(No Model.) 2 Sheets—Sheet 1.

M. WHELESS.

ELECTRIC ARC LAMP.

No. 549,083. Patented Oct. 29, 1895.

Fig. 1.

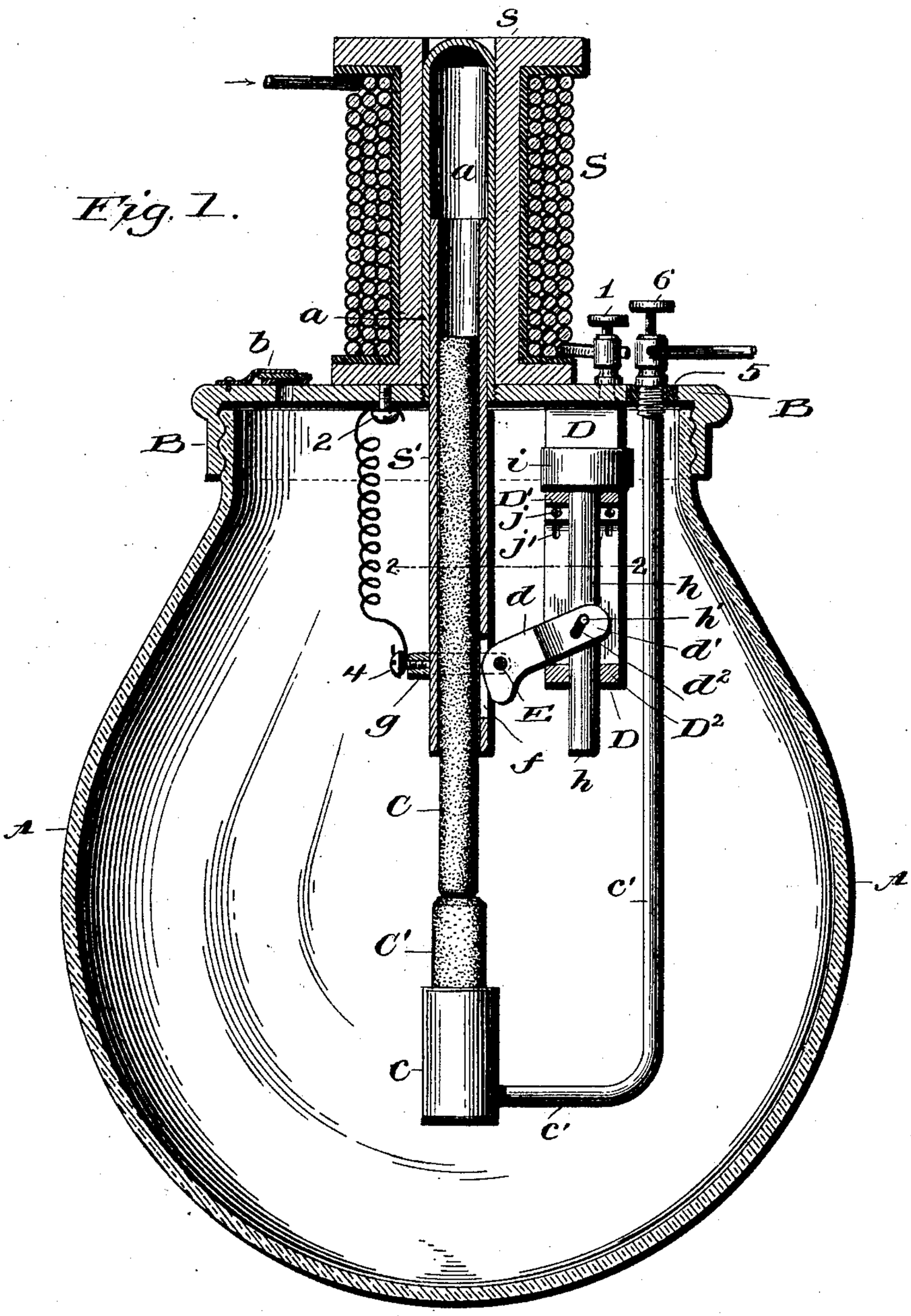

Fig. 2.

Witnesses:
L. C. Hills.
F. B. Keeler

Inventor:
Malone Wheless,
by Marcellus Bailey.
his Atty.

(No Model.) 2 Sheets—Sheet 2.

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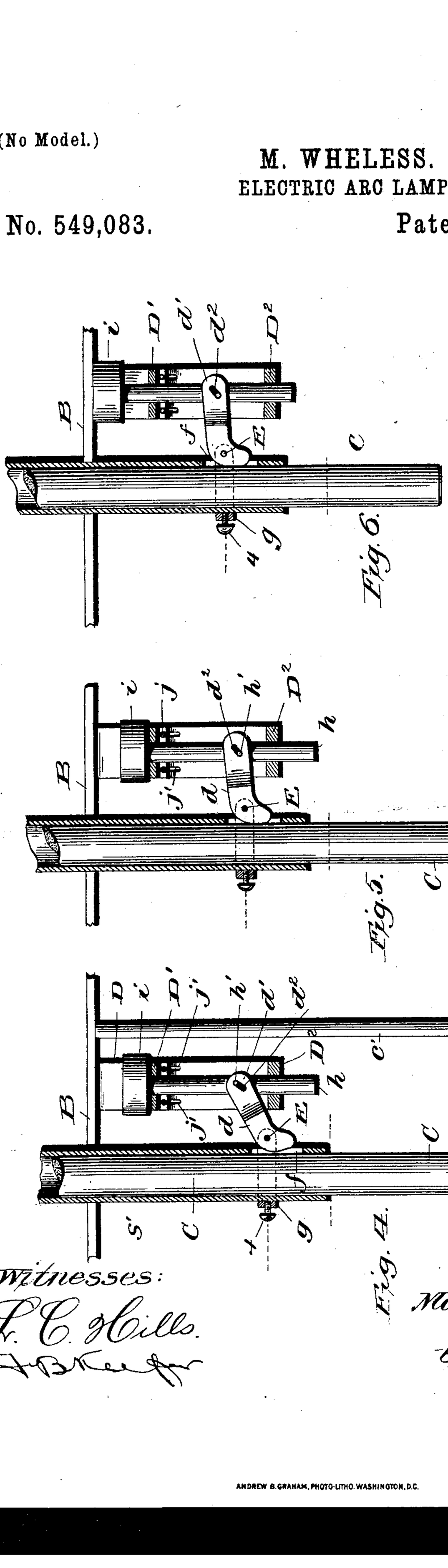

Fig. 6.

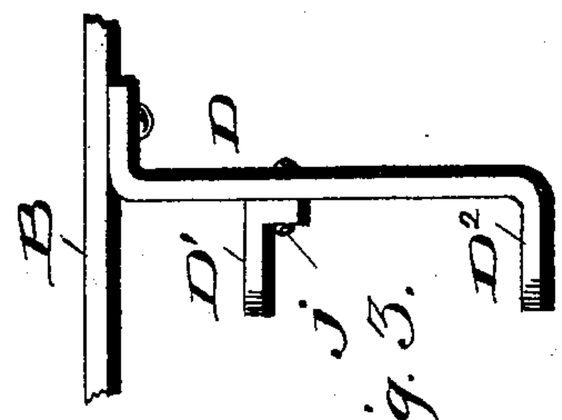

Fig. 3.

Fig. 5.

Fig. 4.

Witnesses:
L. C. Hills.
J. B. Keeler

Inventor:
Malone Wheless,
Marcellus Bailey
by his Atty.

UNITED STATES PATENT OFFICE.

MALONE WHELESS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO EDWARD W. CREECY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 549,083, dated October 29, 1895.

Application filed March 6, 1895. Serial No. 540,799. (No model.)

To all whom it may concern:

Be it known that I, MALONE WHELESS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

The electric-arc lamp in which my improvements are comprised is one designed to combine cheapness and simplicity of construction with efficiency and economy when running or in operation.

I will first describe my improvements in connection with the drawings accompanying and forming part of this specification, and will then point them out more particularly in the claims appended to the description.

In the drawings, Figure 1 is a vertical central section of a lamp embodying my improvements. Fig. 2 is a section on line 2 2, Fig. 1. Fig. 3 is an edge elevation of the supporting-bracket for the vertically-movable controlling-rod to which the tail or stem of the carbon-holding dog is connected. Figs. 4, 5, and 6 are views in sectional elevation of the several positions assumed by the movable carbon and its feeding and controlling mechanism.

The shell of the lamp consists of a globe A, of glass or other transparent or translucent material, and a cap B, which closes the mouth or top of the globe. The globe hangs from the cap and preferably screws into it, as shown, having a ground edge, which when the globe is screwed home fits against the under side of the cap with reasonable tightness, but not necessarily so closely as to exclude all air. As a matter of fact, while the lamp is in operation air will in small quantities filter into the lamp through the joint between the globe and cap. Provision is made to counteract the effect due to any sudden expansion of air by heat or other causes and consequent internal pressure upon the globe by providing in the cap a suitable outwardly-opening spring-closed valve *b*, which normally closes a vent in the cap.

In the center of the cap is formed an opening, to which is fitted a tube *a*, surmounting the cap and rigidly secured thereto in any desired way. In this instance it screws into the central opening in the cap. The tube, which is closed at top, is surrounded by the solenoid S, the spool *s* of which fits upon the tube, and it is intended to accommodate and permit the upward passage of the movable solenoid-core *s'*, serving as a guide for that core.

The core is tubular and is intended to receive the movable carbon C, which fits loosely within it and will drop therefrom by gravity unless restrained by some extraneous means. The stationary carbon C', located, as usual, below the movable one, is carried in a suitable holder *c*, sustained by a supporting-arm *c'*, attached to the cap B.

I have shown the solenoid-core as tubular and constituting a holder for the movable carbon; but manifestly it would be within my invention to make the core solid and to attach to it a suitable tubular holder for said carbon. In other words, that part which receives the movable carbon is a tubular carbon-holder which may or may not form part of the solenoid-core.

To the movable carbon holder as thus defined is connected a cam or eccentric-like dog *d*, carried by the holder and mounted upon a pivot or axle E at right angles to the longitudinal axis of the holder, with its acting face opposite an opening *f* in the holder, through which that face may project to meet and press against the carbon. The dog *d* in this instance is pivoted between the ears of a ring *g*, secured upon the exterior of the holder.

The dog is provided with a tail or stem *d'*, which is designed to engage a vertically-movable guide or controlling rod *h*, for which purpose the outer end of said tail or stem, as seen in Fig. 2, is forked to straddle the rod and is provided with slots d^2, which engage pins *h'*, projecting laterally from opposite sides of the rod.

The controlling-rod is held in a supporting-bracket D, secured to the under side of the cap B, the bracket being provided with laterally-projecting ledges or shelves D' D^2, through guide-holes in which the rod passes.

It is requisite that a stop should be provided to limit both the upward and the downward movement of the rod. The extent of its upward movement determines the extent of sepa-

ration of the carbons, and its downward movement must be arrested at a point where the carbon (which is freed by the act of arresting the down movement of the rod) may continue its descent independently of its holder in order to compensate for any decrease in its length due to combustion or consumption while in action. For this purpose a variety of stop devices may be employed. The simplest and most effective form, however, I find to be a head or enlargement *i* upon the upper end of the controlling-rod *h*. The top of this head by bringing up against the under side of the cap B limits the upward movement of the controlling-rod, and the bottom of the head by bringing up against the top shelf D′ limits the downward movement of the rod.

The distance between the top of the head *i* and the under side or other part of the cap B against which it brings up should equal the distance which the carbons are to be held apart when in action; and for the purpose of getting this distance accurately, as well as for varying the distance whenever desired, I find it convenient to make the top shelf D′ adjustable vertically, or toward and away from the cap B, for which purpose it may be held to the bracket D by set-screws *j*, passing through longitudinal slots *j′* in the bracket.

The electrical connections and course of current in the lamp are as follows: The current, after traversing the windings of the solenoid S, passes to binding-screw 1, thence through cap B to binding-screw 2, thence by wire 3 to binding-screw 4 on upper-carbon holder and through that holder and the upper carbon C to lower carbon C′ and its holder *c*, thence through supporting-arm *c′* (which for this purpose is insulated from the cap B, as indicated at 5) to binding-screw 6, and thence to line.

The operation is as follows: When the current is off, the parts are in the position illustrated in Figs. 1 and 4. In this position the carbons are together, the dog *d* being in a position in which its acting face is removed from contact with the movable carbon C, which consequently is loose in its holder. The holder for the movable carbon is sustained in the position shown by its connection through the intermediary of the dog *d* and its stem *d′* with the controlling-rod *h*, and this rod is held in position by the upper shelf D′, upon which the head *i* rests. Under these conditions when the current is turned on the solenoid S will be energized, and consequently will draw up its core. The first effect of this movement of the core will be to raise the upper-carbon holder independently of the upper carbon C, because the latter is entirely loose and free from the control of the dog *d;* but the holder in its upward movement effects a tilting or partial revolution of the pivoted dog in a direction to bring the swell on its acting face up against the upper carbon, which latter by the time the holder rises to the position shown in Fig. 5 will consequently be clamped firmly between the dog and the opposite side of the holder, the controlling-rod *h* still remaining at rest. When the parts take this position, then by the continued upward movement of the solenoid-core the holder, carbon, dog, and controlling-rod will move as one and will rise together until the head *i* brings up against the cap B, thus establishing the arc. The head may bring up against the cap with some force, but this has only the effect of tightening the hold of the dog upon the upper carbon. The parts continue in this position until the current is turned off or until, owing to the continued maintenance of the arc, there is such consumption of the carbon as to interrupt the continuity of the arc. In any such event the solenoid will become de-energized and its core will drop, thus permitting the parts to descend. In their descent they move together until they reach the position shown in Fig. 5, at which point the controlling-rod will be arrested; but the upper carbon and holder will by gravity continue their descent, the carbon thereby being released from the grip of the dog. The holder will drop as far as permitted by its dog, while the now loose carbon will drop independently of the holder until it brings up against the lower carbon, the parts thus resuming the position shown in Fig. 4, after which, if the current is still on, the upper carbon will at once be again lifted to the position shown in Fig. 6.

Having described my improvements and the best way now known to me of carrying the same into effect, what I claim herein as new and of my own invention is as follows:

1. In an arc lamp and in combination with the solenoid and its core for establishing the arc, the carbon holder actuated by said core, the carbon loosely contained in said holder, the hinged or pivoted carbon gripping dog, carried by said holder, the vertically movable controlling rod connected to the tail or stem of said dog, a support for said rod, and a stop for limiting the movement of said controlling rod in each direction, substantially as and for the purposes hereinbefore set forth.

2. The vertically movable controlling rod, a support therefor and means for limiting the movement of the rod in each direction, in combination with the movable carbon holder and a pivoted or hinged carbon gripping dog carried by the carbon holder and connected to the controlling rod, substantially as and for the purposes hereinbefore set forth.

3. The movable carbon holder, and the pivoted or hinged carbon gripping dog carried by the same, in combination with the vertically movable controlling rod provided with a stop-head, and mounted in a suitable support, an abutment for arresting upward movement of the head, and an adjustable shelf or stop for arresting the descent of the head, substantially as and for the purposes hereinbefore set forth.

4. The supporting cap and globe secured to and hanging from the same, the solenoid

mounted on said cap upon a tube closed at top and opening into the globe through the cap, in combination with a solenoid core in said tube, a carbon holder carried by said core, a loose carbon within said holder, a controlling rod mounted and vertically movable in a bracket attached to said cap, a gripping dog pivoted to the movable carbon holder and connected to the controlling rod, and a stationary lower carbon and carbon holder connected to and supported by the cap, under the arrangement and for joint operation as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 4th day of March, 1895.

MALONE WHELESS.

Witnesses:
F. B. KEEFER,
M. BAILEY.