(No Model.) 2 Sheets—Sheet 1.

J. E. WOOLVERTON.

ELECTRIC ARC LAMP.

No. 527,229. Patented Oct. 9, 1894.

Fig. 1.

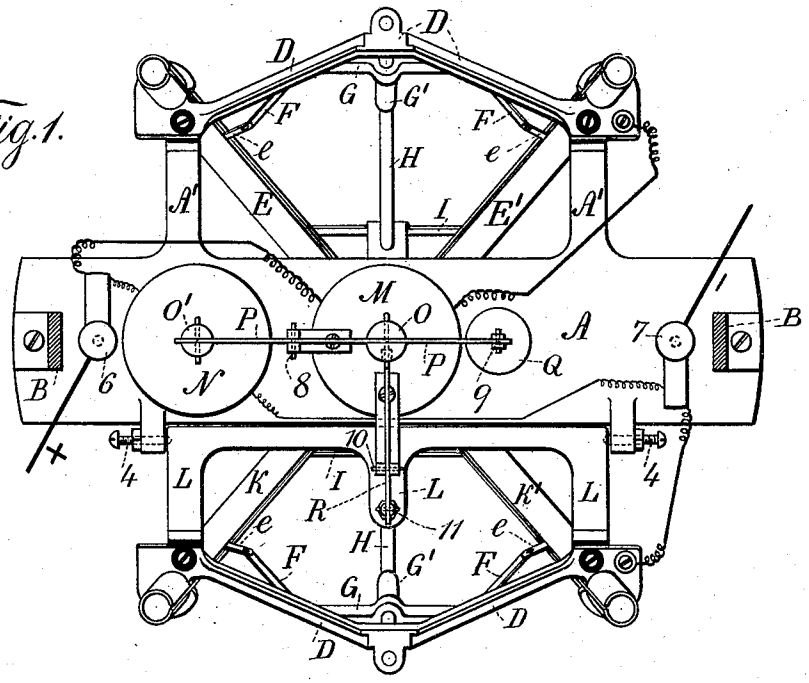
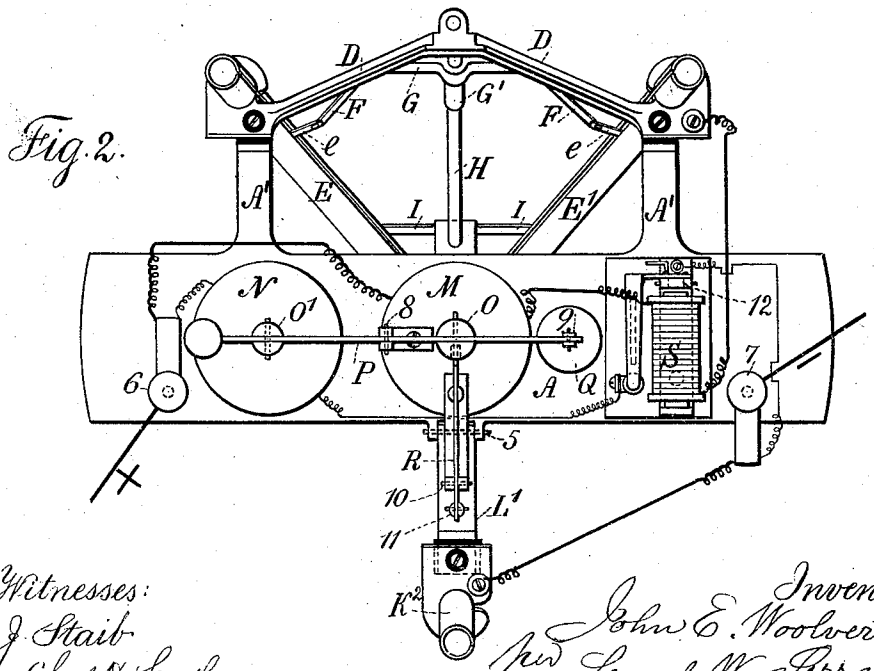


Fig. 2.



Witnesses:
J. Stair
Chas. A. Smith

Inventor
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per Lemuel W. Serrell
Atty.

(No Model.)

2 Sheets—Sheet 2.

J. E. WOOLVERTON.

ELECTRIC ARC LAMP.

No. 527,229.

Patented Oct. 9, 1894.

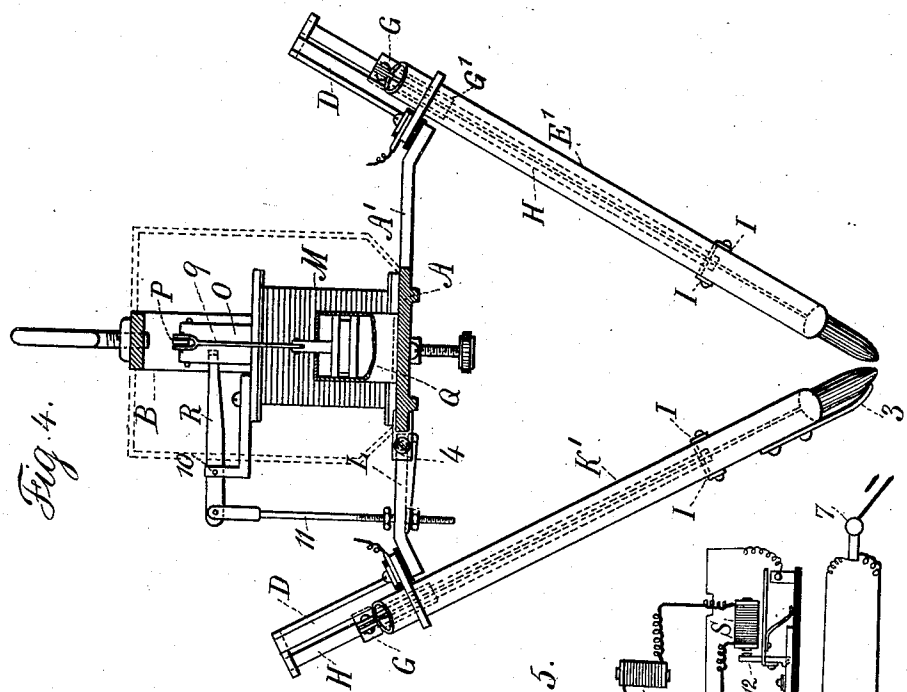

Fig. 4.

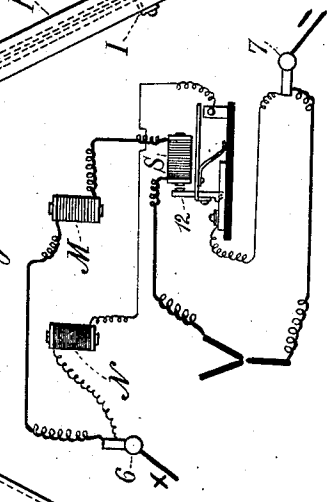

Fig. 5.

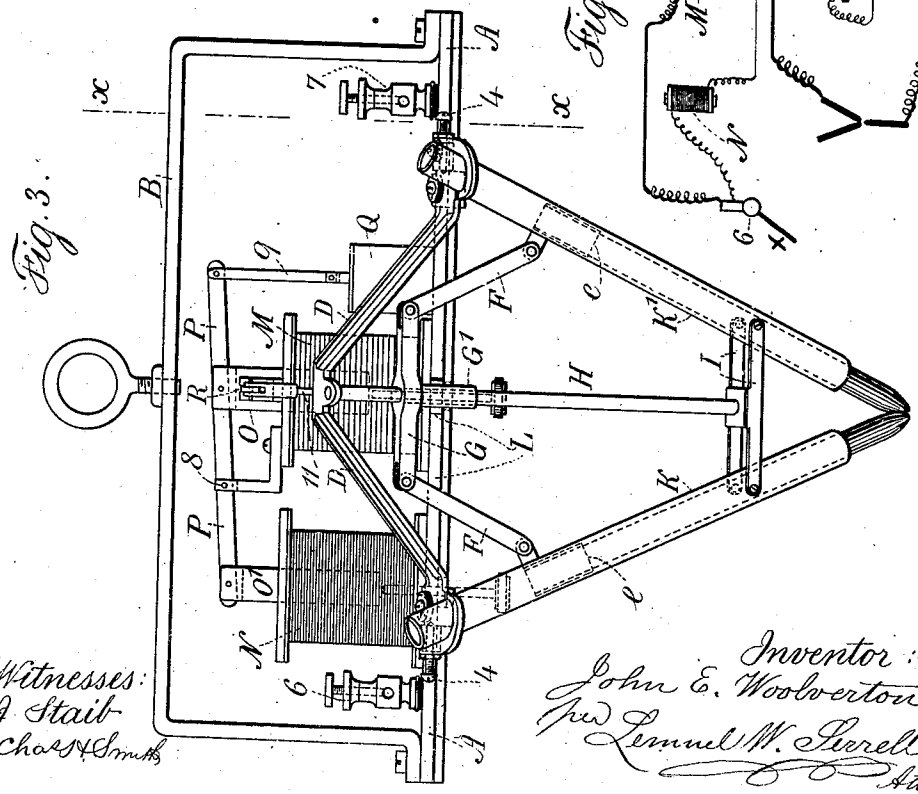

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN E. WOOLVERTON, OF NEW YORK, N. Y., ASSIGNOR TO THE AUERBACH-WOOLVERTON ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 527,229, dated October 9, 1894.

Application filed April 13, 1894. Serial No. 507,356. (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 No. 514,583, granted to me February 13, 1894, four carbons are represented in substantially the same plane and arranged in pairs, the carbons in each pair converging and stopping against each other and the pairs of carbons being separable to draw the arc by the action of the current passing through an electro-magnet, and in my application Serial No. 499,592, filed February 9, 1894, the four carbons are represented as coming together in the form of an inverted pyramid, the two carbons in each pair stopping the one against the other as they are fed down and the carbons being separable by the action of the magnet through which the circuit passes.

In the present improvements the carbons are brought together in the form of a pyramid and separated by the action of the current passing through an electro-magnet, and my present invention relates to the peculiar features of construction hereinafter set forth, whereby the lamp is rendered compact and facility given for the insertion of the carbons and for maintaining the proper relative position of such carbons by a simple mechanism that is not liable to become obstructed by friction or the presence of dust or any foreign substances.

In the drawings, Figure 1 is a plan view of the lamp adapted to receive four carbons. Fig. 2 is a similar plan view with three carbons. Fig. 3 is an elevation sidewise of the frame. Fig. 4 is a sectional elevation of the frame at the line *x*, *x*. Fig. 5 is a diagram of the circuit connections.

The base plate A is of suitable size for receiving the operative parts and the magnets, and above this is a frame or yoke B by which the lamp may be suspended, and any suitable inclosing case may be provided, as represented by the dotted lines at C, Fig. 4.

At one side of the base plate A the arms A′ extend out and receive upon them the insulated arch frame D to which are permanently connected the carbon holders E E′ which are in the form of tubes sufficiently large for receiving the carbons, and these tubes are slotted longitudinally from end to end so as to receive within them the sliding carbon holding sockets *e*, each of which has a projecting plate or flange to which is connected a link F that is pivoted at its upper end to the T-head G of the sliding tube G′, which tube surrounds and slides freely upon the stationary guide-bar H which is fastened at the top end to the arch frame D and at the bottom end by the bars I to the carbon holders, which bars also serve to connect the carbon holders and retain them at the proper distances apart.

The proportion of the parts is advantageously such that when the T-head G is brought up adjacent to the top end of the guide-bar H, the carbon holding sockets *e* are at the extreme upper end of the holders E E′ and hence the carbons can be inserted into or through the sockets *e*, and the holders E E′ being open at their upper ends, allow for the carbons projecting through the sockets if so desired, so that any required length of carbons can be made use of and they can be slipped through the sockets from time to time as such carbons are consumed, but usually the carbon holders will be the same length as the carbons, so that when the sockets *e* are at the upper ends of the carbon holders the carbons can be introduced from below and pressed up into the sockets, and one carbon will not interfere with the insertion of the other carbon, and as soon as the parts are liberated the carbons will slide by gravity toward each other and the movement will be arrested as soon as the points of the carbons come into contact.

Where four carbon holders are made use of, as represented in Figs. 1 and 3, the second set of carbon holders K K′ is constructed in substantially the manner before described, and when a single carbon holder K^3 is made use of, as shown in Fig. 2, the tube and socket are constructed the same as either of the carbon holders before described, but the carbon slides down through the carbon holder by gravity and the lower end thereof rests against the stop finger 3, as shown in Fig. 4, so that

the carbon will not slip out but will slide down gradually as the lower end thereof is consumed.

The frame L, Figs. 1 and 3, is pivoted at 4, and the carbon holders K K′ are permanently connected therewith and preferably insulated therefrom, and the frame L is swung upon its hinges to separate the carbon in the carbon holders K K′ from the carbons in the holders E E′ by the action of the electro-magnet as hereinafter described, and the plate L′ is hinged or pivoted at 5, as seen in Fig. 2, so that the single carbon in the holder K^3 is moved in a similar manner.

The electro-magnet M is in the main circuit between the binding post 6 and the carbon holders E E′, so that the current passes from 6 through M and E′ and by the carbon holders K′ to the binding post 7, and the shunt magnet N is of high resistance and is between the binding posts 6 and 7, and both of these magnets M and N are provided with sliding cores O O′ that are connected with the lever P, the pivot 8 of which is preferably upon the magnet M as indicated, and one end of the lever P has a connecting rod 9 to a piston in the dash-pot Q which acts to prevent the motion of the magnet cores being too sudden, and there is a lever R pivoted at 10 and connected at one end with the core O of the magnet M and at the other end by a screw rod 11 with the frame L or plate L′. It will now be understood that the shunt through the magnet N maintains the electric circuit, and the magnetism in N acts in the opposite direction to the magnetism in M, and when the magnetism in M increases in consequence of the current passing through the carbon holders and carbons, the core of the magnet M acts to separate the carbons and increase the resistance in the circuit passing through the magnet M, and the parts are to be adjusted by the nuts on the screw rod 11, so that the proper length of arc will be maintained by the relative magnetism in the helices M and N.

In Figs. 2 and 5, I have represented a cut-out S the helix of whose electro-magnet is in the main line circuit passing through the magnet M and carbons, and the armature 12 closes the circuit through the shunt magnet N when the current passing through the carbons is too great.

By this improvement the lamp is simplified in its construction so as to be comparatively inexpensive and the carbons are easily introduced or replaced, and very little attention is required in maintaining the lamp in the most efficient working condition, and the carbons coming together as an inverted pyramid, but little shadow is cast downwardly by any portion of the lamp, and where three carbons are made use of the consumption will be nearly uniform if the circuit connections are made in such a manner that the two carbons are connected with the + binding post, and in consequence of the arrangement of the electro-magnets, the levers, and the dash-pot, the lever which controls the electric arc receives its motion directly from the core of the magnet M, but the movements of this are controlled by the electro-magnet N acting upon the lever P in connection with the piston of the dash-pot Q to which such lever P is also connected.

I claim as my invention—

1. In an electric arc lamp, the electro-magnet helix M in the main circuit, and the electro-magnet helix N in the shunt circuit, in combination with the respective cores O and O′, the lever P with which such cores are connected, the dash-pot and the connection from its piston to the lever P, the carbon holders converging to the apex of an inverted pyramid, the hinge connection for the moving carbon holder, a lever receiving its motion from the core of the main electro-magnet, and an adjustable connection therefrom to the hinged support for the movable carbon holder, substantially as set forth.

2. The combination in an electric arc lamp, of two fixed covering tubular carbon holders slotted longitudinally throughout their length, carbon receiving sockets movable longitudinally in the holders, an arch frame and guide-bar rigidly supported and connected with the carbon holders, a tube sliding on the guide-bar and having a T-head, and hinged links extending from the T-head to the sockets, substantially as set forth.

3. The combination in an electric arc lamp, of two fixed converging tubular carbon holders slotted longitudinally throughout their length, carbon-receiving sockets movable longitudinally in the holders, an arch frame and guide-bar rigidly supported and connected with the carbon holders, a tube sliding on the guide-bar and having a T-head, hinged links extending from the T-head to the sockets, a hinged plate and carbon holding tube therewith connected, a stop finger at the lower end of the tube, and an electro-magnet acting upon the hinged plate to draw the arc, substantially as set forth.

4. The combination in an electric arc lamp, of a base plate having arms projecting at one side thereof and a suspending frame above the base plate, an arch frame permanently connected to the arms but insulated therefrom, tubular carbon holders slotted longitudinally and converging at their lower ends, a guide-bar connected with the arch frame and with the carbon holders, a tube sliding upon the guide bar and having a T-head, sliding sockets for the carbons within the carbon holders, hinged links connecting the T-head of the tube and the sockets for insuring uniformity in the feed of the carbons, a frame hinged to the base plate, and a carbon holder carried thereby, an electro-magnet in the main circuit, a sliding core and a lever engaging therewith and a connection therefrom to the hinged frame for drawing the arc, a shunt magnet and its core, a lever connection between the

said core and the core of the main line magnet for regulating the length of the electric arc, and a dash-pot and a connection from the piston thereof to the lever for regulating the rapidity of movement of the parts, substantially as set forth.

5. The combination in an electric arc lamp, of a base plate having arms projecting at one side thereof and a suspending frame above the base plate, an arch frame permanently connected to the arms but insulated therefrom, tubular carbon holders slotted longitudinally and converging at their lower ends, a guide-bar connected with the arch frame and with the carbon holders, a tube sliding upon the guide-bar and having a T-head, sliding sockets for the carbons within the carbon holders, hinged links connecting the T-head of the tube and the sockets for insuring uniformity in the feed of the carbons, a frame hinged to the base plate, and a carbon holder carried thereby, an electro-magnet in the main circuit, a sliding core and a lever engaging therewith and a connection therefrom to the hinged frame for drawing the arc, a shunt magnet and its core, a lever connection between the said core and the core of the main line magnet for regulating the length of the electric arc, a dash-pot and a connection from the piston thereof to the lever for regulating the rapidity of movement of the parts, a cut-out magnet, the helix of which is in the main circuit, and the shunt magnet circuit passing through the armature and contact of said cut out magnet, substantially as set forth.

Signed by me this 7th day of April, 1894.

JOHN E. WOOLVERTON.

Witnesses:
GEO. T. PINCKNEY,
A. M. OLIVER.