No. 698,575. Patented Apr. 29, 1902.

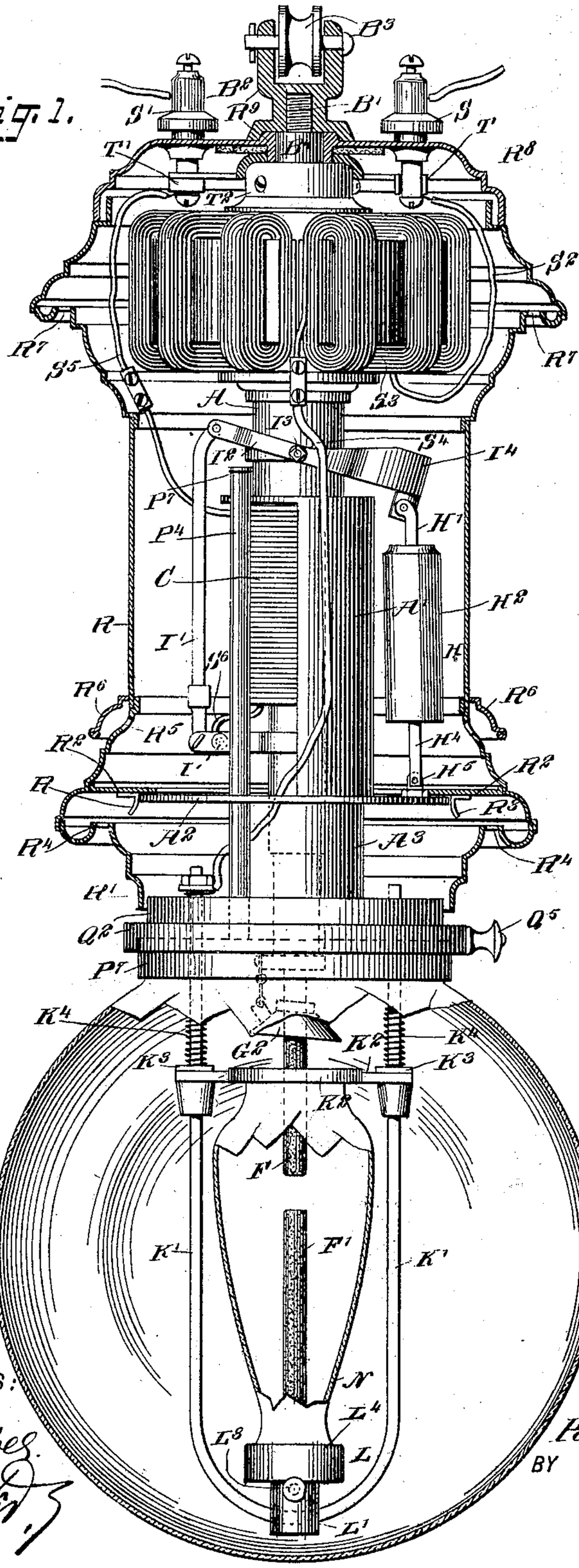
P. H. F. SPIES.

ELECTRIC ARC LAMP.

(Application filed June 5, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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No. 698,575. Patented Apr. 29, 1902.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

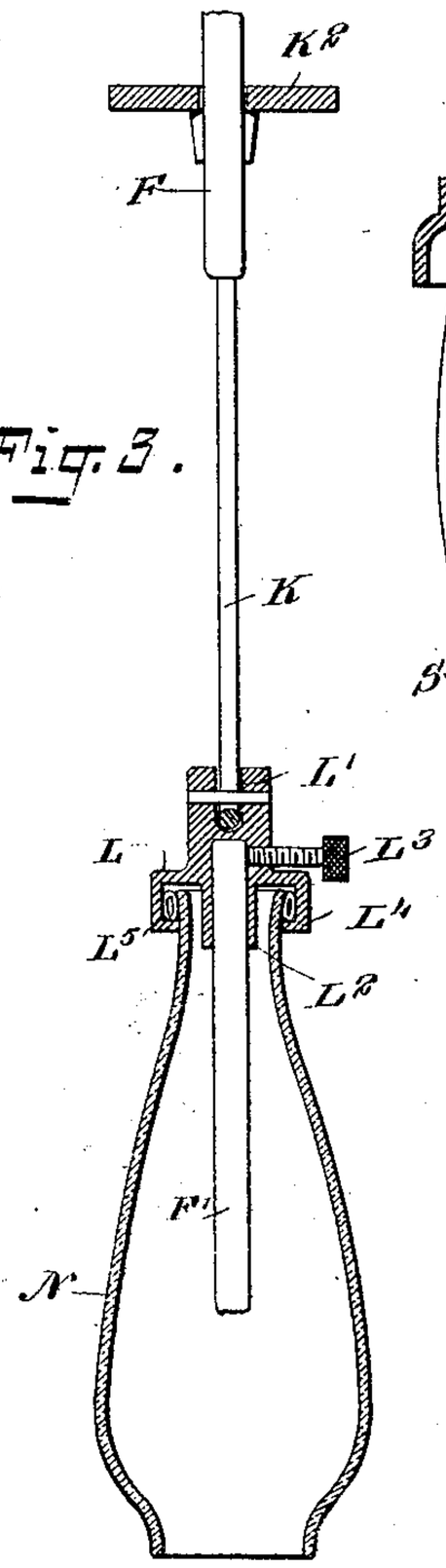

Fig. 2.

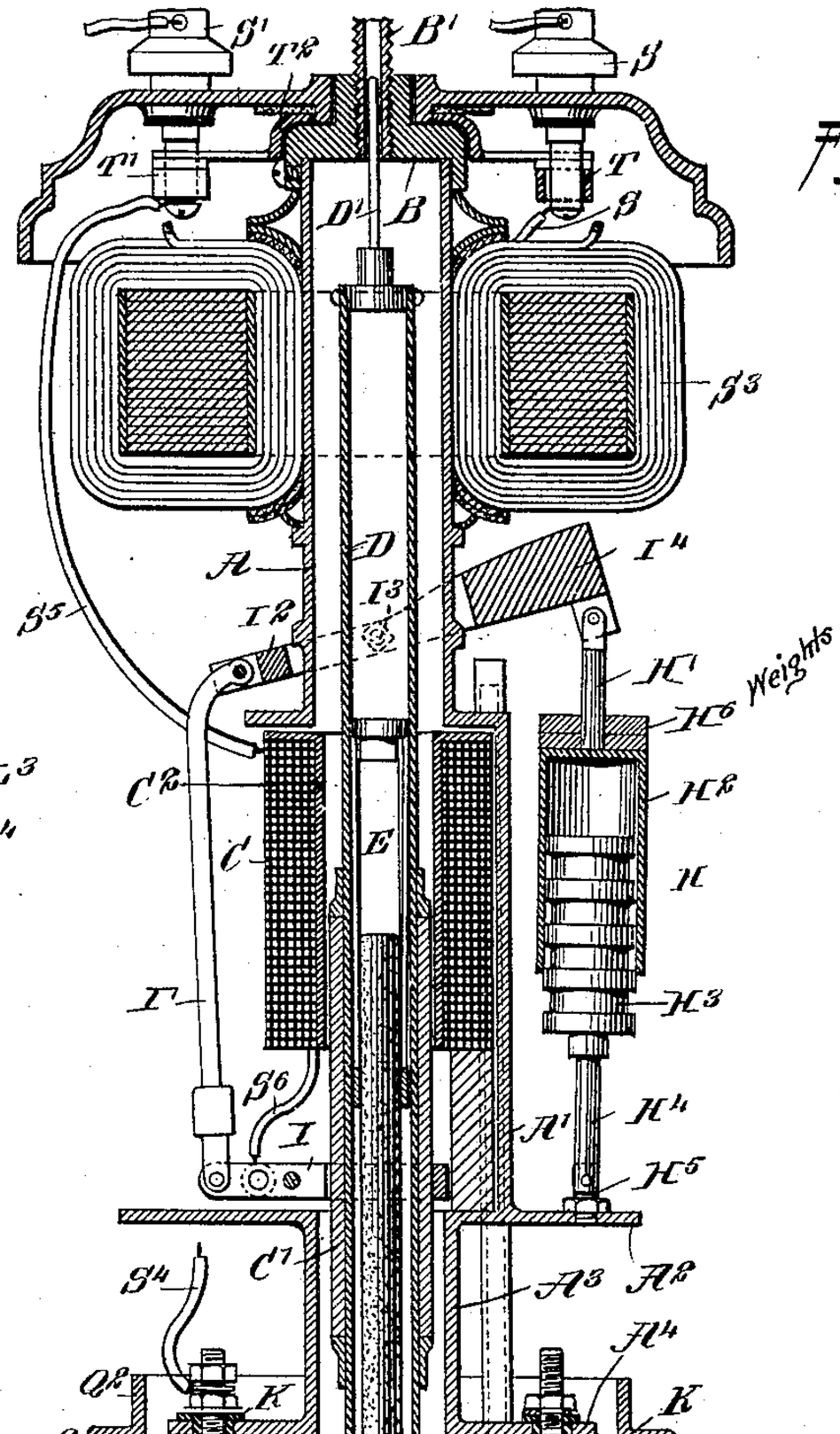

Fig. 4.

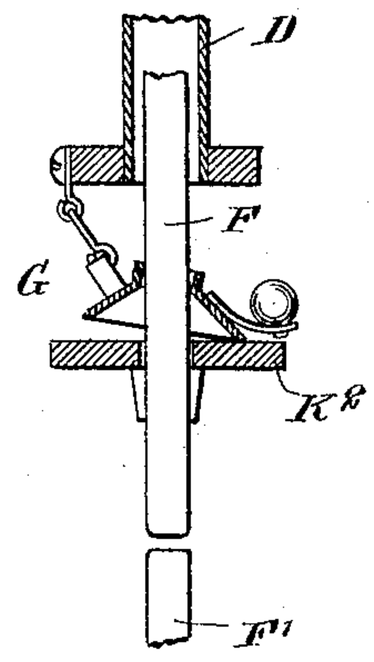

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Fig. 5.

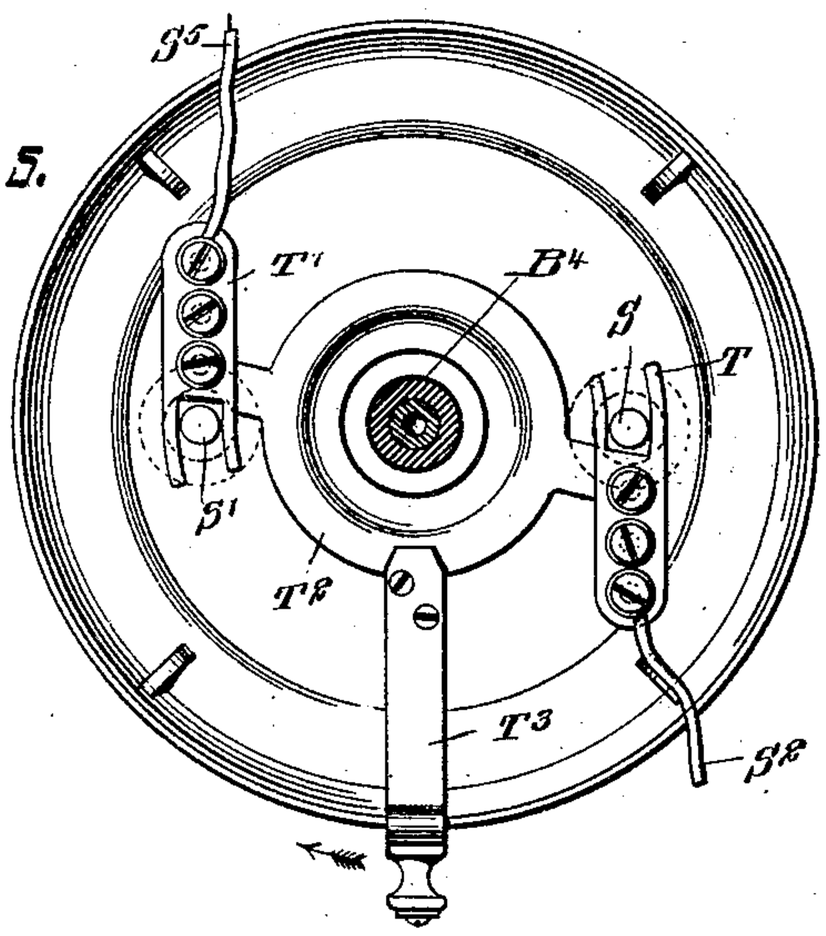


Fig. 7.

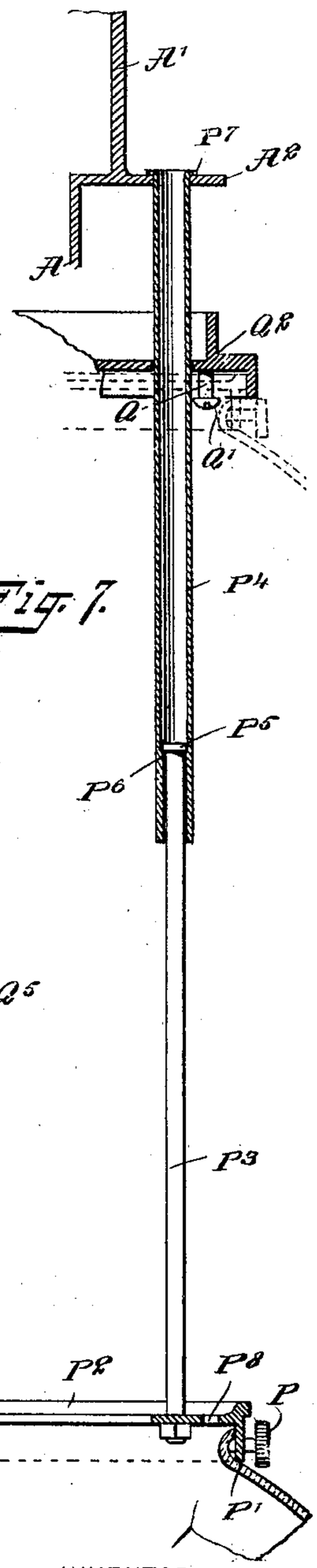


Fig. 8.

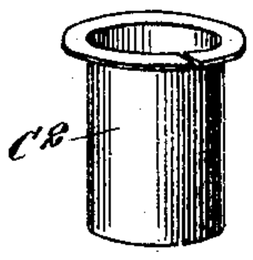


Fig. 6.

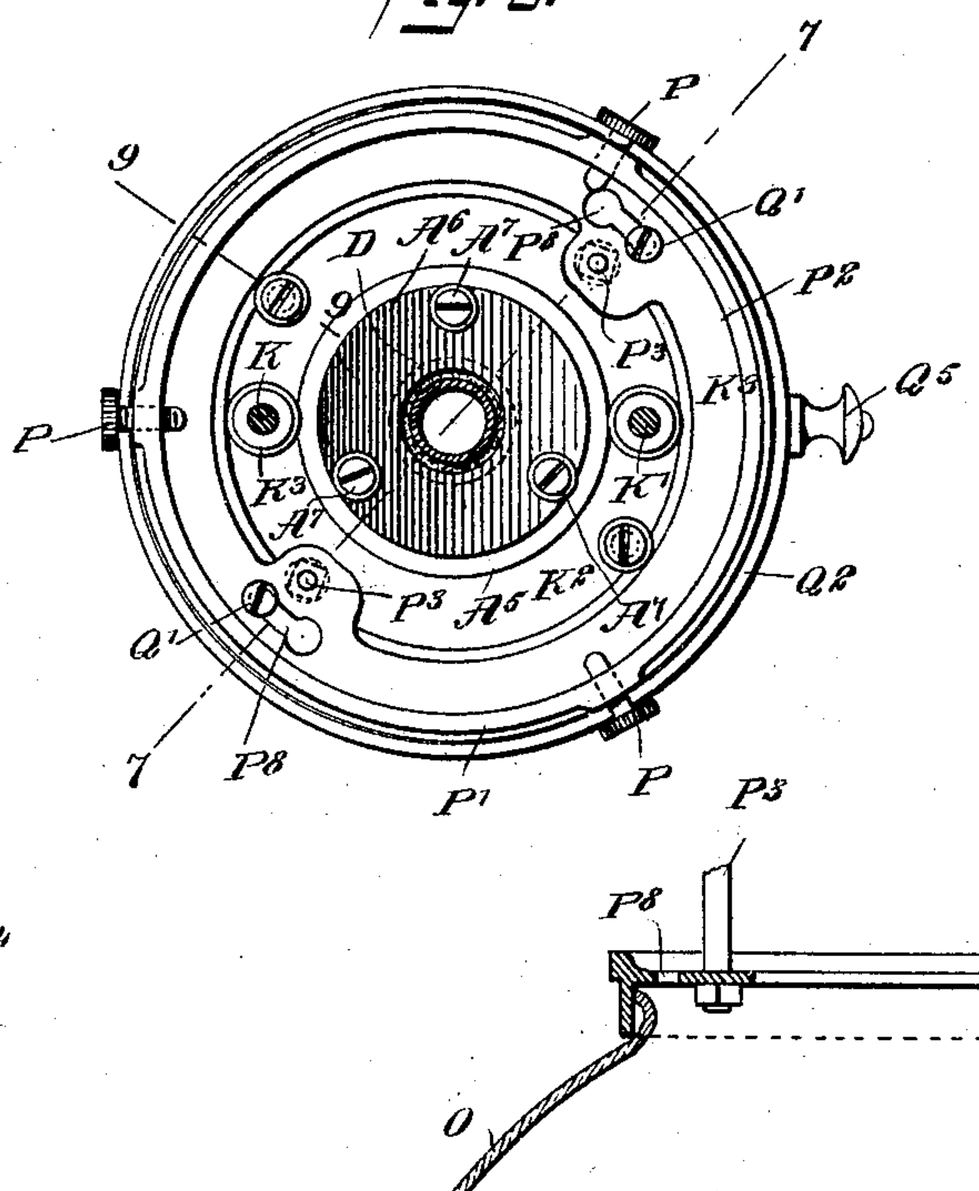
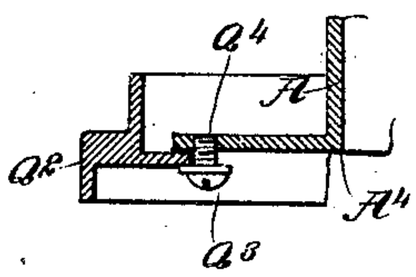


Fig. 9.



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UNITED STATES PATENT OFFICE.

PETER HEINRICH FELIX SPIES, OF MOUNT VERNON, NEW YORK, ASSIGNOR OF ONE-HALF TO JACOB NORDEN, OF MOUNT VERNON, NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 698,575, dated April 29, 1902.

Application filed June 5, 1901. Serial No. 63,216. (No model.)

To all whom it may concern:

Be it known that I, PETER HEINRICH FELIX SPIES, a subject of the Emperor of Germany, and a resident of Mount Vernon, in the county of Westchester and State of New York, have invented a new and Improved Arc-Lamp, of which the following is a full, clear, and exact description.

The invention relates to arc-lamps such as shown and described in the Letters Patent of the United States, No. 668,886, granted to me on February 26, 1901.

The object of the invention is to provide certain new and useful improvements in arc-lamps whereby the feeding of the upper carbon is exceedingly sensitive to insure at all times a uniform steady light and to permit convenient adjustment according to the power of the current, the construction of the arc-lamp permitting the attendant to conveniently and quickly open and close the same for removal of the carbon or for making repairs or the like.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement with parts in section and parts broken away. Fig. 2 is an enlarged sectional side elevation of the improvement. Fig. 3 is a sectional side elevation of the globe and lower carbon in a lowermost position for convenient insertion and removal of the carbons. Fig. 4 is a sectional side elevation of the clutch for the upper carbon. Fig. 5 is an inverted plan view of the switch, parts being in section. Fig. 6 is an inverted plan view of the lower cap, parts being shown in section. Fig. 7 is a sectional side elevation of part of the improvement, showing the globe lowered. Fig. 8 is a perspective view of the lining for the solenoid-magnet; and Fig. 9 is a sectional side elevation of the solenoid-ring and its support, the section being on the line 9 9 in Fig. 6.

The main supporting-tube A is secured at its upper end in a socket B, having a reduced threaded tubular extension B′, on which screws an eye B^2, carrying a pulley B^3 for engagement by a cable, rope, or like support for carrying the lamp. The main tube A is formed with an integral pocket A′ for receiving and supporting the magnet C of a solenoid, having its core C′ attached to the outside of a tube forming a carrier D, which extends loosely in the main tube A with said core C′, as is plainly illustrated in Fig. 2. In the carrier D is removably held a carbon-holder E, similar in construction to the one shown and described in the Letters Patent of the United States above referred to, so that further description of the same is not deemed necessary, it being understood that this carbon-holder E carries the upper carbon F and is free to slide in the carrier D. The upper carbon F is connected by a clutch G with the lower end of the carrier D, said clutch being similar in construction to the one described in the patent above referred to, with the exception that the apertured binding-disk G′ has a funnel-shaped extension G^2.

The carrier D, with the core C′, is controlled by the energizing and deënergizing of the magnet C and by the action of a dash-pot H, arranged at one side of the pocket A′ and supported on a bottom flange A^2, integrally formed on said pocket, as is plainly shown in Figs. 1 and 2. The connection between the carrier D, the core C′, and the dash-pot H is arranged as follows: An arm I is clamped or otherwise secured to the core C′ or to the carrier D below the magnet C, and the outer end of this arm I is pivotally connected by a link I′ with one end of a lever I^2, fulcrumed at or near its middle at I^3 on the main tube A above the pocket A′. The other end of the lever I^2 is provided with a weight I^4 and is pivotally connected with the stem H′ of a cylinder H^2, forming part of the dash-pot H, and in said cylinder H^2 extends a stationary piston H^3, having its plunger-rod H^4 pivotally connected with a bracket H^5, attached to the flange A^2 previously mentioned. Now when the magnet C is energized the core C′ moves upward in the main tube A, and in doing so the arm I and the link I′ impart a swinging motion to the lever I^2, so that the stem H′ and the cylin-

der H^2 are moved downward over the stationary piston H^3. This downward movement of the cylinder H^2 can be accelerated by weights H^6, removably held on the top of the cylinder H^2 on the stem H'. When the magnet C is deënergized, then the weight of the carrier D, its core C', holder E, and carbon F overbalance the dash-pot H, so that the carrier D and the parts thereon move downward, and in doing so cause a swinging of the lever I^2 in an opposite direction by the action of the arm I and the link I', connected with said lever I^2. During the swinging motion of the lever I^2 the cylinder H^2 is drawn upward on the stationary piston H^3; but as the movement of the cylinder on the piston is uniform it is evident that a gradual downward movement of the carrier D, holder E, and upper carbon F takes place to insure a very sensitive feeding of the carbon. By the use of the weights H^6 the resistance of the dash-pot to the up-and-down movement of the carrier can be increased or diminished to suit existing conditions and to at all times insure a sensitive feeding of the carbon and a consequent steady burning of the lamp.

The upper end of the carrier D is provided with a guiding-pin D', engaging the central tubular extension B' as a bearing, to insure a straight up-and-down sliding movement of the carrier D with a minimum of friction. The tube end A^3, depending from the flange A^2, is formed at its lower end with a flange A^4, against the bottom of which rests an asbestos washer A^5, engaged by a bearing A^6 for the lower end of the tube B to slide in, said bearing A^6 being fastened by screws A^7 to the flange A^4, as is plainly shown in Fig. 6, and the said bearing contains a flexible binding, preferably of asbestos and set in an annular recess in the bearing to insure proper sliding of the tube B.

On the flange A^4 are held bushings K, of rubber or other insulating material and supporting the upper ends of a U-shaped frame K', engaged at its middle by an eye L' on a double socket L, carrying the lower carbon F' and the inner or small globe N. The top of the latter is engaged by a plate K^2, having bushings K^3, of rubber or like insulating material, and held to slide loosely on the frame K', but pressed on by springs K^4, coiled on the frame-arms to hold the plate K^2 normally in firm contact with the upper end of the globe N. The double socket L has a small socket and a large socket, of which the small socket L^2 (see Fig. 3) receives the lower carbon F', and said lower carbon F' is secured in place by a set-screw L^3. The large carbon L^4 contains a compressible contact-ring L^5 for engagement by the lower end of the globe N, so as to securely hold the latter in position, said contact-ring L^5 being made of a plurality of helices, which are oval in cross-section and interlocked with one another, as more fully shown and described in the Letters Patent of the United States No. 668,887, granted to me on February 26, 1901, for an electric switch.

The main globe O for inclosing the carbon-globe N and the carbon-supporting frame K and double socket L is secured at its top flange by set-screws P, screwing in the depending flange P' of a ring P^2, secured on the lower ends of rods P^3, telescoping in tubes P^4 and having stop-collars P^5, adapted to be seated on shoulders P^6, near the lower ends of the tube P^4, as is plainly shown in Fig. 7. The tubes P^4 are mounted to slide freely in bearings on the flange A^2, and the upper ends of said tubes are formed with flanges P^7, adapted to be seated on the top surface of the flange A^2, as shown in Fig. 7. The ring P^2 is formed with slots P^8, enlarged at one end for the entrance of the heads Q' of pins Q, secured to a locking-ring Q^2, supported by or mounted to turn on the heads Q^3 of screws or pins Q^4, secured to and depending from the under side of the flange A^4. (See Fig. 9.) The locking-ring Q^2 has a handle Q^5, adapted to be taken hold of by the attendant of the lamp to turn the ring Q^2 after the ring P^2 has passed, with its slot P^8, the heads Q' of the pins Q, so that the latter pass into the narrow portions of the slots P^8 and the ring P^2 then rests on and is supported by the heads Q', the globe O being in an uppermost position. When it is desired to lower the globe O to gain access to the globe N and the carbon F', then the attendant turns the ring Q^2 in an opposite direction to bring the heads Q' in register with the enlarged ends of the slots P^8, so that the ring P^2 is unlocked and is free to slide downward, the rods P^3 sliding in the tubes P^4, and the latter sliding upward in the flange A^2 until the flanges P^7 rest on the top of the flange A^2 and the stop-collars P^5 are seated on the seats P^6. (See Fig. 7.) When this takes place, the ring P^2 is below the lower end of the frame K', so that the attendant now has ready access to the globe N and the plate K^2, which when pressed upward against the tension of the springs K^4 permits of swinging the globe N into a lowermost position, as shown in Fig. 3. The globe N can now be removed, if desired, from its socket L^5 and a new carbon F' can be inserted in the socket L^2 and secured therein by the set-screw L^3. The new upper carbon may now also be placed in position in the carbon-holder E, after which the several parts are returned to their normal positions—that is, the globe N, with the double socket, is swung upward on the lower end of the frame K', and then the plate K^2 is engaged with the top of the said globe, after which the operator pushes the globe O and ring P^2 upward to telescope the rods P^3 in the tubes P^4 and to slide the latter upward in their bearings in the flange A^2. When the ring P^2 moves in an uppermost position, the enlarged ends of the slots P^8 engage the heads Q' of the pins Q, after which the ring Q^2 is turned by the attendant manipulating the handle Q^5 so as to cause

the locking-ring Q^2 to lock the ring P^2 in an uppermost position.

The middle and upper portion of the arc-lamp is inclosed in a casing R, preferably of sheet metal and reduced at its lower end R′ to closely fit the locking-ring Q^2 at its peripheral surface, as is plainly shown in Fig. 1. A distance above this lower end R′ is formed an inwardly-extending annular flange R^2, adapted to rest on the flange A^2, so as to separate the heat-developing portion of the lamp from the solenoid, dash-pot, and adjacent upper parts of the lamp. Spring-lugs R^3 are secured to the flange R^2 to engage the periphery of the flange A^2 and hold the casing R in a centered position. In the portion of the casing below the flange R^2 are formed ventilating-openings R^4 for allowing the heat rising from the burning carbons to escape to the outside of the casing. The openings R^4 are formed in an inwardly and upwardly bent portion, so as to be free from the effects of the wind and to allow a ready escape of heat at all times. Above the flange R^2 are ventilating-openings R^5 in the wall of the casing R, and an annular protecting-flange R^6 is secured to the casing and extends over said openings to prevent rain or snow from entering the casing at said opening. Ventilating-openings R^7, similar to the openings R^4, are arranged near the top of the casing, so that air can freely circulate in the casing above the flanges R^2 to keep the solenoid and connected parts in proper working condition at all times. The extreme upper end of the casing R is closed by a cap R^8, having its hub R^9 engaging the reduced portion B^4 of the socket B, the eye B^2 screwing down upon the cap to hold said cap securely in place.

On the top of the cap R^8 are secured binding and switch posts S S′, extending to the inside of the cap R^8 to be engaged by switching-forks T T′, respectively held on a ring T^2, mounted to turn in the socket B, said ring being provided with a handle T^3, extending to the outside between the cap R^8 and the upper end of the casing R, so that the operator can take hold of the handle T^3 and turn the same to move the switch-forks T T′ in or out of contact with the inner ends of the binding-posts S S′. The switch-fork T is connected by an insulated wire S^2 with a resistance or shock coil S^3, held on the tube A, near the upper end thereof, and this resistance is connected by an insulated wire S^4 with one arm of the frame K′, as is plainly shown in Fig. 1. The other switch-fork T′ is connected by an insulated wire S^5 with the magnet C of the solenoid, and said magnet is connected by an insulated wire S^6 with the arm I. Now when the switch is in a closed position, as shown in Figs. 1 and 5, then electrical connection is had from the binding-post S by way of the switch T, wire S^2, resistance S^3, wire S^4, frame K′, double socket L to the lower carbon F′, and connection is had from the binding-post S′, switch-fork T′, solenoid-magnet C, wire S^6, clamping-arm I, core C′, carrier D, and holder E to the upper carbon F′.

Now when the lamp is lowered and the operator desired to change the carbons, as previously explained, then by shifting the handle T^3 and moving the switch-forks T T′ out of engagement with the inner ends of the binding-posts S S′ the current is positively broken, so that the operator can open and close the lamp and remove or insert the carbons without the slightest danger of personal injury by the electric current.

In order to increase the efficiency or pulling power of the solenoid-magnet C, I provide the same in its central opening with a lining C^2, of iron or other suitable metal.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An arc-lamp provided with a solenoid, a carrier for carrying the carbon and the core of said solenoid, a clutch between the carrier and said carbon, an external dash-pot connected with said carrier, and removable weights for the dash-pot, for increasing or decreasing the resistance of the dash-pot to the movement of the solenoid-core, as set forth.

2. An arc-lamp having a supporting-tube formed with an integral flange, a casing having an inner flange adapted to rest on said tube-flange, to separate the heat-developing part of the lamp from the actuating device for the carbon-feed of the lamp, and lugs on said inner flange for engaging said tube-flange, as set forth.

3. An arc-lamp having a supporting-tube provided with top and bottom bearings, and a carrier for the solenoid-core and mounted to slide in said bearings, the upper end of the carrier being reduced to form a pin engaging the upper bearing, the said lower bearing having a flexible lining for engaging the outside of the tubular carrier, as set forth.

4. An arc-lamp having a central supporting-tube formed with a pocket for the solenoid-magnet, a flange integral with the tube for supporting the casing, and a second integral flange for supporting the lower-carbon holder, as set forth.

5. An arc-lamp having a central supporting-tube formed with a pocket for the solenoid-magnet, a flange integral with the tube for supporting the casing, a second integral flange for supporting the lower-carbon holder, and a bearing on the tube for supporting the resistance-coil, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PETER HEINRICH FELIX SPIES.

Witnesses:
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B. WOODARD.