No. 706,547. Patented Aug. 12, 1902.

F. A. GILBERT & E. O. LUNDIN.

ELECTRIC ARC LAMP.

(Application filed Mar. 24, 1898.)

(No Model.)

Fig: 1.

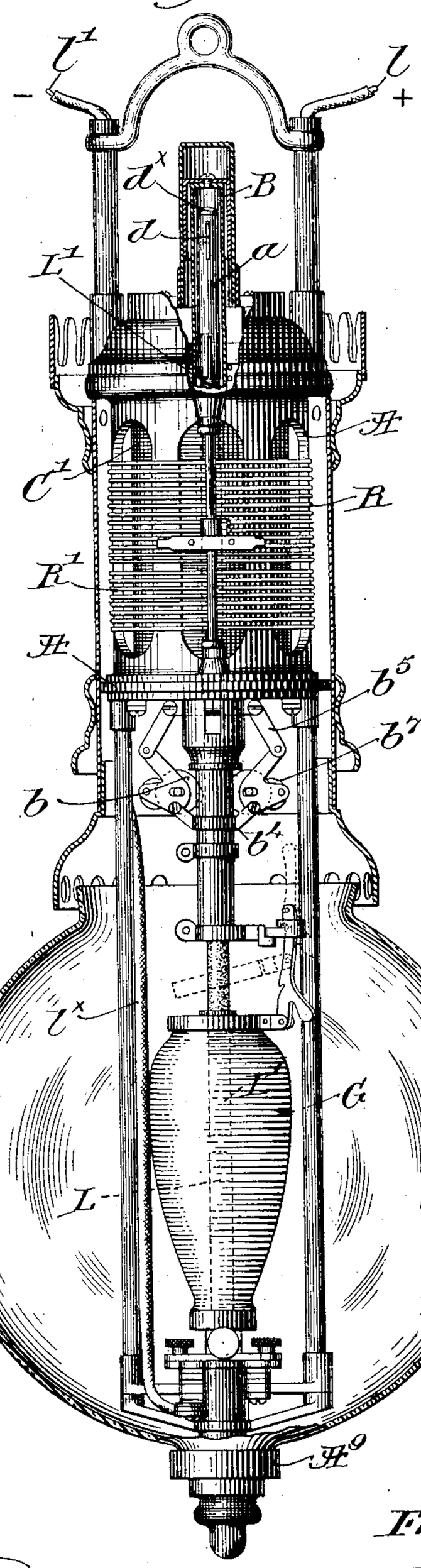


Fig: 2.

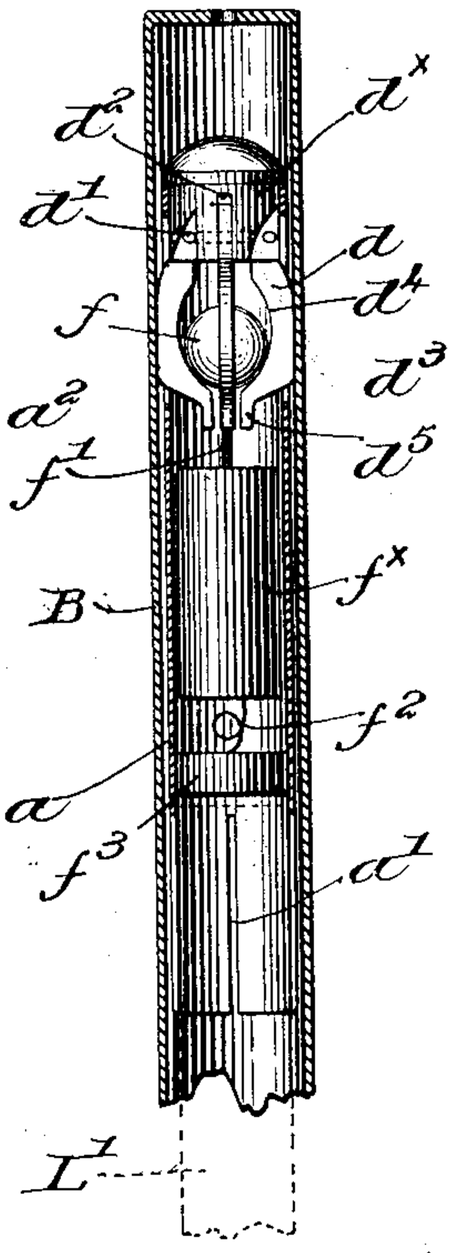


Fig: 3.

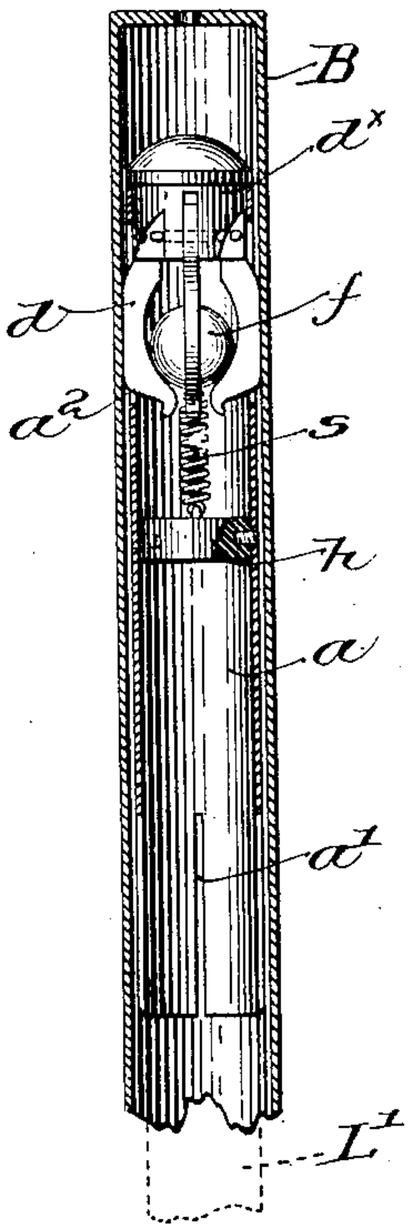
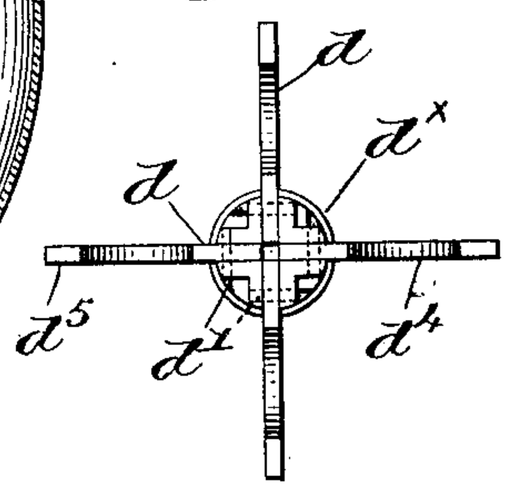


Fig: 4.



Witnesses.
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UNITED STATES PATENT OFFICE.

FREDERICK A. GILBERT, OF BROOKLINE, AND EMIL O. LUNDIN, OF BEACHMONT, MASSACHUSETTS, ASSIGNORS TO THE GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 706,547, dated August 12, 1902.

Application filed March 24, 1898. Serial No. 674,983. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK A. GILBERT, of Brookline, county of Norfolk, and EMIL O. LUNDIN, of Beachmont, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric-Arc Lamps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to arc-lamps, having more especial reference to that class of lamps in which carbon-rods are dispensed with.

The invention has for its particular object the production of simple and highly-effective means for making electrical contact at all times between the upper carbon and the controlling means therefor, obviating the use of resilient or spring contacts, with their rapid deterioration.

Figure 1 represents in elevation an arc-lamp, partly broken out and embodying our invention, the outer globe and the lamp-case being shown in section. Fig. 2 is an enlarged longitudinal sectional view of the tubular clutch-actuator for the upper carbon, the carbon-carrier, and the contact device, the latter being shown in section. Fig. 3 is a like view of a modified form of our invention; and Fig. 4 is an under side view of the contact-support, with the contact members spread apart.

Referring to Fig. 1, the open upper body portion A of the frame, having a base A′, supporting the usual series-wound and shunt coils, the latter being shown at C′, the outer globe $G^{\times}$, its supporting-socket A^{9}, the inner globe G, the clutch mechanism $b\ b^4\ b^5\ b^7$, and the tubular clutch-actuator B, extended through the open body A and contacting with the base A′, which passes freely therethrough, and the resistance R R′, may be and are all substantially as shown in a patent granted to us May 10, 1898, No. 603,630. In the construction therein shown the contact device for the upper carbon L′ comprised a series of gravity-actuated rocking contact members mounted in a suitable holder attached to said actuator.

We have improved the construction of the contact device between the upper carbon and the clutch-actuator B in our present invention, simplifying the same and attaining greater effectiveness in its operation.

Referring to Figs. 1 and 2, the upper-carbon carrier is shown as a short metal tube a, preferably longitudinally slotted at its lower end at a' to embrace and hold frictionally the upper end of the carbon L′. This carrier slides loosely and freely in the tubular clutch-actuator B, electrically connected through the metal body of the lamp with the line-wire l, as in the patent above referred to, and in order to insure effective contact at all times between the tube B and carbon-carrier a the latter is shown as provided with a series of metal contact members d, pivotally mounted at their upper ends at d' on a metal cap $d^{\times}$, secured in the top of the carrier. Four contact members d are shown, arranged in radial slots d^2 in the cap, which latter is recessed between the slots to permit the ready insertion of the pivot-pins d', the contact members projecting through longitudinal slots a^2 in the carrier to engage the inner surface of the tube B, the outer edges of said members d being preferably flattened, as at d^3, to insure a longer engaging surface. The inner edges of the contact members are concaved, as at d^4, for a purpose to be described and their lower ends are extended, as at d^5, below the bottoms of the slots a^2 to act as stops and limit the outward movement of the members. The contact members thus arranged form a cage, as it were, in which is loosely held a spreader f, shown as a metal sphere, which rests on the concave seats d^4, said seats inclining down and inward toward the center of the carrier, the tendency of the spreader being to separate or push the contact members d outward and maintain them against the walls of the clutch-actuator B. In order to increase this action of the spreader, we prefer to attach a weight $f^{\times}$ thereto by a metallic connection f', so that the current will pass from the contact members d to the spreader and thence to the weight, and as the latter is somewhat smaller than the internal diameter of the carrier we prefer to electrically connect the weight to the carrier by a flexible

wire f^2, attached to a metal plug f^3, secured in the carrier below the weight. Current can also pass to the carrier from the contact members by the cap $d^\times$ and thence to the carbon L′ by the metallic walls of the carrier, and it will be obvious that a number of contact members will be at all times in engagement with the tube B, securing a highly-effective electrical contact, while not interfering with the movement of the carbon-carrier as the carbon is fed. By this construction all spring action of the contact members is obviated, the latter being made as rigid metal pieces *per se*, and consequently the rapid deterioration of spring-contacts by the electric current is completely overcome, while at the same time the contact provided by our invention is as effective, if indeed not greatly superior to, as the contact attained by spring-contacts when entirely new and active.

By a slight modification (shown in Fig. 3) the same results are attained, the weight being replaced by a spring, which latter, however, is by suitable insulation protected from the action of the current.

Below the contact members d a plug h is fixed in the carrier a, and a contractile spring s is connected at its ends to the spreader f and plug h, either or both of which are made of insulating material, so that the current cannot pass through the spring and cause it to lose its life.

In either construction the movement of the spreader longitudinally of the carrier and toward the separable ends of the contact members d effects the same result—viz., a positive and continuous lateral separation or spreading of said members.

Our invention is not restricted to the precise construction and arrangement of parts as herein shown, as obviously the same may be varied or rearranged without departing from the spirit and scope of the invention.

The current in the lamp shown herein passes from one carbon to the other, forming the arc when the lamp is burning, and from the lower carbon L by insulated wire $l^\times$ to one end of the series-wound coil, through the latter and back to line at l'.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. An electric-arc lamp provided with a contact device for the movable carbon, means for connecting and disconnecting the same from the carbon, and a rigid lever yieldingly mounted on the contact device and effecting a sliding frictional contact between the carbon-follower and the circuit-terminal.

2. An arc-lamp provided with a device for maintaining contact between the movable carbon and a circuit-terminal, means permitting the carbon to be connected and disconnected therefrom, and a plurality of levers mounted on one of the parts and held in elastic or yielding frictional engagement with the other part.

3. A contact device for the movable carbon of an arc-lamp, comprising a support, a plurality of independently-movable, laterally-separable contact members mounted thereon and electrically connected with the carbon, said members having elongated contact-faces and interior cam portions, and means to engage said cam portions of the contact members and positively spread them laterally into operative position.

4. A contact device for the movable carbon of an arc-lamp, comprising a support, a plurality of independently-movable, laterally-separable contact members mounted thereon and electrically connected with the carbon, said members having elongated contact-faces and interior cam portions, a spreader inclosed and supported by the contact members, and means to move said spreader to positively separate and maintain the contact members in operative position.

5. A contact device for the movable carbon of an electric lamp, comprising a plurality of inflexible, separable contact-levers electrically connected and bodily movable with the carbon and means to positively separate or laterally extend the free ends of said levers in operative position.

6. In an arc-lamp, a carbon-carrier, a tubular metallic guide therefor, a plurality of separable contact-levers mounted on the carrier in electrical connection with the carbon, and means to positively separate or laterally extend the free ends of said levers and maintain them operatively in contact with the guide.

7. In an arc-lamp, a carbon-carrier, a metallic tube through which it travels and in the lamp-circuit, a plurality of separable contact-levers mounted on the carrier and electrically connected with the carbon, and a spreader to act upon the lever-arms and positively separate or laterally extend them and maintain them in operative contact with the tube.

8. In an arc-lamp, a metallic tube in the lamp-circuit and within which the movable carbon travels, a carbon-carrier, pivoted contact-levers in electrical connection with the carbon, and means to positively engage and move said contact-levers into operative position and to maintain them in yielding sliding engagement with said tube.

9. In an arc-lamp, a metallic carbon-carrier having side openings therein, a plurality of depending contact members pivotally mounted on the carrier, a spreader within and supported by the said members, and means to move said spreader to positively separate said contact members and maintain them in operative position projecting laterally through the openings in the carrier.

10. A contact device for the movable carbon of an arc-lamp, comprising a plurality of movable contact-levers electrically connected with the carbon, and means to positively maintain said contact-levers in operative position.

11. In an arc-lamp, a carbon-carrier, a tubular metallic guide therefor, a plurality of mov-

able contact-levers mounted on the carrier in electrical connection with the carbon, and means to positively maintain said levers in operative contact with the guide.

12. In an electric-arc lamp, a movable carbon, a tube wherein the same is adapted to slide, a contact for the movable carbon comprising a series of arms bent inwardly and each pivoted at one end in the holder for the carbon, and means surrounded by said arms for maintaining the same in expanded position.

13. In an electric-arc lamp, a contact for the upper carbon comprising a series of arms bent inwardly and each pivoted at one end in the carbon-holder, and a spherical weight surrounded by, and normally adapted to expand, said arms.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FREDERICK A. GILBERT.
EMIL O. LUNDIN.

Witnesses:
JOHN COUPER EDWARDS,
L. M. WALLACE.