

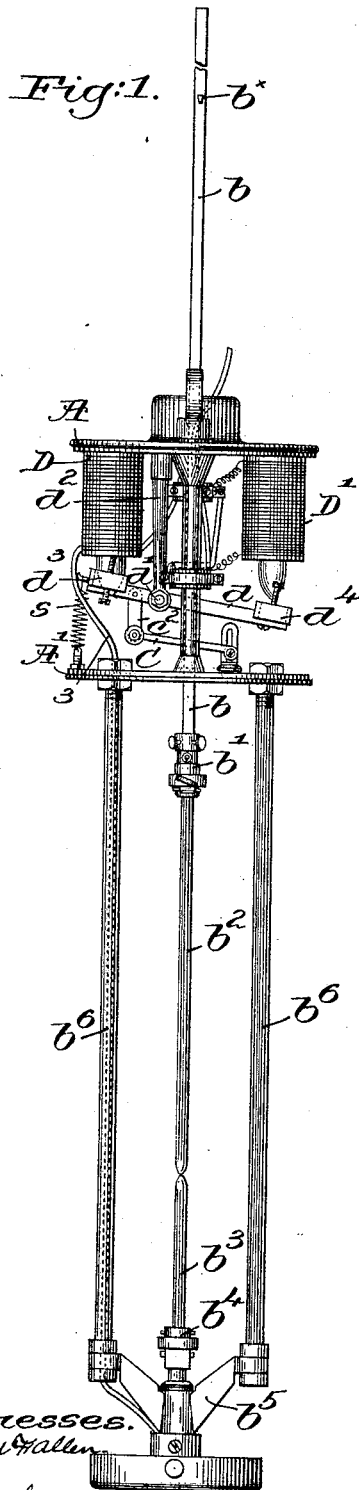
(No Model.)

2 Sheets—Sheet 1.

W. E. FROST.
ELECTRIC ARC LAMP.

No. 523,144.

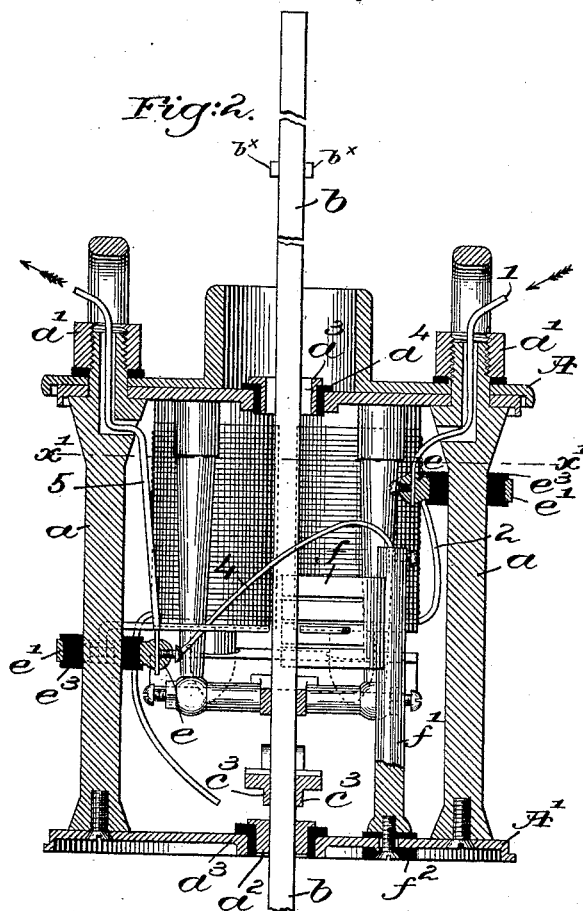
Patented July 17, 1894.



witnesses.

Edward Hallen

Louise K. Soule



Inventor.

Walter E. Frost.

By Crosby & Gregory attys.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

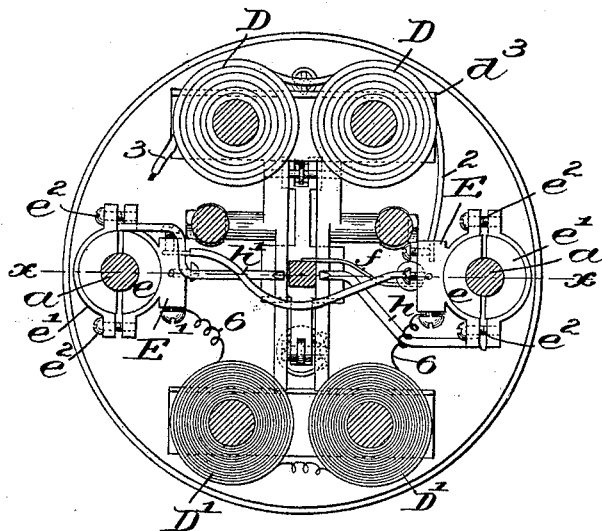


Fig. 4.

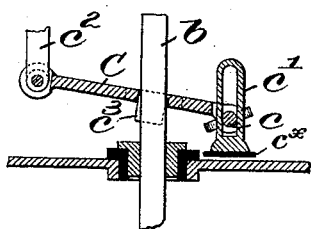
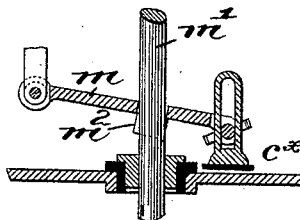


Fig. 5.



Witnesses.
Edward F. Allen.
Louis M. Goull

Inventor
Walter E. Frost,
by Crosby & Gregory
Attys.

UNITED STATES PATENT OFFICE.

WALTER E. FROST, OF LEWISTON, MAINE, ASSIGNOR TO DANIEL A. FIELD,
OF SAME PLACE, AND GEORGE P. SMITH, OF AUBURN, MAINE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 523,144, dated July 17, 1894.

Application filed July 31, 1893. Serial No. 481,917. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. FROST, of Lewiston, county of Androscoggin, State of Maine, have invented an Improvement in Electric-Arc Lamps, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object to provide an improved electric arc lamp.

Prior to this invention, arc lamps have, so far as known to me, been usually provided with a round clutch-rod which is extended 15 through a washer-like clutch-plate provided with a round hole slightly larger in diameter than the diameter of the clutch-rod, and by its angular position determining the vertical position of the clutch-rod. This washer-like 20 clutch-plate is acted upon at diametrically opposite points and held in a more or less angular position, and by reason of the hole in the plate and also the clutch-rod itself, being circular, the said clutch-plate, when in its 25 most angular position supporting the rod acts upon the latter at two diametrically opposite points only, the said clutch-plate being entirely free from contact with the clutch-rod between these two contacting points owing to 30 the greater diameter of the hole in the clutch-plate through which the clutch-rod is passed.

In practice it has been found that when this clutch-plate is dropped into or toward a horizontal position to release the clutch-rod, 35 the said plate, while released front and back or at the diametrically opposite points, is apt to tilt to one side in one or the other direction and contact with or grip the clutch-rod at its sides and thereby prevent the latter sliding freely through. To obviate this difficulty, 40 this present invention comprehends two guide ears or other equivalents extended at one side of the clutch-plate and which act to prevent sidewise tipping or tilting of the clutch-plate whatever be the form of the latter, the 45 clutch-rod thereby acting as a guide to prevent lateral tilting of the clutch-plate, so that the latter can be tipped into an angular position with relation to the rod only in one di-

rection, viz;—to grip or release the latter front 50 and back, but never at its sides. Whenever a round clutch-rod is used, as heretofore, the clutch-plate grips the latter at two points only, and these, located at diametrically opposite sides of the rod.

This invention also comprehends certain 55 constructional details of the lamp, particularly with relation to the location of the binding posts and the wiring, whereby none of the current is permitted to escape into and 60 through the frame or other parts of the lamp than the particular ones absolutely necessary, to thereby save the current as far as possible.

Referring to the drawings, Figure 1, represents in side elevation a sufficient portion of 65 one form of electric lamp to enable this invention to be understood; Fig. 2, an enlarged sectional view of the body portion of the lamp, the section being taken on the dotted line 70 $x-x$, Fig. 3. Fig. 3 is a horizontal section taken on the dotted line $x'-x'$, Fig. 2; Fig. 4, a sectional detail showing the clutch device; and Fig. 5, a modification to be described. 75

Referring particularly to Figs. 1 to 3 inclusive, A, A' represent the top and bottom, preferably disk-like, frame plates of the body of the lamp, the same being connected together 80 in usual manner by diametrically opposite posts a, a , the threaded upper ends of the latter being extended through the top plate to receive thereupon the threaded eye-bolts a' 85 which furnish means by which to hang the lamp.

The clutch-rod b , herein shown and preferably a square or other than round rod, presenting one or more flat faces, is extended 90 vertically through the frame plates A, A', the said rod where it passes through the lower frame plate A' being passed through a properly fitting washer a^2 insulated by means of an insulating bushing a^3 from the said lower frame plate A'. The upper frame plate is 95 also provided with a guiding collar a^3 which is considerably larger than the clutch-rod, and does not necessarily fit and guide the same accurately, the said collar a^3 being also insu-

lated from its supporting plate A by means of an insulating bushing a^4 . The clutch-rod b at its lower end is provided with a suitable clamping device, as b' , to hold the upper carbon or other pencil or electrode b^3 .

The lower carbon pencil or electrode b^3 is held in a suitable clamping device b^4 carried by the yoke b^5 secured to the lower ends of the depending supporting rods b^6 attached to the lower frame plate A'.

C is a clutch plate provided, as herein shown, with a square or slightly rectangular opening through which the clutch-rod b is extended, see Figs. 2, 3 and 4, said plate at one of its ends being pivoted by means of the thumb screw c to the loose slotted stand c' having an insulated bottom plate c^x normally resting upon the lower frame plate A', said plate at its opposite end being loosely connected by a link c^2 with the armature lever d pivoted at d' between suitable depending posts d^2 hung from the upper frame plate A. The stand c' is free to be raised from contact with the bottom plate A' with the clutch rod when the latter is sufficiently raised by the clutch plate. The armature lever d at one of its ends, that at the same side its pivotal point, has a link c^2 with a suitable armature d^3 co-operating with the cores of the main electro-magnet D, the said armature lever at its opposite end carrying the armature d^4 which co-operates with the cores of the shunt magnet D'. A spring s normally tends to retain the armature lever in a position with the armature d^3 retracted from its magnet D. The pivotal thumb screw c of the clutch-plate may be vertically adjusted in and with relation to the slotted stand c' for adjusting purposes as are found necessary.

The clutch-plate C is provided, as shown in Figs. 2 and 4, with two depending ears c^3 located at opposite sides of the clutch rod b and hugging said rod sufficiently close to prevent the clutch-plate from being tilted laterally with relation to the said rod, the said plate having, as will be evident by reference to Figs. 2 and 4, only a movement about its pivotal point c .

E and E' are two binding posts, located at the under side of the top plate A and shown as composed each of two members e, e' , which span the posts a, a , and are clamped together about the same by means of screws e^2 , being insulated from the said posts by the interposed hard rubber or other insulating bushing e^3 . The line wire 1, as herein shown, enters through the hollow threaded upper end of one of the posts a , and leads to the binding post E, from which the wire 2 leads to and through the coils of the main magnet D, the wire 3 leading from the said magnet down through one of the hollow supporting rods b^6 , as shown best in Fig. 1, to and electrically connected with the other fixed carbon pencil b^3 . The current passing from the pencil through the clutch-rod b is removed there-

from by a brush f , Figs. 2 and 3, carried by a post f' standing from the lower frame plate A' but insulated therefrom by the insulating bushing f^2 , see Fig. 2. The current thus collected from the clutch-rod is conducted by a wire 4 to the binding post E', from which a wire 5 leads from the lamp through the hollow upper end of the other post a . The coils of the shunt magnet D' are located in a shunt wire 6 connecting the two binding posts E and E', see Fig. 3.

The operation of the lamp is as usual in lamps of this class, the current when turned on entering by wire 1, passing by wire 2 to and through the magnet D, attracting the armature of the latter, and thereby lifting the clutch-plate C to separate the carbon pencils, the current then passing by wire 3 to and through the carbon pencils, thence through the clutch-rod b from which it is removed by the brush f from which the current passes by wire 4 to the binding post E' and out through the wire 5. When the carbon pencils have burned away sufficiently to weaken the current passing through this circuit, more or less of the current will be forced through the wire 6 and the shunt magnet D', causing the latter to attract its armature d^4 and thereby throw the raised end of the clutch-plate down somewhat to release the clutch-rod and permit the latter to drop to place the carbon pencils in new position, after which, the circuit is immediately strengthened there-through and the magnet D separates the carbon to the proper distance to preserve the core. It will be seen that when the clutch-plate C is dropped to release the clutch-rod it cannot tilt sidewise or laterally to grip the rod at its sides on account of the guide ears c^3 which prevent lateral tipping of the said plate. The flat surface presented by the square or other than round clutch-rod provides a sufficiently long line of contact between the clutch plate and the face of said rod to absolutely prevent accidental slip, and thereby renders the operation of the lamp more accurate and certain.

It will be noticed that the pivot point of the armature lever d is at one side the clutch rod and between the latter and the main shaft, whereby the arm of the lever which carries the main magnet armature is shorter and therefore of less leverage than the other arm of the lever carrying the shunt magnet armature. By thus providing a leverage in favor of the shunt armature, the latter is enabled to respond more promptly to any change in current, thereby rendering the operation of the lamp more accurate and prompt.

Referring now to Figs. 1 and 3, I have provided the clutch-rod b at or near its upper end with two diametrically opposite lugs or ears b^x , only one of which is shown in Fig. 1, the other being upon the opposite side of the rod and in line with the one shown. When the carbon pencils have nearly burned away

the clutch-rod b will have fallen such a distance that the lugs or ears b^x will contact with the oppositely located contacts h and h' , the former of which is connected with the binding post E, and the latter with the binding post E'. The minute the lugs or ears b^x drop into engagement with these contacts h and h' , a short circuit is formed from the binding post E to the binding post E', which permits the current entering through the wire 1 to pass directly across the binding post E' and the wire 5 and out, thereby shunting out both magnets D and D' and the carbon pencils, practically shunting out the entire lamp and preventing possible burning out of the coils of the magnets.

It will be noticed that the current is conducted through insulated wires to and from the insulated binding posts E and E', which are beneath the top frame plate A and that the brush post f' is also insulated as well as the guiding collars a^2 and a^3 for the clutch-rod, so that from the time the current enters until the time it leaves the lamp it is confined to those parts only through which it must necessarily pass, and no current whatever is scattered through the frame of the lamp to be diffused into the atmosphere therefrom, or to give a shock to an operator. This insulation is so efficient that I am enabled to obtain a much more strong and powerful light with the same current than in any lamp at present known to me.

This invention is not restricted to the particular construction or arrangement of devices herein used by me to illustrate the invention, for it is evident the invention may be embodied in other forms of construction without departing from its scope. For instance, Fig. 5 shows a clutch-plate m provided with a round opening through which is passed a round clutch-rod m' , said clutch-plate being provided with the depending ears m^2 to prevent lateral tipping of the clutch-plate, so that while a square or other than round clutch-rod is desirable, yet by providing the clutch-plate with ears or their equivalents, as shown, the objectionable lateral tipping of the clutch-plate even with the use of the round clutch rods is obviated.

The lugs b^x together with the contacts h and h' constructed and arranged as shown constitute a convenient and practical form of automatic cut-out switch, yet such switch need not necessarily embody this particular construction, for it may be varied as necessary in application to different lamps.

In lamps as now ordinarily constructed, the binding posts are placed upon the upper side of the top frame plate and of course, serving as conductors to the lamp, are always charged with electricity, and it frequently happens that in a high wind the lamp is swung so far to one side as to bring one or the other of these binding posts in close proximity to some portion of the building or hanging fixture,

causing an arc to be formed between the said post and the surface with which it is in proximity, thereby frequently damaging the binding post or surface and not infrequently causing fire. In my improved lamp, however, as herein shown, the binding posts are placed below the top frame plate A and the insulated wires carried through the said plate to the binding posts, the latter being thus protected from contact with any surface by the top frame plate, which latter as described is entirely insulated from the remaining parts of the lamp, therefore no arc can possibly be formed. It will also be noticed that the pivoted point or fulcrum of the armature lever d is at one side of the clutch bar, viz:—Between the latter and the main solenoid D, so that the shunt magnet or solenoid D' is favored by having a much longer leverage due to the greater length of the armature carried between its armature d^4 and the pivot point d' . This is of great advantage and makes the lamp much more sensitive and more accurate in its regulation than would be the case were the arms of the lever at each side the pivotal point of the latter equal, for as the current which passes through the shunt magnet D' is apt to be a weak one at first, by favoring this magnet by the increased leverage shown, the magnet responds more readily and releases the carbon at an earlier period, and thus more quickly re-adjusts the lamp, than it would were it necessary to receive a current of sufficient strength to move the armature lever with a shorter leverage.

I claim—

1. In an arc lamp, the combination with a clutch rod, of a clutch-plate provided with guide ears to act upon the said clutch-rod at a distance from the clutch-plate to prevent tipping of the latter, and means to move the said clutch-plate to cause it to grip and release the said clutch-rod, substantially as described.

2. In an arc lamp the combination with a clutch rod, of a clutch-plate embracing the same, an armature lever connected with said plate at one side said clutch rod, and a loose or movable stand provided with an insulated under surface connected with and moved by the opposite end of said clutch plate, substantially as described.

3. In an arc lamp, the combination with the top and bottom frame plates, of posts connecting the same and made hollow at their upper ends for the introduction through said posts of the line wires, eye-bolts threaded upon the extended upper ends of said posts, and leading-in binding posts at the under side of said top frame plate and protected from contact with foreign surfaces thereby, substantially as and for the purpose specified.

4. In an arc lamp the combination with the top and bottom frame plates, of posts connecting the same, made hollow at their upper ends for the introduction therethrough

of the line wires, eye-bolts threaded upon the extended upper ends of said posts, and leading-in binding posts secured to and insulated from the said posts, substantially as described.

5 5. In an electric arc lamp, the combination with top and bottom frame plates, and posts connecting the same, of insulated collars surrounding said posts, and two-part binding

posts clamped together about said collars, substantially as described. 10

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER E. FROST.

Witnesses:

WARREN E. RIKER,

WILLIAM F. BURBANK.