(No Model.) 4 Sheets—Sheet 1.

E. WESTON.

ELECTRIC LAMP.

No. 266,242. Patented Oct. 17, 1882.

Fig. 1.

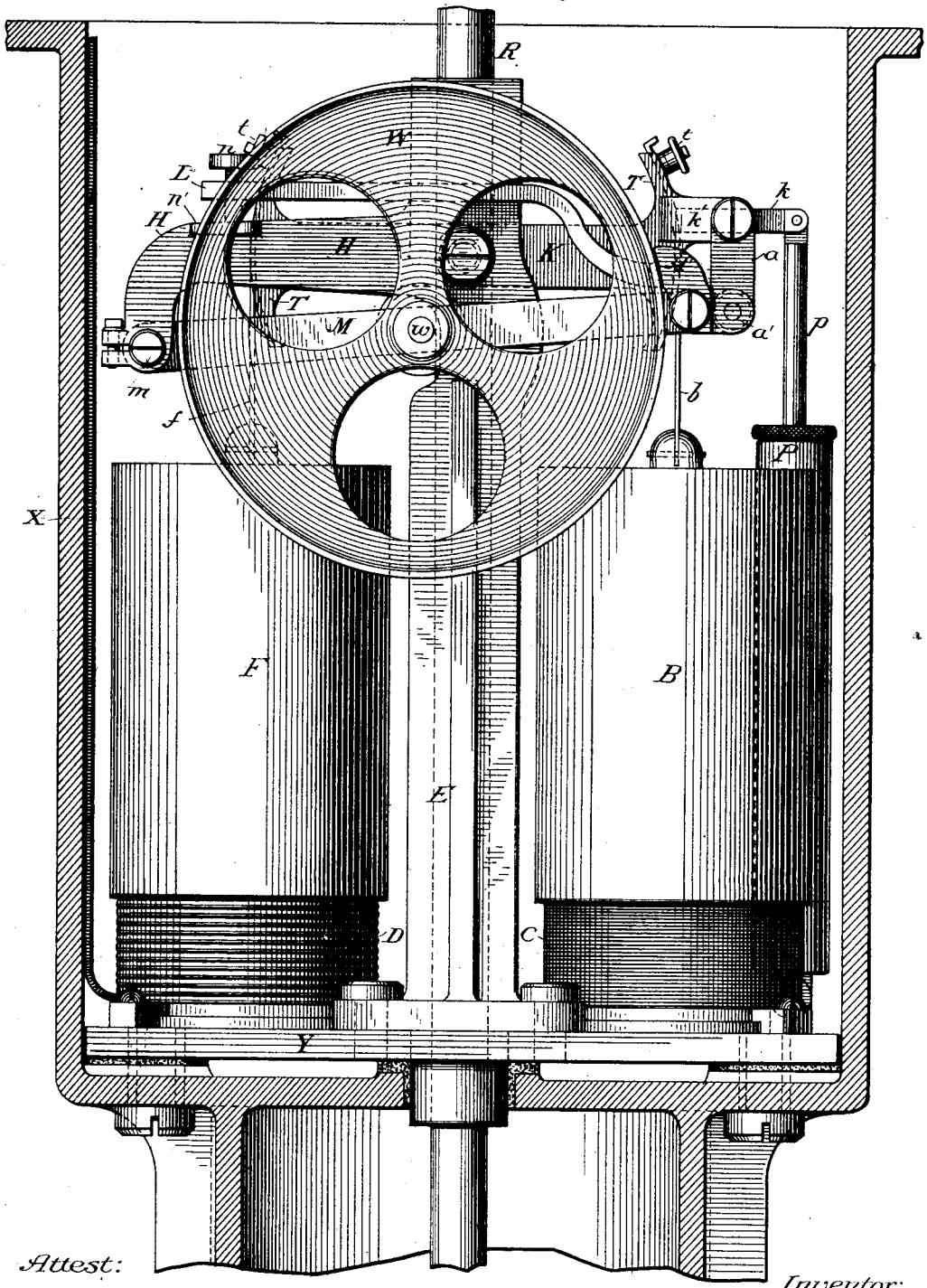

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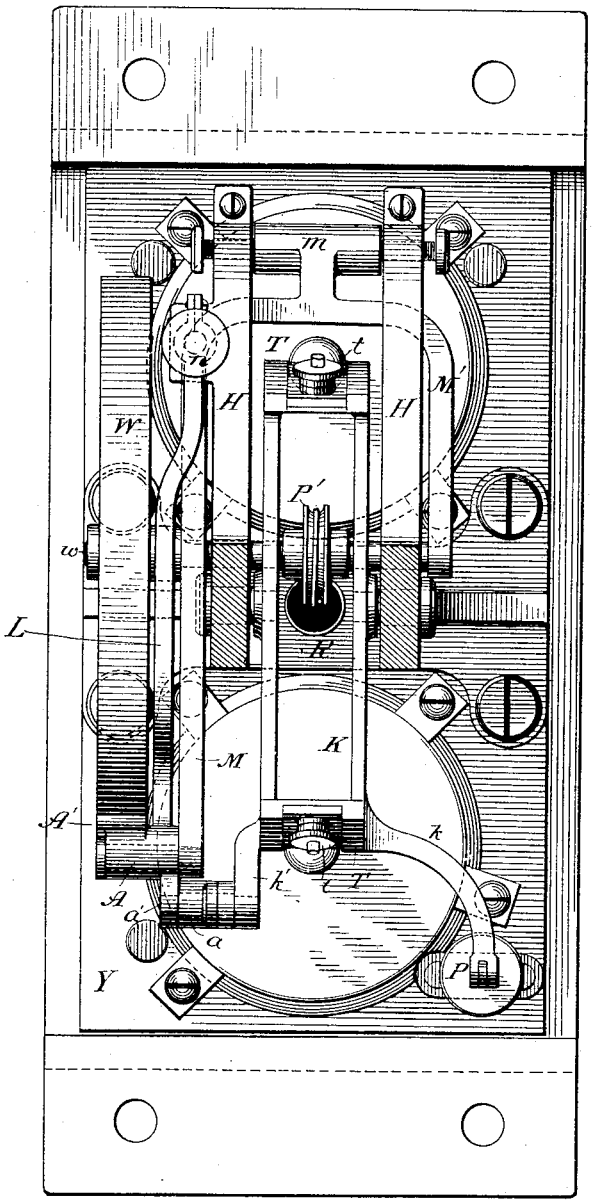
Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

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ELECTRIC LAMP.

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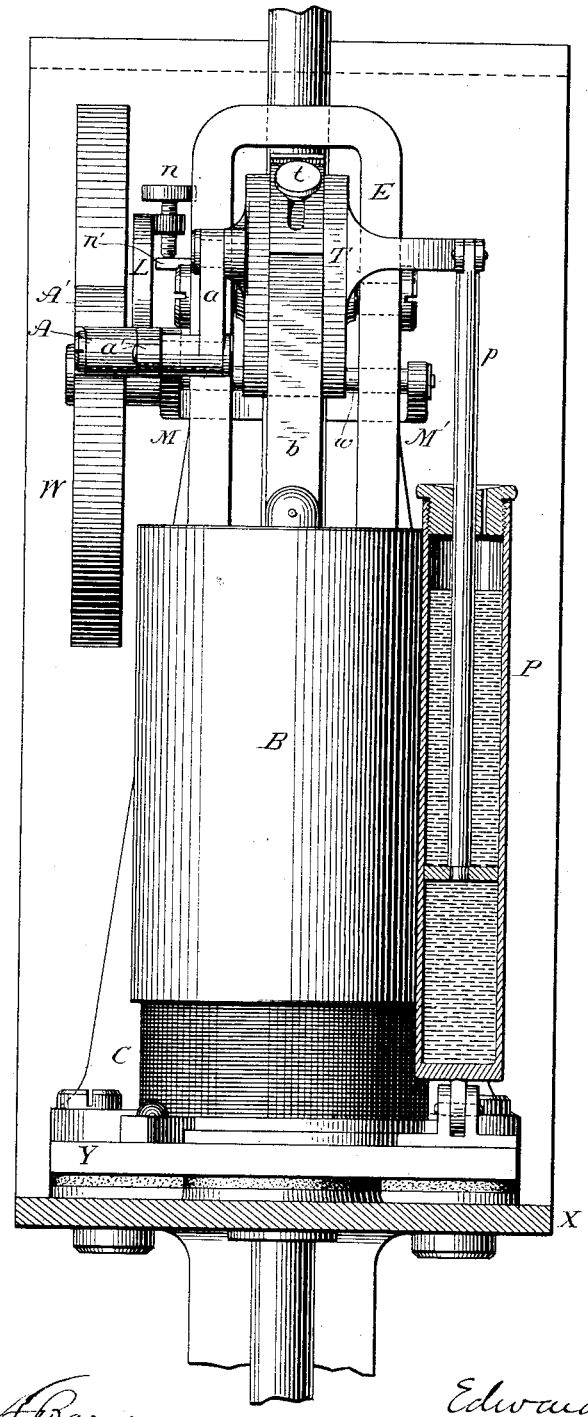
Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

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ELECTRIC LAMP.

No. 266,242. Patented Oct. 17, 1882.

Fig. 4.

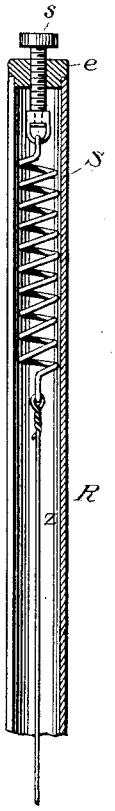


Fig. 5.

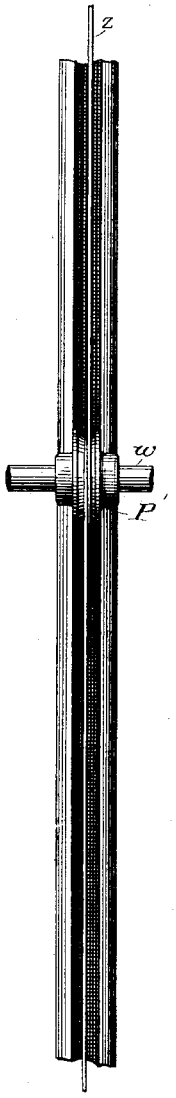
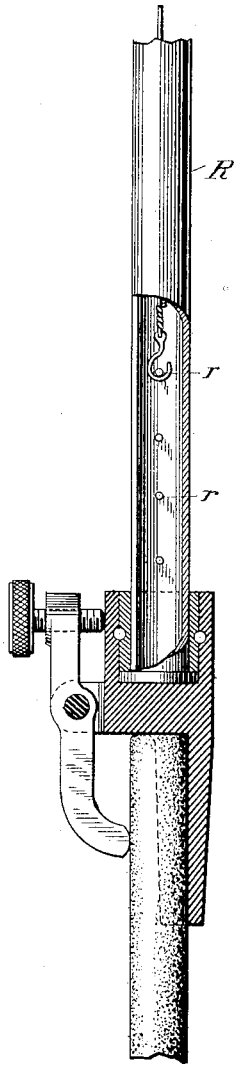


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE UNITED STATES ELECTRIC LIGHTING COMPANY, OF NEW YORK, N. Y.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 266,242, dated October 17, 1882.

Application filed May 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric Lamps, of which invention the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form a part of this specification.

My invention has reference to electric lamps in which the light emitted is due to the formation of an arc between the juxtaposed points of two carbon pencils included in an electric circuit.

My invention consists in improvements upon the instrumentalities which heretofore have been employed for the purpose of regulating the feed and adjusting the separation of the carbons, the said improvements involving mainly a novel construction and mode of operation of the feed-regulating mechanism proper and means for connecting the carrier of the movable carbon to the mechanism controlling it.

A lamp embodying the several improvements which I have named, and in other respects constructed in accordance with my inventions, is illustrated in the accompanying drawings, in which—

Figure 1 is a face view, in elevation, of the feed regulating and adjusting mechanism, the magnets, and a portion of the upper-carbon carrier, and a sectional view of the casing containing the same; Fig. 2, a top view of the same, the cover of the inclosing-case being removed. Fig. 3 is a side view of the parts illustrated in Fig. 1, with the retarding device shown in section; Fig. 4, a sectional view of the upper part of the carbon-carrier; Fig. 5, a view of the middle portion of the same and the means for connecting it with the feed mechanism; and Fig. 6, a part sectional view of the lower end of the carrier, showing a pencil of carbon attached.

In the several figures similar letters indicate corresponding parts.

In the bottom of a box or casing, X, of suitable character, is clamped an insulated metal plate, Y. From the central portion of this plate rises a V-shaped bracket or standard, E. On the sides of bracket E, near the top, are cast or rigidly clamped two arms, H H, extending from the bracket at practically right angles. Through the ends of the arms H H passes a shaft, *m*, from which extends a forked lever, M M′, the arm designated M′ being considerably shorter than the other, the proper proportion being indicated in Fig. 2.

Between the sides of the bracket E, and about on a line with the rigid arms H, there is pivoted a divided lever or frame, K, from one end of which extend suitably-shaped arms *k* and *k′*, the arm *k* being joined to the piston *p* of a dash-pot, P, hinged to plate Y, the arm *k′* being connected with a clamping device.

The clamping device consists of a hub, A, working on a pin extending from the end of arm M, and formed with a lug or arm, *a′*, for connection with a link, *a*, depending from the arm *k′* of lever or frame K. It has also a lug, A′, extending from it, and a long arm or tail-piece, L, the end of which is provided with an adjusting-screw, *n*, that may come in contact with a fixed stop on some stationary portion of the lamp—as, for example, on one of the arms H.

R is the carbon-carrier. It is composed mainly of a tube slotted through the greater portion of its length, and containing a steel wire, *z*, secured to its opposite interior ends. This wire is caused to pass around a grooved pulley-wheel, P′, which enters the slot in the tube, and which is fixed to a shaft, *w*, journaled in the arms M M′. The shaft *w* is extended beyond the bearing in arm M, and carries a wheel, W, of comparatively large diameter, and having a smooth and broad periphery, upon which the lug designated above by the character A′ is caused to press with greater or less force in the operation of the lamp. On opposite sides of the bracket E are the electro-magnets or their equivalents, the movable armatures of which are connected by links or bands *b f* to the ends of the swinging frame K. The coils of the magnet D are in the main circuit, while the coils of magnet C—being that connected to the end of the frame K, to which also the dash-pot and clamping devices are joined, as above described—are in a shunt or derived circuit about the lamp.

From the general description now given of

the nature of the mechanism employed in the construction of the lamp the principles of its operation will be readily understood. As an illustration, suppose that while the carbons are in contact a current be directed through the lamp. The attractive force of magnet D draws down the end of the frame K to which its armature is connected, and as a result the lug A′ is caused to bind tightly against the periphery of wheel or disk W by the movement imparted to it through the link *a*, the arms M M′ are raised, carrying up with them the wheel W and separating the carbons, and the tail-piece L is raised from the fixed stop *n′*. By this means the arc is formed and the requisite separation of the carbons maintained so long as the tail-piece L is out of contact with the stop *n′*, the weight of the carbon-carrier R and carbon attached thereto operating during this interval to hold the lug A′ tightly against the periphery of the wheel or disk W. As the carbons are consumed, or when for any reason the length of the arc and consequent resistance of the main circuit increases, the derived-circuit magnet C draws down its end of the frame K until the tail-piece L encounters the fixed stop *n′*. When this occurs the pin upon which the hub A is mounted becomes the fulcrum about which the tail-piece turns, releasing in so doing the lug A′ from the wheel W and allowing the latter to slightly turn and bring the carbon points back to the degree of separation at which the wheel W is locked.

In practical operation, it may be observed, the operations here described of locking and releasing the wheel W are so delicate as to be scarcely perceptible, while the movement of the locking and releasing devices is rendered slow and steady by the retarding action of the dash-pot P.

I will now indicate certain special and useful features adopted by me in the construction of the above-described lamp, those constituting properly a part of my invention being named in the claims.

In order to obtain a wide range of movement of the swinging frame K with a practically uniform attraction of the magnets, the frame is made with arc-shaped ends T T, the surfaces of which are concentric with a circle of which the fulcrum of the lever is the center, and helices with armatures F B, composed of soft-iron cores and inclosing shells, substantially as described in a former patent granted to me, are employed, the armatures or cores being adjustably connected to the arc-shaped ends of the frame by means of flexible bands or straps *f b*. The bands *f b* are slotted and attached to the surfaces of the ends T T, or in grooves therein, by set-screws *t t*, so that, if necessary, armatures of magnets F B may be adjusted relatively to the frame K. By this construction and arrangement of the parts the cores and shells move always in vertical lines, as the bands *f b* are tangent to the ends T T. Contact of the cores and shells with the coils is thus prevented and a free and even action attained.

As a means of connecting the carbon-carrier to the feed-controlling mechanism, I employ the tube R, described above. This tube is slotted along nearly its whole length, and contains a fine steel, brass, or German-silver wire, *z*. At the bottom of the tube the wire *z* is hooked to a pin, *r*, and at the upper end it is made fast to a spiral spring, S, the tension of which may be regulated by means of a screw, *s*, passing through a head, *e*. The wire *z* is insulated from the tube R in any proper manner, as by making the pins *r* and head *e* of insulating material, the purpose of such insulation being to prevent the flow of current from the pulley P′ to and through the wire and the possible heating of the latter in case the contact between the tube R and the metallic portions of the feed mechanism should be impaired.

The employment of a metal wire in lieu of a cord in cases analogous to the present, where the wire is wound with one or more turns about the pulley, is attended with special advantages. A cord under similar conditions is liable to bind upon itself and stop the feed of the lamp, in addition to which it becomes frayed and quickly worn out. The use of a metal wire under tension avoids completely these objections.

The principle of the construction and operation of the locking mechanism will be understood by comparison with other forms of lamp, upon which this is designed particularly as an improvement.

Heretofore lamps have been constructed in which a disk or wheel on a shaft carried by a swinging frame is geared, by a cord or pulley, by a rack and pinion, or otherwise, with a gravitating carbon. In certain lamps the frame is tilted by an electro magnet or magnets and the disk or wheel brought into and out of engagement with a fixed stop. In others the frame is tilted by a magnet or armature, which in its upward movement encounters the wheel or disk, the downward movement of the frame being limited by a stop. In the former case the difficulties in the way of an accurate and simple action are many and well known. In the latter instance it will be observed that when the movable magnet or armature is raised it is sustaining a portion of its own weight, that of the frame and wheel, and of the carbon-carrier and carbon. As the frame moves downward it encounters the fixed stop, and the armature is now relieved of a great part of its load. As a consequence the wheel is not immediately set free, as it should be, as the armature still presses against it, not with sufficient force to raise it, but still to prevent its turning. In the form of lamp invented by me the load on the magnets during all the time that the lamp is in operation is practically constant, this being effected by the employment, in conjunction with the wheel or disk W and frame M M′, of a weighted brake or clamping-lever pivoted to the said frame and a fixed stop in the path of movement of the long arm of said lever. By "weighted clamping-lever" is meant a pivoted lever with a clamping portion which may be

caused to bear on the wheel W with sufficient force to positively check its movement. This force may be attained by the shape or weight of the lever alone, or, as in the present case, it may be attained by such combination of parts as will cause the weight of the carbon-carrier and the frame M M′ to assist in forcing the lug A′ against the periphery of the wheel W.

The arm or tail piece L should be as long as practicable, in order that the mechanical advantage in favor of the force which tends to release the lug A′ from the wheel W may be so great that the weight sustained by the stop *n′* is inconsiderable, and so that the feed and adjustment of the carbons may continue without sensible variation in the load sustained by the magnets.

In confining myself in the above description to what I consider the most practicable and convenient form of the instrumentalities designated as parts of my invention, I would not be understood as restricting myself to these alone, as I regard as equally within the scope of my invention any lamp combining substantially in the same manner the mechanisms herein described or their equivalents.

It may be stated that, as the present application is concerned only with improvements directly connected with or relating to the feed mechanism, a more detailed description and illustration of such other parts as enter into the construction of the lamp—for instance, the casing and frame—are not given herein, but will be embodied in other applications.

Having now described my invention and the best manner in which the same is or may be carried into effect, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric lamp in which the carbon-carrier is positively connected or geared with feed-controlling mechanism, substantially as herein described, the combination, with the swinging lever or frame, of a brake-wheel and a pivoted locking-lever, both of which are carried by said frame, and a stop arranged in the path of movement of the locking-lever, these parts being constructed and arranged in such manner that the locking-lever may release the brake-wheel and allow the carbon-carrier to descend when the said lever encounters the fixed stop.

2. In an electric lamp of the kind described, the combination, with the carbon-carrier, a fixed stop, and electro-magnets, of a feed-controlling mechanism consisting essentially of a swinging lever or frame, a shaft journaled therein, a friction disk or wheel on said shaft, and a locking or brake lever pivoted on the frame and adapted to lock or release the wheel, substantially in the manner hereinbefore set forth.

3. In an electric lamp, the combination, with a gravitating carbon-carrier, of a swinging lever or frame, a shaft journaled in said frame and connected or geared with the carrier, a disk or wheel fixed to said shaft, a locking or brake lever pivoted to the frame, a fixed stop in the path of movement of the lever, and electro-magnets and armatures connected with and operating to tilt the frame, substantially as herein set forth.

4. In an electric lamp, the combination of a carbon-carrier, a swinging frame, a shaft journaled therein and geared with the carrier, a disk or wheel on said shaft, a locking or brake lever pivoted on the frame, a fixed stop, a pivoted armature-lever, and magnets connected therewith, and a connection between the ends of the armature and brake levers, as described, whereby the weight of the carbon-carrier and carbon attached thereto will be added to that of the brake-lever, causing the same to positively lock the wheel or disk, substantially as hereinbefore set forth.

5. The combination of armature-lever K, swinging frame M M′, shaft *w*, connected or geared with the carbon-carrier, wheel W, locking or brake mechanism A′, having a long tail-piece, L, a link, *a*, connecting the armature-lever with the locking mechanism, and a fixed stop, *n′*, these parts being constructed and combined in substantially the manner described.

6. The combination, in an electric lamp, of a grooved pulley-wheel, forming a part of the feed-regulating mechanism, a slotted carbon-carrier, and a metal wire passing around said pulley and secured to opposite interior ends of said carrier and electrically insulated therefrom, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 22d day of May, 1882.

EDWARD WESTON.

Witnesses:

HENRY A. BECKMEYER,

MORITZ A. MULLER.