

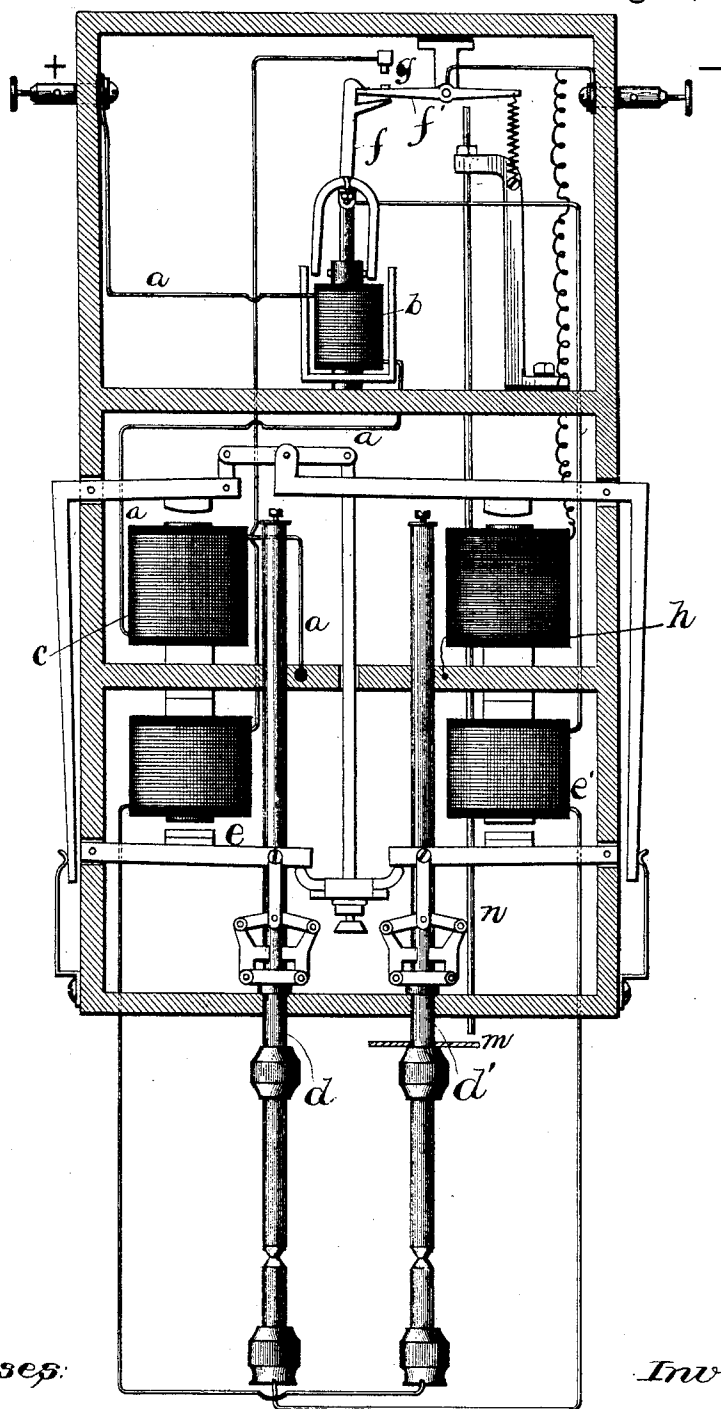
(No Model.)

2 Sheets—Sheet 1.

E. P. WARNER.
DUPLEX ARC LAMP.

No. 480,050.

Patented Aug. 2, 1892.



Witnesses:
George L. Cagg
H. Hurdeman

Fig. 1.

Inventor:
Ernest P. Warner.
By *Samuel R. Barton*
Atty

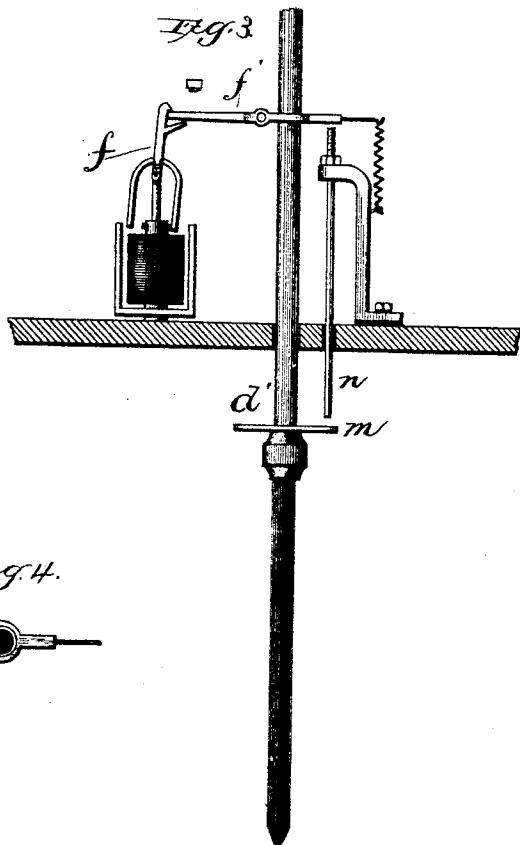
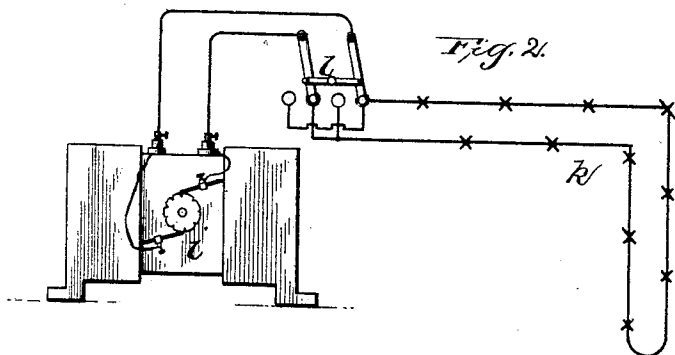
(No Model.)

E. P. WARNER.
DUPLEX ARC LAMP.

2 Sheets—Sheet 2.

No. 480,050.

Patented Aug. 2, 1892.



Witnesses:
George L. Cagg.
A. K. K. K.

Inventor:
Ernest P. Warner.
By *Ernest P. Warner*
Att'y

UNITED STATES PATENT OFFICE.

ERNEST P. WARNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN
ELECTRIC COMPANY, OF SAME PLACE.

DUPLEX ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 480,050, dated August 2, 1892.

Application filed February 24, 1891. Serial No. 382,362. (No model.)

To all whom it may concern:

Be it known that I, ERNEST P. WARNER, 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 Switching Devices for Double-Carbon Arc Lamps, (Case No. 39,) 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 double-carbon arc lamps; and its object is to provide means for shifting the arc from one pair of carbons to the other. It has been found desirable in some instances to avoid any automatic device used in connection with a single regulating mechanism for shifting the arc to the second pair after the carbons of the first pair to burn have been practically consumed.

My invention consists in a polarized electro-magnetic device used in connection with a lamp of the type shown in Letters Patent No. 418,758, granted Charles E. Scribner January 7, 1890, whereby a momentary reversal of the current will shift the arc from one pair of carbons to the other. This Scribner lamp contains, as a distinctive feature, retaining-magnets, one for each clutch, and when one set of carbons is burning the carbon-rod of the other set is held up by its retaining-magnet.

By the use of my invention the circuit may be opened at will through one retaining-magnet and closed through the other, so as to cause the arc to shift from one pair of carbons to the other.

My invention is of special utility when a large number of lamps are connected in series upon the same circuit, since by means of a current-reversing switch the arcs of all the lamps may be simultaneously shifted. Thus after the series of lamps have burned on one side till midnight or until one set of carbons is consumed the attendant, by simply reversing the current for a moment by means of the switch, may bring the unburned pairs of carbons into service, so that the lamps will burn their carbons in succession.

My invention will be more readily under-

stood by reference to the accompanying drawings, in which—

Figure 1 is a diagram illustrative of an electric-arc lamp of the Scribner type embodying my invention. Fig. 2 is a diagram illustrative of the pole-changing switch in connection with an arc-light circuit. Fig. 3 is a view of the polarized electro-magnetic circuit-changing device and means for compelling the trimmer to bring the parts of the switching device into proper position to cause the arc to form between a particular pair of carbons. Fig. 4 is a plan view illustrative of the pivoted lever of the switching device.

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

In Fig. 1 I have shown the polarized electro-magnetic switching device placed above the regulating mechanism of the lamp. This is for clearness of illustration, since the lamp as a whole may be made more compact by placing this switching device at the bottom of the case, as illustrated in Fig. 3.

I will now trace the circuit of the lamp as shown in Fig. 1. Beginning at binding-post + the circuit may be traced by wire *a* through the coil of the polarized magnet *b*, and thence through the coarse-wire lifting-magnet *c*, and thence to the frame of the lamp. From the frame of the lamp the circuit is continued to the carbon-rods *d d'*. As shown in the drawings, the circuit extends from carbon-rod *d* through its pair of carbons, and thence through retaining-magnet *e'*, and thence through the polarized switch-levers *f f'*, and thence out at binding-post —. It will be observed that the carbon-rod *d'* is in open circuit for tracing the circuit from carbon-rod *d'* through its carbons, and thence through retaining-magnet *e* we shall find the circuit open at contact *g*, which is placed in proper relation to pivoted lever *f'* as to be in the path thereof when said pivoted lever *f'* is liberated on the withdrawal of lever *f*.

I do not deem it necessary to describe in detail the action of the feeding-magnet *h* or that of the clutch-levers and clutches, since everything will be found described in detail in the said Scribner patent.

The dynamo *i* in Fig. 2 is shown supplying the circuit *k*, in which are placed arc lamps. The pole-changing switch *l*, placed at the central station, is adapted to reverse the current at the will of the attendant.

In my patent, No. 420,422, granted January 28, 1890, I have shown the combination, with the electro-magnet included in a circuit, of a pivoted permanent magnet, one pole of said electro-magnet being placed between the opposite poles of said permanent magnet, said permanent magnet being adapted to take one position or another, according to the direction of the current through the coils of the electro-magnet. I preferably employ such a device as a part of my polarized electro-magnetic switching device or commutator, as illustrated in Figs. 1 and 3.

As fully described in my said patent, it is apparent that the lever *f* will take one position or another, according to the direction of the current. In this manner the circuit through the carbons of rod *d* may be opened between the levers *f f'* by simply reversing for a moment the direction of the current through the coil *b*. The same movement of lever *f* serves to liberate the pivoted lever *f'* and permits said pivoted lever *f'* to be carried by the force of its retractile spring against contact *g*, so as to close the circuit immediately through the carbons of rod *d'*. The arc being thus transferred to the other set of carbons, the current should be brought back to its proper direction, so that the carbons may be consumed in proper ratio. In this manner when the carbons of rod *d* are practically consumed the arc may be shifted to the other set—that is, to the carbons of rod *d'*.

It will be noted that when the current is changed to its original and normal direction after the transfer of the arc the pivoted lever *f'*, having been carried out of the path of the lever *f*, can no longer engage therewith or form contact therewith, no matter what its position may be, until replaced by hand.

In Fig. 3 I have shown rod *d'* provided with a disk or projection *m*, which when raised in the act of carboning the lamp forces a rod *n* up against the pivoted lever *f'*, thereby bringing it into engagement with the lever or detent *f*. The trimmer is thus made to automatically restore the connection between levers *f f'*, so as to bring the lamp into its proper

initial adjustment ready to be started when the current is established.

My invention may be applied to lamps in which no retaining-magnets are employed, and I therefore do not limit my invention to any particular form or construction of double-carbon lamp. The feature of my invention which I consider novel and important is the use of a polarized electro-magnetic switching device, whereby the arc may be shifted from one pair of carbons to the other by a momentary reversal of the current.

My invention may be employed in connection with two complete single lamps for causing them to burn in succession, the mode of action and construction of the switch being substantially that illustrated and described herein. It is evident that other forms of polarized magnets might be employed, though I consider the form illustrated in my said patent specially adapted to do the work.

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

1. The combination, with two pairs of carbons placed in derived circuit, of a unitary electro-magnetic device for controlling the same and a polarized electro-magnetic switching device or commutator adapted upon the reversal of the current to transfer the arc from one pair of carbons to the other.

2. The combination, with two independently-adjustable carbon-rods and unitary means for automatically controlling the same, of a polarized electro-magnetic switching device for shifting the arc from the carbons of one rod to the other on the reversal of the current, substantially as and for the purpose specified.

3. The combination, with one of two independently-adjustable carbon-rods, of a disk *m*, secured thereto, and a rod *n*, against which the disk is brought to force the said rod *n* against the pivoted lever *f* of the polarized switching device, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 14th day of February, A. D. 1891.

ERNEST P. WARNER.

Witnesses:

ELLA EDLER,
GEORGE L. CRAGG.