No. 750,894. PATENTED FEB. 2, 1904.

J. A. RIGNON.

ELECTRIC ARC LAMP.

APPLICATION FILED APR. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

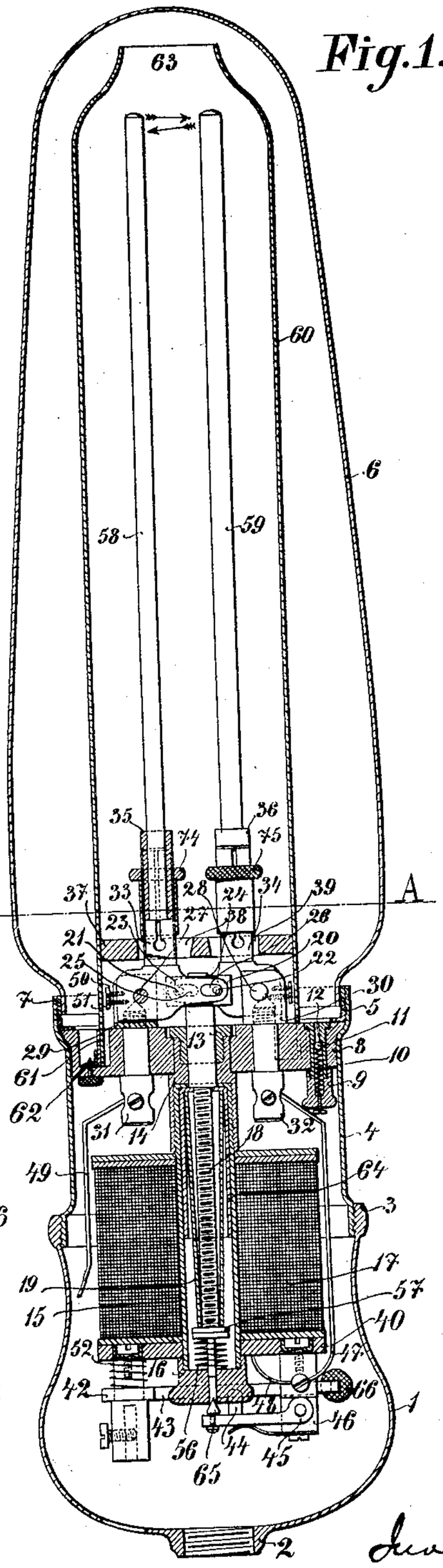


Fig. 2.

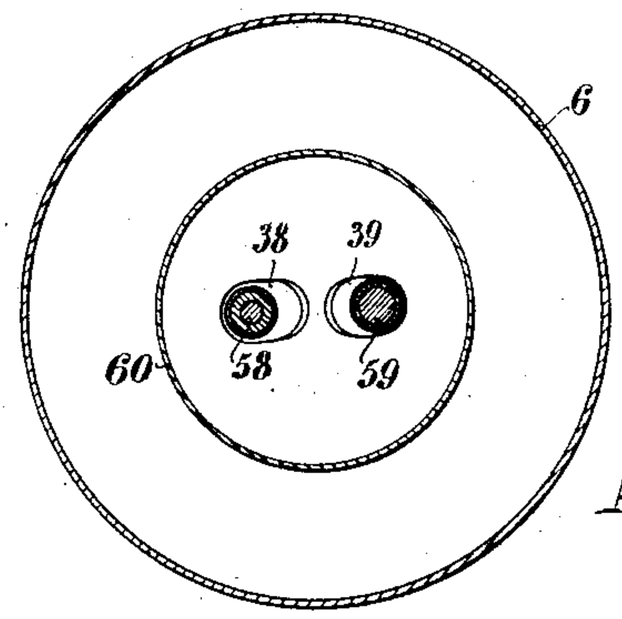
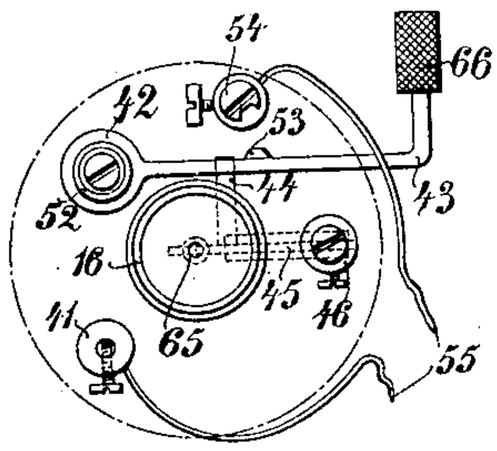


Fig. 3.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

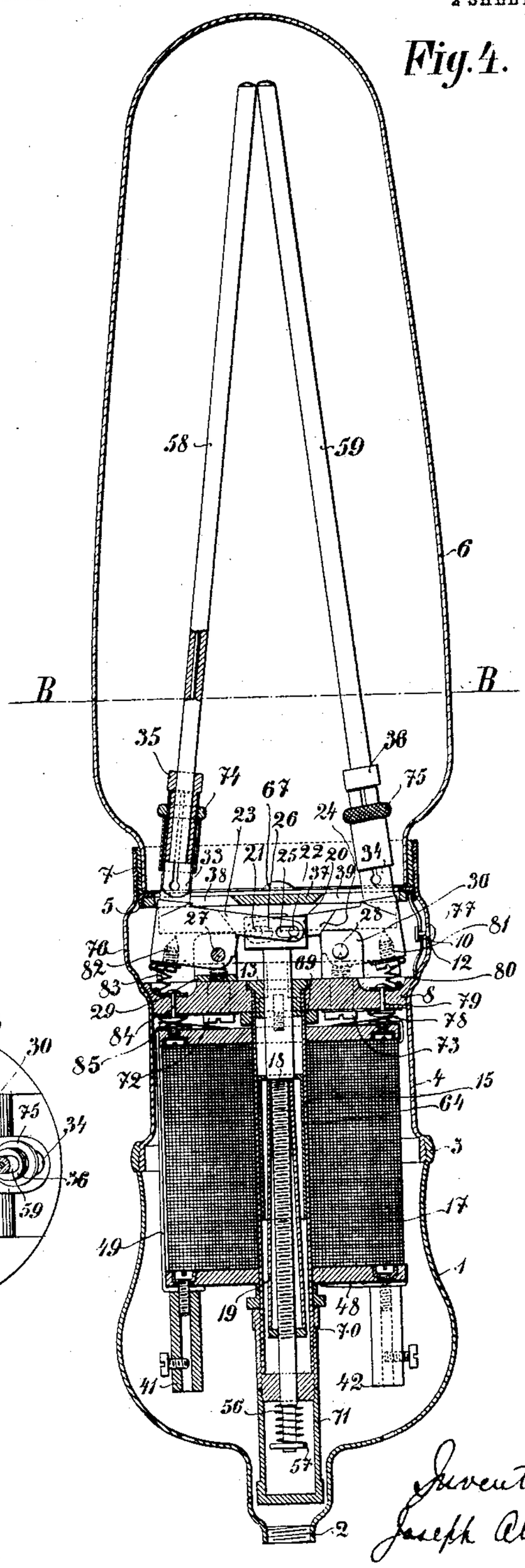
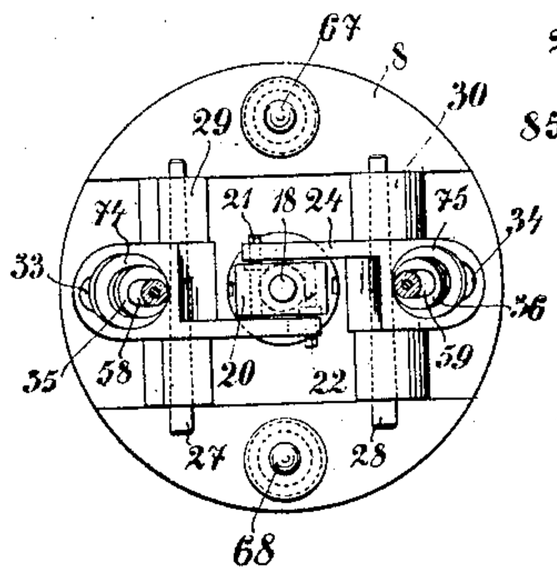


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOSEPH ALBERT RIGNON, OF BERLIN, GERMANY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 750,894, dated February 2, 1904.

Application filed April 11, 1902. Serial No. 102,356. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ALBERT RIGNON, electrical engineer, a subject of the King of Italy, and a resident of 91ª Lützowstrasse, Berlin, Germany, have invented certain new and useful Improvements in or Relating to Electric-Arc Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to an electric-arc lamp adapted to burn in any position—for instance, either in a vertical or in a horizontal position. The improved lamp as compared with arc-lamps hitherto used has the advantage of producing with a very small focus a very intense light, the lamp being adapted for use for direct current as well as alternating current.

In the accompanying drawings, Figure 1 shows in sectional elevation a lamp adapted for use in a system worked in series, the solenoid-coil being in shunt on the arc. Fig. 2 is a horizontal section on the line A A of Fig. 1. Fig. 3 is a plan view of the switch device. Fig. 4 illustrates in elevation and partly in section a lamp adapted for use in a parallel-lamp system, solenoid-coil being in series with the arc. Fig. 5 is a section on the line B B of Fig. 4.

The lower part of the casing 1 is provided with a socket 2, having an internal screw-thread, by means of which it may be screwed on any desired lamp-holder. At the other end the casing 1 terminates in a ring 3, also provided with screw-threads and carrying an extension 4 of the casing, furnished at both ends with a screw-thread. Both parts of the casing are provided with holes to admit air for cooling the solenoid 17, secured to a plate 8, made of porcelain, steatite, or any other insulating material. The plate 8 bears upon a shoulder formed in the upper portion of the casing 4 and is held in position by a ring 5.

In the construction shown in Fig. 1 the ring 5 is screwed directly onto the plate 8, while in the modification, Fig. 4, the ring bears against a second plate 37, connected to the plate 8 by two screws 67 and 68. The globe 6 is screwed in by means of an externally-threaded ring 7, cemented to the globe so as to bear tightly against the ring 5, whereby a hermetical closing is obtained. An externally-threaded socket 13, centrally mounted in the plate 8, carries in the construction shown in Fig. 1 the solenoid 17 by means of a sleeve 14, screwed on the socket 13, and a tube 15, closed by a screw-cap 16, while in the modification illustrated in Fig. 4 the solenoid is held between a ring 69, fixed to a tube 15, screwed directly on the socket 13, and a nut 70, screwed on the tube 15, a cap 71 being screwed upon the nut 70. The parts 13 and 16 and sleeve 14, Fig. 1, or parts 13 and 70, Fig. 4, are provided with holes in which the core-holder 18 is guided, this holder carrying the core 19 and being adapted to move easily up and down. The core has a conical shape and consists of a thin sheet of soft iron, whereby induced currents are greatly reduced. The upper part of the holder 18 carries a head 20, made of insulating material, such as porcelain, provided with two pins or projections 21 and 22. The pins 21 and 22 engage in longitudinal slots 25 and 26 of levers 23 and 24, pivotally mounted on studs or rods 27 and 28, carried in bearings 29 and 30, fixed to the plate 8 by means of clamp-screws 31 and 32, Fig. 1, or screws 72 and 73, Fig. 4. The levers 23 and 24 carry the two carbon-holders 33 and 34, in which the carbons 58 and 59 are fixed by means of tightening-sleeves 35 and 36, and rings 74 and 75 serving for clamping the inner split sleeves. As already mentioned, a second plate 37 is provided, which serves to protect the regulating mechanism and is provided with two openings 38 and 39, Figs. 1, 2, and 4, to permit of the movement of the carbon-holders. A non-return valve 9 is provided in the construction shown in Fig. 1 in the plate 8, while in the modification, Fig. 4, the valve is inserted in the enlarged portion 76 of the casing 4. The air heated in the globe 6 escapes through this valve 9 against the action of a spring 10, forcing the ball 11, Fig. 1, or the valve-cone 77, Fig. 4, off the valve-seat 12.

The operation of the lamp is as follows: When the lamp is switched in and the circuit of the direct or alternating current is closed,

the iron core 19 is attracted, the solenoid 17 being energized by the current. In the construction shown in Fig. 1 the attraction of the core causes the two carbons 58 and 59 to approach each other at their free ends and the arc is struck, whereupon both carbons move apart again. In the modification shown in Fig. 4 the arc is struck immediately after the lamp is switched in, owing to the fact that both carbons are normally in contact. Immediately afterward the two carbons move apart. The lamp is regulated by the iron core 19, being more or less drawn into the solenoid 17, in accordance with the voltage between the carbons or the amperage of the current energizing the solenoid and dependent upon said voltage, the action of the solenoid being permanently counteracted by the spring 56, placed between the nuts 16 and 57, Fig. 1, or between the tube 70 and screw 57, Fig. 4. To prevent the regulating action of the lamp from taking place suddenly, the holder 18 is provided with a cylinder-piston or dash-pot device 64, by which the air inclosed in the tube 15 is compressed as the holder moves down, whereby a braking action is obtained and a soft and gradual regulation is insured. This smooth and gradual regulation is naturally an important point of all lamps, and many attempts have been made in practice to obtain an efficient and uniform regulation by means of brake devices in which the brake-cylinder was charged with oil, glycerin, or other thick liquids. Those devices, however, made the construction of the lamp very complicated, and therefore proved a failure. The brake device described above acts, on the contrary, always in a reliable manner and presents a very simple and effective means for regulating the section without making the construction complicated or difficult. A further essential advantage of using compressed air for damping the regulating movement consists in the lamp being adapted to be used in any desired position, which with lamps having braking devices in which liquids are used is impossible in consequence of the difficulty of preventing the liquid from escaping when the lamp is used in any other than the normal position.

As the carbons burn the position of the arc alters, this alteration, however, taking place so slowly as to be imperceptible to the eye. This is especially due to the above-mentioned provision of the valve 9, through which a partial vacuum is formed in the globe 6. In order always to maintain the arc between the two ends of the carbon, a glass cylinder or chimney 60, Fig. 1, might be preferably provided. The glass cylinder is preferably screwed into a ring 62, fixed to the plate 8 by means of a screw-threaded ring 61, and forms a hermetical closure. The heated air is therefore forced to pass through the opening 63 of the cylinder 60 into the space between the latter cylinder and the globe 6, from which it escapes through the valve 9.

When the carbons 58 and 59 are burned away, the current, in the modification shown in Fig. 4 and representing a lamp adapted to be arranged in parallel or to be switched in singly, is broken, this current flowing normally from terminal 42 through wire 48, solenoid 17, contact-spring 78, contact-pin 79, flexible wire 80, contact-screw 82, carbon-holder 34, carbon 59, carbon 58, carbon-holder 33, contact-screw 82, flexible wire 83, contact-pin 84, contact-spring 85, and wire 49, to the return-terminal.

When the lamp is to be used in a system worked in series, an automatic switch device of the well-known kind must be provided, as in such a system the extinction of one lamp either in consequence of the carbons being burned away or of any other cause must not affect the other lamps arranged in series. This automatic switch device has been improved in accordance with the improved construction of the lamp shown in Fig. 1 in the following manner:

A plate 40, Fig. 1, carries a well-insulated terminal 42, a return-terminal 41, and the automatic switch device. The current passes through terminal 42, lever 43, enters the lateral arm 44 of a lever 45 through pin 46, wire 47, terminal 32, carbon 59, and simultaneously through wire 48, solenoid 17, and then from the carbon 58, through terminal 31 and wire 49, and from the solenoid 17 to the terminal 41. To secure a reliable connection between the two parts 29 and 30 and the two carbon-holders 33 and 34, respectively, each holder may be connected electrically with the corresponding bearing-piece by means of small screws 50 and 51, connected by a flexible wire.

The lever 43 is pivotally mounted on the terminal 42 and is held in normal position by a spiral spring 52, in which position it bears against a projection 53, provided on a lateral arm 44 of the lever 45, Fig. 3.

The operation of the above-described switch device is as follows: When the carbons 58 and 59 are burned out, they approach each other in the direction indicated by arrows in Fig. 1. The core-holder 18 thus assumes its lowest or deepest position and strikes with its end against a projection 65, made of insulating material, on the inner end of the lever 45. By this means the lever 43 is released and comes into contact with the clamping-screw 54 through the action of its spring 52. Thereby a new connection is formed through terminal 54, resistance 55, and terminal 41, the resistance 55 being chosen to correspond with the normal resistance of the lamp. The resistance-wire 55 can be easily arranged in the space existing between the solenoid 17 and the two casing parts 1 and 4. By this means it is insured that upon the lamp going out the current will not be broken. After new carbons

have been inserted or the actual cause of the disturbance has been removed the lever 43 is brought back into its normal position by means of a knob 66, arranged accessibly on the outside of the casing, whereby the circuit is again completed by the solenoid or the lamp. The consumption of energy, owing to the simple construction of the lamp, is reduced to a minimum. The lamp gives with a voltage of seventy to eighty volts between the carbons and one and one-half amperes, a lighting power of about two hundred standard candles and burns for from twenty-five to thirty hours.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent of the United States of America, is—

1. In an electric-arc lamp, a socket portion and a globe portion and an insulating-plate forming a partition therebetween, electrode-supports pivotally mounted on said insulating-plate and extending into the globe portion, a solenoid projecting from said plate into the socket portion, and a movable core within the solenoid having a pivotal connection with both of said electrode-supports, as and for the purpose set forth.

2. In an electric-arc lamp, a socket portion and a globe portion and an insulating-plate forming a partition therebetween, a tube projecting from said partition into said socket and constituting the cylinder member of a dash-pot, a solenoid-coil supported upon said tube, a core movably mounted within said solenoid-coil and carrying a piston to coöperate with said tube or cylinder, and electrode-supports pivotally connected to said core and extending into the globe, as and for the purpose set forth.

3. The combination in an electric-arc lamp, of carbons and their holders, the latter being pivotally mounted, a solenoid having a core, said core having connection with the inner ends of said pivotally-mounted holders, and a dash-pot-regulating device for damping or cushioning the movements of said core, substantially as described.

4. In an electric-arc lamp, a socket portion and a globe portion, a partition-plate separating the socket portion from the globe portion, electrode-supports pivotally mounted upon said partition-plate and extending into the globe portion, a core pivotally connected to each of said electrode-supports and slidably projecting through said partition-plate into the socket portion, a magnet-coil for moving said core in one direction, and a counterbalancing-spring for opposing such movement, as and for the purpose set forth.

5. The combination in an electric-arc lamp, of carbons, pivoted holders therefor, said holders having inwardly-projecting extensions, a solenoid, a movable core therefor having an insulated head with pins connected to said extensions, a cylinder surrounding said core and a piston connected to said core and operating in said cylinder, and a circuit-closing switch operated by said core, substantially as described.

6. In an electric-arc lamp of the kind described an automatic switch device comprising a plate on the solenoid carrying a terminal on which is mounted an adjusting contact-lever, a spring adapted to retain said lever in its normal position in contact with a second lever also mounted upon said plate and carrying a projection pressing against the lower surface of the core of the solenoid and suitable contacts whereby on the movement of the core the latter lever will be operated to release the adjustable contact-lever to cut the lamp out of circuit and to complete a resistance-circuit, substantially as described.

7. In an electric-arc lamp, a socket portion and a globe portion, an air-tight partition separating the socket portion from the globe portion and containing a check-valve opening into the socket portion, electrode-supports within the globe portion, a core connected to said electrode-supports and slidably projecting through said partition-plate, a magnetic coil for operating said core, and a spring for normally pressing the core in opposition to said coil, as and for the purpose set forth.

8. In an electric-arc lamp, a pair of pivotally-mounted electrode-supports, a slidably-mounted core connected to each of said electrode-supports, a solenoid-coil surrounding said core and containing a dash-pot, and a circuit-closing device operated by said core, as and for the purpose set forth.

9. In an electric-arc lamp, a supporting-plate having a pair of electrode-supports pivotally mounted thereon, a tube projecting from said supporting-plate, a coil upon said tube, and a dash-pot within said tube, a core connected to said electrode-supports and extending through said tube, and a circuit-closing device operated by said core, as and for the purpose set forth.

10. In an electric-arc lamp, an insulating-plate, a pair of electrode-supports pivotally mounted thereon, a tube projecting from said plate and surrounding the electrodes, an outer globe hermetically joined to said plate, and an outwardly-opening check-valve in said plate, as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOSEPH ALBERT RIGNON.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.