No. 710,055.

Patented Sept. 30, 1902.

C. E. HARTHAN.

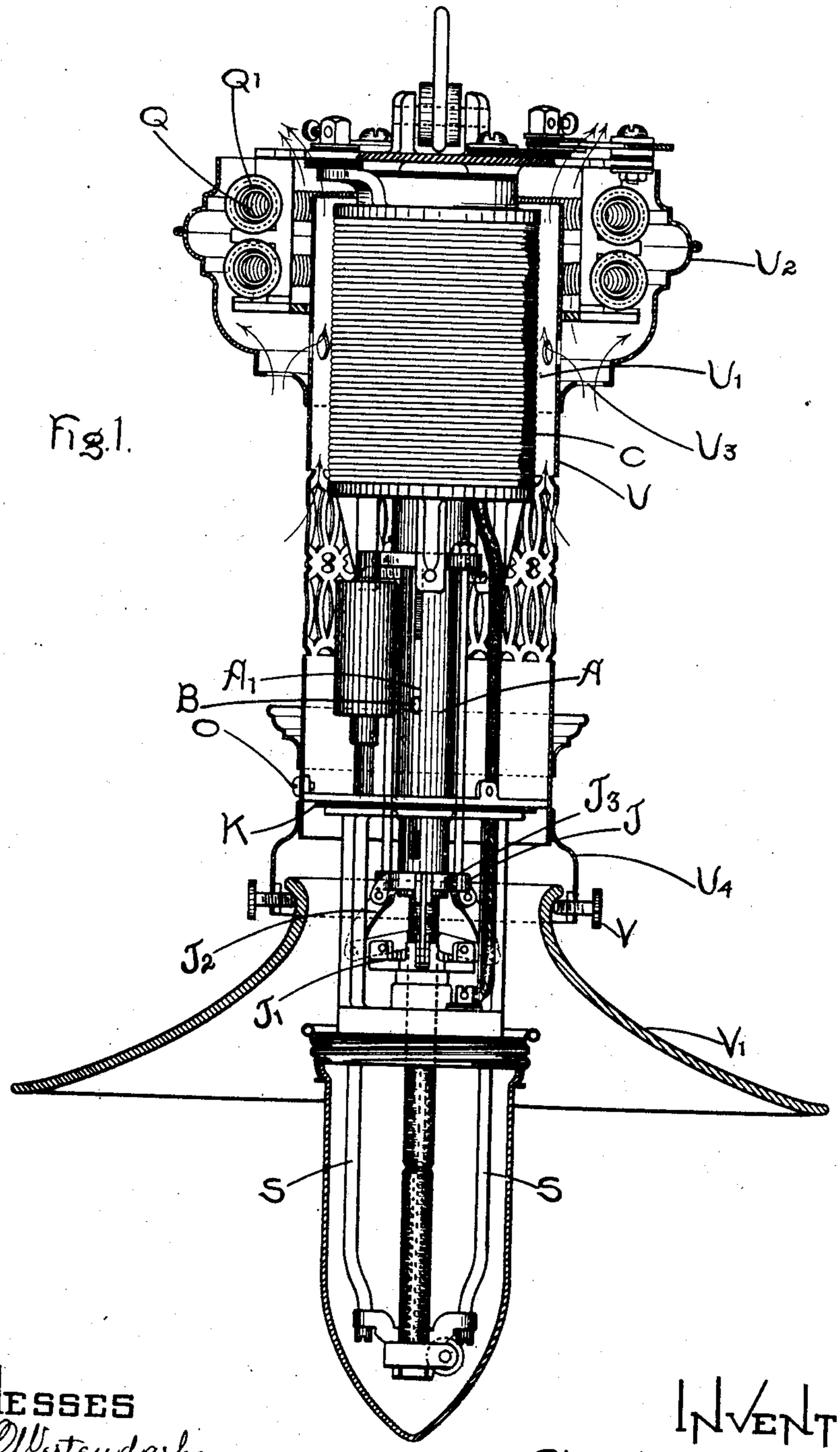
ELECTRIC ARC LAMP.

(Application filed July 24, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

Fig.2.

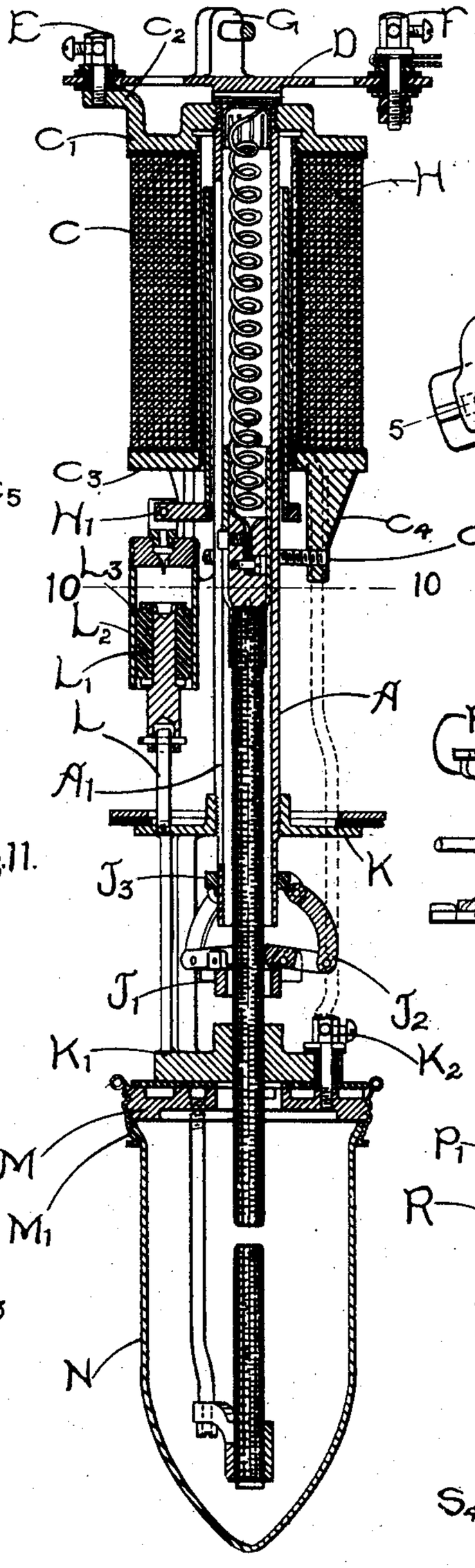


Fig.3

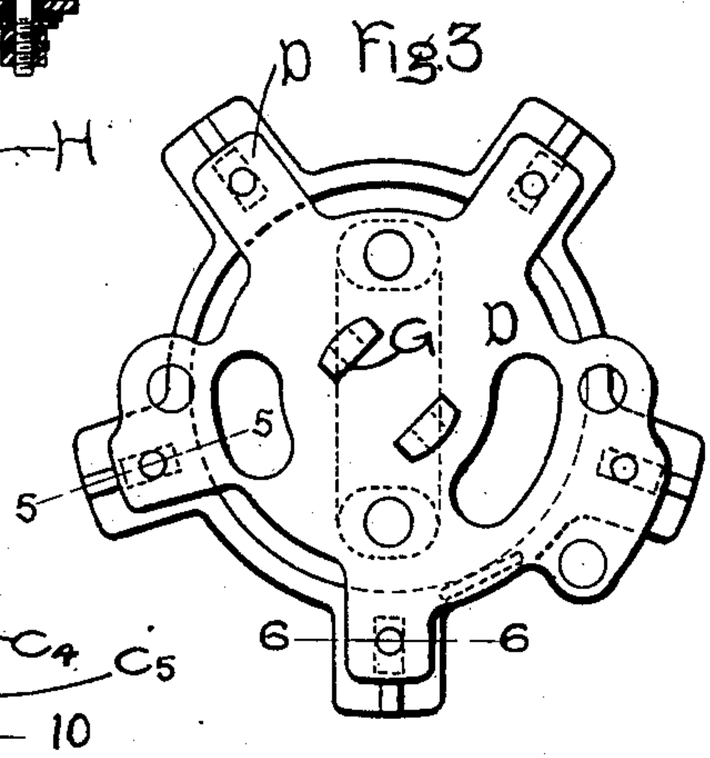


Fig.4.

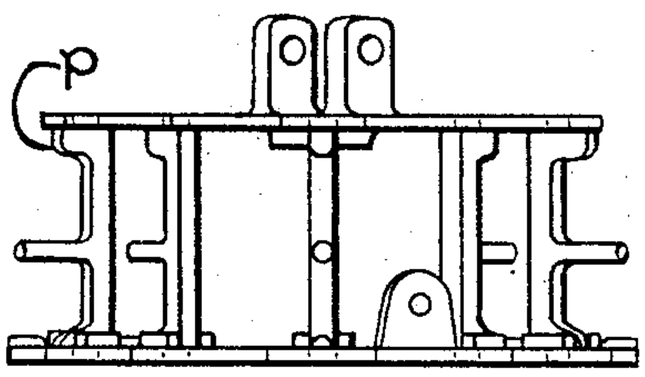


Fig.5.

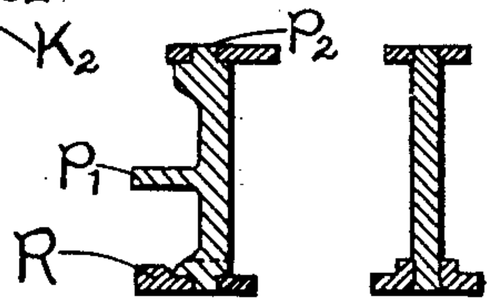


Fig6

Fig.10

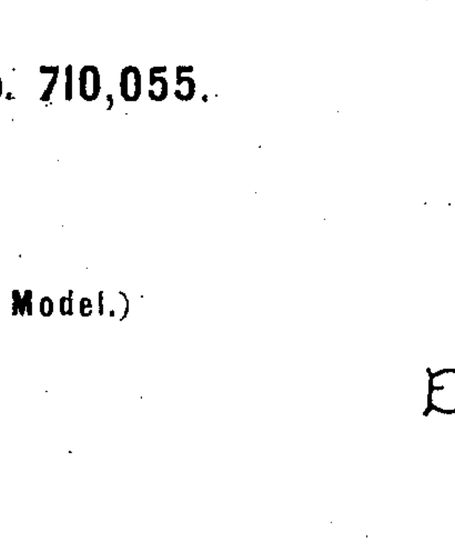


Fig.11.

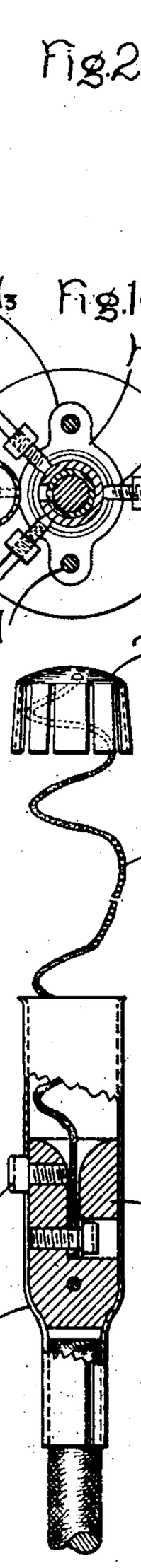


Fig.12.

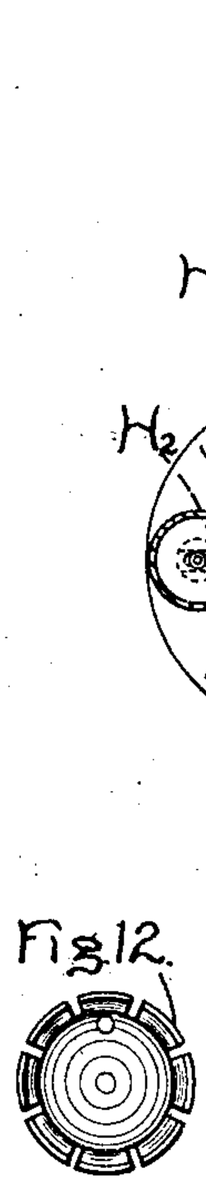


Fig.13.

Fig.7.

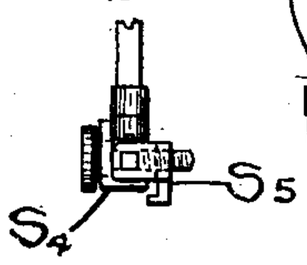


Fig.8.

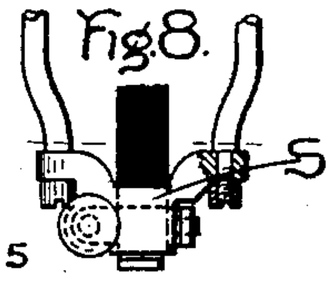
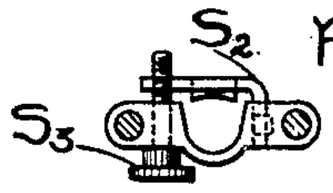


Fig.9.



WITNESSES—

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by Allen & Sons

Atty.

UNITED STATES PATENT OFFICE.

CHARLES E. HARTHAN, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 710,055, dated September 30, 1902.

Application filed July 24, 1900. Serial No. 24,671. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. HARTHAN, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Electric-Arc Lamps, (Case No. 1,510,) of which the following is a specification.

The present invention relates to electric-arc lamps, more particularly to that type of lamp known as "inclosed."

The invention has for its object to provide a lamp which is simple in construction and is cheap to manufacture.

The invention is shown in connection with a lamp designed for use on direct-current constant-potential circuits; but many of the features herein described are applicable to lamps designed for use on other circuits.

In the accompanying drawings, which illustrate my invention, Figure 1 is a side elevation of a lamp with certain of the parts in section. Fig. 2 is a vertical section of the lamp. Figs. 3 and 4 are respectively a plan and side elevation of the resistance-support frame. Fig. 5 is a section taken on line 5 5 of Fig. 3. Fig. 6 is a section taken on line 6 6 of Fig. 3. Figs. 7, 8, and 9 are detail views of the lower-carbon holder or support. Fig. 10 is a sectional view taken on line 10 10 of Fig. 2 viewed in the direction of the arrow. Fig. 11 is a detail view of the upper-carbon holder, and Figs. 12 and 13 are further detail views of the carbon-holder.

Referring to Figs. 1 and 2, A represents the central tube, to which various parts of the lamp are secured. This tube is slotted at A′ to permit the screw-head or some similar projection B on the upper-brush holder to move up and down and at the same time to prevent the brush-holder from twisting. Surrounding the upper end of the split central tube is a solenoid or magnet C. This magnet is provided with a spool having an enlarged head C′, which is screw-threaded to the central tube A. The head is provided with lugs C^2, and fastened to the lugs is a plate D, which carries the positive and negative binding-posts E and F. In the center of the plate D is a support G for suspending the lamps. The lower portion of the spool C is provided with a cast-metal head C^3, and extending downwardly from this head are three lugs C^4. Mounted in each one of these lugs is an adjusting-screw C^5, Figs. 2 and 10, which are employed to center the tube and spool with respect to each other. This centering or adjusting may be for the purpose of placing the parts in suitable alinement or it may be for the purpose of adjusting the magnetic relation of the parts.

Located in the space between the spool of the magnet C and the central tube A and mounted for movement therein is an armature H, made of magnetic material. On the lower end of the armature is plate H′, which is provided with an extension H^2, that is connected to the cylinder of a dash-pot. It is also provided with projections H^3, located on opposite sides of the center, each projection having a hole for receiving a rod I, the latter being connected to the clutch J. The screws C^5, in addition to centering the tube, are employed to act as a lower stop for the moving armature H. Near the lower end of the central tube A and secured thereto by a screw-thread is a disk K, which forms a part of the frame. Screw-threaded to this disk and extended upward is a pin L, that carries the piston L′ of the dash-pot. The dash-pot is provided with a suitable metallic cylinder, with any suitable form of outwardly-opening valve located in the upper end. The piston consists of a central metallic stud, and surrounding it is a cylinder L^2, of graphite, which is retained in place by a plate or washer L^3, the upper end of the central stud being expanded to hold the same in place.

Extending downwardly from the disk K are two vertically-extending supports, which carry a second disk K′, and this plate is provided with a central opening, through which the upper carbon extends. Mounted on the disk K′ and suitably insulated therefrom is a binding-post K^2. The screw which retains this binding-post in place passes through the disk K′ and assists in securing the gas-cap M in place. The periphery of the gas-cap M is provided with a screw-thread, and engaging therewith is a screw-threaded ring M′, which supports the arc-inclosing globe N.

The clutch for feeding the upper carbon

is provided with three pivoted clutch-shoes, which engage directly with the carbon. These shoes are pivoted at their inner ends to a plate J′ and at their outer ends to links J^2, which in turn are pivoted to the ring J^3. The ring J^3 is provided with a central opening, which makes an easy-working fit with the central tube, the latter acting as a guide for the ring in its vertical movements. As the armature H moves vertically, it controls the action of the clutch through the rods I, either raising or lowering it, as the case may be. The disk K′ is provided with a hub or extension, which surrounds the carbon, and as the clutch-ring J′ descends it engages with this hub and causes the clutch to release the upper carbon. With good smooth carbon the feeding of the upper carbon is usually so slight as to be practically imperceptible, although at times the carbon will feed a considerable amount, in which case the coil C, acting on the armature H, will restore the arc to its proper length. In Fig. 1 the carbons are shown in contact with the circuit interrupted, while in Fig. 2 the parts are shown in the position occupied when the lamp is burning.

Referring to Figs. 3 to 6, inclusive, D represents the top plate of the lamp, having radially-projecting arms D′, to which are secured the vertically-extending pieces P, that form supports for the steadying resistance Q. The pieces P, Figs. 5 and 6, are provided with reduced portions P^2 at the ends, whereby they may be riveted to the upper plate D and to the ring R. Midway between the extremities of the resistance-support piece P is an extension P′, which serves to hold the insulators Q′, which surround the resistance-wire and hold it in place. In the drawings five of these resistance-support pieces are shown; but the number may be varied as desired.

The lower-carbon holder is supported by two side rods S, which are screw-threaded to the gas-cap M. The lower extremity of each of these side rods is reduced in section and is screw-threaded to receive a nut for retaining the yoke S′ in place. The yoke is provided with a U-shaped opening, as shown in Fig. 9, for receiving the carbon, and pivoted to a pin or projection S^4 on said yoke and extending around the carbon is an L-shaped clamp S^2. This clamp is adjusted by the screw S^3, which passes through the yoke, and by removing the screw the clamp may be removed from the lamp. On the lower side of the clamp is an inturned projection or stop S^5, which is arranged to extend under the lower carbon and prevent it from dropping.

Referring to Figs. 11, 12, and 13, the construction of the upper-carbon holder will be described. In connection with arc-lamps of the type commonly known as "carbon-feed" it has been found desirable to provide some form of continuous connection between a stationary portion of the lamp and the moving carbon-holder in order that the circuit shall be continuously maintained. To accomplish this, a cap T, having spring-arms, is provided, which is arranged to be forced up into and seated in the end of the central tube A, as shown in Fig. 2. To this cap is secured a flexible cable T′, which is given a considerable number of turns, so that it will not interfere with the vertical movements of the upper carbon, and consequently hamper the feeding of the lamp. The upper-carbon holder proper consists of a sleeve T^2, which is provided at its lower end with spring-fingers that clamp the upper carbon in place. Mounted within this sleeve is a weight T^3, having a central opening to receive the cable T′, the said opening being flared outwardly to prevent chafing or cutting of the cable. The lower end of the cable is secured in place by means of a screw, and the carbon-holder is prevented from turning within the central tube A by means of the screw B. In assembling the lamp the spring-cap T is forced into place in the upper end of the tube and the holder is inserted in place through the lower end of the tube, after which it is given the requisite number of turns and the screw B mounted in place. This screw prevents the turning of the carbon-holder and the proper relation of the parts is always maintained.

Referring more particularly to Fig. 1, special means have been provided for preventing the heat from the resistance affecting the regulating-coil C. To accomplish this, a cylindrical casing U is provided, having perforations in the lower part, which may or may not be arranged to form a design. This casing projects upward slightly above the coil and is placed midway between the coil and the resistance-wire, so that a ventilated space U′ is provided all around the coil, and a space is also provided between the resistance-wire and the casing. Surrounding the resistance-wire and secured to the casing U is a cornice U^2 of any appropriate design. The lower portion of this cornice is provided with openings, through which air is free to enter, as indicated by the arrows. Just above these openings the main casing is perforated at a number of points U^3, and as the air passes from the openings of the cornice it divides, one portion passing to the right and up past the point of the resistance-wire, the other portion passing through the opening U^3 into the space U and up through the top of the lamp. In addition to this air enters the openings in the portion of the casing opposite the dash-pot and mingles with the air from the openings U^3. Thus it will be seen that a substantial draft is provided from the lower to the upper part of the lamp, which carries away a large portion of the heat developed by the resistance, and that the actuating coil or magnet C is protected.

The lower portion of the casing is secured to a ring O, the latter being secured to the plate K, but insulated therefrom. On the lower end of the casing U is an outwardly-

flaring flange U^4, which is provided with screws V for retaining the shade V′ in place.

Having thus described my invention, what I 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 tube, a coil and a spool both of which surround the tube, and adjusting devices mounted on the spool for centering or adjusting the relation of the tube and the spool.

2. In an electric-arc lamp, the combination of a vertically-extending tube forming the central portion of the lamp, a coil and a spool surrounding the tube, lugs formed on the spool, and adjusting-screws mounted in the lugs for centering the tube.

3. In an electric-arc lamp, the combination of a coil, a spool therefor, a tube which is screw-threaded to one head of the spool, lugs extending downwardly from the other head of the spool, and adjusting-screws mounted in the lugs for centering the tube and spool with respect to each other.

4. In an electric-arc lamp, the combination of a central tube which forms the lamp-frame, a spool separated from the tube and having a winding thereon, a tubular armature mounted for movement between the tube and the spool and independent of both, a clutch suspended by the armature, and a dash-pot for checking violent movements.

5. In an electric-arc lamp, the combination of a central tube which forms the lamp-frame, a cylindrical armature surrounding the tube and arranged to move independent thereof, a plate carried by the armature, and having a projection to which an element of a dash-pot is secured, a clutch, rods which connect the plate with the clutch, and a tripping-platform for the clutch which is rigidly secured to the tube.

6. In a resistance-supporting device, the combination of a plate, a ring, metal pieces which are riveted to the plate and to the ring, and are provided with projections, and insulators mounted between the projections for supporting the resistance.

7. In a carbon-holder, for an arc-lamp, the combination of a pair of side rods, a yoke having a U-shaped opening which yoke holds the lower ends of the rods in place, a pin or projection on said yoke, a clamp having an opening into which the pin projects, and a screw which acts to hold the carbon and clamp in place.

8. In an electric-arc lamp, the combination of a central tube, a detachable contact-cap having a spring-pressed finger, which cap is capable of sliding through the tube and is arranged to be mounted therein, a holder for the carbon rod, and a flexible cable which connects the cap and the holder.

9. In an electric-arc lamp, the combination of a slotted central tube, a detachable cap capable of sliding through the tube and arranged to be seated therein, a holder for the carbon which is provided with a projection that works in the slot in the tube to prevent the holder from turning, and a coiled cable which connects the cap and the holder.

10. As an article of manufacture, a holder for carbons, comprising a cap having a spring-pressed portion adapted to engage with a conducting-tube in the lamp, which cap is capable of being inserted or withdrawn from the tube, a holder containing a weight, and a flexible cable which connects the cap and holder.

11. In an electric lamp, the combination of an actuating-magnet, a resistance which is separated therefrom by an air-space, and a detachable cylindrical inclosing casing which extends between the coil and resistance-wire and prevents the heated air from directly striking the magnet.

12. In an electric-arc lamp, the combination of an actuating-magnet, a resistance which is separated therefrom by an air-space, a detachable cylindrical inclosing casing which extends between the coil and resistance-wire and prevents the heated air from striking the magnet, and a ventilated cornice which incloses the resistance-wire and is secured to the detachable casing.

13. In an arc-lamp, the combination of a magnet, a resistance which is separated therefrom by an air-space, a detachable ventilated cylindrical casing which surrounds the coil and prevents the hot air from striking the magnet, and a ventilated cornice which surrounds the resistance and is secured to the casing below the resistance, the openings in the cornice and the casing being so arranged that the same air will freely circulate in both.

14. In an electric-arc lamp, the combination of a tubular conductor, a cap arranged to make frictional engagement with the interior of the tubular conductor and so constructed that it can be forced into the end of the conductor, a carbon-holder, and a flexible conductor connecting the cap with the carbon-holder.

In witness whereof I have hereunto set my hand this 14th day of July, A. D. 1900.

CHARLES E. HARTHAN.

Witnesses:
WM. D. POOL,
JOHN A. MCMANUS.