(No Model.) 3 Sheets—Sheet 1.

E. THOMSON & C. E. HARTHAN.

ELECTRIC ARC LAMP.

No. 551,799. Patented Dec. 24, 1895.

FIG. 1.

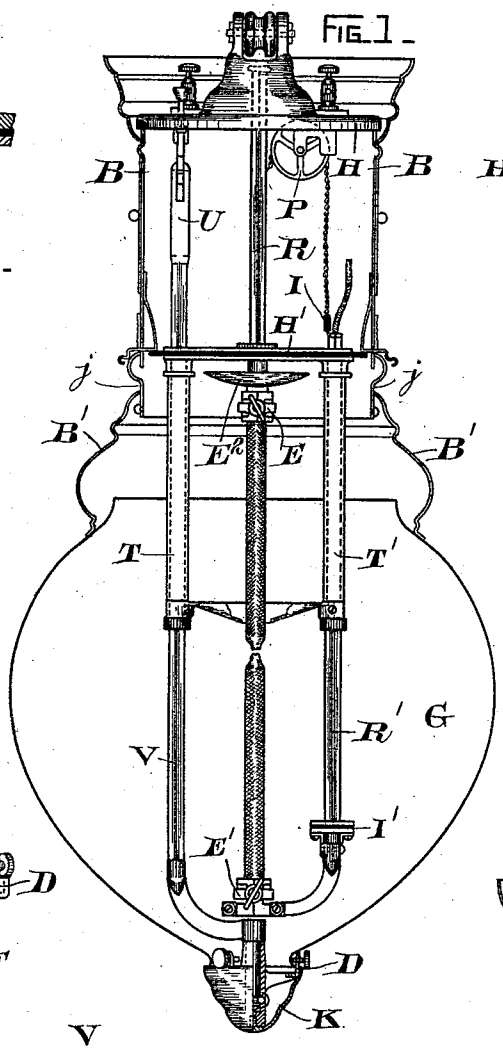


FIG. 2.

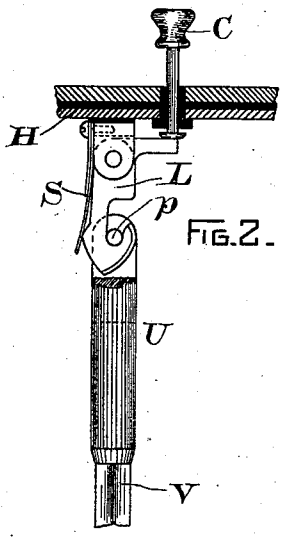


FIG. 3.

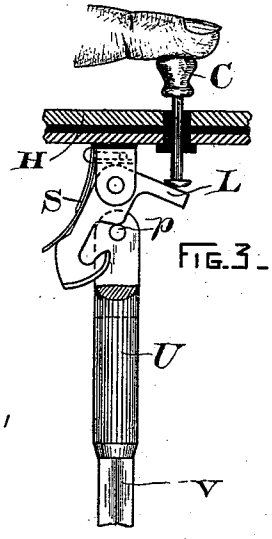


FIG. 4.

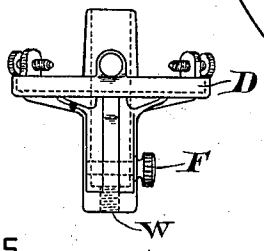


FIG. 5.

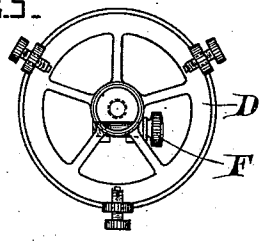


FIG. 6.

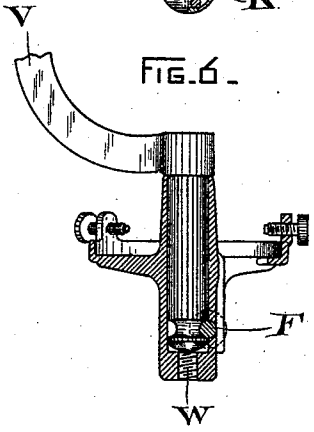


FIG. 7.

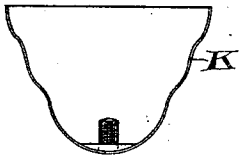
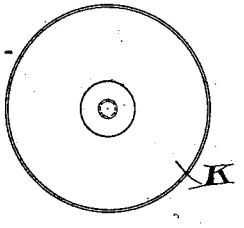


FIG. 8.



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(No Model.) 3 Sheets—Sheet 2.

E. THOMSON & C. E. HARTHAN.

ELECTRIC ARC LAMP.

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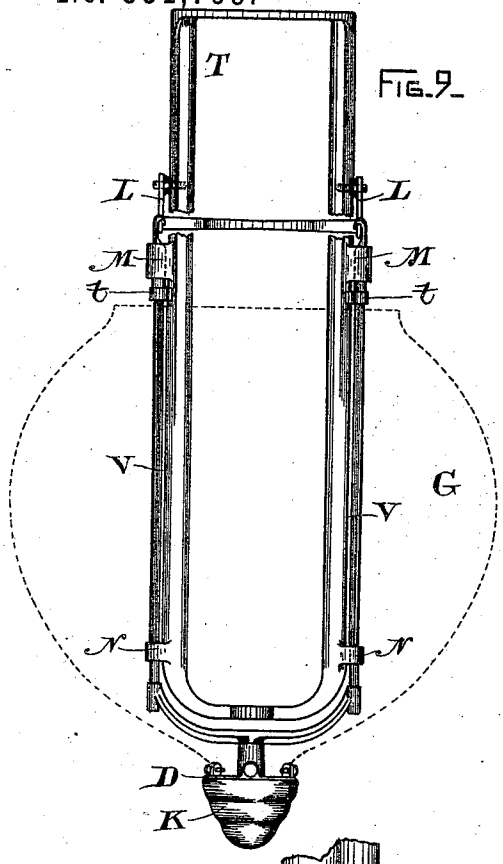

FIG. 9.

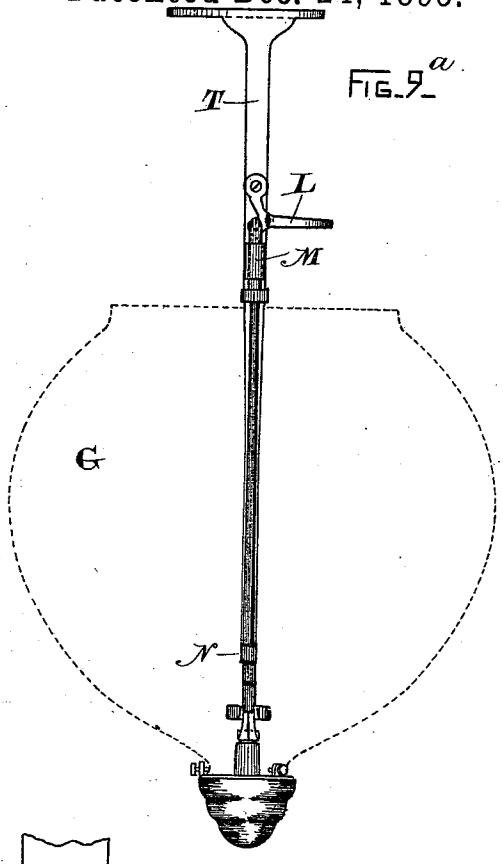

FIG. 9a.

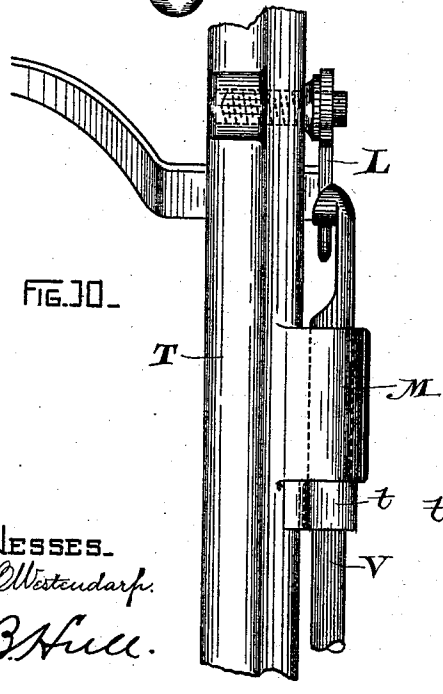

FIG. 10.

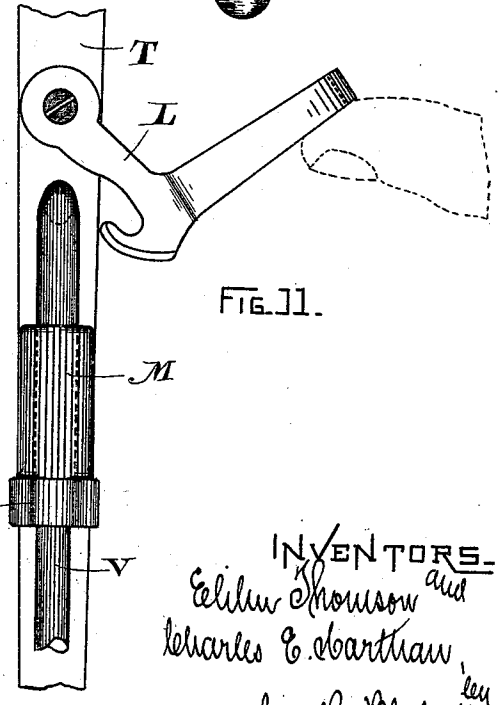

FIG. 11.

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E. THOMSON & C. E. HARTHAN.

ELECTRIC ARC LAMP.

No. 551,799. Patented Dec. 24, 1895.

FIG. 12.

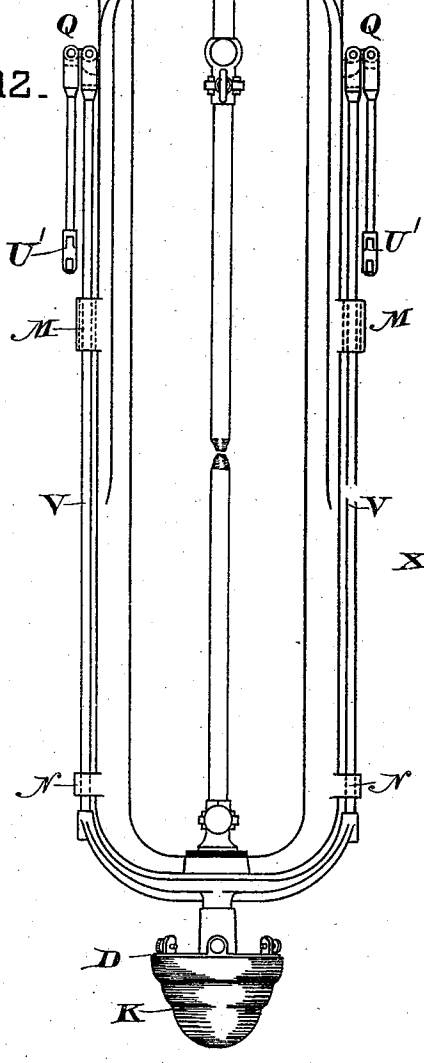

FIG. 13.

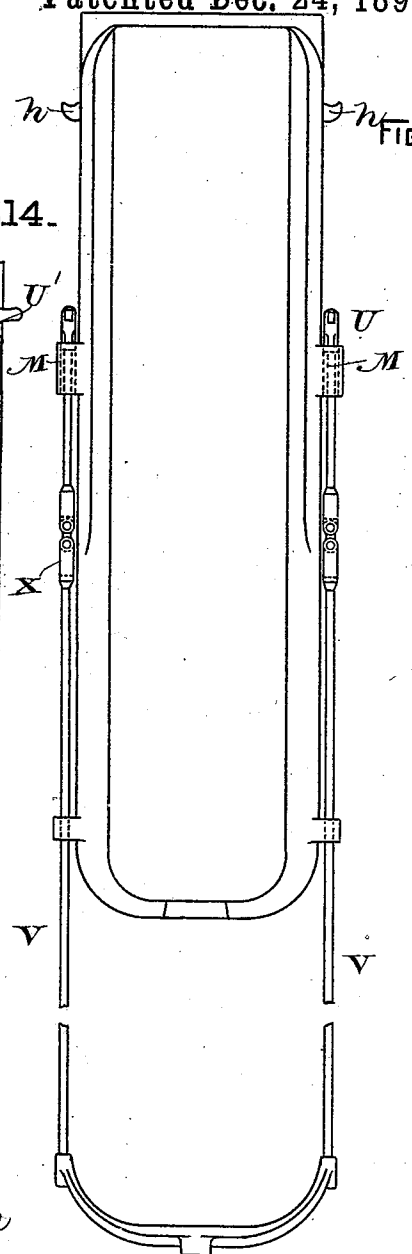

FIG. 14.

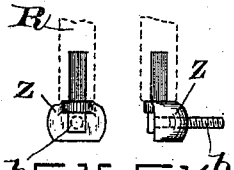

FIG. 15.

FIG. 16.

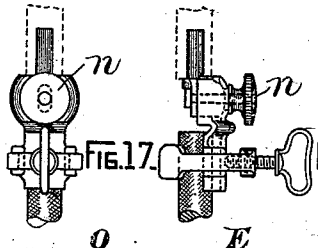

FIG. 17.

FIG. 19.

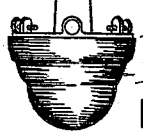

FIG. 18.

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UNITED STATES PATENT OFFICE.

ELIHU THOMSON AND CHARLES E. HARTHAN, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 551,799, dated December 24, 1895.

Application filed May 9, 1895. Serial No. 548,791. (No model.)

To all whom it may concern:

Be it known that we, ELIHU THOMSON, residing at Swampscott, and CHARLES E. HARTHAN, residing at Lynn, county of Essex, State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

Our present invention relates to improvements in the mechanism for facilitating the insertion of carbons and the cleansing of arc lamps.

The object of our invention is particularly to facilitate the manipulation of the lamp so far as renewal of the carbons goes. It therefore involves means for removing or releasing the globe-holding devices, for lowering the globe and for the insertion of carbons, and also means for catching the carbon-dust and removing the same from the globe and from the lamp.

Our invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a general view of an arc lamp embodying the improvements. Figs. 2 and 3 are details of the globe holding and lowering mechanism. Figs. 4 and 5 show the globe-holder itself. Fig. 6 shows the globe-holder in place. Figs. 7 and 8 are views of the carbon-dust cup provided for attachment to the globe-holder. Figs. 9 and 9ª show a modification of certain parts of our invention adapting it to operate with a different style of lamp. Figs. 10 and 11 are illustrative drawings showing the mode of operation. Figs. 12, 13, and 14 show modifications of the latching arrangements for the globe-support. Figs. 15, 16, 17, 18, and 19 are details of the carbon holding and adjusting mechanism.

In Fig. 1, B B is the mechanism box of an arc lamp, the mechanism itself being of any suitable kind to feed the carbons, form and maintain the arc. No mechanism is shown except those parts immediately concerned in the present invention. The box itself is a cylinder inclosing the mechanism, supported between two heads or plates H H′, through which the upper carbon rod R passes. In the figure this rod has a chain attached to it which passes over a pulley at P and connects to the lower-carbon-holding rod R′, which passes down through a portion of the side frame, as shown, and is therein guided. This chain has an insulated section at I or is made of insulating material. From the bottom plate H′ are two depending side tubes T T′, T′ being the support and guide for the rod R′, which by an extension from the lower part carries the lower-carbon holder at E′, the upper-carbon holder E being situated immediately under a small deflecting-plate E^2 shown above it.

The tube T forms the guide for the globe-holding side rod V, the lower end of which is provided with a curved extension from the rod V, and carries centrally in the globe-holder E′ a stud or rod projecting downward, upon which the globe-holder proper is supported at D. This arrangement will be referred to farther on.

The rods R′ and V are preferably made square, so as not to turn out of position, and to this end also the lower openings in the tubes T T′ are made square to fit the rods and prevent them from turning. The upper part U of the rod V, however, as shown in Figs. 1, 2, and 3, is cylindrical. This portion is provided with a pin which engages with a latch in the upper part of the mechanism-box. The arrangement is shown in an enlarged view in Figs. 2 and 3, where U is the cylindrical upper portion of the rod V, acting as the globe-supporting rod and provided, as indicated, with the pin *p*, which is caught by a hooked lever L, pivoted in a piece borne on the upper plate H. This lever is held to the right by a spring S and has a disengager or button C placed upon a small rod extending upward through the lamp-case, by depressing which the lever L may be thrown to the left. It cannot, however, be so thrown until the globe-holder and the attached rod V have been lifted a little, as the shape of the hook on the lever L prevents this. If, however, by placing the hand under the globe and raising it the pin *p* is brought upward in the hook, while at the same time by the button C the lever L is thrown into the position shown in Fig. 3, the hooked lever L is disengaged. By lowering

the globe and globe-holder and rod V U the globe can now descend vertically, free of the hooked lever, and the cylindrical portion U will pass downward in the said tube T, which acts as a guiding-support therefor, and will finally rest at the bottom of the tube, being unable to pass through the square opening below. This will drop the globe G, with the holder D, so as to enable the carbons and carbon-holders to be freely manipulated. It will also allow the carbon-dust collected in the globe to be brushed from the sides of the globe down into the bottom of the same and through the globe-holder into a cup provided therefor, as will be described. It will thus be seen that to disengage the globe it is necessary to support it and even raise it a little by hand, while at the same time the button C is pressed. Hence the globe cannot accidentally come down or cannot be disengaged by either handling the globe itself without touching the button C, or by pressing the button C without raising the globe. This we regard as a valuable feature in our present invention. The mechanism-box B is preferably in this arrangement provided with a slip-section B′ B′, having a slight motion up and down at a joint *j j*, so as to accommodate the slight upward and downward motions of the globe and also accommodate the slight changes in the size of the globe without leaving an opening, the lamp being at all times closed. This is done by simply making the section B′ B′ a circular casing or rim sliding on the exterior of B B, as at *j j*, through a limited range, proper stops being provided to prevent the section B′ B′ becoming completely detached and falling out of place when the globe G is let down, as before described. In this arrangement the lower-carbon holder E′ is insulated from the rod R, preferably by an insulating-joint at I′. The connection to the said holder might be a cable let down through the interior of the rod R′, which is made of tubing for this purpose.

In our invention the globe-holder D, as shown separately in Figs. 4 and 5, is the usual plate or ring having lugs with screws for catching the lower edge or outwardly-turned edge of the globe and for securing the same. The central portion of the globe-holder D is tubular, as shown in section, Fig. 6, passing over a stud or vertical rod extending from the support downward and secured thereto by a laterally-placed screw F passing tangentially through the globe-holder itself and into a groove in the central rod upon which the globe-holder is placed. There are openings provided, as shown in the plan, Fig. 5, in the globe-holder from its upper to lower surface, it preferably being made wheel-like with spokes, though a few openings, all round or of other form, would suffice. The object of this is to allow the carbon-dust to be brushed down through the globe-holder D proper. The lower end of the tubular central section of the globe-holder is threaded, as at W, so that there may be screwed to it an outer inclosing cup. (Shown separately in plan and in section in Figs. 7 and 8, and shown in place in Fig. 1.) This cup K serves to catch the carbon-dust which is brushed down from the globe and can readily be taken off from the globe-holder, removed and emptied, and returned to place without disturbing the fastenings of the globe. It also serves as a finish to the globe-holder itself.

In the arrangement shown in Fig. 1 both carbons move. The upper rod in coming down feeds the upper-carbon holder E downward at the same time that the rod R′ is carried upward with the lower holder E′ attached. It should be mentioned that when the globe has once been lowered and the carbons inserted, the carbon brushed off the globe-holder or the sediment removed, a simple movement upward of the globe, carrying with it the holder E′, cap K, and rod V, will again latch and sustain the globe in position owing to the fact that the lower portion of the hooked lever L is made sloping, so that when the pin *p* meets it on the upward course it deflects the lever and the stud snaps into place. The release of the globe and its descent slightly downward fixes the stud or pin in position in the hook.

The arrangements just described are adapted, as will be seen, to an entirely-closed lamp, the inclosure being secured by the box B B, the slip-section B′ B′, and the globe G. Hence the operating portion or button C is placed at the top of the lamp for convenience. When it is possible to operate the releasing mechanism from below the mechanism-box, and when the lamp-frame has sufficient length therefor, with no obstruction in the way of the operating devices, a modification of the arrangement is used, as shown in Figs. 9, 9ª, 10, and 11. Here we show also the duplication of the supporting-rods for the globe-holder, there being shown two rods V V, provided on opposite sides of the lamp-frame T, which frame carries the lower-carbon holder in the center at the bottom, though this is not shown in the figure.

Fig. 9 is a side view, and Fig. 9ª an edge view of the lamp-frame, suspended from the mechanism-box as usual. In this case the carbon-dust cup K and the globe-holder D are sustained at the center of a yoke joining the two side rods V V, and the globe is shown in dotted lines in the drawings. The rods V V are guided through lugs which have holes drilled in them, which lugs are attached to or made part of the frame T T. The lower lugs are indicated at N N and the upper lugs indicated at M M, while a double hooked lever L L is provided for engagement with the upper end of the side rods V. This will be more clearly shown by reference to Figs 10 and 11, Fig. 10 being a front view of the parts in the act of disengagement, while Fig. 11 is a side view of the same parts in the same position. In Fig. 10 T is one side of the lamp-frame, while M is one of the upper lugs through which an enlarged

portion of the side rod V passes upward and is cut away to form a portion for the engagement of the hooked lever L swung on a pivot attached to the frame T, as shown. To lower the globe as before, it is only necessary to raise the globe slightly with the side rods V V, and when this is done to manually turn aside the lever L into the position shown in Figs. 10 and 11, out of engagement with the upper end of the rods V V. The globe and its attached parts may now be lowered until the enlarged portion of the rod V catches on the lower lugs N N, Fig. 9, of the side frame T T. In replacing the globe the side rods are sent upward, passed through the perforated lugs M M, and reengage with the hooks L L, which are dropped back to a vertical position. The action is in all respects the same as that described in connection with the devices of Figs. 1, 2 and 3. To insure the following of the rods V V upward through the lugs M M, guiding-pieces are attached to them, as at *t t*, which partly embrace the side frames T T, and slide thereon during the upward and downward movements. The hooked levers L L are preferably, of course, connected by a single yoke-piece, (indicated in the drawings,) so that they may be operated together.

A further modification of our invention is made, as shown in Figs. 12, 13 and 14, by causing the side rods V V to pass through the pairs of lugs M M N N, as before, and placing upon the side frame small hook projections *h h*, made flat, in a stationary position, to engage in a slot in the jointed portions of the rods V V, as indicated at Q Q. The slot in which these parts engage is shown at X, Fig. 14. Fig. 12 shows the globe in its upper or raised position and the slotted portions of the side rods V V engaging with the laterally-projecting hooks *h h*, upon which they hang. To disengage them the upper ends of the rods V V are sprung outward, having sufficient elasticity and carried off the ends of the hooks, after which they may be lowered. As they pass downward through the lugs M M, which are bored out large enough to let the jointed portions at L pass, the said jointed portions straighten out and the final position during lowering is reached when the parts are strung out, as in Fig. 14, the jointed portions depending from L downwardly, having an enlarged head at U′ U′, which cannot pass the lugs M M, and which therefore gives support to the globe-holder. On raising these portions again and folding back the jointed side rods the slotted portion X is again carried over the hooks *h h*, and by a slight downward motion locked in place. In this case, as before, it is necessary in disengaging the globe-holding supports to slightly raise the globe and its supports before the same can be lowered, and also to press aside the portions from the hooks. In reversing the motion the globe takes its upper position, and is fastened in place by re-engagement of the hooks, and slightly dropping back with or without manipulation.

Where the lower-carbon holder of the lamp is, as in the last instance, fixed, it is essential in inserting carbons to provide and adjustment for centering the ends of the carbons when they are slightly out of true. It has been usual to secure this result by causing a sort of ball-and-socket joint to have a rocking motion with respect to the rod. Most of these devices employed for this purpose, however, have been uncertain in their action and have oftentimes worked out of place. To prevent this we have devised a simple yet secure arrangement for giving a ball-and-socket motion to the upper-carbon holder relatively to its rod, which is shown in connection with Figs. 16, 17, 18, and 19. R represents the upper-carbon holding rod, into the end of which is inserted a stud or a small casting, as at Z Z, Figs. 15 and 16, forming a portion of a sphere. Through the center of the curved face is passed a bolt, (shown at *b*, Figs. 15 and 16,) the head of the bolt resting against the flat side or cut-away portion of the spherical piece, as shown. There is now slipped over this bolt the upper-carbon holder, Fig. 18, having a cup-shaped portion with an oblong opening, as at O. This cup-shaped portion fits over the spherical surface of the piece Z, and the bolt *b* passes through the opening O. This is followed by a milled nut *n*, Figs. 17 and 19, screwed upon the bolt, and which draws together the faces of the carbon-holder and the piece Z, and holds them firmly in relative position. It will now be seen that by slackening the nut *n* swinging motion in all directions may be given, within a limited range, to the carbon-holder— that is, in Fig. 19 the carbon-holder E could be swung to the right or left within the limits of motion permitted by the oblong opening O, while the swinging motion forward or backward can be obtained by simply pivoting around the bolt *b* in the center of the opening O, and of course any intermediate position between these two motions at right angles can be obtained. After the parts are adjusted with the carbons in proper alignment, it suffices simply to tighten the nut *n* to have the parts remain in rigid relative position.

By our invention we greatly facilitate the handling of the carbons, the replacement of the carbons, the cleansing of the arc-lamp globe, and the removal of the carbon dust or sediment collected therein.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric arc lamp, the combination of a rod supporting the globe-holder, a hook connecting the rod with a fixed part of the lamp, a plunger for releasing the hook, and means for allowing the operation of the plunger only when the rod is in a predetermined position.

2. In an electric arc lamp, the combination of a globe-holder mounted on a side rod, and provided with a hub and rim, openings between the hub and rim, and a cup adapted to screw on the bottom of the hub for the purpose described.

3. In a carbon-holder for an electric lamp, the combination of a spherical piece mounted on the supporting rod, flattened on one side to form a seat for the clamping screw, a cup-shaped piece carrying the carbon-holder fitting over the spherical piece and slotted to receive the screw, and a nut clamping the two parts together.

4. In an electric arc lamp, the combination of a side rod adapted to support the globe, a hook made in the form of a bell-crank lever mounted on the fixed part of the lamp, the hook locked by the side rod, a plunger engaging with one end of the lever, and when depressed forcing the hook at the other end of the lever out of engagement with the side rod.

5. In an electric arc lamp, the combination of a globe-holder supported by a side rod, a bell-crank lever having one of its ends formed as a hook and engaging with the side rod, and locked in its normal position thereby a spring tending to keep the hook in line with the side rod, and a plunger engaging with the other end of the bell-crank lever, to throw the hook out of line with the rod when depressed.

6. In an electric arc lamp, the combination of a single supporting rod for the globe holder adapted to move in a vertical direction, a guide for preventing the rod from rotating, and a hook on the fixed portion of the lamp engaging with the rod and locked thereby.

7. In an electric arc lamp, the combination of a globe-supporting device adapted to move in a vertical line, with a hook engaging the globe-supporter and locked in position thereby, and means for releasing the hook when it is desired to lower the globe.

8. In an electric arc lamp, the combination of a globe-holder supported by a means independent of the frame supporting the lower carbon, a hook on the lamp frame normally supporting the weight of the globe and holder, a lock between the hook and the supporting rod controlled by the latter, and a stop to limit the downward movement of the globe-holder.

9. In an electric arc lamp, the combination of a globe-supporting rod, and a hook mounted on the fixed part of the lamp, supporting the globe rod and locked in position thereby.

10. In an electric arc lamp, the combination of a globe-supporting rod, a hook attached to a fixed part of the lamp frame, and a locking mechanism between the globe-supporting rod and the hook controlled by the rod.

11. In an electric arc lamp, the combination of a globe holder rod, with a supporting and releasing mechanism locked by the rod when in its normal position and released only when the rod has been raised a predetermined amount.

12. In an electric arc lamp, the combination of a globe-supporting rod, a hook from which the rod is suspended, a lock between the rod and the hook controlled by the rod, and a plunger for operating the hook after it has been released by the rod.

In witness whereof we have hereunto set our hands this 23d day of April, 1895.

ELIHU THOMSON.
CHARLES E. HARTHAN.

Witnesses:
JOHN W. GIBBONEY,
HENRY O. WESTENDARP.