No. 631,649. Patented Aug. 22, 1899.

G. R. MacINTIRE.

ELECTRIC ARC LAMP.

(No Model.) (Application filed Feb. 28, 1898.) 2 Sheets—Sheet 1.

Fig. 1.

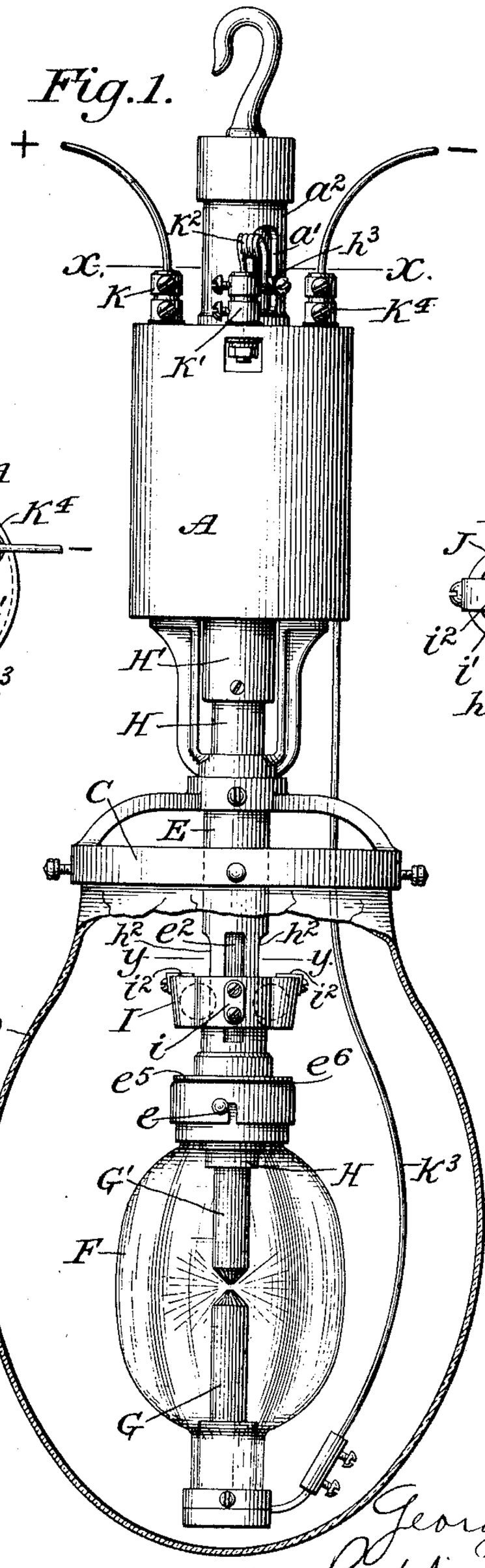

Fig. 2.

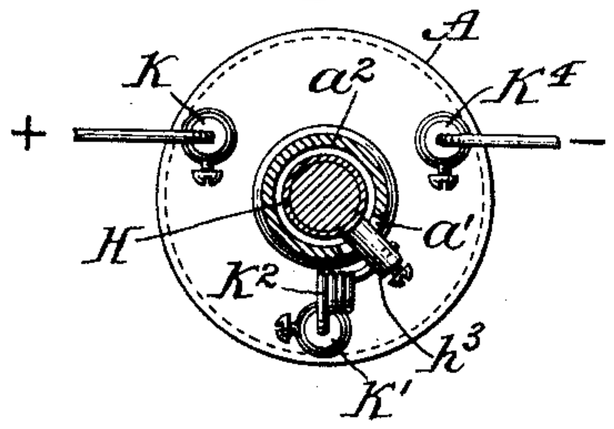

Fig. 3.

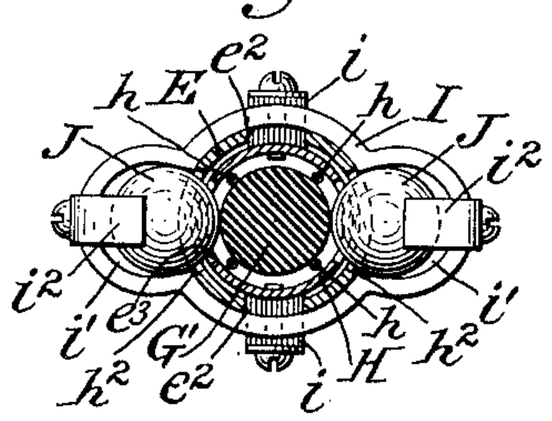

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Fig. 6.

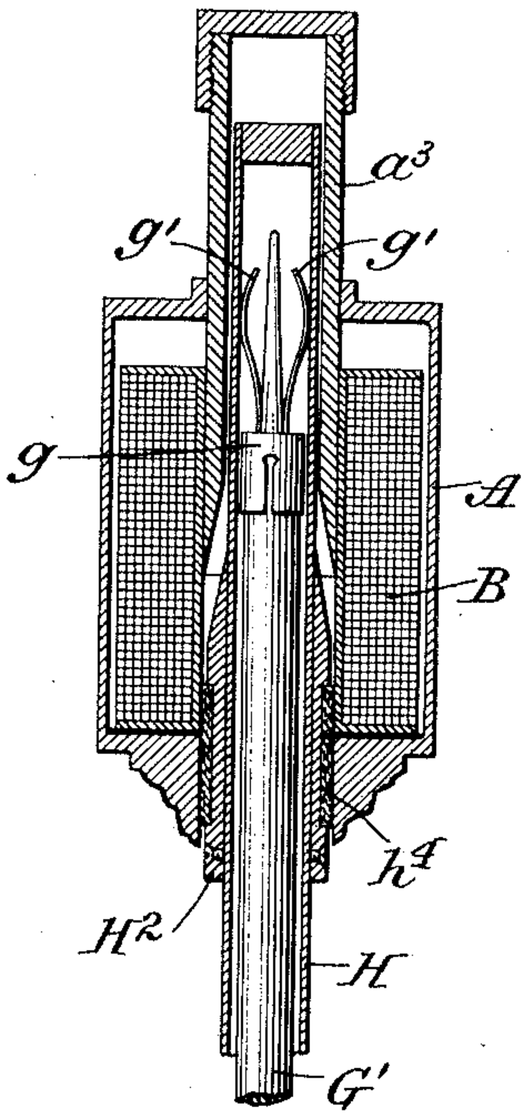


Fig. 4.

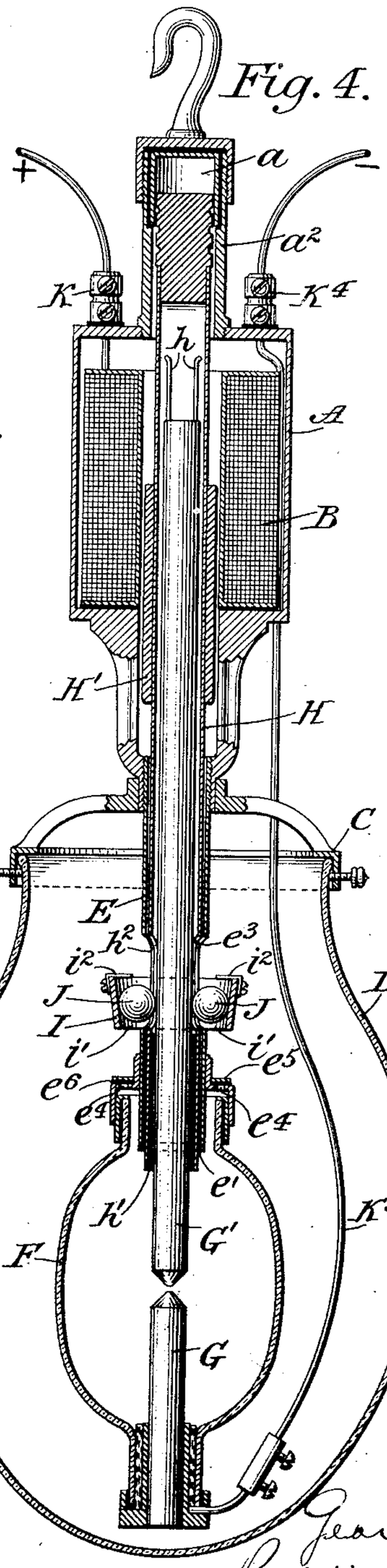
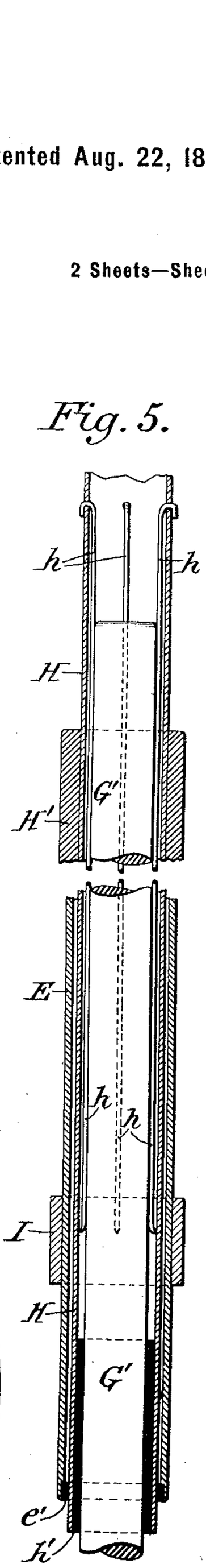


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE R. MACINTIRE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ELLIOTT P. GLEASON, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 631,649, dated August 22, 1899.

Application filed February 28, 1898. Serial No. 671,887. (No model.)

To all whom it may concern:

Be it known that I, GEORGE R. MACINTIRE, a citizen of the United States, residing in the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The objects of this invention are to simplify the construction of electric-arc lamps, to reduce to a minimum the size of such lamps, to improve their practical operation, to obviate as far as possible the danger of the formation of the arcs between their working parts, and to arrange their working parts and electrical connections in such a manner as to diminish the danger in handling them while the current is on. To the end that these various objects may be attained, I have devised the several novel features of construction and arrangement which I have described and explained hereinafter with reference to the convenient and practical embodiments thereof illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of a complete lamp in which my improvements are embodied, the outer globe being shown partly in section. Fig. 2 is a horizontal section on the plane indicated by the line *x x* of Fig. 1. Fig. 3 is a horizontal section on the plane indicated by the line *y y*. Fig. 4 is a vertical central section of the lamp shown in Fig. 1. Fig. 5 is a sectional detail view, on a larger scale, of the upper-carbon holder and some of its associated parts. Fig. 6 is a detail view in vertical central section of the upper portion of the lamp, showing a slight modification to be referred to.

In the construction represented in the drawings, a shell A, adapted for suspension from any suitable support, incloses a solenoid B and supports a holder C for an outer protective globe D. From the shell A depends a sleeve E, to which is secured, by a suitable bayonet or other joint *e*, the inner small globe F, immediately inclosing the arc. The lower or negative carbon G is supported wholly by the globe F, so that there are no arms in the path of the light to obstruct the same and to make shadows. The upper or positive carbon G′ is supported by the holder H within the sleeve E and the central aperture of the solenoid B. The said holder H is preferably a metallic tube adapted to move up and down to a limited extent within the sleeve E and the solenoid B, being guided in its movements and held from electrical contact with the shell A, the solenoid B, and the sleeve E, as clearly shown in Figs. 4 and 5, by a short insulated sleeve *a* at the upper end of the shell A and by a short sleeve or ring *e′* of insulating material seated in the lower end of the sleeve E. At all intermediate points the holder H is free from the shell, solenoid, and sleeve. The upper carbon G′ receives current through the tubular holder H and may rest in immediate contact therewith, or longitudinal wires *h h* may be provided within the holder H, as clearly represented in Fig. 5, to maintain proper electrical contact with the carbon without holding it so tightly as to interfere with its free movement under the operation of the feeding devices.

For the purpose of depriving the upper carbon of current when it has been consumed until but a short portion remains and of preventing at the same time the hot stub of carbon from falling into and perhaps cracking the globe *f* when it has passed beyond the grip of the feeding devices a sleeve *h′* of insulating material is secured within the lower end of the holder H, so that it centers the stub of the upper carbon upon the lower carbon and at the same time holds it out of contact with the conducting-surface.

The holder H has secured to itself at its upper portion the sleeve H′, which constitutes the core of the solenoid, the said sleeve H′ being free from contact with the spool of the solenoid and with the frame of the lamp.

At a convenient distance above the inner globe F the sleeve E is slotted, as at e^2, to permit of the attachment to the holder H by means of insulated studs *i i* of a clutch-carrier I. The latter has one or more cups *i′*, which taper slightly inward and downward to receive a corresponding number of clutch-pieces J J, which are preferably formed as rollers or balls and are made of some insulating material, such as lava, the clutch-pieces

being held from escaping from the cups by suitable clips i^2. The said clutch-pieces are intended to bear directly upon the upper carbon, and for this purpose the sleeve E and the holder II are slotted longitudinally, as at e^3 and h^2, respectively, the said slots registering one with another. It will be obvious that when the holder II moves upward under the influence of the solenoid B upon the core II' it will carry with it the carbon through the coöperation of the tapering cups i' and the clutch-pieces J, while at the same time owing to the nature of the material of which said clutch-pieces are formed there can be no short-circuiting between the upper carbon and the other parts of the lamp. When the holder II descends, the said clutch-pieces will be checked by contact with the lower ends of the slots e^3 in the sleeve E before the holder reaches the extreme limit of its downward movement, and the upper carbon will therefore be released from the grip of the clutch and be permitted to descend to compensate for the reduction in length of said carbon by the consumption thereof at the lower end. In this manner the extremity of the upper carbon will be kept always at the proper distance from the extremity of the lower carbon for the formation of the arc.

The positive wire is brought to a suitable binding-post K on the shell A, from which connection is made to the coils of the solenoid B and thence to a second binding-post K' on the shell A. From said post K' a flexible connection K^2 is made to a stud h^3, which projects from the holder II through an elongated slot a' in the tubular extension a^2 of the shell A. Thence the path of the current is by the upper and lower carbons and the wire K^3 to a binding-post K^4, to which the negative wire may be connected.

It will be observed that in the construction shown in Fig. 4 the cap of the holder H and the sleeve or cup a, within which it moves, form a dash-pot to retard the movement of the holder under the influence of the solenoid.

In the construction shown in Fig. 6 the sleeve-core H^2 is provided with a packing-sleeve h^4 to fit closely within the bore of the spool of the solenoid, and the tubular extension a^3 of the shell A is extended downward to make a tight joint with the spool of the solenoid, whereby also a dash-pot is formed. The packing-sleeve h^4 obviously should be of some suitable insulating material. In the construction shown in said Fig. 6 also the upper carbon G' is represented as having a cap g, which is provided with spring-fingers g' for the purpose of making contact with the conducting-holder H. Furthermore, this cap is of such diameter that it cannot pass the clutch J, wherefore as it holds the carbon frictionally the stub of the carbon will be suspended out of contact with the lower carbon when it has been consumed as far as possible. It is obvious that this device may be employed in the construction shown in Fig. 4 in addition to the insulating-sleeve, if desired. As represented in Fig. 4, the cap to which the globe F is attached is provided with holes e^4, which are covered by a loose annular washer e^5, having a lining e^6 of asbestos or other like material, whereby the globe may be relieved of any excess of pressure of gases developed by the arc and the globe ventilated as much as necessary, while at the same time the globe is protected against the too free entrance of air.

The mode of operation of my improved lamp will be readily understood from the foregoing description of the construction and arrangement of its parts without further explanation herein. It will be evident also that the lamp is not only compact, but is of extremely simple construction and is free from liability to short-circuiting, whereby its operation is rendered much more certain and uniform and there is practically no liability to derangement.

I claim as my invention—

1. In an electric-arc lamp, the combination with a frame or shell and a solenoid supported thereby, of a conducting carbon-holder insulated from the frame or shell, a connection from the solenoid to the holder electrically independent of the frame or shell, means for maintaining contact between the carbon and the holder, a core for said solenoid secured to said holder, a clutch-carrier secured to said holder, and a clutch-piece of insulating material mounted in said carrier to make contact with the carbon in said holder, substantially as shown and described.

2. In an electric-arc lamp, the combination with a frame or shell and a solenoid supported thereby, of a conducting carbon-holder insulated from the frame or shell, a connection from the solenoid to the holder electrically independent of the frame or shell, means for maintaining contact between the carbon and the holder, a core for said solenoid secured to said holder, a clutch-carrier secured to said holder and having a tapering cup, and a clutch-roller of insulating material mounted in said carrier to make contact with the carbon in said holder, substantially as shown and described.

3. In an electric-arc lamp, the combination with a frame or shell having a depending sleeve and a solenoid supported by said frame or shell, of a tubular carbon-holder insulated from the frame or shell, a connection from the solenoid to the holder electrically independent of the frame or shell, means for maintaining contact between the carbon and the holder, a core for said solenoid secured to said holder, a clutch-carrier secured to said holder through slots in said sleeve and a clutch-piece of insulating material mounted in said carrier to make contact with the carbon in said holder through registering slots in said sleeve and holder, substantially as shown and described.

4. In an electric-arc lamp, the combination with a frame or shell having a depending

sleeve, and a solenoid supported by said frame or shell, of a tubular carbon-holder of conducting material, means for maintaining contact between the carbon and the holder, insulated guiding devices to keep said holder out of contact with said frame or shell and sleeve, a core for said solenoid secured to said holder, a connection from the solenoid to said holder electrically independent of the frame or shell, a clutch-carrier secured to said holder, and a clutch-piece of insulating material mounted in said carrier to make contact with the carbon in said holder, substantially as shown and described.

5. In an electric-arc lamp, the combination with a frame or shell and means to support a lower carbon therefrom, of a conducting-holder for the upper carbon, feeding devices for said upper carbon and a sleeve of insulating material within said holder and below said feeding devices to center the stub of the upper carbon upon the lower carbon and to deprive it of current, substantially as shown and described.

6. In an electric-arc lamp, the combination with a frame or shell, and a solenoid supported by said frame or shell, of a conducting carbon-holder, a core for said solenoid secured to said holder, feeding devices carried by said holder and a flexible, electrical connection to said holder through a slot in said shell, substantially as shown and described.

7. In an electric lamp, the combination with a frame or shell, and a solenoid supported thereby, of a carbon-holder electrically connected with the solenoid independent of said frame or shell, a core for the solenoid secured to said holder within the spool of the solenoid and having a packing-sleeve of insulating material in contact with the spool to form, in connection therewith, a dash-pot, and also serving to insulate the core and holder from the frame or shell, and means to close the bore of the spool above the shell; substantially as described.

This specification signed and witnessed this 26th day of February, A. D. 1898.

GEORGE R. MACINTIRE.

In presence of—
W. B. GREELEY,
A. N. JESBERA.