(No Model.)

S. E. NUTTING.

ELECTRIC ARC LAMP.

No. 391,761. Patented Oct. 23, 1888.

Fig. 1.

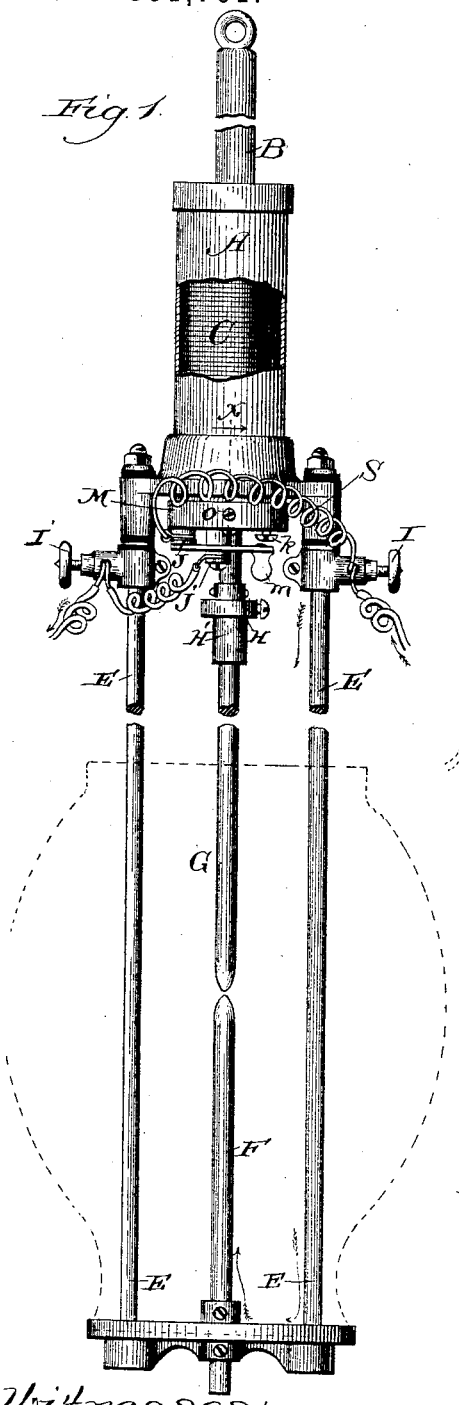


Fig. 2.

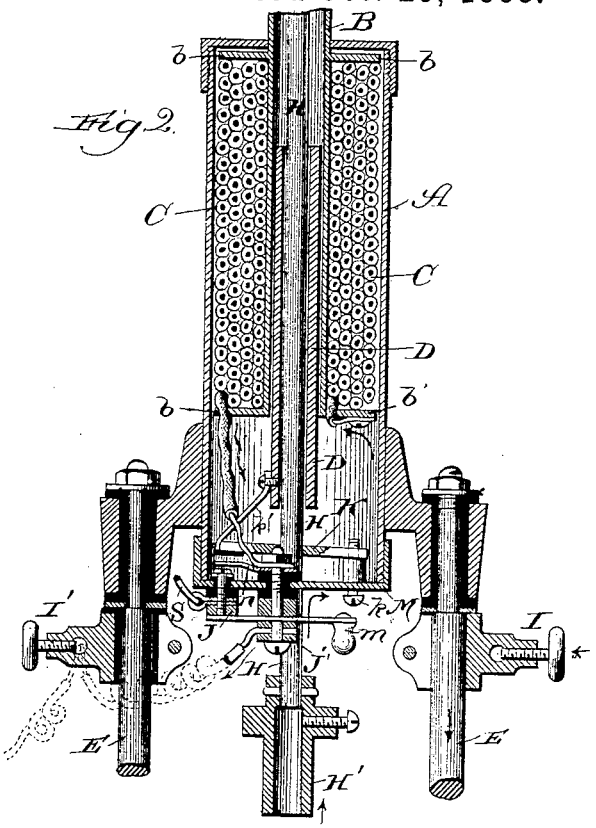


Fig. 3.

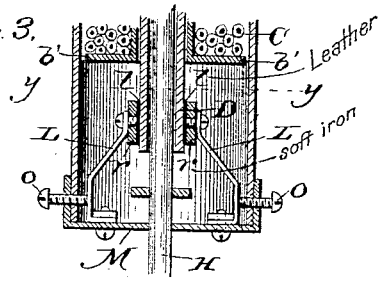
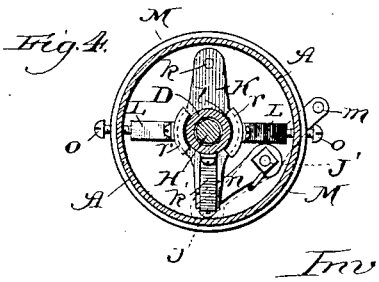


Fig. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL E. NUTTING, OF CHICAGO, ILLINOIS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 391,761, dated October 23, 1888.

Application filed November 18, 1887. Serial No. 255,548. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL E. NUTTING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

The object of my invention, in general terms, is to simplify the mechanism used in electric lamps; and it consists in making an automatic brake or retarder whose effect will maintain a constant relation to the electric current, so as to vary as it varies.

In the drawings, Figure 1 is a side elevation of my improved lamp, with a portion of the shell or case broken away to show the magnet-coil. Fig. 2 is a longitudinal section taken through Fig. 1. Fig. 3 is a portion of a longitudinal section taken through the line *x* of Fig. 1, looking in the direction of the arrow; and Fig. 4 is a plan view taken through the line *y y* of Fig. 3.

In the drawings, A is the shell or case in which the magnet-coil and operating mechanism are contained.

B is a tube in which the carbon-holding rod is arranged, and by which the lamp is suspended.

b b' are flanges on the tube B, to form a spool in which the magnet-coil is arranged.

C is the magnet-coil wound around the tube B.

D is a movable magnet core, movable up or down in the tube B.

E E are side-supporting rods, by which the lower carbon and the globe of the lamp are supported.

F is the lower carbon; G, the upper carbon; H, the carbon-holding rod which holds the upper carbon and whose upper end passes up through the movable magnet-core D into the tube B; H', a socket on the lower end of the carbon-holding rod, in which the upper end of the carbon is held by a screw.

I I' are binding-posts holding the ends of the wires which form the circuit where it enters and where it leaves the lamp; J J', other binding-posts insulated from the frame of the lamp; K, a clutch or clamp; *k*, the arc-adjusting screw; *k'*, a piece connecting the clutch *k* and the movable magnet-core D; L L, a brake or retarder; *l*, leather interposed between such brake and the movable magnet-core; M, the cap or bottom of the lamp-shell; *m*, a hand cut off for connecting the binding-posts J J' and diverting the current from the lamp; *n*, a piece or tongue for automatically connecting the binding-posts J J' and diverting the current, and *o o* are screws for fastening the bottom to the shell or case A and for adjusting the position of the brakes L.

In making my improved lamp I make a shell or case, A, in which the magnet-coil and operative mechanism are to be located. The lower end of this shell is open until closed with a cap or bottom, and the top is provided with a hole. I make a tube, B, adapted to pass up through the hole in the top of the shell, and provide it with flanges *b b'*, extending out from its sides far enough to form a spool to support the magnet-coil which is intended to be wound between them. These flanges must not, of course, extend out too far to prevent them from passing into the shell A when the tube B is extended up through the hole in its top. The position and office of these flanges, which are simply intended to afford a support for the magnet-coil, and which may be replaced by anything adapted to furnish such support, are illustrated in Fig. 2 of the drawings, and need not be more fully described.

The top of the shell A, it may be remarked, may be made either integral therewith or as a separate cap to be screwed or otherwise attached to the top of the shell, and the top of the tube B may be provided with an eye or ring to enable the lamp to be suspended in position. I then take a wire, of a quality and size suitable for the free passage of the electric current, and wind the magnet-coil around the tube B between the flanges *b b'*, which form a "spool," so to speak, to receive it. By the "coil" I mean the helix of wire wound around the tube B, and I shall hereinafter simply speak of it as a "coil." Of course it will be understood that the wire having the magnet coil is properly insulated and prepared for the purpose for which it is intended. The winding of this wire may begin at the bottom and proceed up and down until a sufficient quantity has been wound upon the tube B to form the magnet-coil.

In Fig. 2 I have shown the wire as entering

on the right side and as leaving the spool on the left side and with four rolls of wire in the coil, though of course this arrangement may be varied or changed at pleasure.

The electric current, which may be generated in any of the well-known ways, enters at the binding-post I, which is in contact with one of the side-supporting rods and passes down the same and up the lower carbon, as shown by the direction of the arrows in Fig. 1. It then passes up through the upper carbon into the carbon-supporting rod H until it enters the bottom of the case A, with which such rod is in contact. When it enters the case A, it passes into the end of the wire, which is attached, without insulation, to the lower right-hand side of the flange B′ of the tube B. It then traverses the wire of the magnet-coil until it emerges through the binding-post J′ and passes to the binding-post I′, which is insulated from the side-supporting rod and the frame, whence it passes off around the circuit, as indicated by the arrow in Fig. 1.

As the introduction of the electric current, its operation, and its departure will be fully understood from the drawings, it is unnecessary to describe them more fully in detail.

Within the tube B, I arrange another tube, made of iron or other suitable material, which will respond readily to the action of the electric current to form what I have termed a "hollow movable magnet-core," D. This magnet-core is movable up and down within the tube B. Owing to the fact that the electric current always tends to bring the center of the object on which it exercises its power to a point even with the center of the magnet-coil, its tendency when in operation will always be to draw this magnet-core up to that point where its longitudinal center corresponds to the longitudinal center of the magnet-coil. To prevent this magnet-core from jumping up and falling down too abruptly as the force of the magnet-current varies from time to time, I employ a brake or retarder to make its movements more regular and uniform. This brake consists, preferably, of two springs or flexible pieces, L L, fastened, preferably, to the bottom of the shell or case A by screws, as shown in Fig. 3. These springs or flexible pieces approach each other, as shown in this figure, so that the upper ends lie close to the lower end of the movable core D. To the upper ends of these springs, and between them and the movable core, I attach blocks of iron, *r r*, or other suitable material sensitive to magnetic power. Instead of these blocks, the upper ends of the pieces L L may be headed or finished with thickened portions to take their place. In any case I will, for convenience, term the ends of these pieces "blocks." To separate them from the movable core D, which, as before explained, is sensitive to the magnetic action, I prefer to place small strips of leather, *l l*, or other suitable material between the core and the blocks. The object of these strips of leather is to modify or soften somewhat the friction between the core and the blocks of iron, so that the core will move more steadily and uniformly than if in direct contact with the blocks of iron. The screws *o o*, by which the bottom of the shell is held in place, may be used to adjust the position of the springs L L. As the movable core D becomes strongly magnetized, so that it will tend to jump up, the blocks will be proportionately attracted to it, so that they will bear with greater force against it, thus preventing it moving up too suddenly or rapidly, and as the force becomes weakened the attraction of the blocks of the brake will be correspondingly weakened, so that they will exert less force on the core. In this way the amount of friction or force exerted on the movable core D will be proportioned at all times to the force of the electric current by which it is magnetized, and all sudden changes of position will be prevented and a steady and uniform movement up and down be secured, so as to insure a steady and uniform light.

In making my improved lamp as above described I am enabled to dispense with the ordinary dash-pot used to retard the upward and downward motion of the carbon-holding rod and to simplify the general construction of the lamp.

What I regard as new, and desire to secure by Letters Patent, is—

In an electric lamp, a brake or retarder to impart a regular and uniform movement to the movable magnet-core up and down, comprising the springs L L, attached to the shell or case of the lamp, and blocks or heads *r r*, supported by the springs and attracted magnetically by and exerting a frictional contact on the movable core proportioned at all times to the strength of the electric current, substantially as described.

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