(No Model.)

J. A. DALZELL.

DOUBLE CARBON LAMP.

No. 308,595. Patented Dec. 2, 1884.

Fig. 1.

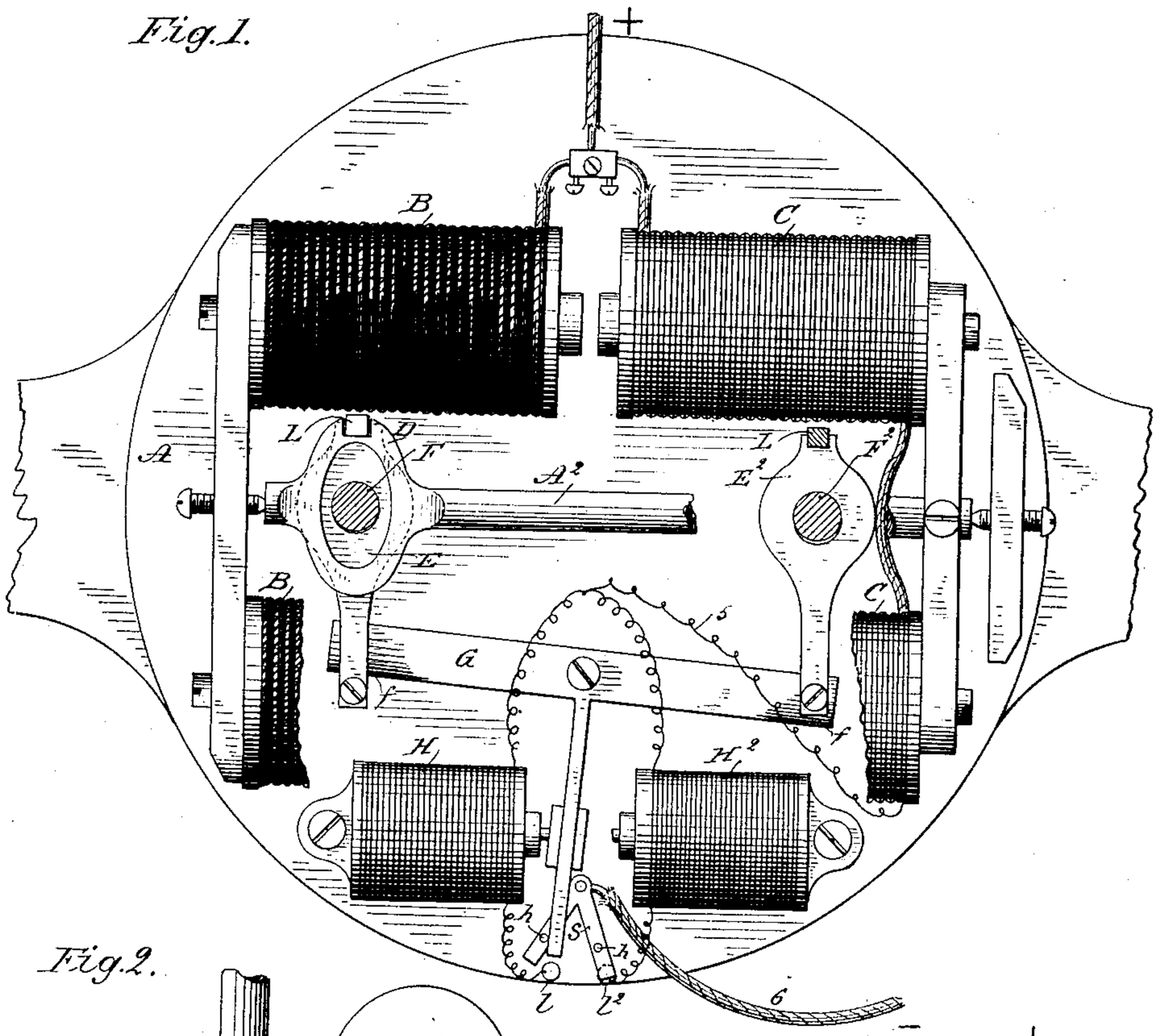


Fig. 2.

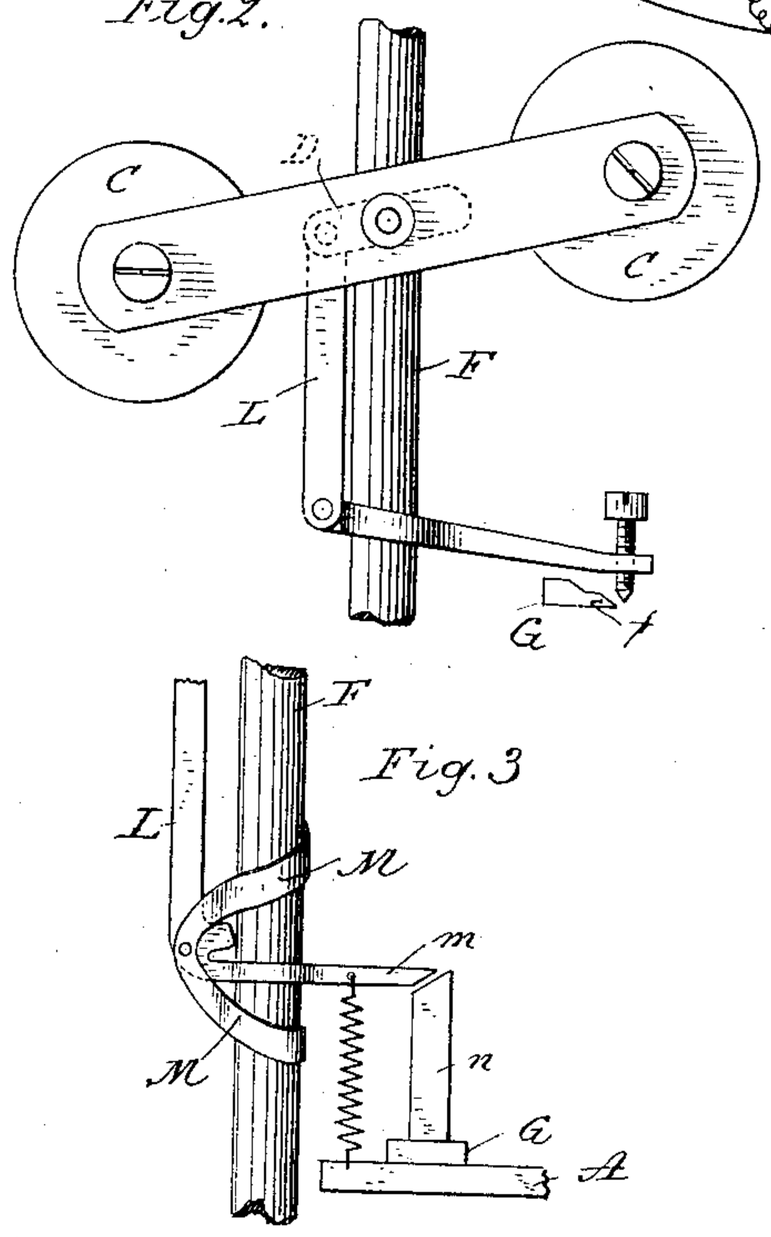
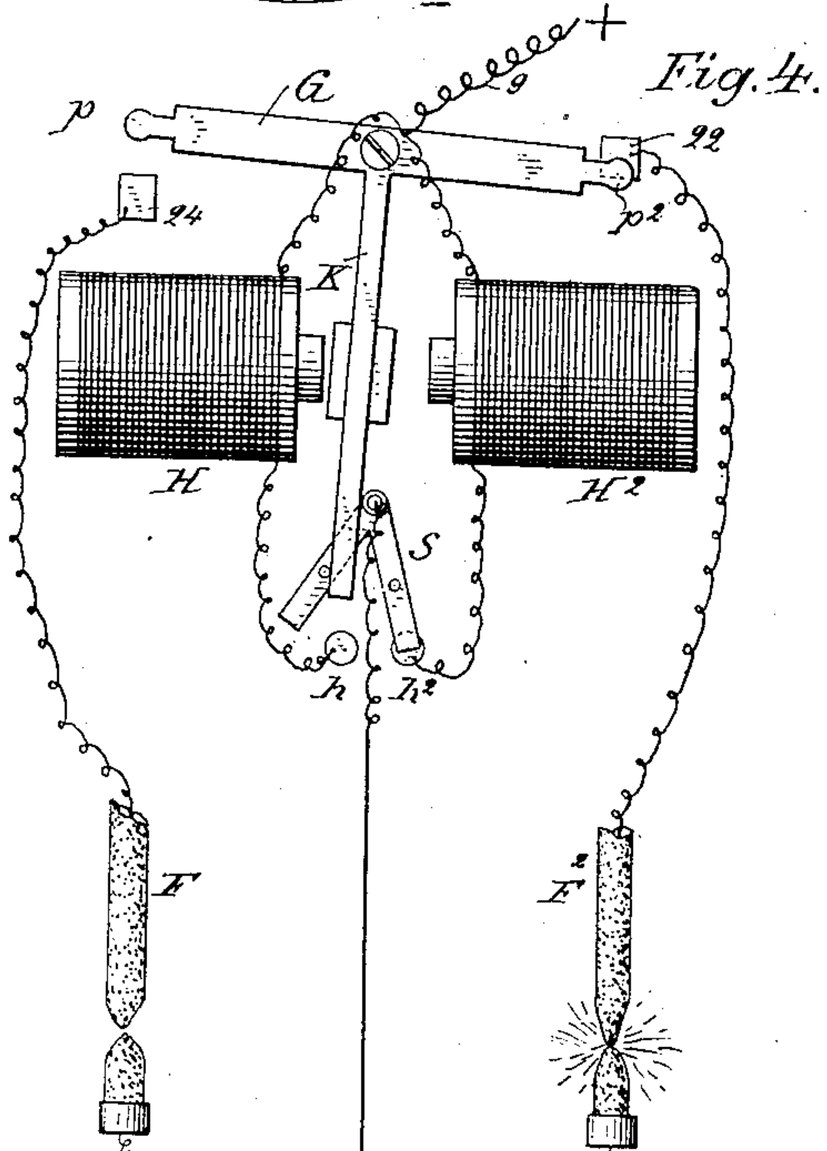


Fig. 3

Fig. 4.



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UNITED STATES PATENT OFFICE.

J. ALLAN DALZELL, OF NEW YORK, N. Y.

DOUBLE-CARBON LAMP.

SPECIFICATION forming part of Letters Patent No. 308,595, dated December 2, 1884.

Application filed May 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, J. ALLAN DALZELL, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Double-Carbon Lamps, of which the following is a specification.

My invention relates to electric-arc lamps of the kind known as "double-carbon lamps," in which two sets of carbons are employed, and are combined with suitable mechanism whereby one set may be kept out of action while the other is burning, but may be automatically thrown into action when the carbons of the set that is burning are nearly consumed, or when the arc between them becomes abnormally long.

My invention is designed, in general, to improve the simplicity and efficiency of this class of lamps, but more especially to furnish a simple and efficient lamp in which the arc may be shifted automatically at any time from either set of carbons to the other in case of an abnormal increase in the length of arc of the set in action, so as to produce a lamp that shall be double acting at any and all times, and not, as in many lamps of the general class referred to, restricted in its action and capable of shifting the arc only from the set of carbons first burning to the other set, and then, as is generally the case, only when the carbons of the first set are consumed. My invention may, however, be applied in a lamp in which a shift from the first burning set to the other only is provided for.

My invention consists, first, in combining with two sets of carbons, suitable means, electrical or mechanical, for preventing the carbons of one set from burning, an electro-magnet in a derived circuit around the other set of carbons for bringing the carbons of the one set into action by any suitable means, and an electric switch that serves to remove the current from said electro-magnet simultaneously with its operation in shifting the arc.

My invention consists, also, in the combination, with two sets of carbons, of a suitable shifting bar, lever, or other support, carrying a device whereby the one set of carbons may be brought into action, an electro-magnet in a derived circuit around the other set for operating the said lever when the arc becomes abnormally long, and an electric switch for automatically and simultaneously removing, breaking, or shunting the current from said electro-magnet.

My invention consists, also, in the combination, with two sets of carbons, of a reciprocating rod, bar, lever, or other suitable device carrying or actuating the devices that control the operation of the two sets of carbons in such a way as to prevent the formation of an arc, or at the proper time to allow an arc to be formed, two electro-magnets acting on said lever in opposite directions, and placed, respectively, in derived-circuit connections around the two sets of carbons, and circuit-controlling devices, whereby the circuit of the magnet which throws the lever may be broken or changed simultaneously with the operation, and the circuit of the other magnet may be completed or changed so as to put the latter into operative electrical connection with relation to the set of carbons rendered operative, while at the same time the other electro-magnet, which is for the time being in a derived circuit around the set from which the arc is shifted, is rendered electrically inoperative.

My invention consists, also, in the combination of a movable releasing-stop for a clamp or clutch of the carbon-carrier for one set of carbons, and an electro-magnet in a derived circuit around the other set of carbons for setting said stop into position where the clutch or clamp may be released.

My invention consists, also, in the combination, with two sets of carbons, of feed clamps or clutches, or equivalent feed-controlling devices, releasing stops or detents mounted on a reciprocating support, electro-magnets arranged in derived-circuit connections, and arranged to act on the support in turn and in opposite directions, and suitable means for electrically disconnecting the magnet, which is in a derived circuit around the set of carbons in action, and which throws the support to bring into action a new set of carbons, and connecting the other magnet into a derived connection around the set of carbons brought in.

My invention also consists in certain speci-

fied combinations of apparatus and devices to be set out in the claims following the subjoined description.

As a preferred method of carrying my invention into practice, I propose to use, as a means of holding a carbon out of action or allowing it to come into action, a movable detent, releasing-stop, or equivalent device for the feed-controlling mechanism, which is made movable, and is so arranged that in one position it will prevent the carbon-carrier from moving, but in another position will allow said carbon to feed when the magnet system of the lamp operates the controlling mechanism in the usual way. With this movable stop, detent, or its equivalent is combined the derived-circuit magnet that serves to actuate the support for said stop in such a way as to bring the stop or detent into operative position with relation to the feed-controlling mechanism. I may, however, use any other means for holding a set of carbons out of action and preventing the arc from forming—as, for instance, an electric switch that serves to break the circuit for one set of carbons, or close the same when it is actuated by the magnet in the derived circuit around the other set.

Some of the methods or combinations and some of the various devices that may be used in carrying my invention into practice are shown in the accompanying drawings, in which—

Figure 1 is a plan view of the magnet system and the shifting-lever and its magnets. Fig. 2 is an elevation of the working parts of the lamp, and shows the form given to that portion of the shifting-lever that works under the clutch and constitutes in effect the releasing-stop for the clutch. Fig. 3 shows another form of clutch. Fig. 4 illustrates the application of my invention to an electric switch for switching the two sets of carbons into or out of circuit.

Referring to Fig. 1, A indicates the plate which supports the lamp mechanism; B B, a fixed main-circuit electro-magnet of horseshoe form, and having the coils of wire upon its two legs.

C C indicate a similar derived-circuit electro-magnet, which is mounted by its cross-piece on a rock-shaft, A^2, mounted on uprights rising from plate A, and provided with two crank-arms, D D, one of which is shown in Fig. 2, and which are connected by links L L with two clutches, E E^2, for the carbon-carriers F F^2. The poles of the magnet C C project toward the poles of B B, and are arranged to swing in the face of the latter and to impart movement to the feed-regulating clutches or equivalent devices in substantially the manner set forth in my prior Patent No. 274,916. In that patent the tails of the clutches rest upon the floor of the lamp, which floor is, in fact, a releasing-stop for the clutches. In the present case the releasing-stops are supported by or formed on the ends of a lever, G, or other suitable reciprocatory support, which is beveled at points *f f*, as indicated, so that it may readily slip under the ends of the clutches, and when in position beneath the end of the clutch may act as a releasing-stop therefor. The lever G is pivoted on a suitable support and swings in a horizontal plane, but is so arranged that it will engage with but one clutch at a time. When in engagement with one, it is out of engagement with the other, and vice versa. When it is out of releasing position with relation to a clutch, that clutch is unsupported save by the magnet system, and the movements of the latter are insufficient to cause it to release its rod, so that the rod remains locked from movement. The other clutch, whose tail is over the releasing-stop on the other end of lever G, will, however, be released in the ordinary way to cause a feed of its carbon-carrier. The lever G is turned to bring the releasing-stop of one clutch or the other into releasing position by the action of two derived-circuit electro-magnets, H H^2, suitably supported and acting oppositely on an armature-lever, K, which extends from lever G between said magnets. Said magnets are here shown as arranged to be placed in a continuation of the derived circuit containing magnet C C through connection 5, which splits to said magnets, as indicated, the circuit of one or the other being completed by a switch, S, to the contact-points *l* l^2, to which the terminals of magnets H H^2 are connected, while the switch-lever itself is connected with the wire 6, leading to the negative binding-post of the lamp. In the position shown the circuit of magnet H^2 is complete through l^2 and the switch-lever; but magnet H is out of circuit, its connections being broken at *h*. Switch S is suitably mounted on the plate A, and is provided with pins *h h*, against which the armature-lever impinges to throw the switch onto one or the other of the contacts, *l* l^2, according to the direction in which it is thrown. The pole ends of the magnets have projections of some non-magnetic material let into their faces to prevent sticking of the armature. In the position of the parts shown the carrier F is locked, because the free end of clutch E is unsupported, and, owing to the removal of its releasing-stop, cannot be released during the movement of the magnet system in regulating the feed of the other carrier. Clutch E^2 operates in the ordinary manner, its releasing-stop being in position. Magnet H^2 is in circuit and H out of circuit, while armature K in its extreme position is so far away from the magnet H^2 that it is not operated thereby during ordinary fluctuations in the length of arc. If, however, the arc becomes abnormally long, owing to sticking of the carbon rod or from the feeding out of the carbon, at which time a suitable pin on the carbon rod prevents farther downward movement thereof, then magnet H^2 becomes sufficiently strong to draw armature K suddenly over, by which operation the stop for clutch E^2 is withdrawn, so

that carrier F^2 will be locked by its clutch, and the releasing-stop for E is placed in operative position, so that carrier F may be fed in the ordinary way. At the same time the switch S is operated by the lever K striking a pin, *h*, thus breaking the connection at l^2 and completing the connection at *l* for magnet H, which is then ready to throw the lever and the stops back to the original position in case of abnormal increase in the length of arc of the pair of carbons then in action. The distance between the pins *h h* is such that the lever K will throw the switch S only when near the end of its movement in one direction or the other, so that the armature may complete its throw without interference from the magnet-pole that it is leaving. By this arrangement the light may be shifted automatically from either set of carbons to the other at any time in case the set in action fails to work properly.

I do not limit myself to any particular arrangement of the circuits of the magnets and switch, the idea and purpose being only to automatically bring said magnets into operative electric condition with relation to the electric arc alternately and singly, and to cause an automatic shifting of the switch to throw out the magnet which draws the armature over and to throw in the magnet on the opposite side, so as to place the latter in condition for causing a reverse movement of the armature and the support for the releasing-stops or other devices that serve to throw the sets of carbons alternately and singly into and out of action, in case such reverse movement should be rendered necessary by an abnormal lengthening of the arc between the set of carbons in action; nor do I limit myself to the employment of the movable releasing-stops for causing the alternate lock and release of the two sets of carbons, as any other devices may be employed which will when in one position lock a carbon-carrier or carbon and when in another position allow said carrier to feed and act in the ordinary way.

It is obvious that the alternate locking and releasing might be accomplished by the application of suitable stops or locking devices to other forms of feed-controlling devices besides to ordinary clutches. The armature-lever and support G may be constructed and mounted in other ways, provided they be properly arranged to retain the position into which they are placed by the action of either magnet until drawn in the opposite position by the other.

Another form of clutch that might be used in place of those shown in Fig. 1 is shown in Fig. 3. In this figure, M M indicate two straps pressing against the carbon-carrier on one side, and on the other carrying a pivoted clutching toe or dog that has an extended arm, *m*, upon which a spring acts to normally hold the dog against the carrier and prevent it from feeding. The clutch is supported by a link, *l*, or other attachment to the magnet system. A stop, *n*, supported by lever L, serves, when in proper position, to release the clutch when lowered; but when said stop is moved by the lever to one side into the position indicated the spring keeps the clutch in engagement with the carrier, and prevents the same from feeding.

Instead of mechanical devices for determining which of the two sets of carbons shall act, I may employ an electric switch to complete the circuit to one set of carbons and simultaneously break the circuit for the other set. Such an arrangement is shown in Fig. 4, in which lever L or other reciprocatory support carries two circuit-closing springs, *p* p^2, one of which makes connection with a contact-point, 22, and the other with a contact-point, 24. The lever is connected with the positive pole of the lamp, and the contact-points 22 24 with the carbon-carriers F F^2 and their carbons, respectively. In one position of the lever (that shown) the circuit of carbon-carrier F^2 of one set is completed and the circuit of the other broken, and vice versa, in the other position of the lever G. The regulating-magnets are not shown, for the sake of simplicity, but they are placed in the circuit in the ordinary way, which need not be recited in detail. The main-circuit magnet might be in the connecting-wire 9, and the derived-circuit magnet in the connecting-wire connecting the switch-lever S with the negative side of the lamp. In the one position of the parts the carrier F^2 is in circuit, and the magnet which is adapted to throw the armature K, so as to bring the other set into circuit and throw the first set out, is in the derived circuit around the carbons in action. In the other position the conditions are reversed, with the obvious result of rendering the apparatus capable of shifting the light from either set of carbons to the other automatically in case the set in action fails to operate properly.

The parts are suitably proportioned to preserve the general circuit as the lever G shifts.

I have herein described a breaking of the circuits containing the magnets and the carbons; but it is obvious that the same results might be accomplished by a short-circuiting of the parts, in a manner well understood by electricians.

I do not limit myself to any particular construction of mechanism or form of individual parts, as the same may be varied in many ways.

Other magnet systems may be employed, and other feed-regulating devices made use of.

What I claim as my invention is—

1. The combination, in an electric lamp, of two sets of carbons, suitable means for preventing one set of carbons from burning while the other set is in action, an electro-magnet in a derived circuit around the latter set for bringing the first-named set into action when the arc resistance of the set in action reaches a predetermined point, and an electric switch controlling the circuit of said electro-magnet,

and actuated thereby so as to remove the current from said electro-magnet simultaneously with the shifting of the arc from the one set of carbons to the other.

2. The combination, in an electric lamp, of two sets of carbons, a reciprocating lever controlling suitable means whereby a set of carbons may be brought into or out of action, electro-magnets acting on said lever in opposite directions and placed in derived-circuit connections around the carbons, and an electric switch controlling the circuits of said electro-magnets in the manner described, so as to throw out the magnet which actuates the lever, and to throw the other magnet into a derived circuit around the set of carbons brought into action.

3. The combination, with two sets of carbons, of means for locking and releasing one set of carbons, an electro-magnet in a derived circuit around the other set of carbons for effecting the release of the first set, and an electric switch for automatically cutting out or short circuiting said magnet simultaneously with the release of the carbons thereby.

4. In a double-carbon lamp, the combination, with a carbon-carrier for one set of carbons, of a clutch or clamp, a movable releasing-stop therefor normally held out of releasing position, and an actuating electro-magnet for throwing said releasing-stop into releasing position, said electro-magnet being placed in a derived circuit, which is closed around the other set of carbons, while such set is in action.

5. The combination, with two sets of carbons, of feed clamps or clutches therefor, releasing-stops for said clamps mounted on a reciprocating support actuating the same in opposite directions, and arranged in derived circuits around the carbons, and means for breaking the derived circuit of a magnet simultaneously with the movement of the reciprocating support thereby, and at the same time closing the derived circuit containing the other magnet.

6. The combination, with two carbon-carriers, of feed-controlling mechanism therefor, a reciprocating lever or other support for the releasing devices of said mechanism, and arranged in the manner described, so as to allow the operation of but one feed-controlling mechanism at a time, derived-circuit electro-magnets for actuating said support in derived-circuit connections around the carbons, and an electric switch for throwing one of said magnets into circuit and the other out of circuit, as and for the purpose described.

7. The combination, with two carbon-carriers, of feed clamps or clutches therefor, a reciprocating feed-shifting bar or support, two electro-magnets for operating said support in opposite directions, placed, respectively, in derived-circuit connections around the carbons, and suitable circuit-controlling devices for admitting the electric current to either of said electro-magnets simultaneously with the operation of the support by an abnormal increase in the length of arc in the set with which the other is connected, as and for the purpose set forth.

8. The combination, with the two carbon-carriers, of the two clutches, the reciprocating lever carrying the releasing-stops, and the two electro-magnets in derived circuits, respectively, around the carbons, and provided with means for automatically switching them into and out of circuit.

9. The combination, with two sets of carbons, of a reciprocating light-shifting lever, two electro-magnets in derived-circuit connections, and two circuit-controlling points, whereby the current may be admitted to said electro-magnets separately and in turn.

10. The combination, in a double-carbon lamp, of two sets of carbons, a shifting-lever, G, two electro-magnets, H H^2, acting thereon in opposite directions, and an automatic circuit-controlling switch for removing the electric current from the magnet which throws the lever, and simultaneously admitting current to the other magnet.

11. The combination of the feed-shifting lever G, electro-magnets H H^2, connected to a derived circuit around the carbons, and an electric switch, S, as and for the purpose described.

12. In a double-carbon lamp, the combination of a movable releasing-stop for the clutch or clamp of one set of carbons, and an electro-magnet in a derived circuit around the other set of carbons for setting said stop into position where the clamp or clutch may be released.

Signed at New York, in the county of New York and State of New York, this 13th day of April, A. D. 1883.

J. ALLAN DALZELL.

Witnesses:
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