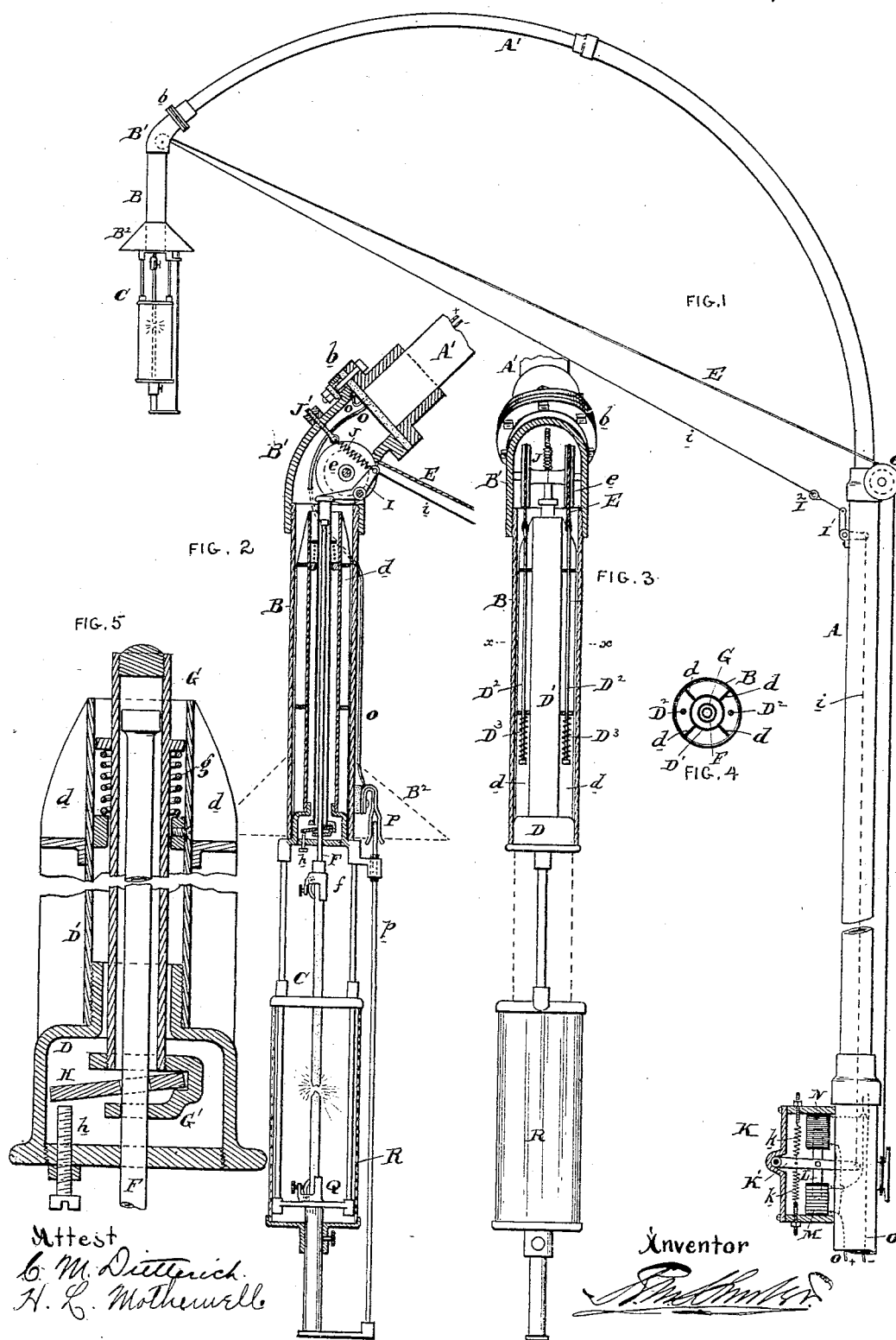


(No Model.)

R. M. HUNTER.
ELECTRIC ARC LAMP.

No. 493,360.

Patented Mar. 14, 1893.



Attest
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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 493,360, dated March 14, 1893.

Application filed October 14, 1892. Serial No. 448,814. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Electric Lamps, of which the following is a specification.

My invention has reference to electric lamps, and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

This application, Case No. 230, has particular reference to the construction of arc lamps and the means for supporting the same in position over the roadway.

In carrying out my invention, I arrange the arc lamp proper upon the upper and outer end of a suitable supporting pole or arm, and support the regulating mechanism at a distance therefrom and upon the base or vertical part of the said supporting arm. By this construction the regulator may be arranged at a great distance from the feeding mechanism of the arc lamp proper and yet be made to control it perfectly. The object of this is to enable the lamp proper to be made as light as possible so that it may be suspended upon the end of a delicate or ornamental arm or pole overhanging the roadway while the heavy regulator mechanism may be supported upon the vertical part of the pole or arm at a distance from the lamp proper and be adapted to control it by a fine connecting wire by which the necessary movements are transmitted.

There are numerous ways of carrying out my invention, and I have shown in the accompanying drawings the most desirable form of lamp, but do not confine myself to the details thereof.

The lamp proper is detachably connected to the end of the arm and may be raised or lowered into position by means of suitable cords or cables. The regulator mechanism is separate and distinct from the lamp proper, and the parts are so combined that when the lamp is drawn into position upon the supporting arm the said parts so co-act that the regulator is at once in operative combination with the lamp proper.

The construction of my improved arc lamp

proper will be better understood by reference to the accompanying drawings, in which;

Figure 1 is a side elevation of the electric lamp and its support, showing the lower part of the pole broken away and the covering plate of the regulator removed. Fig. 2 is a sectional side elevation of the lamp and its connections adjacent to the free end of the supporting arm. Fig. 3 is a front elevation thereof with part of the supporting arm broken away. Fig. 4 is a cross section thereof on $x-x$ of Fig. 3, and Fig. 5 is a sectional elevation of a portion of the lamp showing the feeding mechanism full size.

A is the vertical part of the supporting arm or post of the lamp.

A' is the curved or laterally projecting part. The free end of this part A' is provided with an insulating joint b which connects with the head B' carrying the vertical tubular guide part B.

C is the electric lamp proper. This lamp is drawn into the tubular part B by means of cables E passing over sheaves or grooved pulleys e , arranged in the head B'. The cables E after passing over the guide pulley e , extend down to the lower part of the supporting pole A. By means of cables E the lamp may be lowered for replacing the carbons and otherwise trimming the lamp. The lamp proper is clearly shown in the various figures, the details of the feeding mechanism being more clearly shown in Fig. 5.

D is the frame of the feeding chamber and supports the vertical tube D' which is provided with radial guides d of any suitable construction. These guides center the lamp in the tube B' when it is pulled into place. The lower holder Q for the carbons is supported by rods in the usual manner and is insulated from the upper part of the lamp as is customary.

F is the feeding rod of the upper carbon holder f and is guided through the frame D and the vertical tube G. This tube G is fitted at the lower end with a head G', the lower part of which is guided on the rod F.

H is a feeding washer encircling the rod F and adapted to be moved by the head G'. The free end of the washer works in contact with the tripping screw h carried by the frame

D at the bottom. This screw is made adjustable to control the time of feeding the carbons. The extreme upper end of the tube G is provided with a plug as shown in Fig. 5 and is guided within the tube or casing D'. A spring *g* supports the tube G, the carbon rod F, and the upper carbon, and always tends to separate the carbons to maintain the arc. If pressure is placed upon the top of tube G it is evident that the washer is tripped, and the rod F falls. If the pressure is now removed from the tube G it is evident that the spring *g* will cause the tube to rise, and through the washer H lift the feeding rod F and the upper carbon to maintain the arc between the upper and lower carbons.

There is a bell crank which is pivoted to the head B' and is adapted to press upon the top of the tube G as very clearly shown in Fig. 2. A spring J, supported by an adjustable device J', acts upon the bell crank I with a force greater than the force of the spring *g* so that when permitted, it will force down the tube G and trip the washer. In place of a spring J the lever I may be weighted. Normally, the tube is pressed down, and the carbons are in permanent contact. The spring *g* is one of sufficient strength to lift the parts G', H, F, f, and the upper carbon. The bell crank I is connected by a tension wire *i* to the bell crank I' through an insulator I², and the bell crank I is connected by a second wire *i* with the regulator lever K'. This regulator lever is shown as projecting into the vertical tubular post A and the vertical wire *i* is concealed within the said post. A core L is connected to the lever K' and is movable under the action of the solenoids M and N, the former being in the direct circuit O, while the latter is in a shunt circuit about the lamp. The regulator K is provided with adjusting springs of suitable construction *k* adapted to adjust the action of the regulator. It is evident that this regulator might be located upon any part of the post A. If it is high up it may directly act upon the bell crank I', but where it is arranged at a lower elevation, a vertical wire *i* is necessary. The regulator is usually of considerable weight and the object of this invention is to locate it upon the vertical part of pole or arm where it is easily sustained. Its weight is entirely removed from the extreme end of the supporting arm. It will now be understood that when the solenoid M pulls down the lever K', the wire *i* is put under tension and this removes the pressure from the tube G, permitting the spring *g* to move the tube upward, and lift the carbon. As the arc burns away the carbons, the resistance on the lamp becomes greater, the solenoid M becomes weaker, and the shunt solenoid N becomes stronger. The effect of this is to permit the spring J to press the lever I down upon the tube G bringing the carbons closer together to maintain a uniform arc. As the carbons are gradually consumed, this downward feeding on the tube G ultimately results in the

tripping of the washer H, liberating the holder F and allowing the upper carbon to drop; the instant this takes place the solenoid M becomes stronger, solenoid N weaker, and the lever I is drawn upward from the tube G permitting the spring *g* to separate the carbons, and the operation is repeated.

It will thus be seen that the feeding mechanism proper is located in the lamp and is of small weight, whereas the heavy electric regulator proper is supported at a distance from the lamp structure and where its weight is readily sustained. This distribution of the operative parts of the lamp permit the arm which overhangs to be made very delicate and ornamental, and such as is not apt to injure the appearance of the streets.

It is evident that while I have shown the cord E and wire *i* as extending directly from the head B' to the vertical part of the posts they may be carried up close to the curved part A', but as they could be made so light in practice, the particular location of those parts is immaterial.

The lower carbon holder Q is connected by a rod *p* with the upper part of the lamp and when the lamp is drawn into position within the B, the free end of the rod *p* slides between the spring parts of the contact P connecting with one of the conductors O leading to the lamp. The other conductor connects with the head B', and thence by tube B with the lamp structure. By this means the current passes through the upper carbon to the lower carbon, thence through rod *p* to the spring contact P, and to the return circuit O. These wires are led up through the pole or arm A' as indicated, or may be arranged in any other suitable manner.

It is evident that the tube G must be brought into a relatively correct position with respect to the bell crank I, and to insure this, I have provided the lamp proper with two vertical rods D² having spring connections D³ with the lamp structure formed by the tube D' and head D. The upper ends of these rods are connected to the cords E as clearly shown in Fig. 3. It will now be seen that these cords E may be put under a considerable tension so that the lamp may be drawn up into the tube B and the head D positively supported against the lower edge thereof, bringing the parts in absolutely accurate position. This position will be maintained for considerable variation in the tension of the cords E as the springs B³ will compensate for the variation of tension. It will also permit the lamp trimmer to readily bring the lamp into proper position without stopping to test it.

A hood B³ may be connected with the casing B to inclose the spring contact P. The employment of two cords and two sheaves insure the lamp being drawn up into such a position that the free end of the rod *p* is necessarily required to come into contact with the spring contact P to close the current automatically upon bringing the lamp into posi-

tion. When the lamp is lowered for trimming, it is entirely cut out of the electric circuit and no possible danger to the trimmer can result.

5 R is the globe and is shown as a cylinder, which is an excellent and cheap construction. A wire gauze guard may extend between the upper part of the cap of the globe R and the base of the head of the lamp as a spark ar-
10 rester as indicated in dotted lines in Fig. 3, if so desired. In trimming the lamp the globe may be dropped down to expose the carbon holders.

15 I do not confine myself to the various details herein shown, though I have found them excellently adapted in practice to the purpose of this invention.

Having now described my invention, what I desire to secure by Letters Patent is—

20 1. In an arc lamp the combination of two carbon holders, a feeding device to feed one carbon holder toward the other, a regulator for controlling the feeding device arranged independently of and laterally with respect
25 to the carbon holders, and a connecting wire of considerable length arranged between the regulator and the feeding mechanism whereby the regulator and feeding device of the lamp may be widely separated.

30 2. In an arc lamp, two carbon holders, and feeding device to feed one carbon holder toward the other constituting the lamp proper, in combination with a regulator independent of the carbon holders and feeding device for
35 controlling the feeding device, located at a distance from it, a connecting wire of considerable length arranged between the regulator and the feeding device whereby the regulator and lamp proper may be widely separated,
40 and a common laterally projecting support for said regulator and lamp proper.

45 3. In an arc lamp two carbon holders and a feeding device to feed one carbon holder toward the other, composing the lamp structure proper, in combination with a regulator independent of the lamp proper for controlling the feeding device, a connecting wire of considerable length arranged between the regu-
50 lator and the feeding device whereby the regulator and feeding device may be widely separated, a common support for said regulator and lamp structure proper, consisting of a vertical pole carrying the regulator and
55 having a laterally projecting arm supported upon the upper part of the vertical pole and carrying at its free end the lamp structure proper.

60 4. The combination of an electric lamp having feeding mechanism for the carbons, a regulator to control the feeding of the carbons arranged at a distance from the lamp proper, supporting devices for holding the feeding mechanism and lamp proper in relatively
65 fixed positions, connecting devices between the regulator and feeding mechanism of the lamp proper whereby the latter is controlled by the regulator, and detachable connections

whereby the lamp proper may be removed without displacement to the regulator and connecting devices.

70 5. The combination of an electric lamp having feeding mechanism for the carbons, a regulator to control the feeding of the carbons arranged at a distance from the lamp proper, supporting devices for holding the feeding
75 mechanism and lamp proper in relatively fixed positions, connecting devices between the regulator and feeding mechanism of the lamp proper whereby the latter is controlled by the regulator, detachable connections
80 whereby the lamp proper may be removed without displacement to the regulator and connecting devices, and means for raising or lowering the lamp proper into place for operative connections with the connecting de-
85 vices.

6. The combination of a vertical pole having a laterally projecting arm, a lamp proper adapted to be carried at the free end of said arm, elevating devices for elevating the lamp
90 into position upon the free end of the arm or lowering it therefrom, a regulator supported adjacent to the vertical part of the arm, and connecting mechanism permanently attached to the supporting arm and extending between
95 the free end thereof and the regulator whereby the regulator may control the feeding mechanism of the lamp proper.

7. The combination of a vertical pole having a laterally projecting arm, a lamp proper
100 adapted to be carried at the free end of said arm, elevating devices for elevating the lamp into position upon the free end of the arm or lowering it therefrom, a regulator supported adjacent to the vertical part of the arm, con-
105 necting mechanism permanently attached to the supporting arm and extending between the free end thereof and the regulator whereby the regulator may control the feeding mechanism of the lamp proper, and an insu-
110 lating support for the lamp at the free end of the arm.

8. The combination of a vertical pole having a laterally projecting arm, a lamp proper adapted to be carried at the free end of said
115 arm, elevating devices for elevating the lamp into position upon the free end of the arm or lowering it therefrom, a regulator supported adjacent to the vertical part of the arm, connecting mechanism permanently attached to
120 the supporting arm and extending between the free end thereof and the regulator whereby the regulator may control the feeding mechanism of the lamp proper, an insulated support for the lamp at the free end of the
125 arm, and a guide permanently attached to the free end of the arm for guiding the lamp into a definite position.

9. The combination of a supporting arm terminating at its free end in a vertical guide, a
130 lamp proper adapted to slide vertically into said guide and be held in a fixed position, an adjustable elevating cord adapted to hold the lamp proper in the guide on the free end of

the arm irrespective of variation in the length of the lifting cord and an electric regulator for controlling the lamp proper permanently attached to the arm and unaffected by the movements of the lamp proper.

10. The combination of a supporting arm terminating at its free end in a vertical guide, a lamp proper adapted to slide vertically into said guide and be held in a fixed position, an adjustable elevating device consisting of two cords passing through grooved guides and connecting with the lamp proper by means of springs adapted to hold the lamp proper in the guide on the free end of the arm irrespective of variation in the length of the lifting cords and an electric regulator for controlling the lamp proper permanently attached to the arm and unaffected by the movements of the lamp proper.

11. The combination of a supporting arm having an overhanging arm provided with a guide and terminals of an electric circuit, a movable electric lamp proper adapted to said guide, an electric regulator for the lamp permanently secured to the supporting arm and in circuit with the terminals thereon, and automatic contact devices for automatically coupling the lamp in circuit with the terminals upon lifting it into position upon the guide and automatically coupling the lamp and regulator in circuit.

12. In an electric lamp the combination of a supporting frame for the two carbon holders, a feeding device for one of the carbon holders consisting of a movable part having a trip attached to liberate the carbon holder upon being pressed toward the other carbon holder, a spring to move the said movable part so as to separate the two carbons, an electric regulator at a distance from but in

circuit with the lamp for opposing the action of the said spring whereby the regulator positively brings the carbons toward each other and the spring positively separates the carbons and operating connecting devices connecting the regulator and lamp proper.

13. In an electric lamp the combination of the frame of the lamp, two carbon holders for the carbons, one of which is carried by a movable holder rod F, a frame or tubular part G arranged parallel to the said carbon holder rod provided with a head G', a feeding washer H carried by the head and encircling the feeding rod F, a stop for tripping the washer, a spring for lifting the part G washer and holder rod, an electric regulator for opposing action on the spring by pressing upon the part G, and an electric circuit including the carbons of the lamp and the electric regulator.

14. In an arc lamp, feeding devices for the carbons, and a spring to move the carbons apart, constituting the lamp proper, in combination with an electric regulator distantly removed from the lamp proper in circuit with the carbons, and a connecting wire device extending from the regulator to the lamp proper for forcing the carbons together in opposition to the springs.

15. In an electric lamp, the combination of feeding mechanism for the carbons, a spring to separate the carbons, and a spring actuated electric regulator to force the carbons together, and electric circuits including the electric regulator and the carbons of the lamp.

In testimony of which invention I have hereunto set my hand.

R. M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,
C. M. DIETTERICH.