(No Model.)

J. F. KESTER.

ELECTRIC ARC LAMP.

No. 510,605. Patented Dec. 12, 1893.

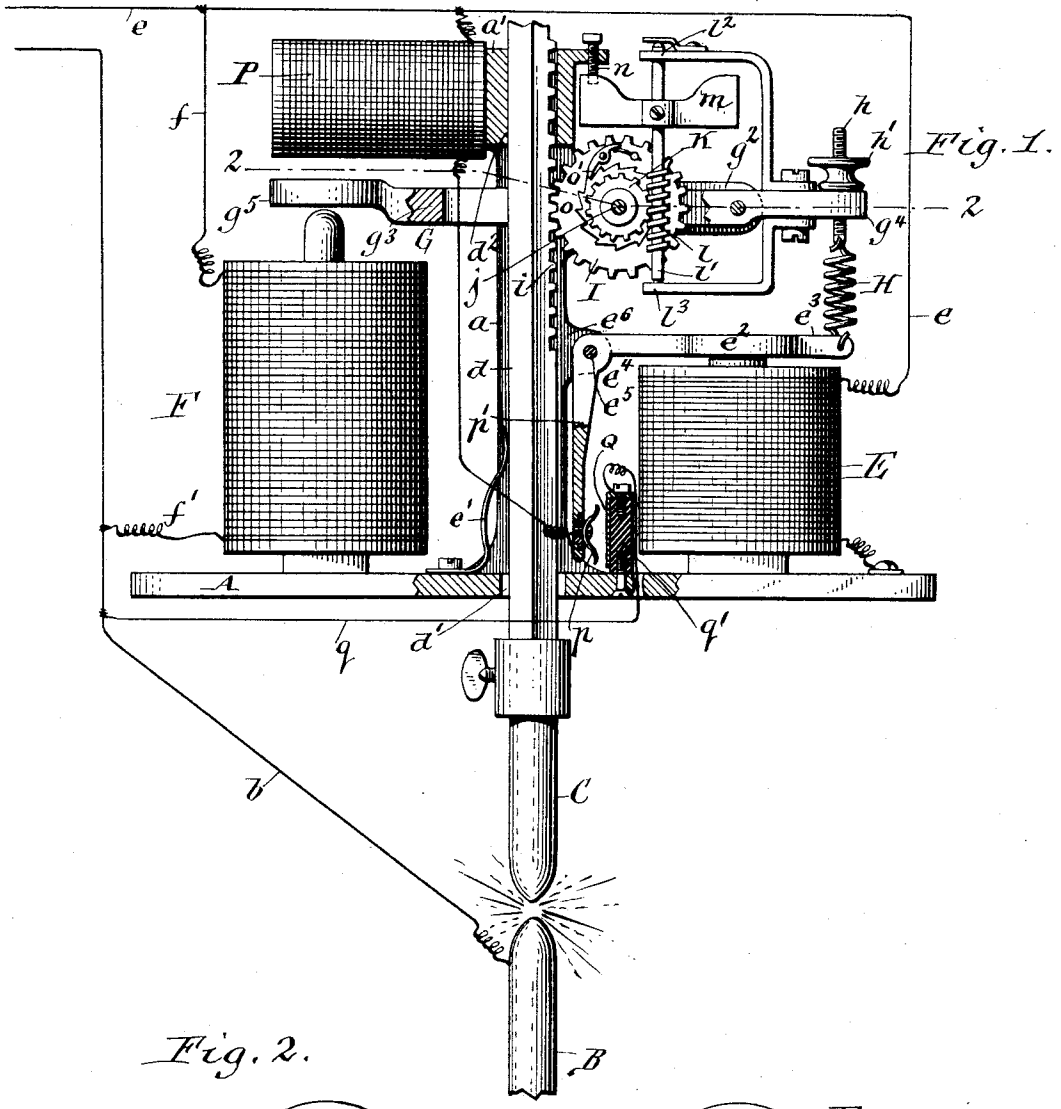
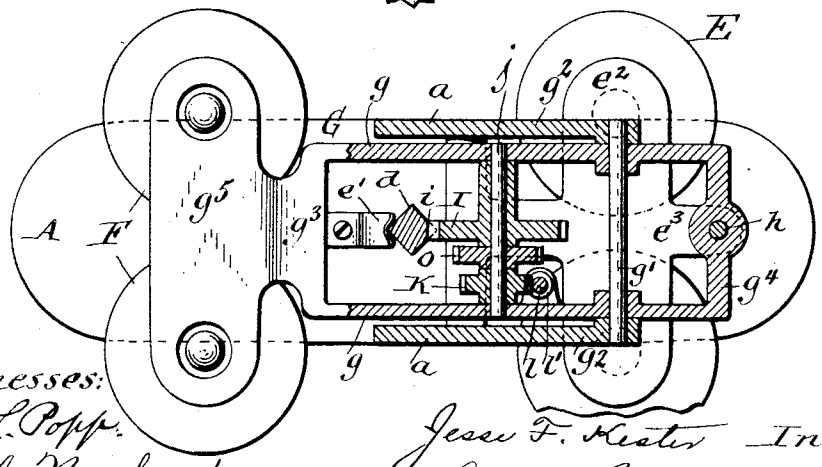


Fig. 1.

Fig. 2.



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JESSE F. KESTER, OF LA GRANGE, ILLINOIS, ASSIGNOR TO THE F. P. LITTLE ELECTRICAL CONSTRUCTION AND SUPPLY COMPANY, OF BUFFALO, NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 510,605, dated December 12, 1893.

Application filed April 24, 1893. Serial No. 471,557. (No model.)

To all whom it may concern:

Be it known that I, JESSE F. KESTER, a citizen of the United States, residing at La Grange, in the county of Cook and State of Illinois, have invented new and useful Improvements in Cut-Outs for Electric-Arc Lamps, of which the following is a specification.

This invention relates to a cut-out for electric arc lamps and has the object to provide a simple and reliable mechanism for automatically cutting out the lamp from the circuit when the feed mechanism fails to operate, or when the carbons are burned out.

In the accompanying drawings:—Figure 1 is a fragmentary sectional elevation of an electric arc lamp provided with my improved cut-out. Fig. 2 is a horizontal section in line 2—2, Fig. 1.

Like letters of reference refer to like parts in both figures.

A represents the base plate which is secured to the casing of the lamp and which is provided on opposite sides with standards a connected at their upper ends by a cross bar a'.

B represents the lower stationary carbon which is connected with the main circuit wire b, and C the upper movable carbon which is secured with its upper end to a vertically movable rod d. The latter passes through openings d' d^2 formed respectively in the base plate and cross bar a'.

E represents a main or lifting magnet of coarse wire which is arranged upon the base plate near one end thereof, and which has the ends of its coils connected with the main circuit wire e and the base plate, the current being conducted from the latter to the rod d by a brush e' in the usual manner.

e^2 is the armature of the main magnet which is formed on the upper arm e^3 of an elbow switch lever e^4. The latter is pivoted by a horizontal pin e^5 to lugs e^6 formed on one side of each standard.

F represents a feed magnet of fine wire which is arranged upon the base, near the opposite end thereof, and which has the ends of its coils connected by branch wires f f' with the main circuit wires e, b.

G represents a movable carrying frame composed of two side bars g, which are pivoted by a horizontal pivot g' to arms g^2 formed on the standards, cross bars g^3 g^4 connecting the ends of the side bars, and a feed armature g^5 formed on the cross bar g^3 over the poles of the feed magnet. When the feed magnet becomes highly active it attracts the feed armature and depresses the adjacent end of the carrying frame.

H represents a spiral spring whereby the opposite end of the carrying frame is depressed when the feed armature is released by the feed magnet. This spring is attached with its lower end to the upper arm of the elbow lever e^4 carrying the armature of the main magnet and with its upper end to an adjusting screw h arranged in the cross bar g^4 of the carrying frame. The tension of the spring is adjusted by a thumb nut h' arranged on the screw h and bearing against the upper side of the cross bar g^4.

I represents a feed gear wheel which meshes with a vertical gear rack i formed on the rod d and which is mounted loosely on a transverse feed shaft j journaled in the carrying frame between its pivot and the feed armature.

K represents a worm wheel secured to one end of an feed shaft j, and l is a worm formed on an upright shaft l' and meshing with the worm wheel. The worm shaft is journaled at its ends in bearings l^2 l^3 formed in brackets arranged on the carrying frame.

m represents revolving arms or blades which are secured to the worm shaft above the worm wheel. Upon turning the feed shaft, when these arms are free, the latter are rotated through the medium of the worm wheel and worm.

n represents a stop screw arranged on the cross bar a' and adapted to engage with one of the arms or blades when the vertical shaft is in its elevated position, and hold the same against rotation.

o is a ratchet wheel secured to the feed shaft j, and o' is a pawl pivoted on the feed wheel and engaging with said ratchet wheel. Upon raising the carbon rod for renewing the upper carbon, when the feed shaft is held against turning by the stop screw, the feed wheel turns

backward on its shaft and its pawl rides over the inclined faces of the ratchet teeth without moving the worm, worm wheel and arms. When the vertical shaft is disengaged from the stop screw and the feed wheel is moved forwardly, the pawl engages against the abrupt side of one of the ratchet teeth, thereby compelling the feed wheel and shaft to turn together, and rotating the upright shaft.

P represents a resistance coil mounted on the cross bar a' and having about the same resistance as the normal resistance of the arc. The resistance coil is connected with one end to the main circuit wire e and with its other end to a contact spring p, secured to the lower arm p' of the switch lever and insulated therefrom.

Q is a metallic contact plate arranged adjacent to the contact spring and connected with the main circuit wire b by a branch wire q. The contact plate is secured to an insulating block q' arranged on the base plate.

When no current passes through the lamp the upper carbon rests on the lower carbon, the feed armature is depressed and the armature of the main magnet is raised. The instant the current passes through the carbons and main magnet the latter becomes active and attracts its armature, thereby lifting the feed armature and upper carbon through the medium of the spring H, and forming an arc between the carbons. When the lamp is burning normally the distance between the carbons is such that the main portion of the current passes through the main magnet and the carbons, forming an arc of comparatively low resistance. When the carbons are in this position only a small portion of the current passes through the feed magnet, owing to the high resistance of the latter which renders the same practically inactive under these conditions. As the carbons burn away and the resistance of the arc increases, a correspondingly greater portion of the current flows through the feed magnet, causing the latter to become more active. When the carbons have burned away sufficiently to produce an arc having a resistance above the normal, the portion of the current which flows through the feed magnet is so great as to cause the latter to attract its armature and move the adjacent end of the carrying frame downwardly, thereby releasing the vertical shaft from its stop. The instant this occurs the upper carbon and the rod descend by their weight and in doing so rotate the upright shaft whose arms or blades have preferably the form of a fan which checks or retards the descent of the upper carbon and prevents the same from dropping suddenly. The armature of the main magnet is firmly held by the latter during the ordinary variations in the resistance of the arc, which causes the feed magnet, when attracting its armature, to strain the spiral spring H. As the carbons approach each other other during the feeding operation the resistance of the arc gradually becomes less which increases the flow of the current through the carbons and reduces the flow of the current through the feed magnet, thereby rendering the latter less active and causing the feed armature and adjacent end of the carrying frame to be raised by the spiral spring H. When the carbons have approached each other sufficiently to produce an arc of normal resistance, the feed magnet becomes practically inactive and allows its armature and the vertical shaft to be raised until one of its arms strikes the stop, whereby the rotation of the shaft and the further descent of the upper carbon are arrested. If the carbons are burned out, or if from any cause the upper carbon should stick and fail to descend when the feed mechanism is released, the feed magnet becomes more powerful and attracts its armature, thereby straining the spring H, while the main magnet becomes at the same time weaker, owing to the constantly increasing resistance of the arc. Eventually the resistance of the arc becomes so great that the main magnet becomes practically powerless and releases its armature, which latter is then instantly raised by the spring H which is under tension. This raises the main armature, rocks the switch lever, and moves the contact spring into engagement with the contact plate, thereby switching the resistance coil across the main circuit wires b and e and cutting the main magnet and carbons out of circuit. The main circuit now passes through the resistance coil and this prevents the coils of the feed magnet from being burned out. If the upper carbon is released, when the lamp is jarred by the wind or otherwise, or if the upper carbon is renewed and touches the lower carbon, the current again takes the shorter course through the carbons and main magnet, because the resistance offered by the resistance coil greatly exceeds that offered by the main magnet and the carbons. The main magnet now becomes active again and attracts its armature, thereby opening the switch and throwing the resistance coil out of circuit and raising the upper carbon, thus restoring the lamp to its normal condition. This cut-out is very simple in construction and positively cuts the lamp out of circuit when the upper carbon fails to feed or when the carbons are burned out, thereby avoiding injury to the feed magnet. It also automatically restores the operation of the lamp when the carbons resume their normal position.

I do not wish to claim in this application the construction of the feed mechanism, irrespective of the cut-out, because the same forms the subject of a separate application filed of even date with this application.

I claim as my invention—

1. In an electric arc lamp, the combination with the main magnet arranged in the main circuit, the main armature, the feed magnet, and the feed armature yieldingly connected with the main armature, of a resistance circuit around the main circuit, and a switch

which opens and closes the resistance circuit and is controlled by the main armature, substantially as set forth.

2. In an electric arc lamp, the combination with the main magnet arranged in the main circuit, the main armature, and the feed magnet, of a movable carrying frame which supports the feeding mechanism and which is provided at one end with a feed armature, a spring connecting the opposite end of the carrying frame with the main armature, a resistance circuit around the main circuit, and a switch connected with the main armature, whereby the resistance circuit is opened and closed by the movement of the main armature, substantially as set forth.

3. The combination with the main magnet arranged in the main circuit, of a feed magnet, a movable frame carrying the feed armature, a switch lever carrying the main armature, a spring connecting said switch lever with said movable frame, and a resistance circuit having one of its parts extending from said switch lever to the main circuit, and the other from a contact piece to the main circuit, substantially as set forth.

Witness my hand this 22d day of April, 1893.

JESSE F. KESTER.

Witnesses:
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