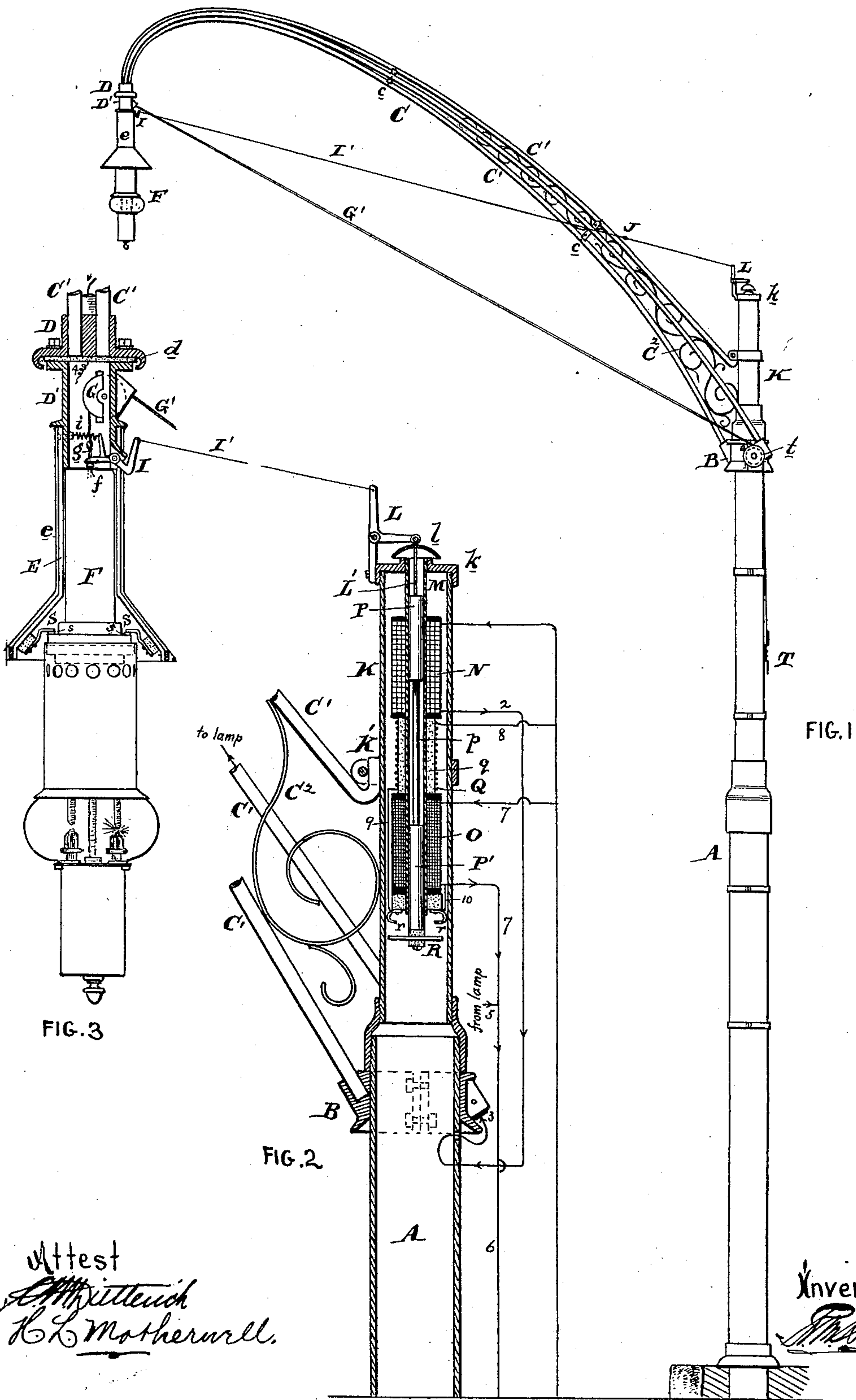


(No Model.)

R. M. HUNTER.
ELECTRIC ARC LAMP.

No. 509,167.

Patented Nov. 21, 1893.



Attest
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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 509,167, dated November 21, 1893.

Application filed June 29, 1893. Serial No. 479,117. (No model.)

To all whom it may concern:

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

My invention has reference to electric lamps for street lighting, 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. 256, relates to certain improvements upon the general construction of electric lamp post and lamp set out in Letters Patent No. 493,360, granted to me on March 14, 1893, and comprehends certain details of construction whereby the general principle of the lamp structures specified in the said patent is better adapted to general use.

The essential feature of the construction of the lamp to which this invention relates resides in the fact that the lamp post proper carries a laterally projecting arm to the outer end of which the carbon holders and feeding devices for the carbon are alone supported, while the heavy electric regulating devices are sustained upon or close to the vertical part of the posts proper.

My present improvement includes, among other things, certain specific constructions of the lamp post whereby it is particularly adapted to support the electric regulator and the carbon feeding devices or lamp proper; and further certain improvements in the electric regulator; and finally to minor details of construction which will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of an electric street lamp embodying my invention. Fig. 2 is a sectional elevation of the electric regulator and upper portion of the lamp post; and Fig. 3 is a sectional elevation of the outer end of the arm of the lamp post showing the connection with the lamp proper.

A is the vertical or upright part of the lamp post, and C is a laterally and upwardly projecting curved arm connected at its lower part with the upper portion of the lamp post A and carrying at its outer end a suitable

support for the lamp proper F. The post A is shown as formed of several sections of wrought iron tubing secured together by suitable couplings. Immediately upon the top of the post A is a short section of tubing K in which the electric lamp proper is located as is very clearly shown in Fig. 2. The arm C is composed of two or more light tubes C' suitably curved, and if desired clamped in definite and relative relation by spiders or spacing irons c. The curvature of the arm preferred is that shown in Fig. 1 as the same has the necessary rigidity and at the same time combines the upward reach with beauty of design. I have found in practice that this style of arm is exceedingly well adapted to the purpose and is highly ornamental. Furthermore a curvature of this character in the arm enables the height of the post A to be a minimum with proper support of the lamp F above the roadway. Between the upper and lower tubes I have used an ornamental scroll C² with excellent artistic effect combined with increased stability since the said scroll acts more or less as a truss. At the base of the arm C the ends of the tubes are supported in sockets formed in the collar or ring casting B which is bolted or clamped to the upper part of the post A as is clearly shown. The upper tube C' of the arm is clamped to the small section of tubing K at or about its middle by a clamping band K'. In this manner the base of the arm has a wide support and is firmly held against sagging at its outer end. The outer ends of the four tubes C' are bent downward and secured to a head D. Bolted to the head D and insulated therefrom is a tubular casting D' to which the guide frame E is secured and which carries the projecting hood or casing e. The lamp F has its upper part made cylindrical and adapted to be drawn up between the guides E until its upper part reaches the lower portion of the casting D' against which it is firmly held. The lamp is provided with terminals s which connect with the spring contacts S, S, carried by the guide frame E and respectively in circuit with the two wires for supplying current to the lamp, the said wires being indicated as 3, 4 and 5, in Figs. 2 and 3, and to which wires reference will be made later on. The

specific construction of the lamp E forms no part of this application as it forms subject matter of my application, Case No. 257, filed June 29, 1893, Serial No. 479,118.

5 This lamp is provided, as in the case of the lamp of my Patent No. 493,360, aforesaid, with an upwardly projecting and movable part *f*, which is raised and lowered by springs in accordance with and controlled by the electric regulator. A lever I pivoted to the tubular casting D' under the action of a spring *i* depresses the movable part *f* to feed the carbons downward, whereas the spring within the lamp raises the movable part *f* and the carbons when the electric regulator pulls upon the lever I through the media found in the wire I'. The lamp is sustained in its guides E by means of lifting cables G' passing over pulleys G in the casting D' and connecting with lifting rods *g* carried by the lamp and substantially of the character shown in the aforesaid Letters Patent and more particularly in my application to which reference has been made. The lifting cords G' pass over guide pulleys *t* on the collar B and are fastened to a cleat T to keep the lamp in its elevated position.

The electric regulator consists of a brass tube M secured to a cap *k* fastened to the top of the tube K. Secured to this brass tube M is a coarse wire coil N and a fine wire or shunt coil O, said coils being arranged at a distance apart. Moving within the tube are two cores P, P' connected by a brass rod *p*. The core P is adapted to be drawn down into the solenoid N, and the core P' adapted to be drawn upward into the solenoid O. These cores are connected by a rod L' with a bell crank lever L pivoted to the cap *k* and connecting directly with the tension wire I' leading to the lever I which controls the feeding of the carbons of the lamp. A small insulator J may be inserted in the wire I' to prevent any possibility of short circuiting in the case of accident. An inverted cup shaped cap *l* is carried upon the upper end of the rod L' so as to keep water out of the tube M. The weight of the cores P and P' I have found in practice amply sufficient to keep the wire I' under tension and to properly operate in a lamp of this character. But it is quite evident that if desired a spring may be employed to assist the action of the said weight. The current from the line leads by wire 1, through the coarse wire solenoid N, thence by wire 2 to the wire 3 which passes up through one of the tubes C' of the arm C to 4 which is to be connected with one of the spring contacts S. After leaving the lamp the current returns by the other contact S and by a wire passes through another tube C' of the arm C back to 5 and thence passes to the line 6. A shunt circuit 7 passes from the wire 1 through the shunt solenoid O and connects with the line 6.

65 Arranged between the solenoid N and O is an insulator *q* about which is wrapped a resistance wire of German silver Q. A circuit

8 leading from the line 1 connects with the resistance coil Q which also connects by a wire 9 with one of the spring contacts *r*. The other spring contact *r* connects by a wire 10 with the wire 7 and by it with the line 6. The lower end of the solenoid P' has an insulated circuit closing bar R. If from any cause the lamp should go out and could not reset itself, the coarse wire coil N would be thrown out of circuit, and the shunt coil O would draw its core P' upward with suitable force completing the main circuit through the resistance Q which is thus substituted for the resistance of the lamp. This saves the shunt coil from being burned out and also maintains the line in operative condition. The coarse wire and fine wire solenoids and their cores operate on the differential principle as is customary in nearly all arc lamps, and need not be described.

My improvements are especially adapted to the details of construction of the lamp post whereby it is particularly adapted to street lighting while maintaining an ornamental appearance to the eye. The object of locating the electric regulator upon the lamp post proper is to reduce to a minimum the weight at the extremity of the arm, by removing from the structure of the lamp proper all the weighty part of an arc lamp. By actual construction I have found that a double or all night lamp may be constructed embodying my invention which shall have not more than one fifth the weight of an ordinary commercial electric lamp, from which it is apparent that the arm C may be made very light and graceful. The arm may be a fixture, and the lamp proper be readily raised and lowered by the cords G'. When lowered, and when the lamp is being trimmed, the electric circuit is broken so that there is no possibility of danger to the trimmer. The moment the lamp is drawn into its guides it is coupled into circuit automatically.

It is quite evident that in place of separating the high and low resistance solenoids as shown in Fig. 2, the high resistance solenoid O might have been placed above the low resistance solenoid N whereby both would act upon the same core P, but I prefer the construction shown for the reason that while it does not differ in principle of operation, the cores, P, P', are more readily guided and prevented from binding, and from a practical standpoint make the regulator more sensitive. It has a further advantage in that the solenoids are kept sufficiently apart to permit each to perform its full function according to the current flowing, thus making the action upon the cores more positive. The cores P and P' taken together in connection with their connecting rod *p* constitute in effect a magnetic armature or movable magnetic part. This magnetic or movable part may be greatly modified as to details without changing the method of operation.

While I prefer the construction herein illus-

trated as being excellently adapted in practice to the carrying out of my invention, I do not confine myself to the details thereof as they may be modified in various ways without departing from the principles of my invention.

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

1. A vertical pole having a tubular part at the top and a laterally projecting arm carried at the upper part of the pole, in combination with an electric lamp regulator proper supported in the tubular part arranged upon the upper portion of the pole, and a connecting wire between the electric regulator and lamp proper whereby the latter may be controlled by the electric regulator.

2. The combination of a vertical pole having a tubular part at the top and a laterally projecting arm carried at the upper part of the pole, with an electric lamp proper supported at the free end of the arm, an electric regulator supported in the tubular part arranged upon the upper portion of the pole, a connecting wire between the electric regulator and lamp proper whereby the latter may be controlled by the electric regulator, and an electric cutout switch also arranged in the tubular part upon the upper part of the pole.

3. The combination of a vertical pole having a tubular part at the top and a laterally projecting arm carried at the upper part of the pole, with an electric lamp proper supported at the free end of the arm, an electric regulator supported in the tubular part arranged upon the upper portion of the pole consisting of a coarse wire solenoid and a fine wire solenoid arranged one above the other and a core or cores adapted to move within the solenoids and suspended at the top by a movable support, and a connecting wire between the electric regulator and lamp proper whereby the latter may be controlled by the electric regulator.

4. An electric lamp post consisting of a vertical pole having at its top a tubular portion, combined with an electric regulator for the lamp proper located within the said tubular portion and shielded thereby.

5. An electric lamp post consisting of a vertical pole having at its top a tubular portion, combined with an electric regulator for the lamp proper located within the said tubular portion and shielded thereby said regulator consisting of a high and low resistance solenoid arranged one above the other and adapted to operate upon a movably suspended magnetic part or armature.

6. An electric lamp post consisting of a vertical pole having at its top a tubular portion, combined with an electric regulator for the lamp proper located within the said tubular portion and shielded thereby said regulator consisting of a high and low resistance solenoid arranged one above the other and adapted to operate upon a movably suspended magnetic part or armature, and a cut out

also arranged within and shielded by the tubular part on top of the post and operated by the movable magnetic part or armature. 70

7. An electric lamp post consisting of a vertical pole having a laterally projecting arm permanently attached to the top of the pole, in combination with a detachable lamp supported at the free end of the arm, means to raise and support the lamp in position upon the free end of the arm, a compartment or tubular case arranged upon the upper part of the pole, an electric regulator arranged within said compartment or tubular case, and power transmitting devices extending from the electric regulator to the lamp. 75

8. An electric lamp post consisting of a vertical pole having a laterally projecting arm permanently attached to the top of the pole, in combination with a detachable lamp supported at the free end of the arm, means to raise and support the lamp in position upon the free end of the arm, a compartment or tubular case arranged upon the upper part of the pole an electric regulator arranged within the said compartment or tubular case, power transmitting devices extending from the electric regulator to the lamp consisting of a wire a bell crank at each end a spring to pull the wire in one direction and a connection between the bell crank at the free end of the wire and the movable core of the electric regulator whereby the latter acts in opposition to the spring to keep the wire under tension and at the same time permit it to move bodily under the action of the electric regulator. 85

9. In an electric lamp, the combination of a vertical pole provided with a laterally extending arm; a lamp proper carried at the extremity of the arm, a tubular part arranged upon the upper part of the pole; an electric regulator arranged in the tubular part consisting of high and low resistance solenoids supported upon a tubular support of diamagnetic material and a movable core structure movable within the diamagnetic support; and power transmitting connections between the movable core structure and the lamp proper. 90

10. In an electric lamp, the combination of a vertical pole provided with a laterally extending arm, a lamp proper carried at the extremity of the arm, a tubular part arranged upon the top of the pole, an electric regulator arranged in the tubular part consisting of high and low resistance solenoids supported upon a tubular support of diamagnetic material and a movable core structure movable within the diamagnetic support, power transmitting connections between the movable core structure and the lamp proper, a resistance coil supported upon the diamagnetic support, cut out terminals also supported upon the diamagnetic support, a cut out switch carried by and moving with the core structure and electric circuits including the solenoid, resistance coil and lamp structure. 120

11. In an electric lamp, the combination of a vertical pole combined with a laterally and upwardly extending curved arm formed of two or more curved tubes spreading as they approach the vertical tube and clamped thereto and having the extreme outer and upper end downwardly curved and provided with a support for a lamp.
12. In an electric lamp, the combination of a vertical pole combined with a laterally and upwardly extending curved arm formed of two or more curved tubes spreading as they approach the vertical tube and clamped thereto and having the extreme outer and upper end downwardly curved and provided with a support for a lamp, and a reinforcing truss or scroll work interposed between the upper and lower tubes forming the arm.
13. In an electric lamp, the combination of a vertical pole, an upwardly and laterally extending arm formed of two or more tubes united at the outer end in a support for an electric lamp and spreading as they approach the vertical pole, and clamps encircling the pole and provided with sockets to receive the tubes forming the arm.
14. The combination of the pole A, the arm C formed of tubes C', supporting or clamping ring B for connecting the arm to the pole, the head D secured to the free end of the arm, and the tubular part D' supported by the head D adapted to support the lamp.
15. The combination of the pole A, the arm C formed of tubes C', supporting or clamping ring B for connecting the arm to the pole, the head D secured to the free end of the arm, the tubular part S' supported by the head D, the lamp guide frame E secured to the tubular part D' and provided with the spring contacts S, S, a shield or hood e carried upon said lamp guide frame E, a lamp F having terminal contacts and means for elevating the lamp into the guide frame.
16. An electric lamp provided with an electric regulator consisting of a movable core structure combined with high and low resistance solenoids, a cut out resistance, and a cut out switch device all arranged in the same cylindrical case and in which the cut out device is directly operated by the movable core structure.
- In testimony of which invention I have hereunto set my hand.
- R. M. HUNTER.
- Witnesses:
HELEN L. MOTHERWELL,
ERNEST HOWARD HUNTER.