Forms of Lightning.

In his meteorological essays Arago collects and classifies the descriptions of the different forms that lightning assumes. The first class consists of narrow, thin, sharply defined, luminous lines which may have crimson, violet or bluish colors. These lines may be classified as straight or slightly curved, zigzag or broken lines, greatly curved and even re-entrant, and, finally, forward and return, very nearly resembling the capital letter V. We have also single flashes that bifurcate into a collection of smaller flashes that may number anywhere from two to one hundred, the double and triple forks being least frequent. To these varieties the editor would add a sinuous form of lightning flash that he has seen on several occasions, both in Chicago and Washington, in which the flash appears to run with comparative slowness, horizontally, along the under surface of a cloud, dying out after it has pursued a path whose apparent angular length is from one to five degrees. No noise whatever usually accompanies this lightning, although the flashes may be in the zenith. When last observed, in May, 1897, it seemed possible that these might be simply long flashes viewed endwise, so that the apparent path, which was sometimes so curved as to form a complete oval or spiral, was simply the projection of what would from another location have appeared to be a long flash between an upper and a lower cloud.

The second class recognized by Arago is that of the diffuse lightning, spreading over immense surfaces, often of an intense reddish tinge, but sometimes blue or violet, and which in America and England are spoken of as "heat lightning," but which are more properly called "sheet lightning." During an ordinary thunderstorm the sheet lightning is far more frequent than the flash lightning.

The third class includes the mysterious "globular or ball lightning," which rolls about on the ground and has thus far defied all attempts at satisfactory explanation.

As a fourth form of electric discharge we must reckon the continuous emission of light from the surface of certain clouds. As these clouds are low, and as the light dies away after a few minutes only to be renewed again after a short interval, we must consider this light as due to myriads of little flashes between the particles of the clouds without appreciable noise.

Besides the lightning interchanged between the clouds or the clouds and the earth in ordinary weather, a still more interesting fifth class should be made of those that play between the earth and the cloud of ashes and vapor formed above a volcano in active eruption.

There does not seem to be any evidence that in these five classes there is any special new production of electricity. We have only to consider the earth as the electrified body, permanently electrified, and always, by induction, inducing electric manifestations in every substance that is near to it. The auroral light ought to be included as one form of the lightning discharge, since it is certainly a form of electric discharge modified by the rarity of the upper atmosphere from the flash to the stratified sheet lightning. The electric discharge is modified, not merely by the rarefaction of the dry atmosphere of oxygen and nitrogen, but still more so by the rarefaction of the other gases in the atmosphere, such as the hydrocarbons and the carbonic acid gas, and probably also by that of the aqueous vapor, so that air which is very dry or very cold, and therefore contains but little aqueous vapor, may have much to do with the formation of auroras. According to the recent researches of Prof. Trowbridge, the character of the electric current as to intensity and quantity is also a prime factor in determining the character of the luminosity. He has been able to reproduce a great variety of forms of lightning, such as have been photographed from time to time, by proper alterations in his apparatus.—Prof. Cleveland Abbe, in Monthly Weather Review.

Cavalry in Future Wars.

It has been said that the days of dashing cavalrymen will soon be over, and that the art of riding will become as purely a pastime as the art of sailing is destined to become by reason of the introduction of steam, says The Literary Digest. This opinion is combated very vigorously by Major Kunz in his Kriegs-Geschichtliche Beiträge. He believes that the uses of cavalry have been changed, but that its existence is not yet endangered. On the other hand, he points out that mere mounted men, as against highly trained riders under the very best leaders, are absolutely useless to-day. Commenting upon the many brilliant though unfortunate cavalry attacks executed by the French in 1870, he says:

"1. A frontal attack of cavalry against victorious infantry can only be justified when the aim is to save time for the purpose of saving the beaten army. The success of such an attack is practically impossible.

"2. Momentary success of an attack against the flank of victorious infantry is possible. But even such an attack must end in the destruction of the force which undertakes it.

"3. If the enemy's infantry is beaten, cavalry may be used to advantage. But it must be faultless cavalry, led by faultless, courageous riders, men who are also perfect in their knowledge of the history and psychology of war. In such a case no thought must be given to a few hundred horses foundering on the field. The enemy's infantry must not be given time to assemble. The cavalry must endeavor to head off the fugitives, for the most disheartened of them will lead the stampede. In the rear of a flying army are always the bravest. It matters little whether the enemy loses much in killed and wounded. The question is not how to kill men, but how to discourage them, to rob them of their leaders, to destroy their organization.

"An infantry which has suffered heavy losses, but has advanced victoriously, and has still sufficient ammunition, may laugh at a cavalry attack. An infantry that has been beaten, and whose officers are killed, and which has lost courage in consequence, is a ready prey for enterprising cavalry. It will be said that, in such a case, the cavalry of the beaten army must sacrifice itself for the infantry. Quite true. The task of the attacking cavalry will then be to overthrow the horsemen of the vanquished army. If this succeeds, the stampeded horsemen will only assist in increasing the confusion of the flying infantry.

"At any rate, a few hundred men and horses dying of sheer exhaustion in the pursuit of a beaten enemy will save the trouble of another bloody battle. To train the cavalry for such work is the purpose of extensive maneuvers."

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RECENTLY PATENTED INVENTIONS.

Engineering.

GAS ENGINE MUFFLER.—Charles S. Bird, Jackson, Mich. This device comprises a casing in which is suspended a vessel into which projects the exhaust pipe from the engine, a conical spreader being supported immediately below the exhaust outlet, and there being ample room for the gases to expand in the vessel, while a U-shaped pipe is provided for the escape of the gases to the outer air.

SPEED-CHANGING DEVICE AND INDICATOR.—Philip J. Runser, Redfield, S. D. This is a device for use on traction and other engines, to indicate the speed while the engine is running and to permit the engineer to readily change the speed at any time as desired. The device is more especially designed for use on engines employed for thrashing and similar purposes, and connected to the governor stem is one end of a spring whose other end is connected to a double gear wheel for adjusting the tension, the gear wheel being normally stationary, an operating device engaging one of its series of teeth while an indicator is operated by the second set of teeth. The speed of the engine is changed by increasing or diminishing the tension of the spring.

WATER WHEEL.—David Morgan, Axial, Col. To facilitate raising and lowering a water wheel, and holding it immersed as desired, is the object of this invention, according to which the wheel is carried at one end of a pivoted frame at whose opposite end is a rack and pivoted levers, one lever having a dog and the other a pawl, both arranged for engagement with the rack, the pawl and lever holding the frame in its adjusted position, and the dog and lever being adapted to raise the wheel and assist in lowering it, and the weight of the frame enabling the levers to be easily operated in raising and lowering the wheel.

BOILER ALARM.—John O'Connor and Collatinus A. Turner, New York City. According to the system provided by this invention, an electric alarm or steam whistle alarm may be employed to indicate high or low water, the device comprising a cylinder with water gage and float from which extends a stem connecting with a shaft carrying an arm to which is attached a yielding contact plate, in connection with an electric circuit, while there is also a spring yielding connection between the arm and a water controlling valve, which is operated by an upward or downward movement of the float.

Electrical.

CALL BOX SYSTEM.—William T. Budds, Charleston, S. C. This system comprises a main wire with which the call boxes have a shunt connection while also having a ground connection, a battery with one pole of which one end of the main wire connects and a wire leading from the other pole of the battery and connected by a switch with a ground wire, a switch also connecting the last wire with the main wire. The first switch also operates to connect the ground wire with an intermediate element of the battery, and there is a sounding device at each extremity of the main wire. The improvement contemplates a single wire open main circuit having a single wire connection with each call box, the circuit being completed through the ground.

Bicycles, Etc.

VARIABLE GEARING.—Samuel J. Evans and Harry H. Huggins, Roanoke, Va. To enable the rider to readily vary the speed of his machine while the latter is in motion is the primary object of this invention, according to which there are a number of concentric gears on the pedal shaft, while a longitudinally grooved shaft at right angles has its rear end geared with the drive wheel, there being a number of loose pinions on the forward end of this shaft to mesh with the gear of the pedal shaft. Separators are arranged between the pinions, the pinions and separators having keyways, while a key sliding in the groove of the shaft is adapted to be moved into engagement with the ways of the pinions or separators.

TANDEM.—Henry M. Hunt, Indianapolis, Ind. This invention provides a construction whereby two bicycles may be easily connected to form a tandem or disconnected and employed as independent bicycles. There is a yielding connection for a leader and trailer, comprising crossheads, one adapted for pivotal connection with the leader and the other with the trailer, while plates having telescopic or tubular portions are mounted to move between the crossheads, and rods extend from the crossheads to connections with the plates. Both the leader and trailer may have one or more seats, or one seat may be omitted and provision made for carrying bundles.

BICYCLE STAND.—William E. Leavitt, New York City. According to this invention, a bicycle stand of strong and inexpensive construction is formed of a block of wood, on a suitable base, a forward inclined groove receiving the front brace, while a transverse groove receives the crank hanger and another groove receives the rear fork. The block is made high enough to hold the wheel free from the ground, permitting the wheels to be revolved and all parts readily reached for cleaning and repairing, and it may also be made sufficiently strong to support the rider while being fitted to the saddle.

Mechanical.

BLANK FOR MANUFACTURING HOLLOW BODIES.—Carl Meyer, Dortmund, Germany. In making seamless hollow bodies from plates or sheets, this invention is designed to facilitate doing the work without materially altering the original distance of the particles of material in a radial direction or in a direction outward from the central portion of the blank. With this view the portion of the blank designed to come directly under the mandrel is made with a marginal portion which for a predetermined distance increases in thickness in such proportion that the area of concentric cross sections at any distance apart from the center of the plate shall be constant, the thickness of the blank at different points being such as would be produced by stretching the finished tubular article into a substantially plain article.

ECCENTRIC.—Casper E. Anderson, Castle Dale, Utah. This invention is for an eccentric which may be reversed by shifting, and is adapted for engines and similar machinery employing slide valves. A sleeve splined on a shaft is inclosed by and has screw-threaded connection with a second sleeve, a boss keyed to the shaft serving to guide the second sleeve as it turns, while an eccentric pivoted to the plate has connection with the second sleeve, the eccentric having an elongated opening to receive the boss of the plate to permit the adjustment of the eccentric.

CASING CUTTER FOR WELL TUBES.—Silas W. Munn, Mannington, West Va. When the iron tubes or casings of artesian or driven wells are to be cut for removing a section, and it is desirable to make the cut near a joint or coupling, this invention provides a device to automatically indicate the location of the joint and at the same time arrest the descent of the cutter at the right point for dividing the tube or casing. Attached to an upper or lower extension of the rotatable tube cutter is a beveled catch and a spring which projects the device laterally for engagement with the joint of the tube or casing, the device holding the cutting apparatus in proper working position.

Agricultural.

CULTIVATOR.—Frederick H. and Thomas C. Bornman, Summit, Miss. In cultivators or side harrows, this invention provides a means whereby the angle, pitch and spaces or distances of all the blades can be simultaneously adjusted, to secure complete arrangement and exactness in relative position, it being possible to retain the equalizing cross bars to which the shanks of the blades are attached transversely to the beam or at any desired angle. The invention also provides for the use of any form of blade, whether it be a turning plow or a half shovel, either being readily secured to the shanks or stocks and given any desired inclination, the attachment being effected by a shoe and a single fastening bolt and being absolutely rigid.

POISON OR FERTILIZER DISTRIBUTER.—Frank L. Richter, Moravia, Texas. For the distribution of poison or a fertilizer to the plants at each side of a furrow through which the machine may be drawn, this invention provides a machine of simple and inexpensive construction, the frame of which carries a fan near the outlet of the poison or fertilizer receptacle, the valved outlet of which is in communication with an adjusting distributing device consisting of a T-shaped tube, open at the ends of its transverse section, the fan and blower being operated by the revolution of the axle carrying the supporting wheels.

Miscellaneous.

CLOCK.—Sigismund B. Wortmann, New York City. This invention relates to clock-driving mechanism to run with but little friction and take up only a small space, whereby a clock may be run for several years and keep accurate time. The mechanism may be connected to an ordinary one-day clock, enabling the clock to run for a year or more with one winding, and comprises substantially a spring motor, such as covered by several former patents granted to the same inventor, but modified by the addition of certain parts and the substitution of other parts.

ACETYLENE GAS GENERATOR.—James L. Hardwick and Sidney O. Manville, Cedar Rapids, Ia. This generator comprises a rising and falling holder in which the receiver is supported to carry the carbide into and out of contact with the water, a gasometer to hold the gas being connected with the holder by a pipe, and there being an intermediate mechanism whereby the movement of the dome of the gasometer will operate to control the up and down movement of the holder, whereby only the required amount of gas, as taken off for consumption, will be generated.

EARTH AUGER.—Joseph Carter and William Richmond, Blyth, Canada. A tool for conveniently boring post holes, devised by these inventors, comprises a telescopically adjustable handle with spider-shaped foot piece carrying blades curving inwardly, and attached to a vertically adjustable ring, to regulate the stiffness of the lower ends of the blades, the blades forming a skeleton basket in which the earth is received as the auger is rotated and forced down, and the loose earth being thus removed as the operation progresses.

WHIP SOCKET AND REIN HOLDER.—Marshall T. Howland, Pittsford, Vt. This is a combination device for attachment to the dashboard of vehicles and has two pivoted members arranged to hold the whip and a supplemental member to hold the reins. Two clips are rigidly secured to the whip socket, along which extends a rib, and a post stands rigidly on the upper clip, from which projects a stop, while a spring embracing the post serves to throw a shoe toward the rib.

SAFETY DEVICE FOR ENVELOPES.—Aaron H. Danner, Manheim, Pa. To prevent the fraudulent opening of envelopes by steaming or otherwise, this invention provides for the cementing of a piece of material to the inner face of the envelope adjacent to the address, such material being covered by the sealing and not being liable to be loosened without blurring the address. Another form of the improvement provides for an inner and outer envelope, the sealed side of the inner envelope being cemented to the back of the address portion of the outer envelope.

COFFEE ROASTING.—John W. Pinkerton, Zanesville, O. This invention covers a method and apparatus for roasting coffee, the apparatus comprising a roasting furnace in which is a coffee cylinder having a hood or cover with an opening, a burner being movable into and out of the opening, whereby a gas flame may be introduced at intervals as the roasting proceeds, the method being to subject the roasting coffee to the intermittent action of direct flame and thus insure a more immediate evaporation of its moisture.

SPRINKLING NOZZLE.—Arthur W. Joy, Bangor, Me. This nozzle is designed for sprinkling roadways, lawns, etc., and to be connected with underground pipes, the top of its body being rounded to lie flat on the curbing or project slightly therefrom, so as not to obstruct travel. It has a central water supply chamber communicating by ports with outer flaring sockets in which are conical hollow heads, each provided with a series of outlets, a seat being formed at the smaller end of each head for a ball valve, while the outlets form spraying passages or ways around the ball.

WHIST TABLE.—William P. Morrissy, Brooklyn, N. Y. This inventor has devised a table especially adapted for duplicate whist, in which the hands

played at each table will remain on the table in proper order for the duplicate play. The table has a stationary square top, below which is a round revoluble top in which, at four equidistant points, are card-receiving receptacles, the round top being of a diameter about equal to the greatest diameter of the square top, whereby the portions carrying the card receptacles will project beyond the four sides of the square top. Means are provided for locking the revoluble top against rotation.

HEATING STOVE.—Cornelius Barnhart, Walker Valley, N. Y. In the ash pit of this stove is a number of fire pots, supported from the top of the ash pit, there being a combustion chamber into which the tops of the fire pots open, and a feeding magazine adapted to convey fuel to all the fire pots automatically, although the construction is such that, when but a small amount of heat is required, but one of the fire pots may be employed. Heat-radiating flues lead from the combustion chamber into a hot air chamber, from which a draught flue leads to a point of discharge, the stove being designed to afford high efficiency and be very economical of fuel.

WINDOW BRACKET.—Silas G. Dean, Norfolk, Neb. This bracket is designed especially for use as a scaffolding for persons cleaning windows, being readily adjustable to windows or openings of different sizes, and easily made secure in position. It has a body portion consisting of binding strips made in adjustable sections and connected by clamping devices, a platform being adjustably supported by the binding strips, while an adjustable support is hinged to the outer end of the platform, for which also a locking device is provided.

KETTLE RACK.—William C. Donica, Grayson, Ind. To facilitate suspending one or more kettles over a fire, for outdoor use, this invention provides suitable uprights, not liable to become unduly heated and which may be readily set up, and from which the pots may be easily suspended, the pots being directly connected to clamps adjustable upon the uprights or standards of the rack, and locking themselves thereto automatically.

WASHING MACHINE. — Samuel Hartridge, Huntington, N. Y. This invention relates to machines adapted to be attached to an ordinary tub, and consists of a bar clamped at its ends to the sides of the tub, while in the center of the bar is journaled a shaft on whose upper end is an operating crank and on the lower end a rubbing wheel. The ends of the bar are pivoted to clamps of peculiar construction which engage the sides of the tub, the device being adjustable to tubs of different sizes, and in operation the wheel, which is furnished with slats or ribs, is designed to rest directly upon the clothes and keep them beneath the water.

NAPKIN RING AND HOLDER.—John S. and William W. Hoagland, Long Branch, N. J. This device is made in detachably connected sections, each section being provided with a fastening device adapted for application to the clothing of a person and a holder for the napkin, whereby the ring may be utilized to hold the napkin in front of the person. When the sections of the ring are locked together, pendent members prevent the ring from rolling

CURTAIN HOLDER.—Ulysses S. Parish and Flavel A. Rudolph, Carmi, Ill. This holder is arranged to permit of conveniently and quickly moving the ordinary spring roller carrying the curtain up or down on the window, permitting the unscreening of the upper portion of the window while the lower portion is screened. Upon a centrally depending rod is a longitudinally adjustable support having a slotted plate in which an adjustable frame for the curtain roller may be held in adjusted position, the device being of simple construction, easily manipulated and not liable to get out of order.

CAME.—Christopher C. Tracy, Brooklyn, N. Y. This invention relates to latticed or stained glass windows, and provides useful improvements in lead cames whereby a pane is securely united with the came to prevent rattling and to render the joint between the came and pane waterproof. The came is formed at the inside with recesses or grooves for the reception of cement or other binding material to hold the pane securely in place between the flanges, the recesses being formed at the time the came is produced in the lead press.

Designs.

CARPET.—Eugene A. Crowe, Brooklyn, N. Y. Three carpet designs have been patented by this inventor, in one of which the main figure is a rosette comprising a floral center and foliate fringe, there being opposing triangular groups of leaves and irregular checkering, with scrolls. Another design comprises a fanciful composite figure of floral center piece and border of palm scrolls, with leaf scroll decorations, while a third design has an irregular checkered background upon which a main figure represents a branch with leaves, the leaves apparently resting on other larger and shadowy leaves.

KNOB FOR VESSELS.—Cæsar A. Cuppia, New York City. The leading feature of this design consists in a stag crown, the shank being reduced relatively to the crown, the back of which is roughened to simulate a stag horn.

CONDIMENT HOLDER.—This is a further patent of the same inventor, the design representing the crown of a stag horn, as a body, framed by a top and base, the holder being adapted for all kinds of handleless vessels.

FRAME FOR SPOOLS OR REELS.—August Scherrer, Biegel, Texas. This design provides a device designed to facilitate holding and handling spools of wire, the trunnions of the spools being received in apertures in the ends of a forked portion of the device, the other end of the frame of which is provided with two handles.

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(7358) H. P. R. asks: Would an engine 3×4; revolutions, 500; steam pressure, 100 pounds; give power enough to run the dynamo described in SUPPLEMENT No. 600? A. This engine should have ample power. It will be necessary to use a pulley 3⅜ times as large on the engine as on the dynamo to bring the speed up to 1,800 turns per minute.

(7359) A. J. M. asks for some means to remove frictional electricity from a pile of paper that is just printed. A. There does not seem to be any better mode of preventing the electrification of paper in running through the press than to dampen it with water. The paper is thus made a fairly good conductor and the electric charge is dissipated.

(7360) T. S. asks (1) if the motor described in SUPPLEMENT, No. 641, can be changed into a dynamo, and how. A. The motor in SUPPLEMENT, No. 641, may be run as a dynamo by applying power to the armature. 2. I wish you would also state what kind of a battery and how to make it as a plunging battery. A. The plunge battery is fully described in SUPPLEMENT, No. 792 (price ten cents); so that any one can make it from the drawings there given. 3. How are the filaments in incandescent lights made, and from what material? A. The filaments of incandescent lamps are made of vegetable fiber, formerly of split bamboo, but now of cellulose or something of that sort prepared chemically from vegetable material. The process is a long one. The principal change is produced by heating it for a long time in a red hot iron box in a furnace where the fibers are carbonized.

(7361) F. G. G. writes: A says that crystals of ice form at the bottom of a body of water and rise as crystals to the surface and are then massed in a sheet of ice. This has reference to a small fresh water lake or pond. B says that this is not the process of the freezing of ice. Please say who is right, A or B. A. B is right. The water toward the bottom of a fresh water lake in winter is at 39° Fah. Water colder than 39° is lighter than water at 39°, and therefore the colder water floats on the warmer. Ice can form only in water at 32°, and water at this temperature can only be found on top of the water at higher temperature. Hence ice forms on the surface. This is true of all ice excepting anchor ice, the formation of which it is difficult to explain.

(7362) "Old Reader" asks: Will you very kindly give in Notes and Queries a recipe for a furniture renovator and polish? Something that can be used on pianos, furniture and all polished or varnished surfaces, a polish that will dry hard and not be sticky. A. Formulas for excellent furniture polishes are given in our SUPPLEMENT, Nos. 1067, 1099, and 1145, price 10 cents each by mail.

(7363) I. D. asks: 1. Have you a SUPPLEMENT which contains a good article with diagrams on building a canvas canoe? If so, will you let me know through your Notes and Queries? A. Full details for the construction of a canvas canoe are given in SUPPLEMENT, No. 216, price 10 cents by mail. 2. What wood do you advise for the ribs of a canoe? A. Use oak.

(7364) Since replying to query 7329 we have received from a manufacturer a sample of "boiled out" linseed oil. Excepting for a slight odor it bears no resemblance to linseed oil. It is a solid, noninflammable, nearly fibrous and elastic like a sponge. We are not informed as to the article, except as to its name, which seems to be a trade name. Its insulating qualities would be no greater than those of air, since air fills its pores, and it has been proved that porous insulators are pierced as easily as the air. It could not be used to separate the layers of a coil nor to immerse a coil in. All liquid insulators fill the spaces of the coil and are continuous. If a spark ruptures them, they close again instantly and are as strong as before.

(7365) W. F. R. writes: As a core for a choking coil I use an iron pipe, into which other and smaller pipes may be inserted. These pipes soon become inconveniently hot. Would slitting the pipes longitudinally diminish the heat sufficiently to repay one for the trouble of doing it? Does the unslit pipe really waste much energy, and about how much? Would the slit pipe choke more, and about how much more? If you need data they are these: Length of coil 18 inches, diameter of core 2 inches, volts 106, amperes about 8, 300 turns of No. 12 wire in 2 layers. A. The object of a choking coil is to offer a counter-electromotive force. The only energy which is lost is due to the ohmic resistance of the wire and the core losses, which can be made very small. Make your core of a bundle of No. 18 best annealed Norway iron wire. Slitting your pipes would help your case a little, but not enough for your purpose.

(7366) H. T. W. asks (1) where to get information how to make a direct current dynamo that will produce as small a current as 10 to 15 volts. A. The hand dynamo described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161, has about 3 amperes at 12 volts when run at full speed. You could attach a motor to it with little trouble. Croft's "How to Make a Dynamo," 60 cents; Halliday's "Small Dynamo," $1, are both for amateurs. 2. Can the little alternating dynamo mentioned in SCIENTIFIC AMERICAN of November 11, 1897, be changed (from the directions given) so as to produce only 10 or 12 volts instead of 150, as stated? More than 12 volts will heat up the fields of the magnet too much. A. You would have to charge the fields of the alternator by battery and would be no better off than at present. We think you will have less trouble with your battery than with more complicated machinery.

(7367) L. & B. ask: 1. By using a transformer could we cut a 110 volt current down to about 10 volts? A. If the current is alternating, it can be changed by a transformer from 110 volts to 10 volts, but if the current is direct, a rotary converter must be used. 2. Would 10 volts give a large enough spark to explode gasoline in a gasoline engine? A. Yes. 3. Where could we have one made? A. Consult our advertising columns or some electrical engineer in your vicinity.

(7368) A. S. asks: 1. Where can I get miniature accumulators such as described in SUPPLEMENT, No. 842? A. Consult our advertising columns. 2. Can I charge 52 of them on a 104 volt lamp circuit? A. Accumulators are charged at a pressure of 2½ volts each. At this rate 42 could be charged on a 104 volt circuit.

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FEBRUARY 15, 1898,

AND EACH BEARING THAT DATE.

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

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Boot or shoe cover and cover holder, C. H. Smith 599,133
Boot or shoe nailing machine, W. E. Bailey 598,890
Boots or shoes, device for preserving or restoring shape of, T. Austin 599,691
Bosom pad, D. Harrison 599,180
Bottle, L. H. Griste 598,923
Bottle, E. Moore 599,285
Bottle, etc., indicator, W. N. Thompson 599,156
Bottle, jar or other vessel or reservoir for containing and delivering liquids, earthenware or glass, Chambers & Basden 599,095
Bottle, non-refillable, J. A. Holman 599,077
Bottle, non-refillable, L. W. Merriam 599,185
Bottle, non-refillable, C. C. Richmond 599,254
Bottle sealing attachment, R. Hearns 598,929
Bottle stopper, J. A. Donahue 599,226
Bottle stopper, J. B. Neuendorff 598,952
Bottle stopper, F. T. Robinson 599,112
Bottle stopper, automatic, T. M. Sanderlin 599,258
Box. See Pen and pencil box. Refrigerator shipping box.
Brake. See Car brake.
Bridge, sidewalk, C. T. Ford 599,037
Brush, rotary, E. Pain 599,044
Buckle, G. Page 598,956
Buggy, W. H. Makutchan 599,298
Bung, barrel, J. Mohn 599,300
Burglar alarm, F. Fenley 598,916
Burial casket, W. C. Lautner 599,043
Burner. See Gas burner.
Button attaching implement, hand, F. S. McKenney 599,007
Camera, magazine, J. A. Mosher 599,188
Can. See Milk can. Oil can.
Candelabrum, H. F. Nehr 599,190
Car and mowing machine, combined hand, J. L. Smith 599,201
Car brake, J. T. Davis 598,981
Car, burglar proof express, O. J. Foster 599,170
Car center plate, railway, P. Reilly 599,150
Car coupling, P. Hien 598,990
Car fender, street, H. W. Bodeman 599,281
Car window, J. Halin 598,925
Carding machine, C. E. Smith 599,067
Carriage, folding, Stern & Lefkowitz 598,964
Carrier. See Luggage carrier.
Carrying apparatus, J. Anderson 599,137
Cash register, pocket, E. L. Gibson 599,174
Cash registering machine, C. H. Little 599,297
Cask or barrel trussing, chiming and crozing apparatus, A. Dunbar 599,057
Castrating instrument, J. W. Latta 598,999
Centerboard, H. W. Fairbrass 599,097
Chain link, W. H. Griffith 599,232
Chart, adjustable dress, A. H. Ormsby 599,247
Chromates, making, S. P. Sadtler 599,197
Chuck, expansion, J. Robinson 599,255
Churn, S. B. Jones 598,996
Churn, R. F. Yancey 599,212
Cigar wrapper cutting machine, N. Du Brul 599,227
Clamp, W. S. Gubelmann 599,059
Clean out trap for range closets, J. H. Brady 598,899
Cleaner. See Street cleaner.
Cleaning and polishing composition, A. Maher 599,003
Clevis, cross, J. L. Thomas 599,204
Cloth holder, S. Bloomer 599,072
Clutch mechanism, A. H. Hoyt 598,982
Coal handling device, A. C. Dinkey 599,036
Coat, J. Chisholm 599,139
Cock, water, M. Andriveou 599,158
Coffin lid fastener, L. L. Pletcher 599,109
Coin freed automatic delivery machine, Hulme & Williams 599,100
Combination wrench, C. Bickel 598,897
Confectioner's kettle, C. S. Rider 599,047
Controller, W. M. Jewell 598,965
Cord or rope, ornamental, F. W. Oehrle 599,191
Corset stiffener, W. Kerkenbusch 599,042
Cotton cleaning and mattress stuffing machine, C. W. White 599,049
Cotton for ginning and baling, apparatus for cleansing and preparing, C. Van Orden 599,272
Coupling. See Car coupling. Pipe coupling. Thill coupling.
Cuff holder, H. B. Fisher 598,917
Culinary beater, Spruin & Barnett 599,268
Cultivator, W. Beam 599,093
Cultivator and harrow, Cook & Whitfield 599,165
Current meter, direct, G. A. Scheeffer 599,202
Curtain hanger, L. H. Broome 599,116
Cutout, fusible, J. Jones, Jr 598,940
Cutter. See Thread cutter. Wrapper cutter.
Cyanids and ammonia, process of and apparatus for making, T. B. Forgarty 598,918
Cycle package holder, C. S. Coolidge 599,119
Demagnetizing device, H. A. Storrs 599,504
Desk attachment for chairs, etc., J. Tremearne 599,069
Dividers, F. H. De Tray 598,911
Door, scuttle, E. Burger 598,975
Drawer fastener, J. V. Hemstreet 599,296
Dress, riding, M. E. Colegrove 598,980
Drum, heating, H. C. Stover 599,068
Dry separator for auriferous material, E. C. Sooy 598,963
Dust and dress guard, Parke & Lamb 599,192
Electric battery for medical purposes, C. W. Moessner 598,948
Electric conductor tip, A. B. Blodgett 598,972
Electric controller, F. A. Merrick 599,186
Electric elevator, H. Rowntree 599,015
Electric meter, C. Raab 599,046
Electric motor controller, E. W. G. C. Hoffmann 598,941
Electric motor, direct acting oscillating, J. H. Mason 598,946
Electric system of propulsion, W. M. Brown 599,162
Electric wires, underground conduit for, A. L. Daniels 599,202
Electrical converters, automatic cutout for, W. J. Greene 598,922
Electrical energy, transforming potential energy of carbon into, H. Blumenberg, Jr 599,094
Electrodes, box or case for secondary battery, Harris & Holland 598,926
Elevator. See Electric elevator.
Elevator car safety brake, E. Collins 598,910
Elevator or conveyer, F. F. Kanne 599,101
Embroidery ring, L. Gibbs 599,127
Engine. See Explosive engine. Rotary engine. Rotary steam engine. Steam engine. Vapor engine.
Engine, R. G. Newman 598,953
Engine stop, J. R. & F. P. Reynolds 599,014
Excavating, conveying and distributing clay upon ballast kilns, machine for, J. B. Faulkner 599,124
Excavator, dredging, F. H. Heath 598,988
Explosive engine, P. L. Hider 599,235
Eye protector or guard, E. G. Stevens 598,289
Eyeglasses, T. M. Heard 598,928
Fabric. See Wire fabric.
Fastener, H. S. Richardson 598,959
Faucet, R. Rowe 599,256
Fence post, R. R. Spoore 599,303
Fence stays, tool for attaching wire, R. B. Robbins 599,196
Fence tool, wire, A. & C. A. Church 598,907
Fence, wire, R. L. F. Strathy 599,024
Fender. See Car fender.
Filaments for electric lighting, making, D. C. Voss 599,306
Filter and making same, germ proof, J. A. Wesener 599,030
Filtering apparatus, Palmer & Brownell 599,089
Filtering apparatus, water, J. W. Ledoux 599,103
Fire battery, T. A. Ready 599,195
Fire escape, J. Lauxmann 599,000
Fire extinguisher, G. C. Hale 598,924
Fire extinguisher, chemical, C. S. Page 598,955
Fire extinguisher valve, automatic, G. E. Hibbard 599,099
Fishing reel, automatic, F. J. Boyle 599,138
Flower pot, C. Sherman 599,263
Fuel, apparatus for producing artificial, C. W. Smith 599,264
Furnace. See Boiler furnace. Heating furnace. Underfeed furnace. Warm air furnace.
Furniture, knockdown, D. Lynn 599,107
Game apparatus, S. P. Anderton 598,969
Game apparatus, W. J. McCauley 599,063
Game apparatus, Sturges & Leaycraft 599,025
Garbage treating apparatus, C. Edgerton 599,229
Garter, J. W. Clements 599,164
Gas apparatus for producing acetylene, Hanotier & Hostelet 599,096
Gas burner, self-closing, F. P. Barney 598,892
Gas, method of and apparatus for carbureting water, A. G. Glasgow 598,921
Gas generating apparatus, acetylene, A. K. Stein 599,270
Gas generator, acetylene, Z. P. Dederick 599,074
Gas lighting apparatus, electric, Cram & Clegg 599,121
Gate. See Railway gate.
Gate, B. McNall 599,008
Gate or door hanger, Westin & Magnuson 599,083
Gear case, F. L. Minturn 599,005
Generator. See Gas generator.
Glass. See Graduate glass.
Glass press, G. Henning 598,930
Glove stretcher, G. Havell 599,285
Glycerol ether of aromatic compounds, H. Endemann 599,123

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