(No Model.)

J. E. WOOLVERTON.

ELECTRIC ARC LAMP.

No. 527,228. Patented Oct. 9, 1894.

Fig. 1.

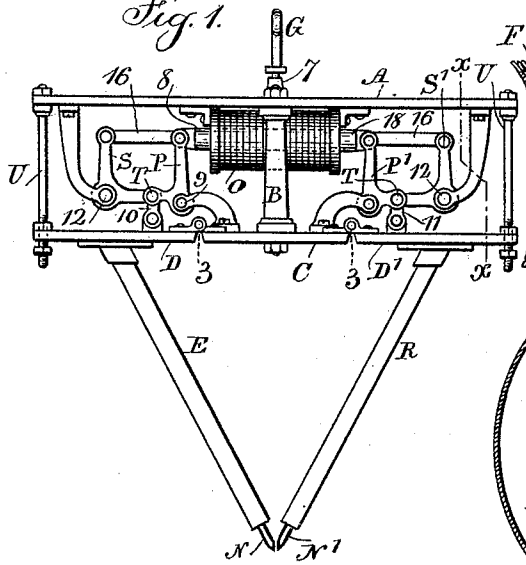


Fig. 2.

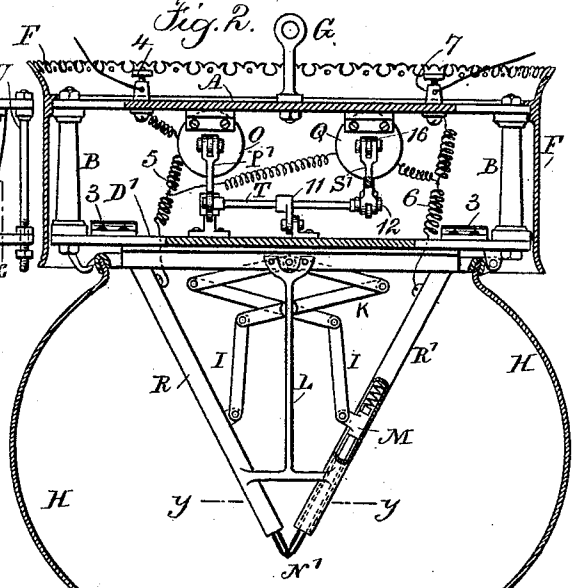


Fig. 3.

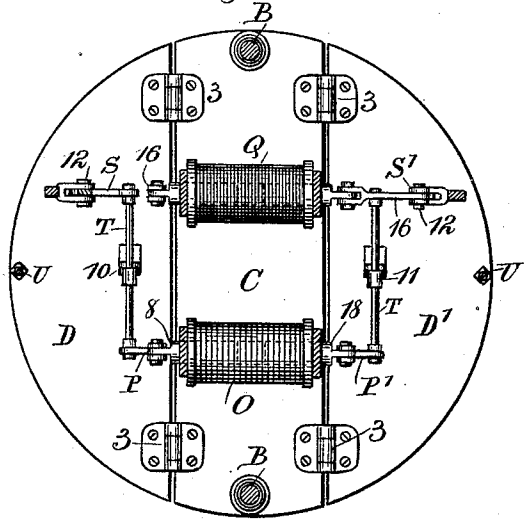
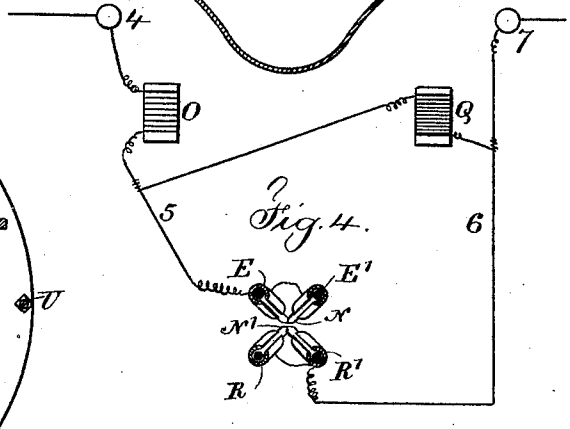


Fig. 4.



Witnesses
Chas. H. Smith
J. Stair

Inventor
John E. Woolverton
per Samuel W. Serrell
Atty.

UNITED STATES PATENT OFFICE.

JOHN E. WOOLVERTON, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE AUERBACH-WOOLVERTON ELECTRIC COMPANY, OF NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 527,228, dated October 9, 1894.

Application filed February 9, 1894. Serial No. 499,592. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. WOOLVERTON, a citizen of the United States, residing in the city, county, and State of New York, have invented an Improvement in Electric-Arc Lamps, of which the following is a specification.

In Letters Patent issued to me pursuant to application, Serial No. 446,642, an electric arc lamp is represented having four carbons arranged in two pairs, and the pairs of carbons are in holders and received into sockets that are connected to lazy tongs bars by which they are guided, so that the two carbons in each pair can be moved downwardly and with uniformity so as to come into contact and form one electrode, but in this improvement one pair of carbons was below the other pair of carbons and hence a shadow was cast below the electric light.

The present invention is made with reference to avoiding a shadow, and I make use of four carbons placed at an inclination to each other and coming to a focus or inverted apex, thereby entirely avoiding the casting of a shadow downwardly, and I combine with the carbons, their holders, sockets and lazy tongs, a main electro-magnet and a shunt magnet that act upon one or both pairs of carbons to separate them more or less in drawing the electric arc, one or both bases to which the pairs of carbons are permanently connected being hinged so as to allow for the aforesaid movement being given with but little friction or power in the regulation of the arc.

In the drawings, Figure 1 is an elevation. Fig. 2 is a section at right angles to Fig. 1, on the line *x*, *x*, and Fig. 3 is a plan view, with the top plate removed, and Fig. 4 is a diagram of the circuits and sectional plan of the carbon holder at the line *y*, *y*.

The carbon holders E E′ and R R′ are connected in pairs. These carbon holders are tubular and permanently fastened to the parts D D′ which are preferably in the form of plates hinged at 3 to the intermediate plate C, and this plate C is permanently fastened to the top plate A of the lamp by the pillars or columns B; and it is usually advantageous to make the top plate A circular and to provide the same with a surrounding case or cylinder F, but the shape and size of the top plate may be varied, and it is also advantageous to have the outline of the plates C, D and D′ correspond in size and shape with the top plate A, as illustrated in Fig. 3. It however is only necessary to provide a top plate as a support for the intermediate plate C and for the electro-magnets made use of in regulating the lamp, and there may be any suitable suspending device such as the eye G connected with the top plate A of the lamp, and the glass or globe H when provided may be of any desired size or shape, and it is suspended from the intermediate plate C or from the columns B so as not to interfere with the plates D D′ being moved upon their hinges 3.

The carbons or electrodes N N′ are received into sockets M that slide freely in the carbon holding tubes, and such tubes are slotted for flanges or ears upon the sockets to which are connected links I that are pivoted at the ends of the lazy tongs bars K, and there is a stationary guide L for the pivots of the lazy tongs, so that the sockets receiving the electrodes can only move downwardly by gravity and with uniformity in each pair of electrodes, so that the ends of the carbons in each pair touch each other and form stops. Hence the lower ends of the carbons are always at the same point and feed down automatically as consumed away, and the carbons will slide down until they come into contact. In consequence of the carbons resting against each other in the respective pairs thereby the risk of the carbons breaking is reduced to a minimum.

It will now be understood that the four carbons come together similar to an inverted pyramid and one pair of carbons forms one electrode and the other pair of carbons forms the other electrode, and the arc is produced by moving one pair of carbons away from the other pair of carbons, and the light being at the extreme lower ends of the carbons and the holders and mechanism being above, no shadow is cast downwardly from the electric light, and it is only necessary to provide means for swinging one pair of carbons away from the other pair of carbons, and with this

object in view, one pair of carbons and their holders may be stationary, and the other pair of carbons and their holders fitted to swing, but I have represented both pairs of carbon holders as adapted to swing under the operation of the electro-magnets hereinafter described.

The carbon holders E E′ are permanently connected to the plate D, and the carbon holders R R′ are permanently connected to the plate D′, and I provide an electro-magnet O preferably supported by the top plate A through the helix of which the current from the binding post 4 passes and is led by the wire 5 to the carbon holders E E′; and there is a wire 6 from the carbon holders R R′ to the binding post 7.

The core 8 of the electro-magnet O is connected to a bent lever P pivoted at 9 upon the plate C and connected by a link 10 to the plate D. Hence the bent lever P will act to open the arc between the pairs of carbons to the stops hereinafter mentioned or in proportion to the current passing through the electro-magnet O. When the current diminishes by the resistance of the arc, the core of the magnet allows the plate D to swing downwardly and bring the electrodes nearer together or the reverse movement takes place when the current increases and the magnet is more highly energized.

I prefer to employ an electro-magnet O with two sliding cores, the core 18 being connected to a bent lever P′ and a link 11 being connected to the plate D′ so that by this arrangement both of the pairs of electrodes are swung or moved equally, and I still further prefer to make use of an electro-magnet Q in a shunt passing from the wire 5 to the wire 6, and to the cores of this electro-magnet Q connections 16 are made to the bent levers S S′ that are pivoted at 12 to brackets extending down from the top plate A, and the bent levers S S′ stand in the opposite directions to the bent levers P P′, and there are cross-bars T extending between the ends of the bent levers in each pair to which the links 10 and 11 are connected near the middle, the object of this arrangement being that the electro-magnet Q in the shunt acts in the opposite direction to the electro-magnet O in the main line, such electro-magnet Q being of fine wire to offer a large resistance, thus preventing the electric circuit being broken between the electrodes and promoting the more accurate regulation of the arc between the electrodes.

The rods U that are permanently connected at their upper ends to the plate A pass through the plates D and D′ and are provided with nuts that may be raised or lowered to limit the extremes of movement that may be given by the electro-magnets to the respective plates in establishing the arc of the lamp.

It is advantageous to have the sliding cores of the magnets as long as possible and a non-magnetic material should intervene between their inner ends to prevent the cores sticking together should they touch.

If desired, springs may be provided in the carbon holders to move the carbons endwise.

I claim as my invention—

1. Rigid tubular carbon holders converging, in combination with sliding sockets within the tubular carbon holders for the reception of carbons or electrodes, lazy tongs connections substantially as specified for causing a uniform feed of the two carbons as consumed, a second pair of carbon holders, sockets, and lazy tongs mechanism, and means for moving one pair of carbon holders in relation to the other pair of carbon holders for forming the electric arc, substantially as set forth.

2. The combination with a supporting plate, of a central plate and two side plates and hinges for connecting the side plates to the central plate, carbon holders in pairs permanently connected to the respective side plates, means for feeding the carbons uniformly into contact with each other in each pair, an electro-magnet and connections therefrom for swinging one or both of the plates on their hinges to move one pair of electrodes away from the other pair of electrodes in forming the arc, substantially as set forth.

3. The combination with a pair of converging carbon holders and means for feeding the carbons uniformly into contact with each other, of a second pair of carbon holders, means for feeding the carbons uniformly into contact with each other, a plate to which one pair of carbon holders is connected, hinges upon which the plate can be moved, an electro-magnet in the main circuit, a connection therefrom for moving the plate and drawing the electric arc, a second electro-magnet in a shunt between the supply wires, and lever connections therefrom acting in the opposite direction to the connections from the magnet in the main circuit for regulating the electric arc, substantially as set forth.

4. The combination with a pair of converging carbon holders and means for feeding the carbons uniformly into contact with each other, of a second pair of carbon holders, means for feeding the carbons uniformly into contact with each other, a plate to which one pair of carbon holders is connected, hinges upon which the plate can be moved, an electro-magnet in the main circuit, a connection therefrom for moving the plate and drawing the electric arc, an adjustable stop for regulating the extent of motion of the plate, a second electro-magnet in a shunt between the supply wires, and lever connections therefrom acting in the opposite direction to the connections from the magnet in the main circuit for regulating the electric arc, substantially as set forth.

5. The combination in an electric lamp, of one pair of carbon holders and means for feeding the carbons with uniformity and into contact with each other, the second set of converging carbon holders and means for feed-

ing the carbons into contact with each other and uniformly, supports to which the respective pairs of carbon holders are permanently connected, and hinges upon which one of the carbon holders can be swung, a main electro-magnet and a shunt electro-magnet, and lever connections to the respective electro-magnets and acting in the opposite direction for moving the electrodes and regulating the electric arc, substantially as set forth.

6. The combination in an electric lamp, of one pair of carbon holders and means for feeding the carbons with uniformity and into contact with each other, the second set of converging carbon holders and means for feeding the carbons into contact with each other and uniformly, plates to which the respective pairs of carbon holders are permanently connected, a supporting plate and hinges upon which the carbon holders and their plates can be swung, a main electro-magnet and a shunt electro-magnet, and lever connections to the respective electro-magnets and acting in the opposite direction for moving the respective pairs of electrodes and regulating the electric arc, substantially as set forth,

Signed by me this 5th day of February, 1894.

JOHN E. WOOLVERTON.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.