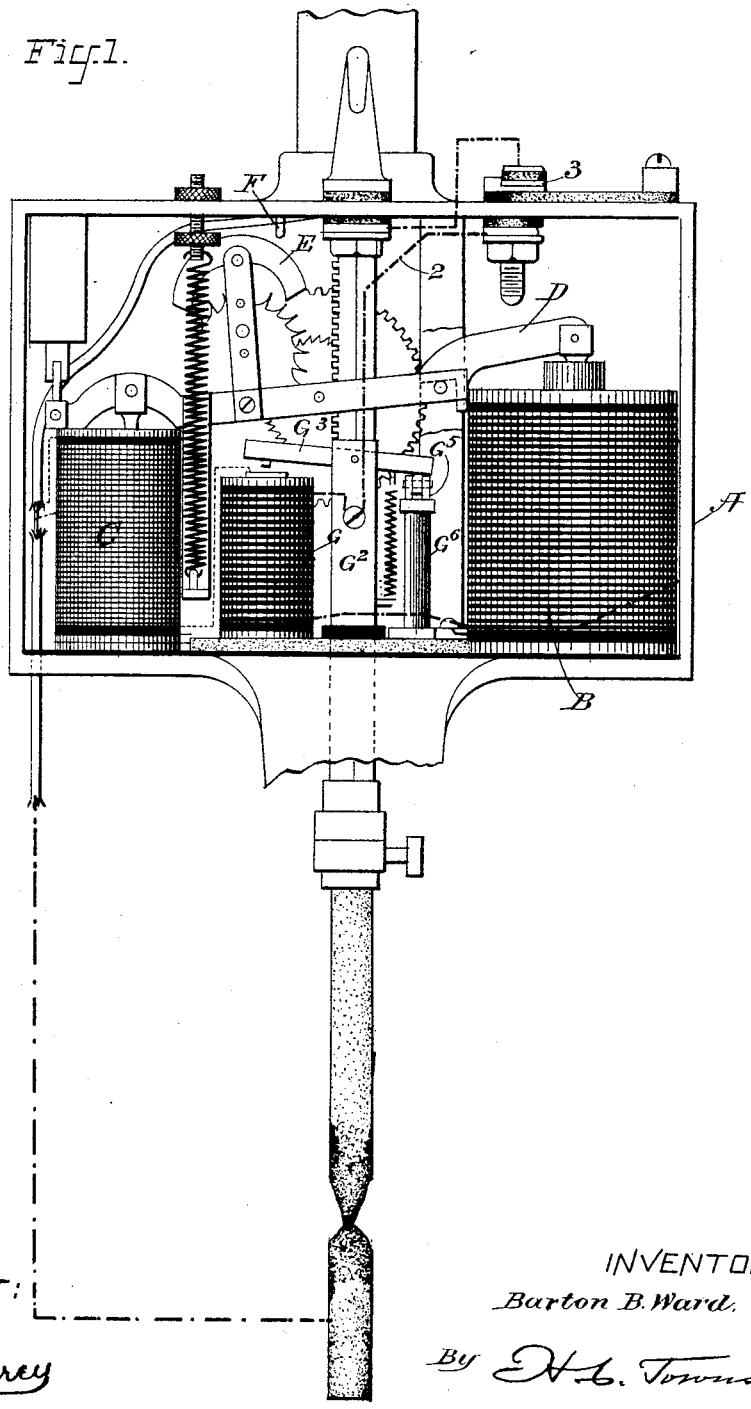
(No Model.) 3 Sheets—Sheet 1.

B. B. WARD.

DUPLEX ARC LAMP.

No. 458,719. Patented Sept. 1, 1891.

Fig. 1.



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T. F. Courey

INVENTOR:
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Attorney

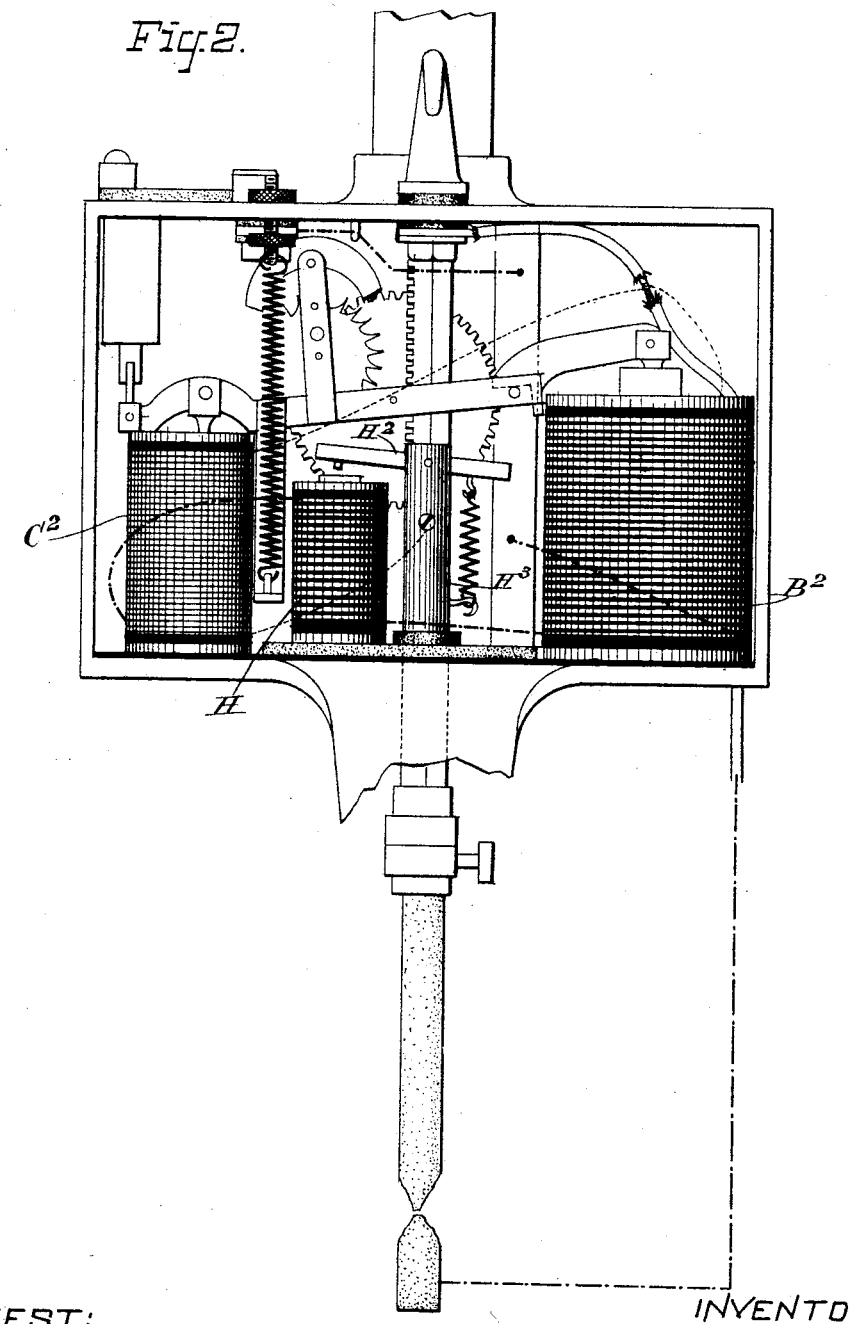
(No Model.) 3 Sheets—Sheet 2.

B. B. WARD.

DUPLEX ARC LAMP.

No. 458,719. Patented Sept. 1, 1891.

Fig. 2.



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(No Model.)

3 Sheets—Sheet 3.

B. B. WARD.

DUPLEX ARC LAMP.

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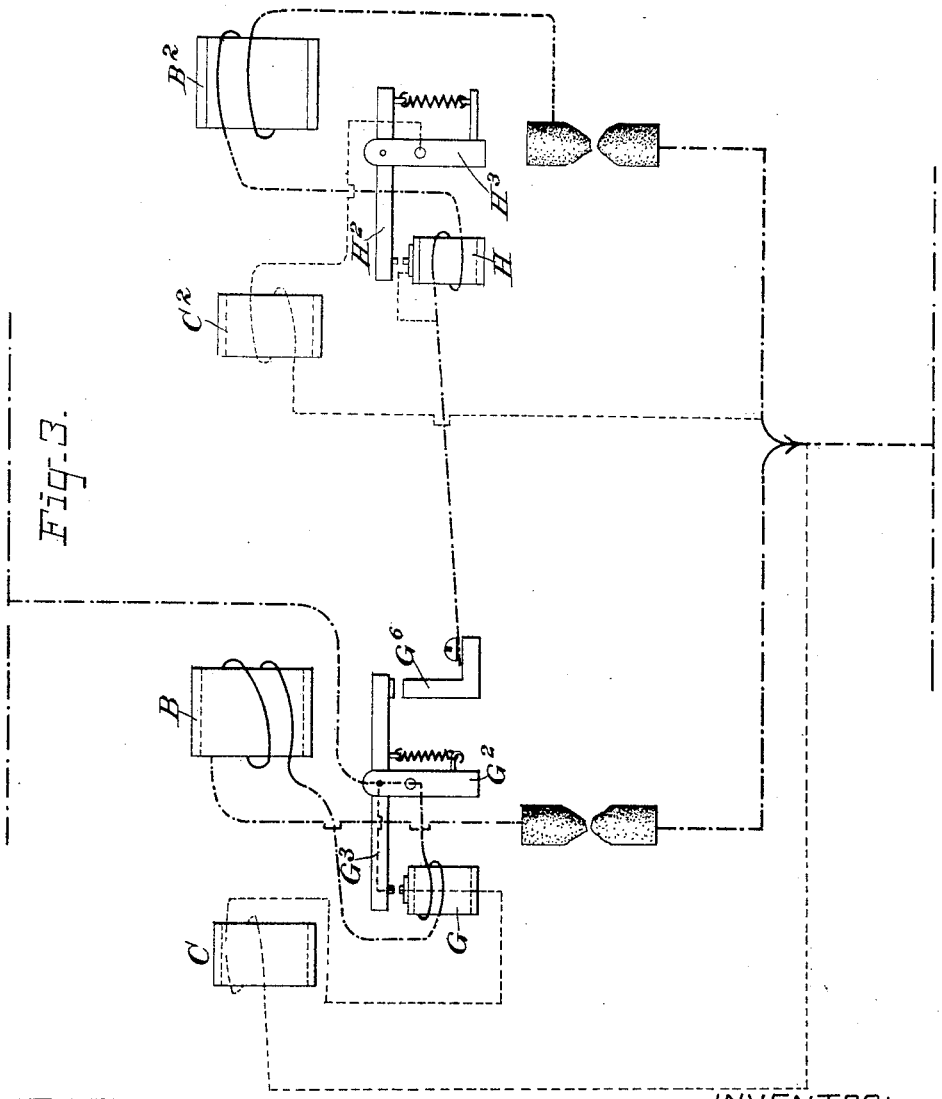

Fig-3.

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UNITED STATES PATENT OFFICE.

BARTON B. WARD, OF NEW YORK, N. Y.

DUPLEX-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 458,719, dated September 1, 1891.

Application filed December 31, 1890. Serial No. 376,347. (No model.)

To all whom it may concern:

Be it known that I, BARTON B. WARD, a citizen of the Dominion of Canada, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Double-Arc Lamps, of which the following is a specification.

My invention relates to double-arc lamps, and is more particularly adapted for use with lamps run from constant-potential circuits.

The object of my invention is to provide a simple and effective means whereby the two sets of carbons may be caused to operate in the proper order one after the other; and it consists in the combination of switches, circuits, and devices hereinafter more fully set forth and claimed.

In the accompanying drawings, Figure 1 is an elevation from one side of the lamp, showing the lamp mechanism which operates or controls the first burning set of carbons. Fig. 2 is an elevation taken from the opposite side of the lamp, and shows the magnets and mechanism for the second burning pair of carbons. Fig. 3 is a diagram showing the connections of the switches, magnets, and lamps.

A is a suitable case containing the mechanism, while B is the main-circuit magnet and C the derived-circuit magnet, which have suitable movable cores suspended from a lever D, pivoted in the frame of the lamp and supporting any suitable feed-controlling mechanism for the first burning pair of carbons.

In the present instance I have shown the carbon-carrier as provided with a rack meshing with the gear-train which is suspended by the lever D, said train being connected with an escapement-wheel and escape-lever E, the movements of which are controlled by the engagement and disengagement of said escapement with a stop F, as well understood in the art. My invention does not, however, consist in any particular construction of mechanism for controlling the feed of the carbons, and this part of the apparatus need not be, therefore, further described.

The magnets B C are preferably mounted on some sort of an insulating-support. B^2 and C^2 are similar magnets, which control the action of another mechanism connected to the second burning pair of carbons.

G is a switch electro-magnet which is included in the circuit to the first burning pair of carbons and operates upon a circuit-controller or switch-lever G^3, mounted on an insulated standard G^2. The switch-lever G^3 is actuated in one direction by the said magnet G and in the other direction by a suitable spring or retractor and controls two circuits, one of which is connected to the back contact of the switch-lever or that through which circuit is closed when the spring operates upon said lever, while the other controls the branch leading through the derived-circuit magnet C and constitutes the front contact of the switch-lever or that which is closed when the magnet G is excited. The standard G^2, which is of suitable conducting material, together with the switch-contacts, are mounted upon a suitable insulating-plate, as shown. Insulation is provided at other points when necessary in order to keep the circuits, as hereinafter described, insulated from one another. The standard G^2, which is of conducting material, connects with one pole of the circuit or wire 2 through a switch-lever (indicated at 3) or in any other suitable way. By this means the switch-lever G^3 is placed in connection with the positive pole of the circuit. The back contact carried by lever G^3 is preferably made as a swinging contact-piece G^5.

G^6 is the contact post or stop, with which G^5 makes connection for the purpose of closing the circuit. The front-contact stop or connection is made through contact of the lever with the core of electro-magnet G, from which connection runs to the derived-circuit magnet C. The post G^6 connects to the magnets B^2 C^2 and carbons of the second burning lamp, the circuit being through a second switch-magnet H, which when excited closes the branch through the derived-circuit magnet C^2 by drawing down a switch-lever H^2, that is mounted on an insulating-post H^3, connected with one terminal of the coils of magnet C^2. The lever H^2 makes contact with the core of the magnet H or with an insulated contact-stop carried thereby, and said stop or

core is connected, as more clearly shown in the diagram, with the wire leading from the post G^6 to the electro-magnet G.

The various connections of the apparatus are shown more clearly in the diagram, and are substantially as follows, the connections being made by proper connecting insulated wires: From the positive pole of the circuit a connection is formed by means of the post G^2 through electro-magnet H, through electro-magnet B, and thence to the frame and to the positive carbon of the first burning pair of carbons, the lower or negative of which latter connects to the negative pole of the circuit in the ordinary manner. When the lever G^3 is retracted and held down by magnet H, a branch circuit is formed through the front contacts of said magnet, which may be of any suitable character, by way of electro-magnet C to the negative pole of the circuit. When the switch-lever G^3 is against its back-contact stop, the branch circuit just described is broken and connection is formed from the positive pole of the circuit by way of the back-contact stop G^6 through the electro-magnet H, and thence through the electro-magnet B^2 for the second burning pair of carbons and to the negative pole of the circuit in the ordinary manner. When the lever H^2 is attracted, a branch is formed from the circuit leading to the second burning pair of carbons through derived-circuit electro-magnet C^2 to the negative pole, as clearly shown in the diagram.

The operation of the apparatus is as follows when organized as hereinbefore explained: When no current is on, circuit is formed from the positive pole through the back contact of the switch or circuit-controller through the second set of carbons by way of main-circuit magnet B^2. Both derived-circuit magnets connected to both lamp mechanisms are cut out of circuit. There being no current through the lamp mechanisms, the two sets of carbons will be in contact. When the current is turned on, the switch-lever G^3 is actuated by magnet G, thus breaking the circuit to the second set of carbons, but leaving the circuit intact through the magnet B and carbons of the first set. At the same time the switch-lever when it is drawn down by magnet G completes the branch circuit through the derived-circuit magnet C, so that the mechanism and controlling-magnet system of the first burning pair of carbons are in condition to operate and said lamp begins to act in the ordinary way. As soon as the carbon is consumed and the further progress downward of the carbon-carrier is interrupted by the stop usually employed the circuit through the first burning pair is interrupted through the interruption of the arc. The effect of this is that as the magnet G is in the circuit with said carbons the switch-lever G^3 is relieved from the influence of such magnet and its retracting-spring operates said switch-lever so as to close the circuit on its back contact and complete the connection to the second burning pair of carbons. This closure of contact is accompanied, as will be obvious, by a breaking of the branch connection through the derived-circuit magnet C of the first burning lamp or part of a lamp, and the circuit having been already interrupted at the arc there is now no opportunity for the flow of current through any portion of the magnets B C G. The current now passes to the electro-magnet H and through the main-circuit magnet B^2 of the second set of carbons and by way of said set of carbons to the negative pole of the circuit. Electro-magnet H, being thereby excited, closes the branch for the derived-circuit magnet C^2, and the second pair of carbons is now operated and controlled by its magnet system in the ordinary manner so long as the current flows through the carbons. When the second pair of carbons is burned out, the circuit is interrupted thereby through magnets B^2 and H, so that the lever H^2 is now operated upon by its retractor and opens the branch circuit through the derived-circuit magnet C^2, thus wholly interrupting the circuits through the lamp. When the lamp is recarboned and its carbons left in contact, the lamp is in condition to resume the operation already described, the set controlled by magnets B C burning first and being entirely thrown out of operation at the same time that the second set is brought into action, and is finally cut out again with its lamp-magnets, as already explained.

I do not limit myself to any particular construction of switching-magnet or contact devices controlled by said switch, my invention consisting in the combinations of circuits and apparatus, as described, whereby the interruption of the circuit through the first-named pair of carbons and the consequent movement of the switch by its retractor will close the circuit of the second set and at the same time break the branch circuit for the derived-circuit magnet of the first set.

What I claim as my invention is—

1. The combination, substantially as described, in a double-arc lamp, of a switch-magnet in the main circuit to the first burning pair of carbons, a switch or circuit controller having back contacts and connections controlling the circuit to the second burning pair of carbons and front-contact connections controlling a branch circuit to the derived-circuit magnet of the first set, and a retractor operating in opposition to the switch-magnet and serving to close the back-contact connections and simultaneously open the front-contact connections when the arc is interrupted at the first burning pair of carbons.

2. The combination, in a double-arc lamp, of two sets of carbons, main and derived circuit magnets controlling the action of said sets, respectively, a switch electro-magnet in the main-circuit connection through the main-circuit magnet of each pair, a branch circuit through the derived-circuit magnet of each

pair controlled and closed by said switch-magnets when excited, and connections to the second burning pair of carbons through back contacts of the switch controlled by the magnet in the circuit to the main-circuit magnet for the first pair of carbons, as and for the purpose described.

3. The combination, in a double-carbon lamp, of two sets of carbons, two sets of controlling-magnets, an electro-magnet G in the main-circuit connection through the main-circuit magnet and carbons of one set, a switch-lever connected to the main circuit and actuated in one direction by said switch-magnet and in the other by a suitable retractor, a back-contact stop or connection for said switch-lever connected to the main-circuit magnet and carbons of the other pair of carbons, and a front-contact stop for said switch-lever connected to the derived-circuit magnet for the first-named pair of carbons.

4. The combination, in a double-carbon lamp, of two sets of magnets, a main and derived circuit magnet or coil for each set, an electro-magnet in the circuit to the first burning pair of carbons, switch-contacts actuated by said magnet and serving to close the circuit to the derived-circuit magnet of said first pair, a retractor operating in opposition to said magnet and serving to close the switch-contacts which complete the connection between the main and second pair of carbons, an electro-magnet in the connection to the second pair, and switch-contacts actuated thereby for closing the connection through the derived-circuit magnet of such second set.

Signed at New York, in the county of New York and State of New York, this 11th day of December, A. D. 1890.

BARTON B. WARD.

Witnesses:
T. F. COUREY,
WM. H. CAPEL.