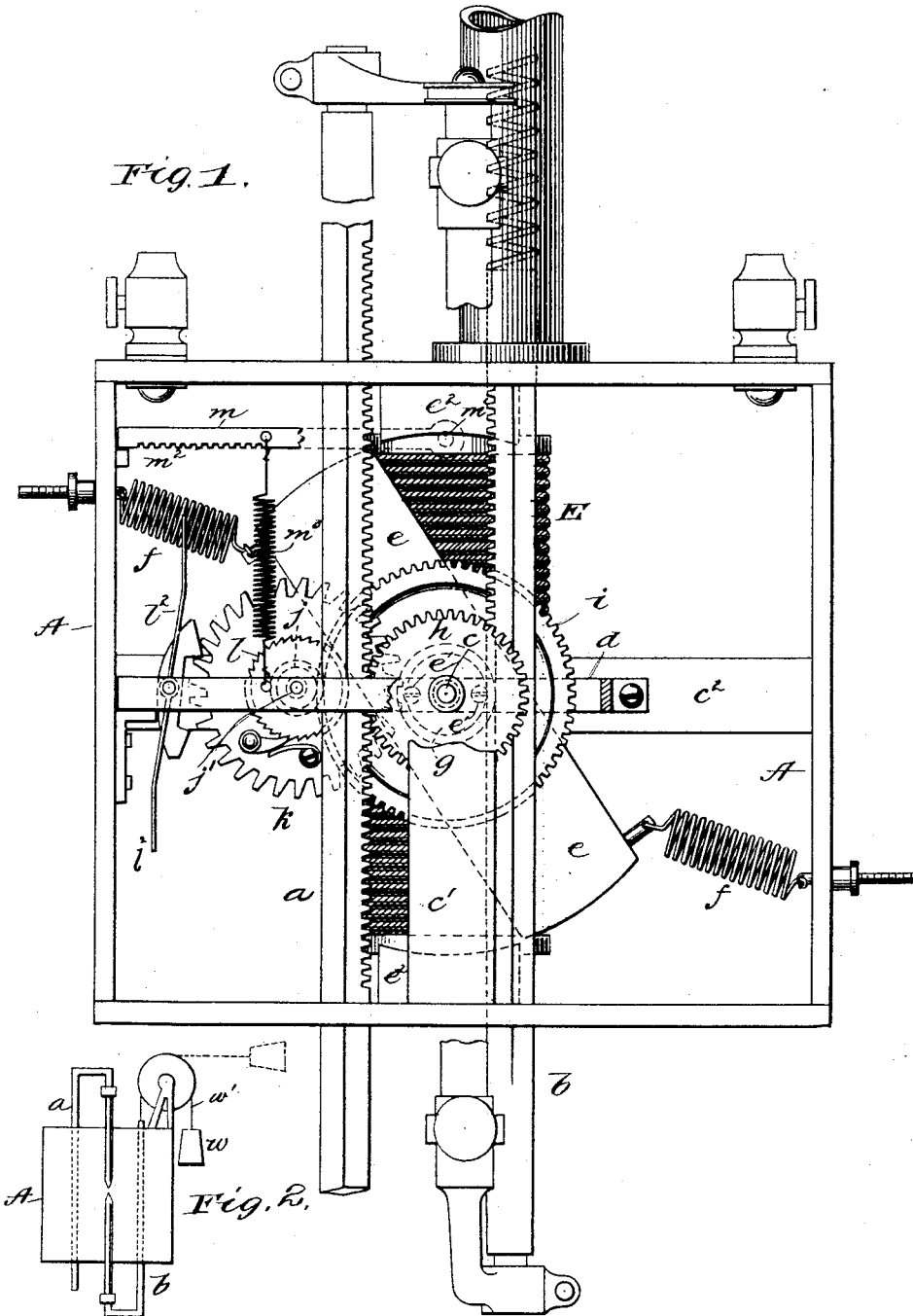


(No Model.)

S. W. RUSHMORE.
ELECTRIC ARC LAMP.

No. 515,022.

Patented Feb. 20, 1894.



WITNESSES:
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SAMUEL W. RUSHMORE, OF BROOKLYN, NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 515,022, dated February 20, 1894.

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To all whom it may concern:

Be it known that I, SAMUEL W. RUSHMORE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Arc Lamps, of which the following is a full, clear, and exact description.

My invention relates to electric arc lamps and has especial reference to that type of lamp in which both electrodes are movable, for the purpose of maintaining the arc at the same position in space; this type is ordinarily known as the focusing lamp.

The object of the invention is to produce a lamp of this class in which all of the parts will be symmetrically disposed and well balanced and thereby operate with very little friction.

A further object is to make the apparatus as compact as possible and of simple and cheap construction.

My invention involves the use of a single electro-magnet in combination with an armature moving upon a central axis under the influence of both poles of the magnet and a short train of gearing mounted in a frame which is pivoted on an axis coincident with the axis of the armature.

Other details of the invention will be pointed out in the description which follows.

In the accompanying drawings, Figure 1 represents a side elevation of the lamp mechanism, parts being broken away for the sake of clearness. Fig. 2 represents the lamp conventionally on a small scale, showing weight attached to carbon rod.

Referring to the drawings by letter, A represents a box or casing within which the lamp mechanism is housed.

a and b , respectively, represent the positive and negative carrying rods. They stand parallel to each other and both pass through the top and bottom of the lamp case. The rods are squared and provided on adjacent corners or edges with rack teeth in a usual manner. The extremity of the negative or short rod opposite the carbon holder is connected with a spiral spring or weight, the function of which is to force the carbons toward each other. Between these two rods is mounted a

horizontal shaft c in bearings, formed in parts c' and c'' of the frame.

d represents a rectangular frame which is loosely mounted upon a shaft and therefore free to turn thereupon. This frame has rigidly attached to it, a soft iron plate e which constitutes the armature of the electro-magnet E. The armature occupies an oblique position with respect to the frame and is secured thereto by means of screws e' , shown in dotted lines, or in any other suitable manner. The armature is also loose upon the shaft and when it is caused to swing by the attraction of the electro-magnet, it carries the frame d with it. The magnet is comparatively long and its pole pieces e'' project laterally across its heads and are provided with curved faces between which the armature plays.

f, f represent two coiled springs, respectively attached to the opposite sides and ends of the armature and act in opposition to the attraction of the magnet. As one of these springs is located on each side of the axis of the armature, the armature will move with very little friction at its axis.

Upon the shaft c , and between the sides of the frame are mounted three gear wheels g, h and i , respectively, varying in size to suit the conditions of movement. Wheel g engages with carbon rod b , wheel h engages with carbon rod a , and wheel i engages with pinion j on a counter shaft j' , mounted in the frame. On the counter shaft is also fixed a ratchet wheel k , with which a pawl engages to prevent backward movement, and an escapement wheel l with which engages a pallet l' . On the shaft with the pallet is a vibrating arm l'' , having a broad surface so that its motion will be retarded by the air. Directly above the frame is fixed a stop lever m , pivoted at the point m' , and resting normally upon a stop m'' . It is connected with the frame d by a light coiled spring m''' . The lower edge of this lever is provided with a series of notches with which the vibrating arm l'' is adapted to engage and thereby be prevented from vibrating.

When the lamp is not burning, the carbons are in contact. When the current is turned on, magnet E attracts both ends of the armature and swings it on its axis with a tendency

to bring it into a coincident plane with itself. This movement of the armature also swings frame *d* on the same center. The pinion *j* climbs up on the periphery of wheel *i*, the arm *l* vibrating meanwhile and preventing a too sudden movement of the frame. The frame is carried up until the vibrating arm engages with the lever *m*, and prevents the wheel *j* from rotating. Then in the further upward movement of the frame, gear wheel *i* is rotated and its movement is communicated to the shaft *c* and the other two wheels upon it, thus causing the rod *b* to move downward and the rod *a* to move upward. This separates the carbons and establishes the arc. When the current flowing through the lamp decreases, owing to the resistance of the arc, the magnet becomes correspondingly weak and allows the spring *f* to retract the armature. This movement first lets the lever *m* down onto its stop and then releases the vibrating arm *l* and allows the spring or weight attached to the negative or short carbon rod to rotate the train and move the rods toward each other. The upper rod moves faster than the lower rod, because of the larger wheel being in engagement with it. This results in maintaining the arc at a fixed position in space.

In Fig. 1 a spring is shown in dotted lines attached to the negative rod, and in Fig. 2 a weight *w* is shown attached to the same rod through a cord *w'*. It is preferable to connect these devices to the negative rod only because its movement is much shorter than that of the positive; the spring may therefore be short and strong, and the cord and weight, if used, be short and heavy, and the motion will be transmitted to the positive rod at an increased rate through the gearing.

In other lamps of this character, so far as known to me, their construction has been such that it was impossible to apply a weight or spring to the negative rod in such a manner as to cause the simultaneous movement of the positive rod at a different speed. It is only because of the differential gear *g, h* that I am able to do it. These lamps are ordinarily made to swing on a horizontal axis through an arc of ninety degrees, and it will be observed that the weight when applied in the manner shown in Fig. 2 will be as effective in one position as the other. The func-

tion of coiled spring *m*³ is to hold the lever in toward its stop.

Having thus described my invention, I claim—

1. In an arc lamp, the combination of an electro-magnet, an armature pivoted between its extremities, a frame carrying a train of gearing and pivoted concentrically with said armature, two carbon rods engaging respectively with two wheels of said train, and upon opposite sides of the pivot of the armature, said two wheels being concentric with the axis of the armature, and a detent for the train operated by the movement of the frame, substantially as described.

2. In an arc lamp, the combination of an electro-magnet, a centrally pivoted armature, a pivoted frame moving with the armature, two carbon rods, two gear wheels respectively in engagement therewith, the rods being located on opposite sides of the pivoted frame, and a detent for said wheels, the armature, frame, and wheels all being pivoted on concentric axes, substantially as described.

3. In an arc lamp, the combination of a shaft, a frame loosely pivoted thereon, an armature rigidly fixed to the frame on a coincident axis, a single spool electro-magnet standing parallel to the armature, pole pieces extending across the heads of the magnet and acting together upon the armature, a train of gearing carried by the frame, a detent therefor and two carbon rods engaging respectively with two wheels of the gearing and located on opposite sides of the pivot of the armature as set forth.

4. In an arc lamp, the combination of a shaft, a frame loosely pivoted thereon, an armature rigidly fixed to the frame on a coincident axis, a single spool electro-magnet standing parallel to the armature, pole pieces extending across the heads of the magnet and acting together upon the armature, a train of gearing carried by the frame, a detent therefor and carbon rods engaging with the gearing and standing on opposite sides of said shaft, whereby a compact structure is secured.

In testimony whereof I subscribe my signature in presence of two witnesses.

SAML. W. RUSHMORE.

Witnesses:

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