(No Model.)

H. P. BALL.

ELECTRIC ARC LAMP.

No. 509,014. Patented Nov. 21, 1893.

Fig. 1.

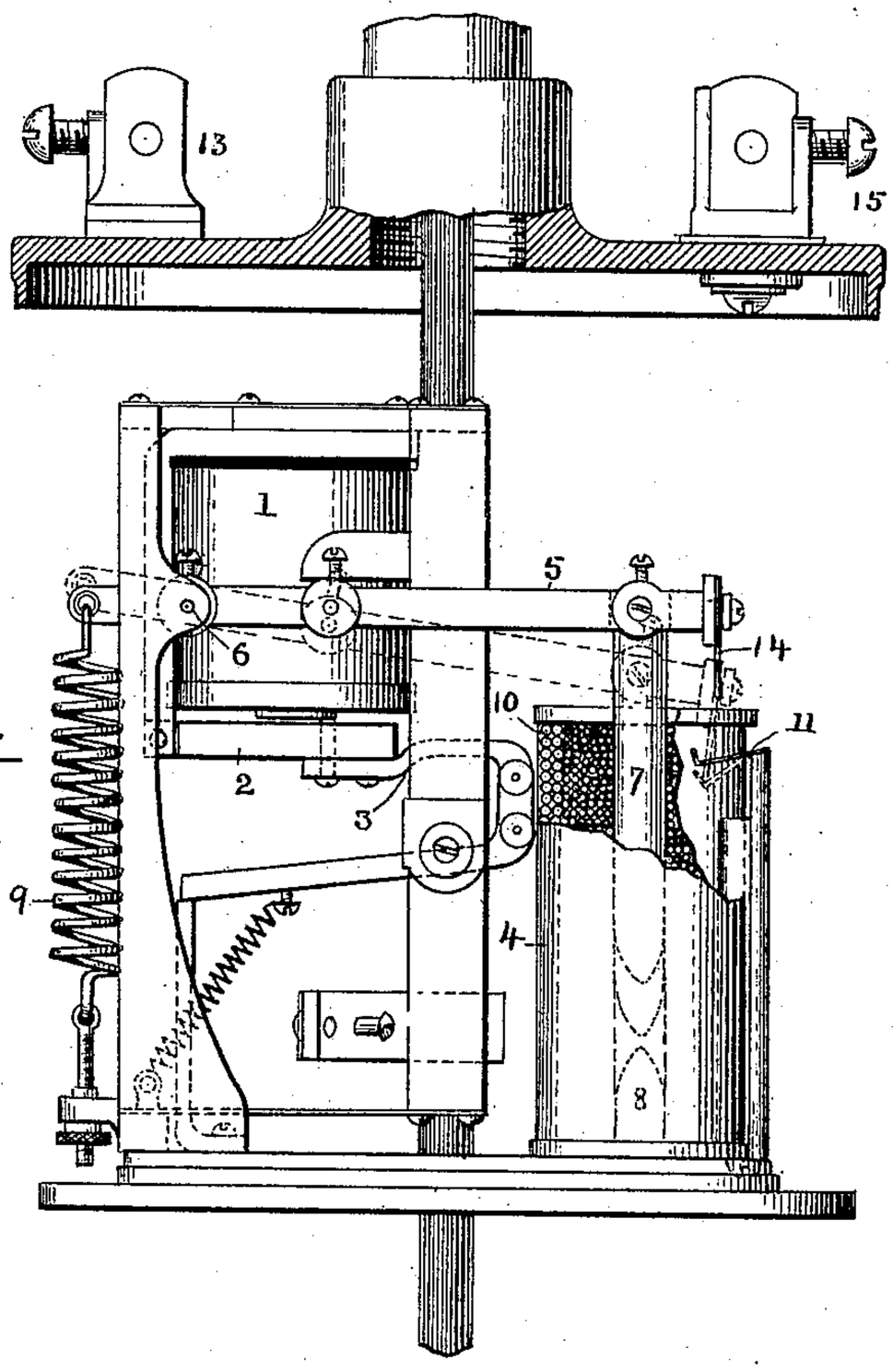
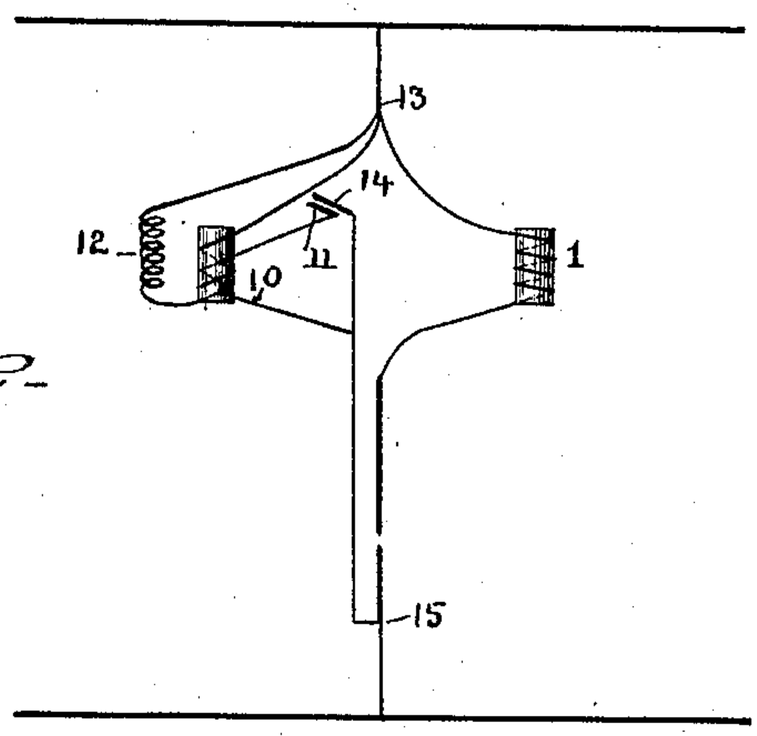


Fig. 2.



Witnesses
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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 509,014, dated November 21, 1893.

Application filed March 2, 1891. Serial No. 383,348. (No model.)

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Improvement in Arc Lamps, of which the following is a specification.

The present invention relates to apparatus for controlling the arc and circuits of an arc lamp, and to a cut-out for short circuiting the lamp under certain conditions, and the invention consists in the devices and combinations hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side view partly in section of a portion of an arc lamp; and Fig. 2 is a diagram showing the lamp circuits.

The improvement is shown in this application applied to a lamp similar to that described in patent to E. A. Sperry, No. 405,440, granted June 18, 1889.

1 is the main magnet which is in series with the lamp carbons.

2 is the armature of this magnet and is adapted to raise the clutch 3 and thereby the carbon-holder and carbon, establishing an arc.

4 is a second magnet and is in a shunt to the arc. Both the main and shunt magnets are preferably arranged in the form of coils or solenoids. Above the shunt magnet is an arm 5, pivoted at 6 and carrying the armature 7. This armature is either rounded and tapering at its lower end as shown, or is formed in the usual way without the taper. Near the bottom of the coil, but beyond the range of movement of the armature, is a tapering or rounded pole-piece 8. The pivoted arm serves in its downward movement to move the frame which supports the main magnet 1 and the clutch as in the patent above referred to.

9 is a retracting spring for the pivoted arm.

Surrounding the shunt coil, so that it may act on the same armature, is a coarse cut-out coil 10, terminating at one end in a contact plate 11 and connected at the other end to a resistance 12 (see Fig. 2), and to one of the lamp terminals 13. Carried by the armature lever 5 is a second contact plate or spring 14, adapted to be moved against the first contact, and connected to the opposite terminal 15 of the lamp. Contact 11 is formed with a bend near its free end. When 14 is moved down by the armature its end strikes 11 at a short distance from the bend and slides along until it rests in the angle as shown in dotted lines. The resistance of the cut-out coil 10 plus the resistance 12 is preferably greater than the resistance through the carbons when they are in contact or nearer together than during normal operation of the lamp.

The operation of the lamp is as follows: When the lamp circuit is first closed, the carbon is raised by the main magnet and the arc formed, since the resistance through this magnet is less than through the shunt. As the carbons burn away more current will be diverted through the shunt and less will pass through the main magnet and the arc; this so strengthens the shunt magnet that it pulls down its armature, thereby moving the carbon down in the well known manner. By making the pole-piece, or the armature, or both, tapering as described, I find that the initial movement of the armature, such as is sufficient to feed down the carbon to maintain the arc, is very slow or gradual, and that the movement increases rapidly as the armature and pole approach each other. It is these facts that make it possible to arrange the cut-out as shown, since when the lamp is feeding normally, the armature does not move down far enough to cause contacts 11, 14 to touch, but when the carbon is broken, or when the arc for any reason gets so long that all or nearly all of the current passes through the shunt, the armature is drawn entirely down bringing said contacts together and short circuiting the carbons, the main magnet and the shunt magnet. The coarse coil 10 however holds the armature down after the shunt coil is cut-out. When the armature is in its lowest position it does not quite touch the pole-piece, as shown in Fig. 1. Hence there is no danger of sticking. When the lamp is thus cut-out, if the carbons should again feed together, sufficient current will be diverted from the cut-out circuit to the main lamp circuit (since as above stated the latter is preferably of less resistance than the former) to release the armature and to re-establish the arc, and since the coarse coil holds the armature and the lever 5 down, this be-

ing the best possible position for allowing the carbon to feed, the re-establishment of the arc is very likely to occur.

Having thus described the invention, what I claim is—

1. The combination with the carbon carrier and clutch, of means to feed the carbon forward, a shunt magnet for moving the carbon oppositely having a tapering armature or pole piece or both, a cut out operated by said armature, and a cut out coil acting upon said armature, substantially as set forth.

2. The combination with the carbon carrier and clutch, of means to feed the carbon forward, a solenoid having a tapering pole piece and an armature extending into it, said armature being connected with said clutch, a cut out operated by said armature, a coil of said solenoid being in a shunt to the carbons and another coil thereof in a cut out circuit, substantially as set forth.

This specification signed and witnessed this 25th day of February, 1891.

HENRY PRICE BALL.

Witnesses:
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