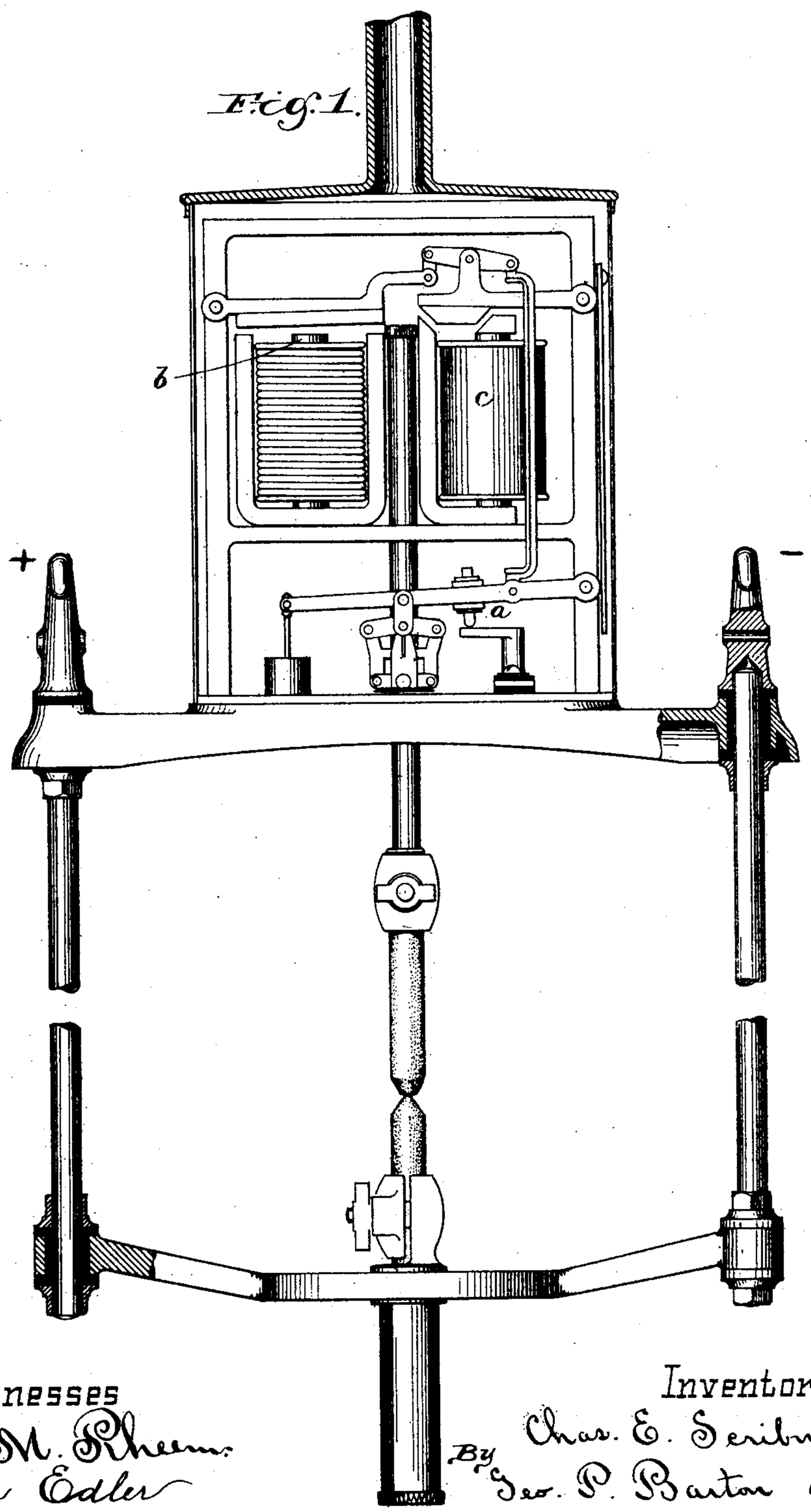
(No Model.) 2 Sheets—Sheet 1.

C. E. SCRIBNER.

CIRCUIT CONTROLLING MECHANISM FOR ARC LAMPS.

No. 502,535. Patented Aug. 1, 1893.

Fig. 1.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

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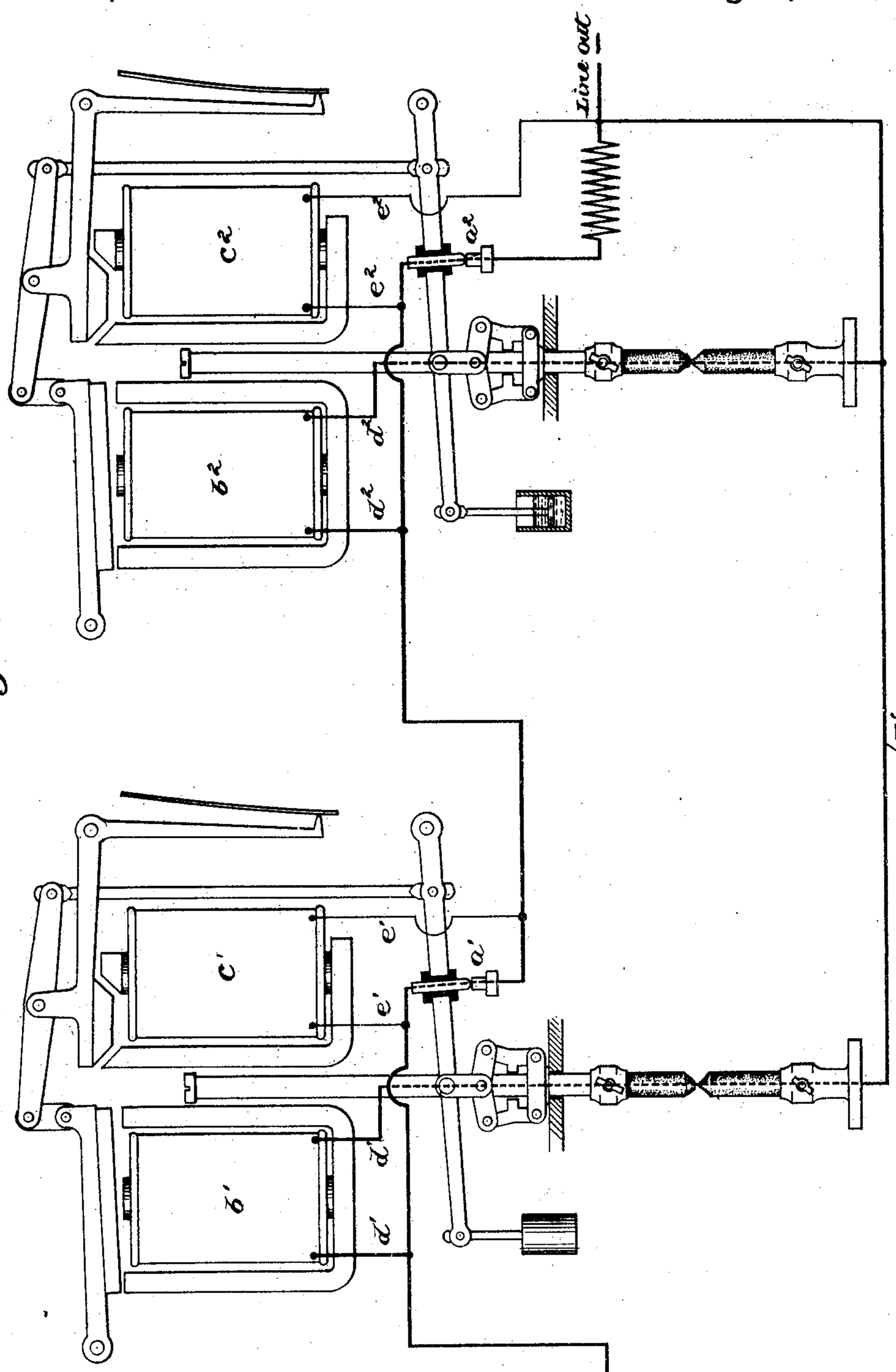

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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

CIRCUIT-CONTROLLING MECHANISM FOR ARC LAMPS.

SPECIFICATION forming part of Letters Patent No. 502,535, dated August 1, 1893.

Application filed July 26, 1890. Serial No. 360,062. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Circuit-Controlling Mechanism for Arc Lamps, (Case No. 230,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric arc light systems and its object is to provide automatic means for switching the current from one lamp of the series, after its carbons are consumed, to the next lamp and so on in order that the lamps may be caused to burn one after the other in consecutive order.

Heretofore various forms of multiple and duplex lamps have been employed.

In Letters Patent No. 147,827, granted Matthias Day, Jr., February 24, 1874, for electric lights, is shown a lamp in which two or more sets of carbons are controlled by the same regulating mechanism. In the Day lamp the different pairs of carbons are arranged in multiple arc and the mechanism is such that the arc will alternate from time to time between the different sets of carbons.

In British Patent No. 3,170 of 1877, granted Louis Denayrouse, provision is made for burning several candles successively one after the other.

In Letters Patent No. 219,208, granted Charles F. Brush, September 2, 1879, for an electric lamp, one regulating mechanism is employed in such manner that two, three or more sets of carbons may be burned one after the other. In the Brush lamp, however, the mechanism is such that the succeeding arcs will be of different lengths.

In Letters Patent No. 418,758, granted me January 7, 1890, I have provided in the same lamp in connection with one regulating and one feeding mechanism means whereby two sets of carbons may be burned completely one after the other. In my lamp the arcs of the different sets will be of the same length; the construction, however, is such that only two pairs of carbons can be used in the same lamp.

The object of my invention herein is to provide for automatically lighting and burning any number of lamps, one after the other, each of these lamps being complete in itself and capable of independent regulation so that the arcs of all the lamps may be maintained of the same average length, or, if it should be desired, of different lengths.

My invention herein is not limited to any particular form of regulating and feeding mechanism, but relates more particularly to the circuits between the different lamps and the means for bringing the different lamps into circuit one after the other, the first lamp of a group being so arranged that when it lights all the succeeding lamps of the group will be switched out of circuit.

My invention will be readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of one of several electric lamps of the group adapted to be burned consecutively one after the other. Fig. 2 is a diagram illustrative of the circuits between two such lamps.

Like parts are indicated by similar letters of reference throughout both figures.

The lamp, as shown in Fig. 1, is of the general type illustrated and described in my Patent No. 415,571 of November 19, 1889, in which a balance lever mechanism is employed, the construction being such that when the current is sent through the lamp the lifting or coarse wire magnet attracts its armature, thereby lifting the clutch lever and establishing the arc. During the subsequent operation of the lamp the lever of the lifting magnet is held in a fixed position against its pole, the feeding or regulation of the arc being accomplished by the fine wire magnet included in the shunt of the arc so arranged as to raise and lower the fulcrum of the lever system connected with the clutch lever. In this manner the upper carbon is fed until the descent of the rod is arrested by a stop or button provided upon the upper end thereof or otherwise. When the descent of the rod is thus arrested the arc becomes abnormally long and the cut out is closed so as to shunt the arc which is thus extinguished.

It will presently be observed that any lamp

provided with a cut out constructed so as to be closed upon the formation of an abnormally long arc may be used in connection with my invention herein.

The circuits of the lamp shown in Fig. 1 may be as follows: First, starting from the hook + the circuit extends first to the insulated contacts of the cut out a and thence to hook —. We have another circuit from hook + which extends through the lifting magnet b and thence to the frame of the lamp and thence through the carbons to the rod of hook — and thence out. The feeding or fine wire magnet c is in a shunt around the carbons and the cut out a is so placed as to short circuit this fine wire magnet when the cut out is closed. The circuit through the cut out should have a slight amount of resistance so that some current in the first instance will be diverted through the lifting magnet to cause the same to attract its armature and open the cut out, whereupon the entire current will be directed through the lifting magnet to cause the same to draw down its armature, thus separating the carbons and establishing the arc; the opening of the cut out removes the short circuit from the feed or fine wire magnet.

I will now describe my invention as illustrated in Fig. 2 in which are shown lamps so arranged that when current is established the first lamp of the group will light and burn until an abnormal arc is formed, whereupon the first will be automatically cut out and the arc transferred to the next lamp and so on. Thus I am enabled to indefinitely prolong the light, there being practically no limit to the number of lamps that may be included in a single group since each lamp in its burning is entirely independent of all the other lamps so that each may be adjusted as to length of arc without regard to any other of the group. The "line in" when there is no current on finds circuit as indicated through the cut outs a' a^2 of the different lamps and thence to the "line out." We have, however, a circuit branched from the line in through the lifting magnet and to the frame of each lamp and thence through the carbons of the lamp and thence to the "line out." Thus in lamp 1 we have the circuit d extending through lifting magnet b' and thence to the frame of the lamp and the upper rod, thence through the pair of carbons and thence to the "line out." In lamp 2 we have the circuit d^2 through the lifting magnet b^2, thence through the carbons of the second lamp and to the line out. The feeding or fine wire magnet of each lamp is included in a shunt around the carbons and the cut out of each lamp, when closed, serves to short circuit this feed magnet. Thus in lamp 1 we have the circuit e' through fine wire magnet c and connected on different sides of the carbons of lamp 1. The cut out a' when closed short circuits this shunt circuit e' as shown. In lamp 2 in like manner we have the shunt circuit of high resistance e^2 through the feeding magnet c^2, this shunt circuit e^2 being connected around the carbons of lamp 2 and the cut out a^2 being so arranged that when closed it will short circuit the feeding magnet c^2 as shown. Suppose now current is established. The first impulse will be through cut outs a' a^2 of the different lamps; enough current, however, will be sent through the lifting magnets to slightly energize them. The tendency will be to open all the cut outs. It is apparent, however, that the opening of the cut out of the first lamp of the group will cut off the current from all the succeeding lamps. Therefore only the first lamp will light and burn and all the other lamps will be out of circuit during the time the first lamp is burning. An abnormally long arc of the first lamp, however, will cause its feeding magnet to become so strong as to carry the clutch lever or some portion of the movable mechanism into position to close the cut out. In the lamp shown the upper contact of the cut out a' is carried on the clutch lever and therefore when the arc of lamp 1 is long enough to divert sufficient current through feed magnet c', feed magnet c' draws down its armature and hence lowers the clutch lever so as to close the cut out a'. The closing of this cut out a' shunts the arc and also the feed magnet c'. Now assuming that the descent of the rod has been arrested by a stop the circuit will be permanently broken between the carbons of lamp 1. Thereupon the next lamp will be brought into service; thus the cut out a' being closed and the fine wire magnet c' being short circuited and the circuit of lifting magnet b' being opened at the carbons the first lamp is entirely out of circuit so that the current will pass to the second lamp and the same action will be repeated at the second lamp as heretofore described with respect to lamp 1. Thus any number of lamps may be burned one after the other.

We will consider lamp 2 as the last of a group. The lamps of the group preceding lamp 2 we will assume to have been all burned one after the other and to be each in the condition last described with respect to lamp 1, that is to say, the circuit of lifting magnet b' open and the circuit closed through the cut out a' so that lamp 1, may be entirely disregarded with respect to the burning of any subsequent lamp of the group. Therefore, when lamp 1 is through burning the current will be sent through lamp 2; the lifting magnet will be excited and the carbons separated and the arc established. The cut out a^2 being open the fine wire or feeding magnet c^2 will perform its function of feeding, that is, as the arc grows long the feeding magnet will become more strongly energized and so lower the clutch until it opens sufficiently to permit the rod to descend but without actually closing the cut out a^2; when the carbons are consumed or the descent of the rod arrested

the cut out a^2 will be closed and the lamp will be cut out of circuit.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A group of two or more arc light regulators connected with the same circuit, one branch of said circuit being connected directly through a cut out device of each of the lamps, each lamp being separately provided with an electro-magnetic device for separating the carbons and an electro-magnetic device connected in shunt of the arc for feeding the carbons together, as consumed, said feeding device being connected in each lamp with the cut out to close the same when the arc becomes abnormally long, whereby the said lamps will be caused to burn automatically one after the other; substantially as specified.

2. Two or more electric arc regulators connected with the same circuit, said circuit extending through a cut out of each of the lamps and each lamp being provided with a lifting electro magnetic device included in a branch circuit extending from the line in through said lifting device to its carbons and thence to the line out, and a feeding electro magnetic device included in a shunt around the carbons, the cut out of each lamp when closed serving to short circuit such feeding magnet, whereby when current is established the first lamp will be lighted and the succeeding lamps will be disconnected from the circuit while the first lamp is burning, while upon the interruption of the branch circuit through the feeding device of the first lamp its cut out will be closed and the arc transferred to the next lamp of the group, substantially as and for the purpose specified.

3. In combination, several arc lamps, each having a lifting magnet in the main circuit with its carbons, a feeding magnet in shunt of its carbons, feeding mechanism actuated thereby, and contact points carried by said mechanism arranged to be closed together when the arc becomes abnormally long, and conductors connecting like members of the carbons of all the lamps together in parallel, and other conductors connecting said cut out contacts of the different lamps together in series, the remaining carbon of each lamp being connected with one contact point of its own cut out; substantially as described.

4. In combination several arc lamps, each having an electro-magnet in series with its carbons and an electro-magnet in shunt of its carbons and cut out contacts arranged to be actuated by said series magnet to be separated when said magnet is energized, and by said shunt magnet to be closed together when said shunt magnet is abnormally energized, one limb of the main circuit joining one member of each lamp in parallel with the like members of the other lamps, another limb of the main circuit extending through all the cut outs in series, the remaining member of each lamp being connected with the main circuit at its own cut out; substantially as described.

In witness whereof I hereunto subscribe my name this 23d day of July, A. D. 1890.

CHARLES E. SCRIBNER.

Witnesses:
WM. S. GRANGER,
C. D. CRANDALL.