(No Model.)

J. H. J. HAINES & A. B. FERNALD.

ELECTRIC ARC LAMP.

No. 544,579. Patented Aug. 13, 1895.

Fig. 1.

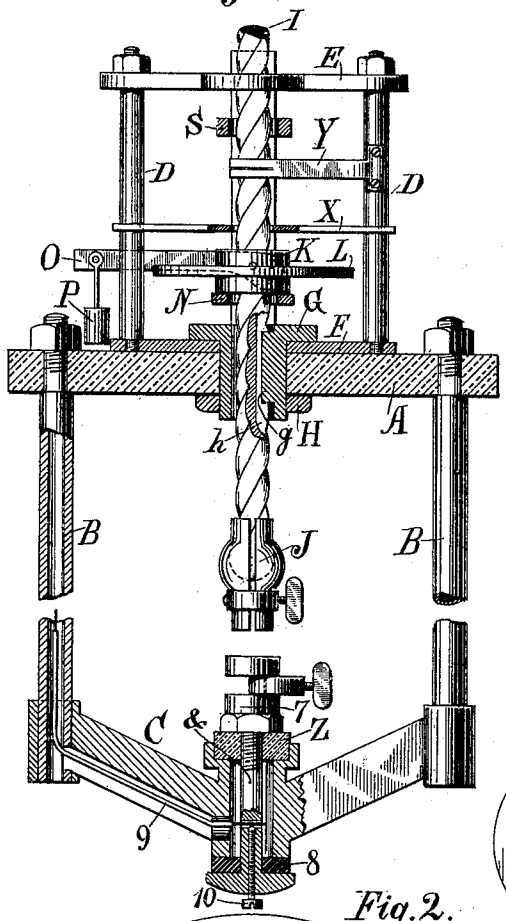


Fig. 3.

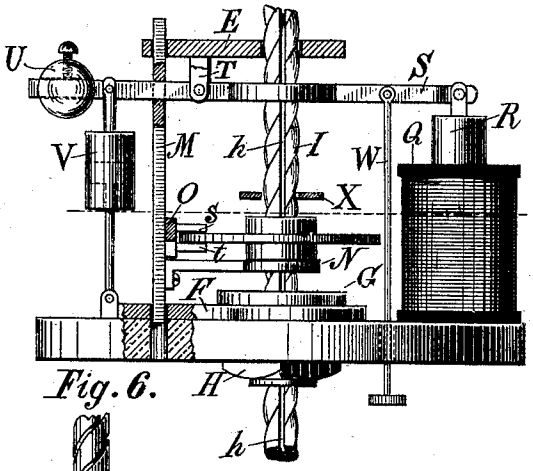


Fig. 6.

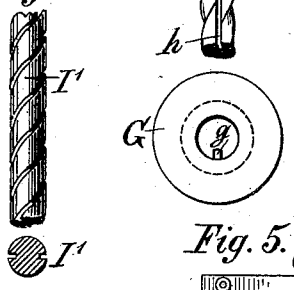
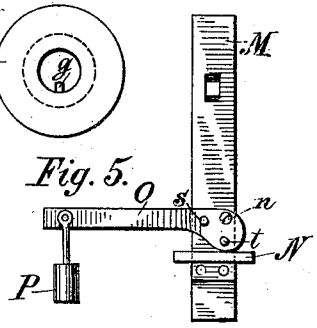


Fig. 5.



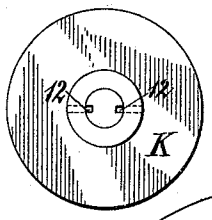


Fig. 2.

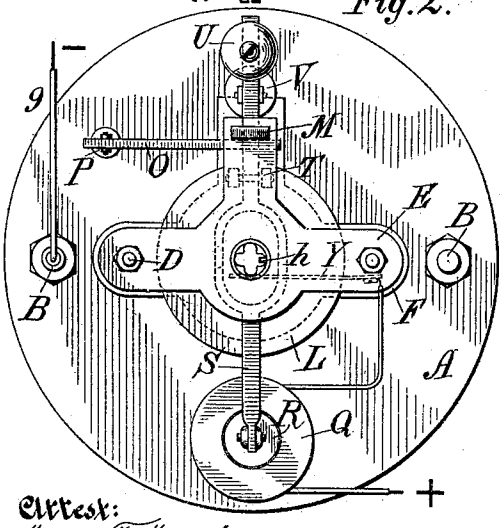
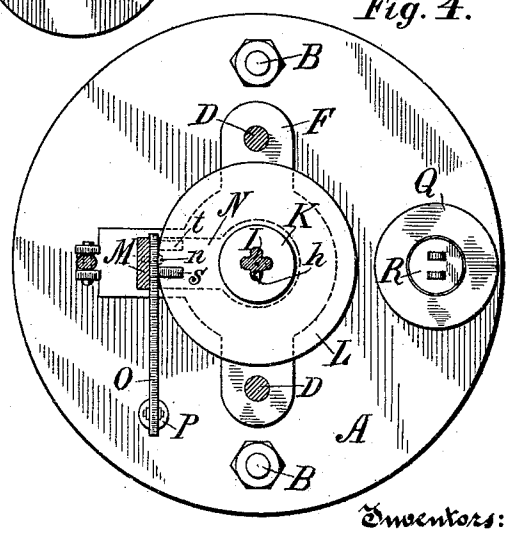


Fig. 4.



Witnesses:
Henry T. Hirsch
Wm. H. Capel

Inventors:
John H. J. Haines,
Alex. B. Fernald.
by Townsend
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN H. J. HAINES, OF NEW YORK, N. Y., AND ALEXANDER B. FERNALD, OF JERSEY CITY, NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 544,579, dated August 13, 1895.

Application filed November 20, 1894. Serial No. 529,381. (No model.)

To all whom it may concern:

Be it known that we, JOHN H. J. HAINES, residing at New York, in the county of New York and State of New York, and ALEXANDER B. FERNALD, residing at Jersey City, in the county of Hudson and State of New Jersey, citizens of the United States, have invented a certain new and useful Arc Lamp, of which the following is a specification,

This invention relates to feeding mechanism for electric-arc lamps, and particularly to a regulating device for such mechanism, and has for its main object the construction of a regulating device such as will be operable upon any circuit and will insure a constant and steady feed.

The invention therefore consists in the combination, with a carbon-carrier in the form of a screw and a nut rotated thereby, of a movable support for said nut, by which it and the rod may be lifted, and means mounted upon said support for acting upon and controlling the rotation of the nut.

It further consists in the combination, with said carbon-carrier and nut, of a support for the nut, movable by the controlling-magnet of the lamp, and a clamping device or detent mounted upon said support and engaging with the nut and controlled in its operation by the movement of said support.

It also consists in the construction and combination of parts hereinafter described and claimed.

In the accompanying sheet of drawings, forming a part of this specification, Figure 1 represents a vertical central section of my improved lamp. Fig. 2 is a plan thereof. Fig. 3 is a partially sectionized side elevation of the feeding mechanism of the lamp, viewed at an angle of ninety degrees from the position shown in Fig. 1. Fig. 4 is a horizontal section in the plane of the line 4 4 of Fig. 1. Fig. 5 represents a detail of the feed-regulating device. Fig. 6 represents in side elevation and cross-section a modified form of carbon-carrier and a plan of the controlling-nut therefor.

In the drawings, A represents the base of the lamp, which is preferably made of some suitable non-conducting material. The material which I find most satisfactory for this purpose is slate. From this base is suspended by means of the side rods B a cross-piece C, upon which the lower-carbon holder is supported.

Above the base A is the frame for the feeding mechanism, consisting of the posts D, the top plate E, and the bottom plate F. This frame is secured to the base by means of the hollow bolt G and nut H. Through bolt G and the top plate E passes the upper-carbon carrier or rod I, which is made in the form of a screw by one or more threads of coarse pitch running from end to end thereof. To the lower end of the carrier is attached a carbon-holder J, of any approved form. Upon this screw-threaded carrier is a nut K, provided with a friction surface or flange L; or this flange may be considered as a friction-disk provided with a screw-threaded hub fitting upon said carrier. Preferably the pitch of the thread upon the carrier is sufficiently coarse to allow it to descend by its own weight through nut K. This screw-threaded carrier may be prevented from rotating in any suitable way, as by a groove and spline. The preferable arrangement of the groove and spline is as illustrated, the spline being upon the inner surface of the bolt G, as at *g*, Figs. 1 and 3, by being cast thereon or inserted therein, and the groove, as *h*, being made longitudinally of the carrier parallel to the axis thereof. By this construction the non-rotating screw will in reciprocating cause the nut K to rotate. By regulating the rate of rotation of the nut the descent of the rod may be controlled. To provide for this regulation a bar M is mounted to slide in ways formed in the top and bottom plates E and F. To this bar is attached an arm, as N, which projects therefrom and forms a movable support for the nut K, and also for the carrier when said nut is clamped from rotation. The clamping or friction device for said nut, which may be considered a detent, consists of a weighted lever O, pivoted at *n* to the bar N and provided with a pair of pins *s* and *t*, which bear respectively upon the upper and lower sides of the disk or friction-surface L. The weight P upon said lever depends therefrom, and when by the descent of the bar M it is brought to rest upon the base of the lamp or other suitable stop it acts to

relieve the pressure between said pins and disk and in effect remove the clamp or release the detent from the nut K. The movement of the bar M is produced by means of the controlling-magnet Q, here shown as a solenoid provided with a core or armature R. Pivoted to said armature is a lever S, split near its middle for spanning the carbon-rod, fulcrumed at T upon lugs depending from the top plate E, and passed through a hole in said bar. At the outer end of this lever is a counterbalancing-weight U. A dash-pot V is also pivoted to the weighted end of said lever and to lugs on the bottom plate F.

A rod, as W, depends from the lever S and extends through a hole in the base A, where it may be readily reached for releasing the hold of the clamping device upon disk L at the time of trimming the lamp. A stop X is also provided to limit the upward movement of nut K, particularly in trimming. This stop may be located in any convenient place or manner, but is shown as consisting of a plate extending from one post D to the other.

A suitable brush, as Y, is attached to one of the posts D for conducting current from the frame of the lamp to the carbon-carrier.

The lower-carbon holder may be of any approved form and is connected to the cross-piece C; but I have devised a special form for such holder or rather for the support therefor, which consists in seating a bushing of insulation Z, preferably slate, in an opening formed in said cross-piece, passing a bolt as &, of less diameter than said opening, through the opening and bushing and screwing the carbon-clamp 7 onto the end thereof; a washer 8 of asbestos or some other insulation being placed between the head of the bolt and the cross-piece. The insulated wire 9, which passes through the hollow rod B, is then clamped in a recess in the side of bolt & by the screw 10.

The lamp shown is intended for use upon an alternating-current circuit and the regulating-coil is located in the main circuit, the path for the current being, as indicated in Fig. 2, from the source of supply through the magnet to the frame of the lamp, over brush Y to the carbon-carrier, through the carbons to bolt &, thence by insulated conductor 9, located in one of the hollow rods B, to said source.

The operation of the feeding mechanism is as follows: The normal condition of the lamp when out of circuit is substantially as shown, the carbons being together and the core R raised. When the current is turned on, the core is drawn down, the bar M is raised, the pins *s t* bind upon the disk, preventing it from rotating, and as the core continues to descend the upper carbon is lifted from the lower and the arc is formed. It will be noticed that at this point the core is counterbalanced, not only by the weight U, but by the nut, the carbon-carrier, and its carbon. Then as the arc lengthens and the pull of the magnet upon the core decreases, it gradually raises, and the parts elevated thereby descend until the weight P strikes its stop, when, upon further descent of the support N, the hold of pins *s* and *t* upon the surface L of nut K is loosened and said nut allowed to rotate, thereby permitting the carbon-rod to descend. When the carbons approach sufficiently near together, the magnet draws down the armature and the support is sufficiently raised to apply the necessary restraint to the rotation of nut K. The dash-pot, as is obvious, prevents too sudden action of the parts. The rotation of said nut is not only controlled by the action of the detent, but by the friction between it and the support N, which always sustains the weight of the nut and carrier. The main object of permanently sustaining the nut and carrier on the support N, and therefore on the lever S, counter to the weight of the magnet-core is to preserve the balance of the lamp when the detent is released from the nut, since in that action it is only one-half the weight of lever O that is removed from the lever S. This construction greatly assists in making the feeding operation steady and constant.

The clamping or detent device may be variously constructed and mounted without departing from the gist of our invention in this feature, which resides, essentially, in regulating the rotation of the nut while permanently resting upon a movable support. The form of screw may also be greatly varied. Instead of being of four rounded threads, as shown, it may have but one thread, and that square, or two square threads, as seen at I′ in Fig. 6, and the nut K may be provided with pins 12 for entering into said threads. The descent of the carbon-rod of course depends largely upon the pitch of the thread cut thereon. The finer the pitch the less restraining influence is needed for the nut K, and vice versa. The threads should be of a pitch sufficiently coarse to provide a free and ready descent of the rod through said nut when the latter is free from other restraint than that of the friction between it and its support.

Though the invention has been illustrated in connection with the controlling-magnet in the main circuit, obviously said magnet may be connected in any other manner, so long as the desired action on lever S is produced. The mechanical arrangement of said magnet and lever may also be greatly varied.

In trimming the lamp to operate the upper rod it is only necessary to push up on the rod W and thereby release the detent from the nut, when said rod may be readily raised, the nut resting against the stop.

What we claim as our invention is—

1. In an electric arc lamp, the combination with a carbon carrier in the form of a screw of coarse pitch held against rotation while allowed to move longitudinally, of a nut free to rotate on said screw, means engaging said nut for lifting it and the carrier, and a detent or clamping device carried by said lift-

ing means and also engaging the nut to regulate the rotation thereof.

2. In an electric arc lamp, the combination with a carbon carrier in the form of a reciprocating non-rotating screw, of a nut free to rotate on said screw, a movable support on which said nut rests, and a detent carried by said support and engaging said nut to hold it from rotation and adapted to release it when a feed of the carbon is required.

3. In an electric arc lamp, the combination with a carbon carrier in the form of a coarse pitch screw held against rotation while allowed to move longitudinally, of a nut free to rotate on said screw as the carrier descends, a movable support on which said nut rests, means for connecting the armature of the controlling magnet of the lamp to said support for imparting motion thereto, and a detent carried upon said movable support and engaging said nut, as and for the purpose set forth.

4. In an electric arc lamp, the combination with a carbon carrier in the form of a screw and a nut thereon freely rotated by the descent of the carrier, of a movable support for the nut reciprocated by the controlling magnet of the lamp, and a detent device mounted upon said movable support for engaging said nut to regulate its rotation and thereby control the descent of the carbon carrier.

5. In an electric arc lamp, the combination with a carbon carrier in the form of a screw and a nut thereon freely rotated by the descent of the carrier, of a movable support for the nut reciprocated by the controlling magnet of the lamp, a detent device mounted upon said support for engaging said nut to regulate its rotation and thereby control the descent of the carbon carrier, and means controlled by the position of the movable support for regulating the action of the detent device upon said nut, substantially as set forth.

6. In an electric arc lamp, the combination with a carbon carrier in the form of a screw and a nut thereon rotated by the descent of the carrier and provided with a friction surface, of a reciprocating bar, a weighted lever pivoted thereto, and projections or pins on said lever engaging with the friction surface of said nut to regulate the rotation thereof and control the descent of the carrier.

7. In an electric arc lamp, the combination with the carbon carrier in the form of a screw and a nut thereon rotated by the descent of the carrier and provided with a friction surface, of a reciprocating bar connected to and operated by the controlling magnet of the lamp, a support connected to said bar for sustaining the weight of the nut and the carrier with its carbon to counterbalance the weight of the movable portion of the controlling magnet, and a friction device mounted upon said bar for regulating the rotation of said nut, substantially as set forth.

8. In an electric arc lamp, the combination, with a carbon carrying rod in the form of a reciprocating non-rotating screw, of a carbon clamp secured thereto, a nut free to rotate upon said rod and provided with an extended flange, a movable support for said nut connected to and reciprocated by the controlling magnet of the lamp, a detent device mounted upon said support and adapted to engage with said flange, and means for regulating the engagement between the detent device and flange as and for the purpose set forth.

9. In an electric arc lamp, the combination of a carbon carrier in the form of a screw, of a nut thereon rotated by the descent of the carrier and provided with an extended flange, a reciprocating bar connected to the regulating magnet of the lamp, a lever pivoted to said bar and provided with a detent device for engagement with said flange, and means for operating said lever for throwing said detent device into and out of engagement with said flange, as and for the purpose set forth.

Signed at New York, in the county of New York and State of New York, this 17th day of November, A. D. 1894.

JOHN H. J. HAINES.
ALEXANDER B. FERNALD.

Witnesses:
WM. H. CAPEL,
HENRY T. HIRSCHY.