

have to travel this defect is sometimes greatly intensified.

The camera shown in the accompanying illustrations, the invention of Henry W. Hales and manufactured under American and foreign patents by the Hales Camera Company, of Ridgewood, N. J., is designed to be more simple in operation than the mirror form of camera, and to be especially useful in enabling the operator to obtain and observe an accurately sharp, brilliant image projected directly upon a white focusing ground and in an apparent proper position on account of the way it is looked at.

The general appearance of the camera opened for operation will be seen in the perspective view and its novel features in the diagram views. The side forming the front and base of the camera is dropped down in the usual way and the lens portion drawn out on to a plate provided with a rack and pinion focusing adjustment. The top of the box folds backward over the rear of the camera and as it does so allows the eye observing apertures to be elevated into position by means of a light spring below. A curved arm shown at one side of the top is actuated downward when the top is closed, thereby automatically folding the eye-piece into place, when the camera is not in use. A convenient handle is on the outside of this top piece for carrying the camera. In appearance it is like an ordinary square shaped box.

The back portion of the camera as shown in the right diagram is made in two parts, one of which is rigid and the other movable. The latter part carries the focal plane curtain shutter and the plate holder. The shutter is of the ordinary simple form with a single horizontal slot of uniform width, but a part of its outer surface opposite the lens is whitened with a smooth, fine surface and forms, when the shutter is wound up, a perfect focusing screen, the full size of the plate, shown plainly in the left diagram.

Directly under the eye observing portion is a horizontal light cut-off slide which is kept closed by a spring and is only opened when the image is observed, by pressing down the handle B. This is connected by a thread passing over a roller to the lever operating the slide. In focusing the forehead rests against the eye apertures, in which spectacle lenses are located to partly magnify the image, and the operator looks backward at the image. The view is indicated by the dotted lines in the diagram. Inasmuch as the head is downwardly inclined the inverted image on the

screen looks in the right position. The foreground appears at the top of the screen and the sky below. A is the shutter release lever. Its function is, as soon as the focus is obtained and the image located in position on the screen, to first advance the movable back and the plate holder forward until the plane of the plate occupies the same focal plane as the former focusing surface of the curtain shutter did; then a trip at the top of the fixed back throws out the spring holding the shutter at C, releases the latter, causing the exposure to be made in the usual way. It will be seen that the shutter release A operates, in its downward movement, a vertical toggle bar which carries the movable back forward and closes it against the stationary back. After the exposure is made the curtain is wound up for another exposure by the knob C, and at D is another knob or shaft for increasing the tension of the actuating shutter spring. On the opposite end of this shaft is an indicator (not shown) for indicating the speed of the shutter. By the movement of the shutter lever A upward the movable part of the camera is pushed backward and the curtain shutter is placed in position for focusing.

E is a lock for the shutter lever. In the general view it is a small button, which on being pulled outward by the fingers brings a spring stop under the toggle connection and holds it from operating. On releasing E it springs inward out of the way of the toggle bar.

By placing the lever A in a half-way position the curtain shutter may be entirely rolled up, leaving the camera open in the back for ordinary time exposures with the use of the usual ground glass if so desired. The ordinary plate holder is used. In a trial of the camera we found it exceedingly easy to obtain an accurate focus on account of the brilliancy of the image on the white shutter. The camera presents a neat and attractive appearance. All portions of the metal work are blackened to prevent reflections, while the mechanism is simple, easily operated, and so far as can be made is what is called "foolproof." As the camera contains no ground glass or mirrors its weight is somewhat lighter than others.

Air at 82 deg. Fah., with moisture at 90 per cent of saturation, has its absorption power more than doubled when it is heated to 110 deg., since the saturation is reduced to about 42 per cent by the elevation of temperature.

The Irish International Exhibition.

The forthcoming International Exhibition at Dublin, Ireland, which will be open from May to October, 1907, will be the biggest undertaking of its kind ever organized by Irishmen, completely dwarfing any of the expositions previously held. So favorably has the enterprise been received that more than 1,000 guarantors have subscribed to the guarantee fund, which now exceeds \$900,000, and is constantly growing. Work on the exhibit buildings has gone on so rapidly that they will be finished some months before the day set for opening, May 1, 1907. Machinery Hall is already completed. It is believed that 3,000,000 people will attend the exposition during the time it is open.

Foreign countries, recognizing the opportunities which the exposition will afford, are making active preparations to send exhibits. France is preparing a French section which will equal that at the exposition at Liege; Russia has appointed an agent to make necessary arrangements for a large exhibit; Italy, Canada, and Australia and other countries will be well represented.

Exhibits will be classified in nineteen sections as follows: Irish industries; history and education; fine arts, including photography, engraving, etc.; arts and crafts; liberal arts; manufactures, textiles; engineering and shipbuilding; civil engineering and transportation; electricity; motors; gas lighting, heating and cooking; agricultural implements and chemical industries; horticulture and arboriculture; sport and fishing; mining and metallurgy; hygiene; women's section; agriculture and food products; cottage industries.

Opposite the main entrance will be the principal building, consisting of a central octagonal court, 215 feet in diameter, surrounded by a corridor capable of accommodating 7,000 people. The corridor will open into four radial wings each 164 feet long and 80 feet wide with a combined area of 52,000 square feet. The total area of the central building will exceed 100,000 feet. Around this will be grouped the pavilions for the British, foreign, and colonial exhibits. The machinery building will be 900 by 100 feet, giving a floor area of 90,000 square feet. The fine arts gallery, one of the features of the exposition, will have 30,000 square feet, and several other buildings ranging from 10,000 to 50,000 square feet are in course of erection. Altogether, the exposition will cover fifty-two acres of ground.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

METALLIC BUTTONING DEVICE.—E. I. RAINS, New York, N. Y. This buttoning device yieldingly connects two garments or two parts of a garment with each other—for instance, connecting boys' pants with their shirt-waists and blouses—the device being arranged to readily compensate for strains in almost every direction and without danger of breaking or tearing the connected parts, especially when the wearer is bending in a forward position.

Electrical Devices.

ELECTRIC ALARM.—E. S. MOORER, Anderson, S. C. In this case the invention relates to electric alarms and admits of general use, but is of peculiar value in instances where it is desired for the alarm to be automatic in its action, so as to indicate the change in condition of an electric circuit due to the movements of a burglar, the presence of a fire, or the like.

Of Interest to Farmers.

COLTER AND STUBBLE-TURNER.—C. S. UPTON, Walla Walla, Wash. In this agricultural implement a disk-colter is journaled in a fork supported at the cranked lower end of a vertically adjustable colter standard secured to the plow beam; and in connection with the disk-colter a novel stubble turner is employed which is supported on the forward end of the colter fork and is adjusted to assume the proper position in the front of the disk.

Of General Interest.

CONVEYER.—I. PEABODY, St. Marys, New Brunswick, Canada. The objects of this invention are to provide certain improvements over the conveyer disclosed and claimed in the United States patent formerly granted to Mr. Peabody, whereby the conveyer-belt may be more economically manufactured and rendered more efficient in use. In the use of the improved strap-and-link connection there is no liability of the chain becoming detached or lost.

FURNACE.—W. F. CARR and J. P. McLIMANS, Coatesville, Pa. The object of this invention is to provide a means for removing slag and foreign substances while the furnace is under operation, thus permitting the furnace to finish its run, obviating the cooling off to remove deposits of slag and the like, which is the usual practice, and which is detrimental to the life and run of the furnace, also injurious to the brickwork, as the brickwork is often

drawn out when removing slag in the ordinary way, resulting in the stopping of the run.

FIREARM.—W. W. SMITH, Trenton, N. J. The purpose of the inventor is to provide a single or a double barrel gun with extension-barrels, said barrels being provided with removable interchangeable muzzle-sections, which may be made in various lengths and bored to suit all field purposes, and to provide readily-operated means for attaching the sections of the barrels and rendering them gas-tight where they connect.

MAGAZINE-FIREARM.—W. SONNENBERG, Winona, Minn. One purpose of this invention is to provide a form of breech-bolt and means for accurately guiding the same in the frame, together with means for automatically locking the breech-bolt when in firing position, which locking means are rendered inactive only when the hammer is in an uncocked position or through the medium of a push-button operated at the exterior of the frame.

GUN-SIGHT.—R. W. HENNESSY, Burntranch, Cal. The invention refers to a front sight for rifles adapted to be used with any character of peep-sight. The purpose is to provide a construction of front sight which will afford the person aiming a clear, concentrated, and practically-unobstructed view of the object at which the gun is aimed, and which will enable the marksman to see clearly both above and below and along the bead.

TABLE.—S. HALL, Chicago, Ill. The table is especially adapted for use in smoking-cars, and adapted to be removably attached to the sides of a car and to extend horizontally between the chairs in such manner as not to interfere with the comfortable use of the latter. The invention provides individual tables supported at one side of the chairs and held in front of them, which tables are adapted to receive glasses, ash-trays, or other articles used in such a car.

BOTTLE.—W. L. VANDERGOOT and N. P. J. FOLEN, Portland, Ore. In the present patent the invention relates to bottles and more especially to those of the non-refillable type. The improvement has for its principal objects the provision of simple means for preventing the surreptitious filling of the bottle while not materially interfering with the freedom of delivery.

SAFETY DEVICE FOR WATCHES.—F. D. ELY, Salt Lake City, Utah. One of the principal objects of this invention is to provide a device that when mounted upon the rim of a watchcase will prevent the easy abstraction of the watch from a pocket in which it may be placed and which will also prevent a watch having a device thereon from falling out from a pocket and by striking on its edge or side "bank" the works of the watch, so that re-

pairs are required for restoring the same to normal operative use.

SILVERSMITH'S STOCK.—M. T. GOLD-SMITH, New York, N. Y. The inventor's object is to provide a stock designed for use in the manufacture of purses and like articles, and arranged to present smooth inner and outer surfaces to prevent handkerchiefs and other fabrics from being caught on undesirable projections, as is so frequently the case with fish-scale purses and like articles as now constructed.

FIRE-BUCKET.—J. W. BOWERBANK, Jersey City, N. J. The bucket or pail permits a fireman or other person to send with one charge successive powerful streams of the fire-extinguishing liquid accurately to the seat of the fire with a view to extinguish the same, to prevent the use of the bucket for other than extinguishing purposes, to allow the discharge of all the extinguishing liquid contained in the bucket without becoming air-bound, and to allow of directing the liquid to places not readily accessible to streams dashed out of ordinary buckets.

Heating and Lighting.

THIMBLE.—J. J. LE SAUVAGE, New York, N. Y. This invention refers to the thimbles employed in chimney-openings to adapt them to receive the smoke-pipes of heating apparatus. Its principal objects are to provide means for securing a capability for a movement of the smoke-pipe laterally of the thimble while still furnishing a proper closure between the pipe and thimble under normal conditions.

TIME GAS-LIGHTING MECHANISM.—N. F. ENGLUND, Ashland, Wis. The clock is set at the hour desired to extinguish the lamp. As the alarm rings a drum will turn and wind the cord, thus exerting a swinging force on an arm and turning the stem to shut off gas-supply. The arrangement may be reversed in connection with a gas-lamp using a pilot-flame, so as to automatically light the lamp at any stated hour or to control other lamps than those using a gaseous fuel.

Machines and Mechanical Devices.

SWAGE FOR INSERTED SAW-TEETH.—W. L. NEWELL, Buckeye, Wash. The invention is especially useful for swaging saw-teeth when removed from the body of the saw. The object is to provide means for holding the teeth against the anvil and swage during the swaging operation. It is an improvement on the invention described in application formerly made to Mr. U. Staley and Mr. Newell.

POWER-TRANSMITTING MECHANISM.—J. L. NELSON, Colona, Col. In this case the invention has reference to mechanisms for transmitting power, its principal object being to provide means for overcoming dead-centers. The power transmitted to and developed by the weight is taken off the pivot-pins, thus securing the maximum leverage of the weight and making two strokes for each stroke of the connecting-rod.

GOLD WASHER AND AMALGAMATOR.—J. J. SOUTHWICK, Great Falls, Mont. The improvement pertains to means for saving fine gold that is in flakes, and which in washing pay dirt is ordinarily floated and carried away with the water used to separate values from the dirt. It consists in the peculiar construction and in the novel method for amalgamating gold that is washed from waste matter as the rich dirt is passed through the machine.

ROAD LEVELER AND SCRAPER.—C. W. KAUFFMAN, Dale Township, McLean County, Ill. Mr. Kauffman's invention is an improved machine for leveling and scraping roads, streets, or farm land and the like. It contemplates the production of a device of this character which shall be of simple construction, and an effective means to level a road or other land, combined with a detachable drag-plate to adapt the machine to be used in the capacity of a scraper, when desired. In the operation of the machine the leveler-beam is used solely with the leveler-blade or in connection with the drag-plate, according to the nature of the work which is to be performed.

CLAM-SHELL BUCKET.—V. E. LANE, 325 Vine Street, Berwick, Pa. The main objects of the improvement are to provide a bucket which shall be self-filling and which will be capable of being emptied by a very simple operation. A further object is to provide automatic closing mechanism for a bucket of this character, thus doing away with the necessity of the auxiliary drum or hoist commonly used.

SAWMILL-DOG.—G. S. SERGEANT, Greensboro, N. C. In carrying out the present invention Mr. Sergeant provides a lower dog, means for forcing the dog upwardly into the under side of the log and for forcibly releasing it from engagement with the log, and arrange the said means and devices for convenient operation.

NAIL-COATING MACHINE.—C. WAGGNER, Akron, Ohio. Briefly stated, the invention has reference to certain improvements in nail-coating machines whereby the operation of machines of this character may be rendered more economical and more easily controlled, such results being due to the oscillatory rather than to the rotary movement of the device.

Pertaining to Recreation.

TOY.—W. V. GILBERT, No. 30 Lonsdale road, Wanstead, N. E., London, England. This device is actuated by compression in opposing directions. It forms the chief feature in the toy for imparting the required movement to the eyes, ears, and other parts of the figure representing the head of a man or animal, whereby the moving features or parts are actuated in an unusual or extravagant manner, so that the figure may present preferably a grotesque appearance.

FIGURE TOY.—W. V. GILBERT, No. 30 Lonsdale road, Wanstead, N. E., London, England. In carrying out the invention Mr. Gilbert makes use of a spring device adapted to be actuated by compression on opposite directions. It is so constructed and arranged that what have been termed the "sides" or "wings" thereof are extended or lengthened so as to constitute the beak, jaws, or mandibles of the bird, reptile, insect, or other creature represented in whole or in part by the toy figure, such extended portion being preferably ribbed or corrugated.

BOWLING-ALLEY.—F. H. BEDELL, Brooklyn, N. Y. The floor of the alley has a triangular portion removed and replaced by a triangular metallic plate. The latter is of sufficient extent to contain all the bowling pins when they are set up in proper position thereon and is provided with a plurality of circular openings corresponding in number and position to those of the pins. By providing a metallic plate for receiving the bowling pins the life of the floor is prolonged, since the greater part of the wear is at the point where the balls strike the pins. Bowlers obtain many advantages through the means provided for placing the pins in correct position.

AMUSEMENT DEVICE.—D. J. B. CAFFODIO, New York, N. Y. The invention relates to amusement devices, and especially to the general type of such devices which are popularly known as "merry-go-rounds." The object is to produce a device which will give pleasure-seekers a new and enjoyable sensation. Bicycling, automobiling, and skating are prominent features of amusement provided by the operation of the device.

TOY OR TOY WAGON.—E. C. SEERREITER, Buffalo, N. Y. In this instance the object is to provide a toy or toy wagon built of easily-separable pieces to allow a child to readily take the whole article apart and to reunite the pieces and rebuild the article, thus furnishing means to keep the child occupied and at the same time serving as a medium for educational or manual-training purposes.

GAME-TABLE.—A. VAN B. BUSH, New York, N. Y. The invention comprises a table having a body with pockets formed therein adapted to receive a ball, a back-stop presenting a curved inner face, and an elevated tray adjacent to the back-stop having pockets adapted to receive the ball and an opening through which the ball may fall.

AMUSEMENT DEVICE.—A. BOECK and J. MÜLLER, New York, N. Y. The object of the invention which relates to amusement devices is to provide a tower having attachments enabling persons to climb to the top thereof and having means of rapid descent from the tower. A further object is to provide the tower with means of amusement to entertain visitors.

Pertaining to Vehicles.

ELASTIC TIRE FOR WHEELS.—L. BOIR-AULT, 8 Rue Emile Gilbert, Paris, France. This invention relates to an elastic tire compressing a series of corrugated flat springs arranged around the rim or felly and a cover or tread arranged around the said springs. It consists neither in arranging on a felly springs surrounded by a flexible tread nor in providing the felly with any kind of ribs, but in combining the springs with the ribs and with the tread to allow of the springs yielding totally in radial and partially in transversal direction, while they are in part rigidly supported in the latter and completely so in the circumferential direction.

WHIP-SOCKET.—R. H. HEBERLING, Wilmerding, Pa. The invention is an improvement in that class of whip-sockets which are provided with means for locking a whip to prevent its surreptitious removal. The grippers are held so that the whip is gripped with minimum force, yet when introduced its frictional contact with the rims of the grippers causes the latter to rotate on their pivots, so that as the whip descends the eccentricity of the portion in contact with it increases, and thus the gripping action becomes stronger and stronger.

Designs.

DESIGN FOR A KNIT FABRIC.—C. H. FRENCH, Canton, Mass. This ornamental design for a knit fabric is laid out by arranging rows of squares of dark material each united at two opposite ends. The position of the squares or diamonds is such that the separating body of light colored material presents an accurate zig-zag path the whole length of the pattern.

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

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. In every case it is necessary to give the number of the inquiry.

MUNN & CO.

Marine Iron Works. Chicago. Catalogue free. Inquiry No. 8518.—Wanted, a machine for making down out of ordinary chicken feathers. Pattern Letters. Knight & Son, Seneca Falls, N. Y. Inquiry No. 8519.—Wanted, name and address of the manufacturers of a sheet metal locked box with envelopes inside, for holding valuable papers. "U. S." Metal Polish. Indianapolis. Samples free. Inquiry No. 8520.—Wanted, the address of the Royal Motor Works, of New York.

Handle & Spoke Mch. Ober Mfg. Co. 10 Bell St., Chagrin Falls, O. Inquiry No. 8521.—Wanted, a machine (gasoline preferred) for sawing down trees, and cutting in cord lengths. Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

Inquiry No. 8522.—Wanted, particulars of appliances and shifting type for marking aluminum strips and washers with names, addresses and consecutive numbering. Make Alcohol from Farm Products.—New book, \$1.00. Spon & Chamberlain, 123 S. A. Liberty Street, N. Y.

Inquiry No. 8523.—Wanted, machinery for making small pin tickets. WANTED.—Copies of our "Manufacturers' Index" issued some eight years ago. State price. Munn & Co., 361 Broadway, New York.

Inquiry No. 8524.—Wanted, the address of the Higginum Mfg. Co. The celebrated "Hornsby-Akroyd" safety oil engine. Koerting gas engine and producer. Ice machines. Built by De La Vergne Mch. Co., Ft. E. 138th St. N. Y. C.

Inquiry No. 8525.—Wanted, machinery for manufacturing butterine, lard and oleomargarine. Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machine work and special size washers. Quadriga Manufacturing Company, 18 South Canal St., Chicago.

Inquiry No. 8526.—For a firm wishing to undertake the manufacture of scissors.

Inquiry No. 8527.—Wanted, addresses of makers of matrices for type-casting machines or of steel dies for forming the matrix letters.

Inquiry No. 8528.—Wanted, name and address of the manufacturers of the Minerva Piano Player.

Inquiry No. 8529.—Wanted, makers of ras mantle knitting machines.

Inquiry No. 8530.—Wanted, parties to manufacture insect traps.

Inquiry No. 8531.—Wanted, parties to manufacture small compressed air motor.

Inquiry No. 8532.—Wanted, a machine for extracting gold from dry sand or gravel.

Inquiry No. 8533.—Wanted, spectacles having artificial eyes on back of the glasses.



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. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. 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.

(10250) W. B. M. asks: 1. What is the nature of the conductivity of selenium in carrying a current of electricity, as affected or influenced by light? A. We do not know the nature of electrical conductivity in any substance. 2. Does the exposure or influence of light act on selenium gradually or instantaneously? A. All action of light is practically instantaneous. 3. Is selenium a non-conductor in the dark, i. e., absence of light? A. Selenium is to be classed among the non-conductors. 4. Do any particular colors or rays of light affect it more quickly than others? A. We have no data at hand on this point. The best method of learning all about selenium is to go to some first-class library and go through the reports of learned societies. You will then have it all. We can send you articles in our SUPPLEMENT Nos. 462, 484, 492, and 1348 for ten cents each.

(10251) F. J. B. asks: I would thank you if you would treat upon the hardening of copper and aluminium, and if the discoverer of same would be amply rewarded. A. There is a very old belief that the ancients knew how to temper copper as we temper steel. No tempered copper is in existence, and there are scholars who do not believe it ever was done. We doubt very much whether there would be a wide use for hardened copper or aluminium, unless their tensile strength could be greatly increased by the process. We have assisted in making experiments to this end, but without success. If aluminium could be made as strong as iron, there would be a great market for the wire for electrical purposes.

(10252) F. S. writes: 1. A friend of mine got into an argument with me concerning electricity. I said it was made or generated by the use of a magnetic field or produced by the chemical changes which take place in a liquid cell. He said it was gathered or collected from the air in all cases, either by mechanical means or chemical means. He said he would not believe that I was right, and so I said I would see who was right; and please describe how it is made, so we may settle the question. A. Electricity is produced in batteries by chemical action; in most primary cells by dissolving zinc in sulphuric acid. It is produced in dynamos by revolving coils of wire in a magnetic field; in thermo-couples by heating the junction of two metals. The first two methods named are the ones by which most of the commercial current is generated. There is electricity always present in the atmosphere, which can be detected by the proper instruments, but which is seen by any one in thunderstorms. This electricity is, however, not used for any practical purpose. 2. I have a magneto-generator, such as are used in telephones, giving an alternating current because there are only two sets of coils on the armature. Why is it not possible to use a ring armature and have one continuous coil wound on it, having a one-piece commutator? Would it generate a continuous current by keeping the current up to a maximum instead of at zero and then a maximum, and about what would be the voltage? Could I increase the strength of the permanent magnetic field by wrapping it with magnet wire in the right direction, and if possible could you tell me the amperage of a telephone magneto-generator wound the way I have described? A. The current of the magneto is alternating because the armature is not provided with a commutator. A direct current can be produced by a single coil on an armature if there is a commutator. We do not know how much you can get out of your magneto; enough to ring a bell, surely, but not enough to do much more than this.

(10253) J. J. S. asks: 1. In making Leyden jars, I have had great difficulty in coating the inside with tinfoil. Will you kindly advise me on the following points: Would it do equally well to half fill the jar with tinsel, of course coating the outside with tinfoil? A. No. The tinsel will not be continuous, nor will it be in contact with the sides of the jar. 2. Would it do to shellac the inside up to the proper height and shake in bronze powder? A. Not so well as tinfoil. 3. In using tinfoil, should the bottom, inside and outside be covered? A. Yes. There is not much difficulty in placing the tinfoil properly in the jar. Cut the foil into strips of two inches or thereabout in width. Apply the paste to the inside of the jar with a long-handled brush. Put the foil in with forceps or in any other convenient manner, and bring it to its place and rub it down with a dry brush with long bristles. 4. I have made a Wimshurst machine with 18-inch plates, but can only get a spark of 1/4 inch. Is this all a machine of that size is capable of, or have I made some mistake in construction? A. The spark is not long when a Leyden jar is not used. And indeed when the jar is used, its effect is to render the discharge intense rather than to lengthen the spark.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending December 4, 1906,

AND EACH BEARING THAT DATE [See note at end of list about copies of these patents.]

Table listing inventions with patent numbers, including: Acid concentrating apparatus, sulfuric, L. Stange; Acid, manufacturing, boric, O. Best; Adjusting, combination, T. E. Lutz; Air brake, H. M. Marsh; Air compressors, mechanism for unloading, H. P. Morgan; Air ship, E. Hutchinson; Alkylaminomethylpentyl benzate, T. Emilewicz; Alloys, improving the magnetic qualities of iron-silicon-manganese, R. A. Hadfield; Amalgam trap, C. F. Hawley; Animal trap, O. Schneekloth; Antijouncing appliance, F. A. Law; Automobile bearing, removable, C. S. Lockwood; Bag frame, Haring & Fuller; Bakeboard, pastry cup, C. Schiller; Balance, F. Aronson; Baler power, bay, F. A. Lake; Baling press, W. H. Bonwell; Balloon, dirigible, E. M. Bossuet; Balls from sheet metal, machine for making, A. Johnston; Band, rubber, H. E. Gries; Barrel, metallic, H. A. Keiner; Barrel press, W. P. Robinson; Basin, wash, B. N. Miles; Basket, A. J. Carlton; Bath and basin steppers, making, H. C. Freshour; Batteries, cleaning storage, J. W. Aylesworth; Battery, connector, storage, A. F. Clark; Battery plate, secondary, F. C. Hood; Bearing, roller, Heinkel & Muth; Beater, mixer, and masher for eggs, cream, vegetables, etc., W. Sturm; Bed attachment, L. A. Povell; Bed, device for holding children in, D. C. Akers; Bed, invalid, H. L. Prichard; Beer tap, M. J. Chaplin; Bell, electric, H. W. Eden; Bell, electric signal, H. W. Eden; Bell, electrically actuated signal, H. W. Eden; Bell frame, electric, H. W. Eden.

Table listing inventions with patent numbers, including: Bell ringing circuit, G. P. McDonnell; Binder, loose leaf, C. C. Malby; Bit, A. L. Nelson; Bleaching, K. Reinking, et al.; Blue, salt, J. W. McGrain; Block, See Building block; Block molding machine, E. N. Edwards; Boiler, G. Kingsley; Boiler tube cutter, G. F. Seymour; Bond detectors, receiving device for, H. A. Watson; Bookcase, sectional, Faust & Brölin; Boot and shoe, C. Radetinsky; Boot polishing machine, G. A. Pines; Bottle and bottle closure, A. Elmer; Bottle and cap therefor, Strom & Elstrom; Bottle closure, F. H. Bills; Bottle, non-refillable, C. A. Clark; Bottle washer, G. W. Harris; Bottle washing apparatus, D. M. Kyle; Bottle washing machine, D. M. Kyle; Box fastener, A. Suter; Box forming machine, J. H. Mitchell; Box making machine, J. M. Carnross; Box making machine, flexible, E. G. Staude; Box making machines, cutting rolls and knives for, E. G. Staude; Brake shoe, A. L. Streeter; Brake shoe, C. Jager; Bricks, compressing, L. Elkus; Brick making machine, J. W. & G. W. Ferguson; Bridge, G. H. Chavey; Bridge and door operating device, S. Szentjanszky; Bridge floor fastener, J. T. Campbell; Broiler, meat, J. Glanberg; Brush, J. & W. H. Wamborgans; Brush and dentifice bracket, tooth, McCannell & Gage; Brush rake and harrow, combined, W. J. Crook; Buckle, O. C. Davis; Buckle, A. T. Van Alstyn; Buckle, W. A. Baldwin; Buckle, sanitary belt, R. F. Bennett; Buckle, suspender, J. F. Molloy; Building block, E. V. Johnson; Building block mold core, F. A. Berst; Burial apparatus, R. A. Shoemith; Burial case, E. A. Knoke; Butt plate, cushioned, A. T. Duncan; Button attaching machine, Cooke & Lord; Cab, hansom, H. C. Sears; Cacao product and making same, J. E. Bloom; Canning apparatus, J. F. Ragan; Cap, O. C. Olsen; Car brake, S. J. Killingworth; Car coupling, J. C. Yeiser; Car coupling, automatic, W. S. Wright; Car door sill, railway, W. O. & F. H. Jewell; Car draft, rubber, Tatum & Prentergast; Car, dump, H. E. Murphy; Car fender, F. Cushman; Car grain door, box, H. J. Forst; Car, railway, E. Pessen; Car sanding appliance, trolley, A. H. Flexer; Car, side dump, S. W. Miller; Car steel underframe construction, A. Becker; Car structure, F. Jeddene, Jr.; Car windows, sash fastener for, H. Moorman; Carousel, D. W. Sharkey; Carrier, See Manure carrier; Carrier, A. Klinzing; Cartridge belt, W. W. Gibson; Cattle guard, L. A. Jungman; Cement compounds, apparatus for making, H. M. Perry; Cement compounds, making, H. M. Perry; Center marking device, D. A. Labunski; Centrifugal machine, E. Ljungstrom; Chair attachment, A. V. & W. H. Jackson; Chair hub pattern, J. M. Germanson; Chalk line, self-chalking, J. E. Dennison; Chandelier support, D. V. Cushman; Cheese box and cutter, Black & Sanford; Chemical desks, ventilating apparatus for, L. B. & F. A. Altaffer; Chimney, tent, R. S. Reid; Chin support, C. G. Davis; Chlorinating apparatus, J. E. Greenawalt; Churn power mechanism, H. F. Garvie; Chute, portable loading, A. Benenate; Cigarette and match case, combination, G. B. Groesbeck; Cigarette making machines, apparatus for feeding tobacco to, B. Baren; Circuit controller, automatic, R. Varley; Cloth shrinking device, A. Bray; Clutch, F. Muller; Clutch, friction, S. J. Riley; Coal tipple, J. J. Fleming; Coffee cooker, M. M. C. Herrera; Coin detector, H. G. Kellogg; Coin holder, R. R. Kintz; Coke leveling machine, G. T. Wickes; Commutator, S. S. Seyfert; Composition of matter, W. H. Smith; Compound engine, I. H. Boyer; Concrete block making machine, W. G. Tower; Continuous kiln and drier combined, G. Curley; Cooker, steam, J. Mackey; Cooling and condensing apparatus, Perkins & Kitchen; Copper ores, treating, E. H. Hamilton; Core making machine, Coles & Schmitz; Corn crib, W. Branch; Corn husking machine, A. P. Wolfe; Corner post, transm bar, or mullion, L. von Gerichten; Corset busk, P. Drossness; Cotton chopper, W. C. Kyle; Crib folding, F. Bogardus; Cultivator attachment, S. Seitner, Jr.; Cultivator replanting attachment, F. W. Shaver; Cultivator, tooth, automatic spring, Nelson & Kalkhurst; Culvert mold, E. T. Morris; Currents, means for commutating motor and other electric, S. S. Seyfert; Dating machine, C. Spielmann; Dental handpiece, E. Sargent; Derrick, oil well, W. Heckart; Derricks or cranes, device for swinging, O. L. Schlumpf; Disk drill, H. C. Howe, et al.; Disk jointer, N. P. Nelson; Distilling and rectifying apparatus, U. Lorenz; Door and window securer, B. E. Storr; Doors and other hinged closures, mechanism for operating, A. M. Spink; Draft appliance, T. E. & W. L. Cox; Draft attachment for vehicles, spring, W. H. Robinson; Draft equalizer, F. W. Raymond; Draft equalizer, F. A. Froehrich; Draft rigging, friction, Asper & Boryesen; Drawing press, O. S. Beyer; Driers. See Hay drier; Drills and like tools, taper shank for, A. A. Miller; Driving mechanism, E. J. Mason; Drum, snudge and beat, C. Griffiths; Dump, rotary, Blair & Robb; Dust collector, W. V. Sly; Dye and making same, halogenated, O. Bally; Dye and making same, anthracene, M. H. Isler; Dye and making same, red azo, A. Scheller; Edger, gang, C. W. Willett; Egg heater, N. Stromer; Electric conduits, finishing or guard ring for, A. L. Appleton; Electric furnace, Birkland & Edson; Electric controlling system, U. J. Fry; Electric meter regulating device, R. C. Lamphier; Electric motor, D. Mendelson; Electric signal, H. W. Eden; Electric switch, G. P. McDonnell; Electrically operated drill, portable, A. Pedersen, reissue; Electrode plates, apparatus for forming tubes for, F. Moutereau.