIA VINE DISEASE. A preliminary report of investigations. By Newton B. Pierce. Washington: Government Printing Office. 1892. Pp. 222.

This monograph is an excellent exemplification of the solid work done by the Department of Agriculture of Washington. It is excellently printed and illustrated, some colored prints being especially worthy of notice. It has a very long index, and, if it may be accepted as a pledge of the work to be done by that department in the future, it will have the tendency to make all farmers wish well for the last of the federal departments,

ENERGY AND VISION. By S. P. Langley. National Academy of Sciences. V. First memoir. Pp. 18; 4 plates.

In commencing his paper the author says: "While it is quite a familiar fact that the luminosity of any spectral ray increases proportionately to the heat in this ray, and indeed is but another manifestation of the same energy, I have recently had occasion to notice that there is on the part of some physicists a failure to recognize how totally different optical effects may be produced by one and the same amount of energy, according to the wave length in which this energy is exhibited. I have undertaken, therefore, during the last few months, an experimental reinvestigation of this subject with such a statement especially in view." The experiments are very interesting to those who are fond of advanced physics and reflect great credit upon this eminent scientist.

NATURE STORIES FOR YOUNG READERS. Boston: D. C. Heath & Co. An instructive little book for young people. Price 30 cents.

LE REGIME DES EAUX A LILLE. Etude sur l'Hygiene et l'Assainment des Villes. By Ange Descamps. Publi-cation of the Société Industrielle du Nord de la France. 8vo. Pp. 140. Maps and plans.

This report is chiefly interesting to civil engineers, and we might remark to the engineers of Lille, for the work is of purely local interest. The Lillois are evidently extremely well pleased with their water supply, their sewers-and themselves.

SCIENTIFIC AMERICAN BUILDING EDITION

DECEMBER NUMBER.-(No. 86.)

TABLE OF CONTENTS.

- 1. Elegant plate in colors, showing a very attractive dwelling at Warberth Park, Pa., erected at a cost of \$4,150 complete. Floor plans and two perspective elevations. John Robinson, architect, Germantown, Pa.
- 2. Plate in colors showing a residence at Springfield, Mass. Perspective views and floor plans. Cost \$12,000 complete. Mr. Guy Kirkham, architect, Springfield, Mass. An excellent design,
- A colonial residence at Newton Highlands, Muss Perspective view and floor plans. J. W. Beak, architect, Boston. A picturesque design.
- 4. A pretty cottage erected at Bridgeport, Conn., at a cost of \$1,600. Floor plans, perspective, etc.
 A. M. Jenks, architect, Bridgeport, Conn.
 5. A dwelling house erected at Warberth Park, Pa.,
- at a cost of \$4,478 complete. Mr. C. W. Macfarlane, architect, same place. A model design. Floor plans and perspective.
- 6. A "Queen Anne" cottage erected at St. David's Pa., at a cost of \$5,500 complete. A unique design. Perspective elevation and floor plans. F. L. & W. L. Price, architects, Philadelphia.
- 7. A residence in the "Colonial" style of architecture, erected at St. David's, Pa. Perspective view and floor plans. Cost complete \$5,800. F. L. & W. L. Price, Philadelphia, architects,
- A residence on Golden Hill, at Bridgeport, Conn. Perspective elevation and floor plans. D. R. Brown, architect, New Haven, Conn. An excellent design.
- 9. A residence recently erected at Springfield, Mass Floor plans and perspective elevation. Cost \$2,490 complete. Mr. A. B. Root, architect, same place. A pleasing design. 10. Picture of Aldworth, Sussex, the home of Lord
- Tennyson. Portrait of Lord Tennyson.
- 11. Sketch for a cottage at Saucelito, Cal. 12. Design for a thirty-story building.
- 13. Sketch of residence of Mr. Howard Bell, Atlanta,
- 14. Miscellaneous contents; Some of the merits. Water tight cellars.-Read this with care.-Improve your property.-How to catch contracts.-The education of customers.-Erection of additional buildings,-Concave sounding boards.-A high railway bridge.-A complete steel house front, illustrated.-An improved woodworking machine.-Finely carved woodwork, illustrated.-Steam and hot water radiators, illustrated .-Plaster of Paris .- Disinfection by means of sulphur .- A novel newspaper building .- Fine steel ceiling in an art gallery.

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The Engineering Record, the recognized authority on municipal and building engineering, has recently been enlarged by the addition of a department in which notable industrial plants are regularly described and illustrated, the steam and power plants being a conspicuous feature. Recent publications include the great Ivorydale plant of Messrs. Proctor & Gamble, described in 23 columns and illustrated by 57 drawings. The steam plant at Ivorydale is separately treated in 13 columns plant at Ivorydale is separately treated in 13 columns and 31 drawings. The new foundry of Henry R. Worthington, at Elizabethport, N. J., 16 columns, 28 illustrations. National Meter Company's foundry and brass finishing shop, Brooklyn, 13 columns, 29 illustrations. Niagara Power Plant (now in process of publication). 6 columns, 6 illustrations. Steam power plant of the Dwight Manufacturing Co., Chicopee, Mass., 9 columns, 7 illustrations. Machinery Hall steam power plant, 8 columns, 6 illustrations. Published Saturdays. 12 cents a copy. The Engineering Record, 277 Pearl St., New

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Hooks referred to promptly supplied on receipt of price.

Winerals sent for examination should be distinctly marked or labeled.

(4617) R. L. B. asks: Who was the inventor of the friction match? A. It is said M. Derosne made a friction match with a phosphorus tip in 1816 An impetus was given to the match industry by the Dobereiner lamp, and in 1827 the first really practical friction matches were made by Mr. John Walker, a druggist of Stockton-on-Tees. They were known as "Congreves." and consisted of wooden splints or sticks of cardboard coated with sulphur and tipped with a mixture of antimony sulphide, potassium chlorate and gum. Each hox contained 84 and they were retailed at a shilling. With each box there was supplied a folded piece of glass paper, the folds of which were to be tightly pressed together when the match was drawn through them.

(4618) R. F.—To become a first class electrician or electrical engineer, you will need, first of all, a good mathematical education. If you have not a good education, you can of course secure it by studying the ordinary school books. If you are well up in mathematics, the rest is simple and rlain. By studying electrical books you can acquire a knowledge of elec-

tricity. Latin, while it is desirable, is not absolutely necessary to an electrical engineer. We would suggest the following books for your use: "Experimental Science," Ayrton's "Practical Electricity," Thompson's "Dynamo Electric Machinery," Kempe's "Hand Book of Electrical Testing," Lockwood's "Electrical Measurements," Sloane's "Electrical Arithmetic."

(4619) R. M. F.-German silver has 13 times the resistance of copper. It requires of No. 16 copper wire 23434 feet for the resistance of 1 ohm. As tated above, it will require only 1-13 of this amount of German silver of the same size for 1 ohm. With this as a basis, if you know the resistance of your lamp, you can make the necessary calculations.

(4620) W. P. C.—You can make your moulds of wood or metal. If you intend to use them a great deal, it would, perhaps, be well to make them of hard bronze. Your clay cylinder should first be dried in the open air, then heated slowly to a red heat and kept at that heat for several hours. It requires experience to judge when the work is done. We would suggest the purchase of a work on pottery.

(4621) O. J.—There is very little action in the battery referred to when the circuit is open. Carbon pieces can be granulated, and pulverized and moulded together after being mixed with a little flour and molasses and then baked. See "Experimental Science," for information on moulding carbons. For points on nickel and silver plating consult Supplement, No. 310.

(4622) T. J. R.—If most of the lines of force pass to the armature as indicated by your sketch, it serves to render the core more magnetic and thereby increases the efficiency of the machine. It is not definitely settled that it is advantageous in all machines to provide teeth as suggested.

(4623) W. Z. writes: We have a private elegraph line of 12 instruments, each wound to 20 ohms resistance. Could we run the line with a dynamo? Will it be less expensive than batteries, considering that we construct the dynamo ourselves, and also have free use of water power to run it? A. You can operate your telegraph line by means of a dynamo, but we think a battery would be preferable for a small installation, as it is always ready for use.

(4624) J. F-The only suggestion we ean make in regard to your belt, is to wet, it evenly all over, stretch it until it is straight, and allow it to dry, afterward filling the leather with some of the dressings used for that purpose. We think, however, it will be better for you to write to the manufacturers of the belt.

(4625) C. L. S.-If you have placed the poles of your dynamo on an iron base, you cannot expect it to work as a dynamo, and it would not be a success as a motor. Place the machine of a wooden or a brass base, and you will find it will behave quite differently.

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 unequaled 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 Broad-

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

December 13, 1892,

AND EACH BEARING THAT DATE.

[Seenoteatend of list about copies of these patents.]

Account keeping device, W. W. Maxwell	487,953
Adhesives, production of, L. Kern	487.928
Aging and purifying liquors, apparatus for, A. L. Wood. Alarm. See Burglar alarm. Fire alarm. Animal trap, J. R. Bromwell	488 104
Alarm. See Burglar alarm. Fire alarm.	400 111
Animai trap, J. R. Bromweil	400,111
Armature, jr. R. Bromwei. Armature, electric machine, B. G. Lamme Armature for electro-magnetic machines, R. Lundell Atomizer, C. M. Blackman Autographic register, W. H. Glennon Automatic regulator, Houghton & White. Automatic switch, N. Newman Axes, manufacture of, C. W. Hubbard, Jr Balance, J. De Royir,	400,010
Adamiese C. M. Disaleman	481,100
Automizer, C. M. Blackman	400,000
Automatic manufator, W. H. Glennon	400,004
Automatic emitch N Nowman	107 001
Area manufacture of C W Unbhard Ir	407 040
Polongo T. Do Posis	100 149
Ralling slivers machine for W M Pawling	487 801
Rand out tor and feeder W P Rurke	187 007
Balance, L. Da Rozir. Balling slivers, machine for, W. M. Pawling Band cutter and feeder, W. P. Burke. Banjos or violins, tail piece for, H. C. Middle-	497 C70
Barrel head machine, F. H. Kane	100,010
Poth tub goot () A Voone	400 M11
Battery. See Galvanic battery. Bed spring, J. B. Russel. Beer cooler, W. Gibson. Beer filling apparatus, H. Stockheim.	400,011
Pad enring J R Russel	488 030
Rear cooler W Gibson	488 144
Reer filling apparatus H Stockheim	487 790
Relt electric O Kingstad	488 013
Reit holder W F Cleveland	497 003
Relting O'Connell & Medcraft	487 855
Bench dog or clamp G R Norman	487 762
Bicycle saddle, J. A. Stenberg.	487.789
Bit. See Bridle bit. Dado or moulding bit.	
Blacking kit, boot, H. Pistorius	487.963
Beet ninng apparatus, it Stockheim. Belt, electric, O. Kjors tad. Belt bolder, W. F. Cleveland. Belting, O'Connell & Medcraft. Bench dog or clamp, G. B. Norman. Bicycle saddle, J. A. Stenberg. Bit. See Bridle bit. Dado or moulding bit. Blacking sit, boot, H. Pistorius Blank feeding device, W. W. Miner.	488,084
Block. See Snatch block.	
Blower, centrifugal, M. R. Ruble	487,883
Bobbin used in spinning and twisting frames, J.	
H, Wilson	488,045
Boiler. See Steam boiler. Tubular boiler.	40W #00
Blank feeding device, W. W. Miner. Block. See Snatch block. Blower, centrifugal, M. R. Ruble. Bobbin used in spinning and twisting frames, J. H. Wilson. Boiler. See Steam boiler. Tubular boiler. Boiler. L. & T. J. Sturtevant. Boilers, downdraught furnace for steam, J. F. Wangler.	487,793
Boilers, downdraught furnace for steam, J. F.	407 000
Politing real flows C T Townstt	107 030
Bottle stopper lock F Jorden	407 740
Rottle weeker & R King	487 642
Bottle washer and ringer () Eick	487 999
Wangler. Botting reel, flour, G. L. Jarrett. Botting reel, flour, G. L. Jarrett. Bottle topper lock, F. Jordan. Bottle washer, S. R. King. Bottle washer and rinser, O. Eick. Box. See Fruit box. Paper box. Box machine, J. Neeft.	401,000
Box machine J Neeff	488 DRG
Box machine, C. W. Roberts	487,967
Box machine, C. W. Roberts. Bracket. See Sign bracket. Brake. See Car brake. Roller brake. Brick, drying, C. J. Dion.	201,001
Brake. See Car brake. Roller brake.	
Brick, drving, C. J. Dion.	487 827
Brick machine, S. P. Baucock	488.10
Brick press G. H. Babcock	488.049
Rridge I. Barnes	487.819
Bridle bit, W. J. Barndollar	488,051
Bridle bit, W. J. Barndollar	487,707
Burglar alarm, W. W. Climenson	488,162
Burner. See Gas burner. Lamp burner. Oil	
burner.	