(No Model.)

W. L. DUDLEY & C. F. RAPP.

ELECTRIC ARC LAMP.

No. 271,816. Patented Feb. 6, 1883.

Fig. 1.

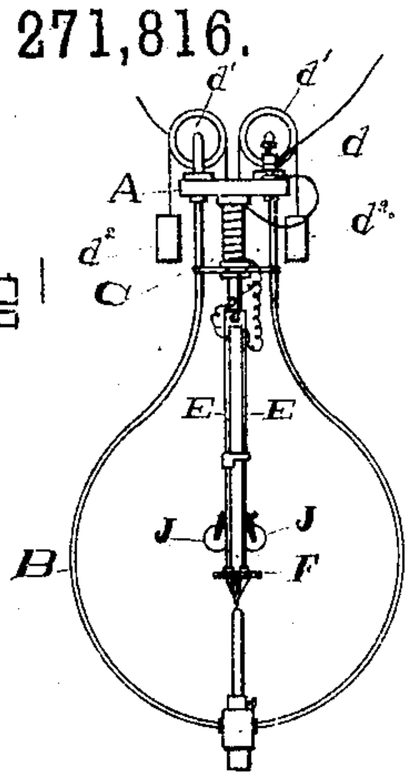


Fig. 2.

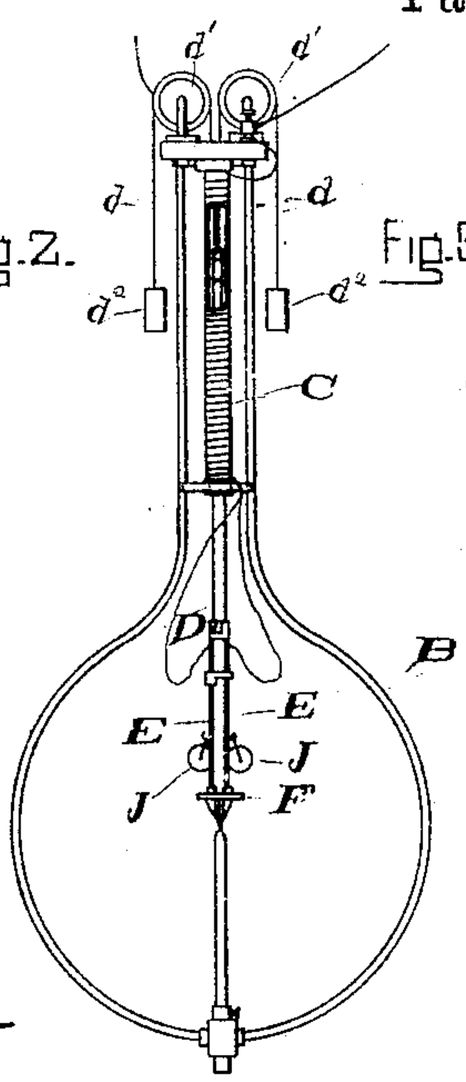


Fig. 3.

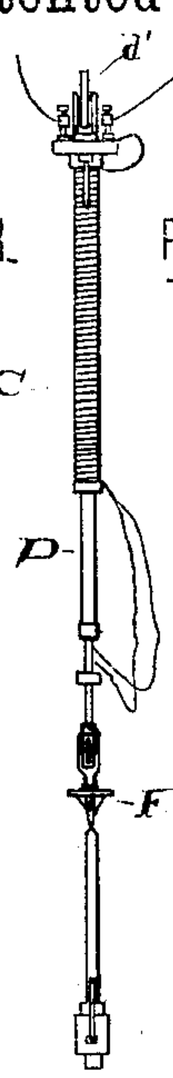


Fig. 4.

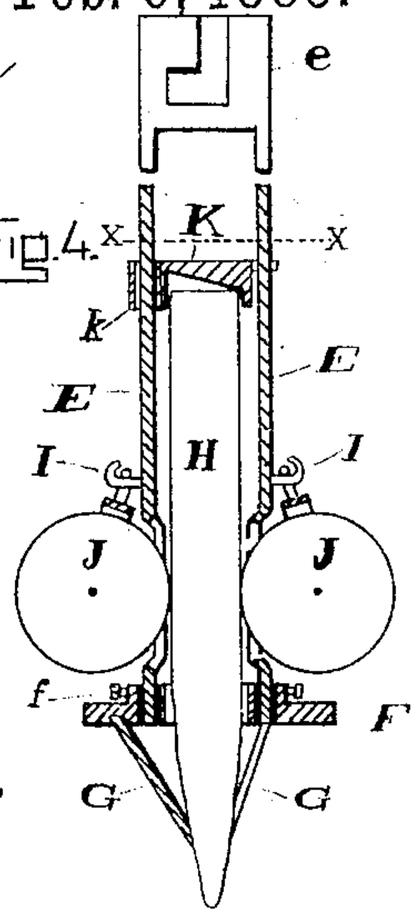


Fig. 5.

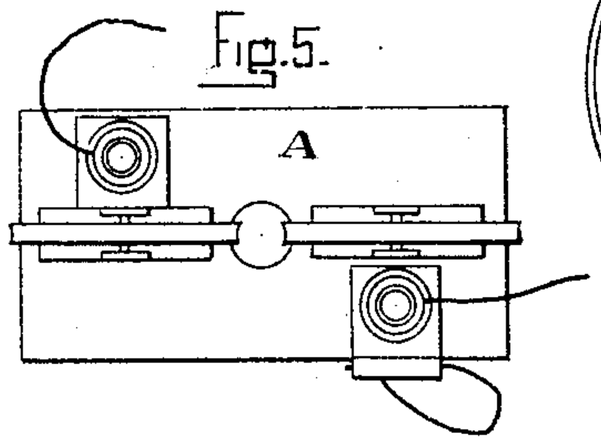


Fig. 6.

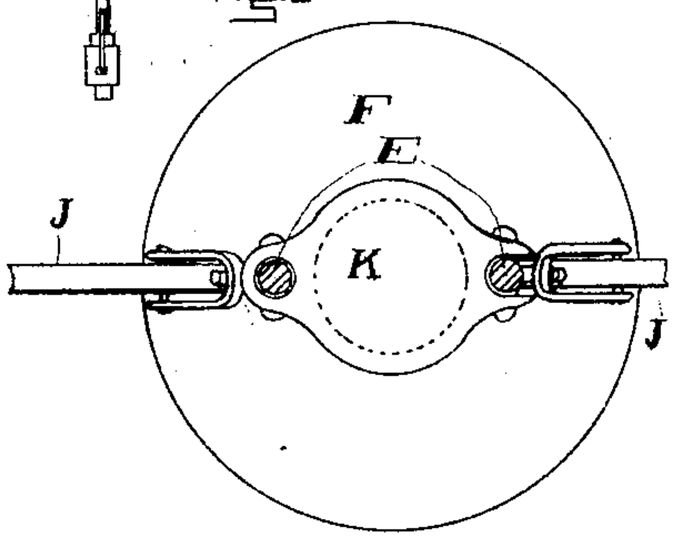


Fig. 7.

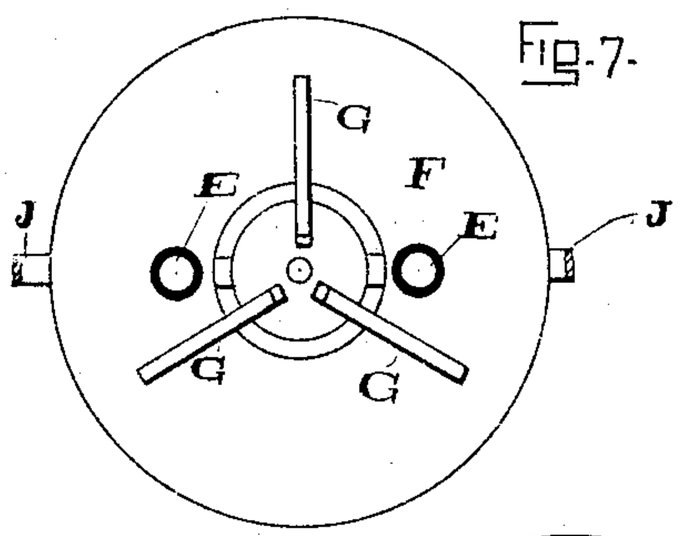
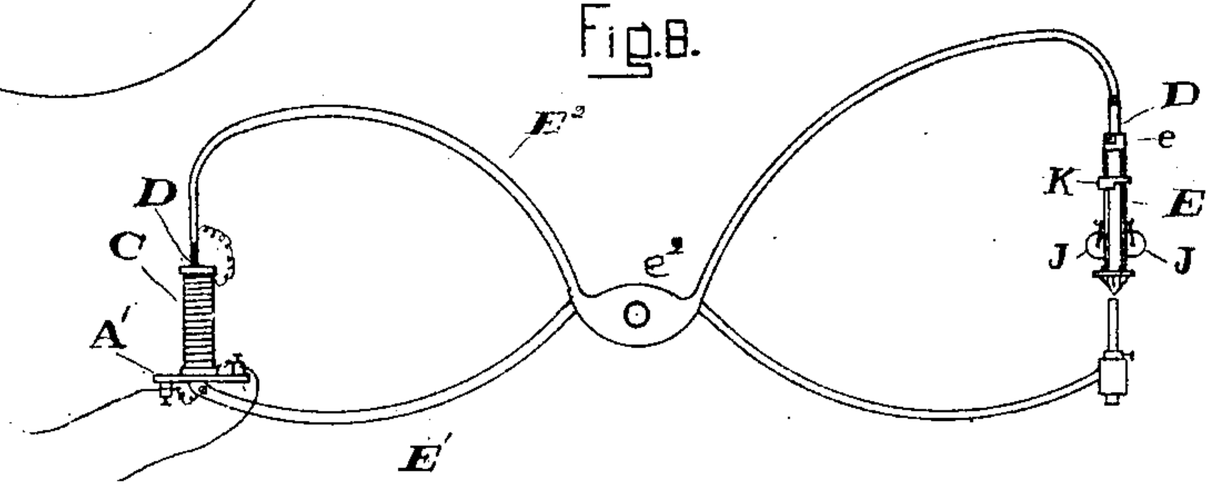


Fig. 8.



Attest

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UNITED STATES PATENT OFFICE.

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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 271,816, dated February 6, 1883.

Application filed May 25, 1882. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM L. DUDLEY and CHRISTIAN F. RAPP, citizens of the United States, and residing respectively at Covington, in the county of Kenton, State of Kentucky, and at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Electric Lights, of which the following is a specification.

Our invention relates to that class of electric apparatus for producing and controlling light by the use of discontinuous conductors.

The chief objects of the invention are, first, to prevent the striking or pounding of the electrodes, thus permitting the use of a non-combustible electrode by which the point of light is always in the same position; second, to economize power in the production of light, and labor and material in the apparatus by which it is produced; third, to utilize the natural form or taper of the positive carbon, caused by its combustion, to automatically feed the same, so that the point always retains the same position relative to its supports, thus diminishing the longitudinal motion of the core equal to the length of the positive carbon or electrode; fourth, to hold the positive electrode permanently in its supports. These objects are attained by the means illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of our improved lamp, adapted to use a non-combustible negative electrode, the point or tip of which is preferably made of iridium. Fig. 2 is a similar view of our lamp, having the helix and core lengthened for use with both electrodes of carbon. Fig. 3 is an edge elevation of the lamp shown in Fig. 2. Fig. 4 is an enlarged view, in vertical section, of the devices which are attached to the lower end of the core to sustain and feed the positive electrode and conduct the electricity down to near the point of the same. Fig. 5 is a plan view of the top of the lamp-frame. Fig. 6 is a transverse section through line *x* of Fig. 4. Fig. 7 is an inverted plan view of the parts represented in Fig. 4; and Fig. 8 is a side elevation of a bracket-lamp provided with our improvements.

Similar letters refer to similar parts throughout the several views.

The form of lamp-frame to which we have applied our improvements (except Fig. 8) is in general structure like those in common use; but as the play of the positive-electrode holder of our device is very limited and the length of our electro-magnet is much diminished the frame is correspondingly shortened.

A is the cap, of ebonite or other non-conducting material, to which is suspended the curved metal frame B and helix C. Within the helix a soft-iron core, D, is suspended by chains or cords *d*, which pass over pulleys *d'*, journaled in standards, which are secured on top of cap A. To the outer ends of the chains or cords are attached weights d^2 to nearly counterpoise the weight of the core and its attachments. The top of the core is capped with ebonite to insulate it from the chains.

In the bottom of frame B, directly below the core D, is the customary socket for the reception of the negative electrode. A ring or collar, *e*, which is secured to the lower end of core D by a bayonet-joint or other suitable means, has two rods, E E, depending from it upon opposite sides, and secured to the lower ends of these rods is a metal disk, F. The rods E pass through bosses projecting from the upper side of disk F, and secured by set-screws *f*. The rods are insulated by a bushing of asbestus or other suitable non-conducting material between them and the bosses.

From the under side of disk F three fingers, G, of platinum or other material capable of resisting a high degree of heat, incline inward to receive and support the positive electrode H. For this purpose the ends of the fingers should be equidistant from the axis of the electrodes, and in a circular path of less diameter than the carbon H, so that they grasp it around the tapering part. Now, as the carbon is consumed in use it still retains the same tapering form at the point. It will therefore be fed regularly downward by its own weight as it burns away, and the distance between the point of the carbon and the fingers G remains the same until the carbon is consumed.

The rods E have hooks I projecting from them, upon which are suspended frames carrying contact-rollers J J. These rollers pass through loops in rods E, and have grooved peripheries to bear against the electrode H.

The disk F serves as a shield to prevent the

particles of carbon thrown off by combustion from rising and adhering to the rollers J. The purpose of making these rollers and their frames detachable is for convenience in cleaning their grooved peripheries, so as to insure perfect contact between the rollers and positive electrode.

Above the electrode H is a follower, K, which is guided by the rods E. The follower has a long boss, *k*, upon one side, through which one of the rods E loosely passes. The opposite side of the follower has a notch to receive the opposite rod E. The follower is beveled upon the under side, and is insulated from the carbon by a cap or washer of ebonite. As the carbon feeds itself down the follower K travels with it; but being beveled, so that the top side of the carbon opposite the boss *k* only touches the under side of the follower, any inclination of the carbon to rise will lock the follower. The point of the positive carbon will thus be held in the same position relative to the fingers G.

Instead of the follower K, a weight might be substituted; but this would not be so good, because the weight that would be just sufficient to keep the full carbon in place would be too light when the carbon is partially consumed. It is also obvious that instead of the rods or frame E a tube might be used, the opposite sides of the same being slotted to permit the rollers J J to touch the carbon H; and instead of the rollers J stationary contact-surfaces may be substituted to conduct the electricity to the carbon H near the point.

In Fig. 8 is shown how our improvements may be applied to a bracket-lamp or a headlight for vessels, &c. The cap A′ is attached to any suitable support and the rod E′ rigidly attached to it. The helix C is supported upon top of the cap. To the top of the core D is hinged the lever-rod E^2. This rod is fulcrumed at *e′* in the rod E′. The journal-pin and the joint between the rods E′ and E^2 are bushed with ebonite to insulate the rods from each other.

To the outer end of rod E′ is the customary holder for the negative electrode, (which in this case should be non-combustible.) The end of rod E^2 is bent to be vertically above the negative, and the attachments shown in Fig. 4 are secured to the downwardly-bent end, substantially as they are to the core in the hanging lamp. The operation of the lamps is the same.

It will be seen that when a non-combustible negative electrode is used—as, for instance, the ordinary iridium or iridium-tipped electrodes—the play of the core D is very limited, and when carbons are used for both electrodes the play is only equal to the length of the negative, so that our lamps are very compact in form and can be made much cheaper than any in use; and in our lamp the electricity is conducted to near the arc, and is not therefore resisted by passing through the entire carbon. We therefore use naked carbons for our positive electrode instead of the copper-plated ones generally used with other lamps.

What we claim, and desire to secure by Letters Patent, is—

1. A carbon-holder for electric lamps having an insulated section constructed to grasp the carbon at the tapered portion of the same and permit it to pass down as the carbon is consumed.

2. The combination, in an electric lamp, of an electro-magnet having a carbon-holder attached to the core of the same, said holder having an insulated section constructed to grasp the carbon at the tapered portion thereof with the electrodes of an arc-lamp, substantially as specified.

3. In an electric lamp, the combination of a non-combustible negative electrode with a carbon-holder having an insulated section constructed to grasp the positive electrode at the tapered portion of the same, said holder being attached to the core of an electro-magnet, substantially as specified.

4. In an electric lamp, the combination, substantially as hereinbefore set forth, of an electro-magnet with a carbon-holder, consisting of frame E E and fingers G, suitably connected to but insulated from said frame, said holder being attached to the core of the magnet.

5. The carbon-holder consisting of frame E E, ring or disk F, connected to but insulated from said frame, fingers G, and the tapered electrode H, in combination with a follower, as K, to retain the electrode in contact with said fingers.

6. The combination of a carbon-holder having an insulated section constructed to grasp the carbon at the tapered portion thereof, with contact-wheels, as J, held in electrical contact with the carbon, near the tapered end of the same, for the purpose set forth.

7. The combination of the electrode H, a holder grasping the said electrode at the tapered end, with wheels J in electrical connection with the said electrode, near the tapered end, and the disk F to protect the wheels from the particles of carbon arising from the combustion of the electrode.

8. The combination, as specified, of an electro-magnet, a carbon-holder attached to the core of the magnet, and having an insulated section constructed to hold the positive electrode at the tapered portion of the same, with the weights d^2, pulleys *d′*, and chains *d* to counterbalance the weight of the said core and carbon-holder.

9. The combination, substantially as specified, of a short electro-magnet, a carbon-holder consisting of a frame or tube, attached to the core of said magnet, and having insulated fingers G at the lower end of said frame to grasp a combustible positive electrode, with a non-combustible negative electrode of iridium or other material capable of resisting a high degree of heat.

10. The combination, as specified, of the rods E E, having loops to pass the wheels J J,

and hooks I, with wheels J and their frames detachably suspended from said hooks, for the purpose set forth.

11. In an electric light, the combination of a carbon-holder regulated by but insulated from the current, and a carbon having a movement in the holder independent of the action of the current upon the holder.

12. In an electric light, the combination of a carbon-holder regulated by means or with the aid of the current, and having retaining-fingers insulated from the current, and a carbon having a movement in the holder independent of the action of the current upon the holder, and having the part for conducting the electric current to the carbon applied to the carbon, near the point thereof.

13. In an electric light, the combination of a carbon-holder regulated by means or with the aid of the current, and a carbon having a movement in the holder independent of the action of the current upon the holder, said holder having one or more fingers for retaining the carbon, said fingers being insulated from the current.

14. In an electric light, the combination of a carbon-holder regulated by means or with the aid of the current, and a carbon having a movement in the holder independent of the current upon the holder, said holder having insulated fingers for retaining the carbon, and suitable means for conducting the electric current to the carbon, near the point thereof.

15. A carbon-holder the carbon in which has a movement in the insulated holding device independent of the electric current, and the part for conducting the electric current to the carbon applied to the carbon, near the end thereof.

16. An electrode, J, through which the current passes to the carbon, movable toward and from the carbon, the insulated retaining-fingers to hold and feed the carbon, in combination with a frame for supporting both the electrode and said retaining-fingers.

17. A carbon-holder having an electrode attached thereto, and retaining-fingers insulated, for the purpose described.

18. The combination of the carbon-holder *e* E E F, the retaining-fingers G, and the insulating substance interposed between said fingers and part E, substantially as described.

19. An electrode-holder having the retaining finger or fingers insulated for the purpose of preventing the electric current from passing to the carbon through the fingers, and having the part through which the current is transmitted to the carbon arranged to bear upon the carbon, at the side thereof.

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CHRISTIAN F. RAPP.

Witnesses:
GEO. J. MURRAY,
SOL. H. WOLF.