(No Model.)

L. G. WOOLLEY.

ELECTRIC ARC LAMP.

No. 269,151. Patented Dec. 12, 1882.

Fig. 1.

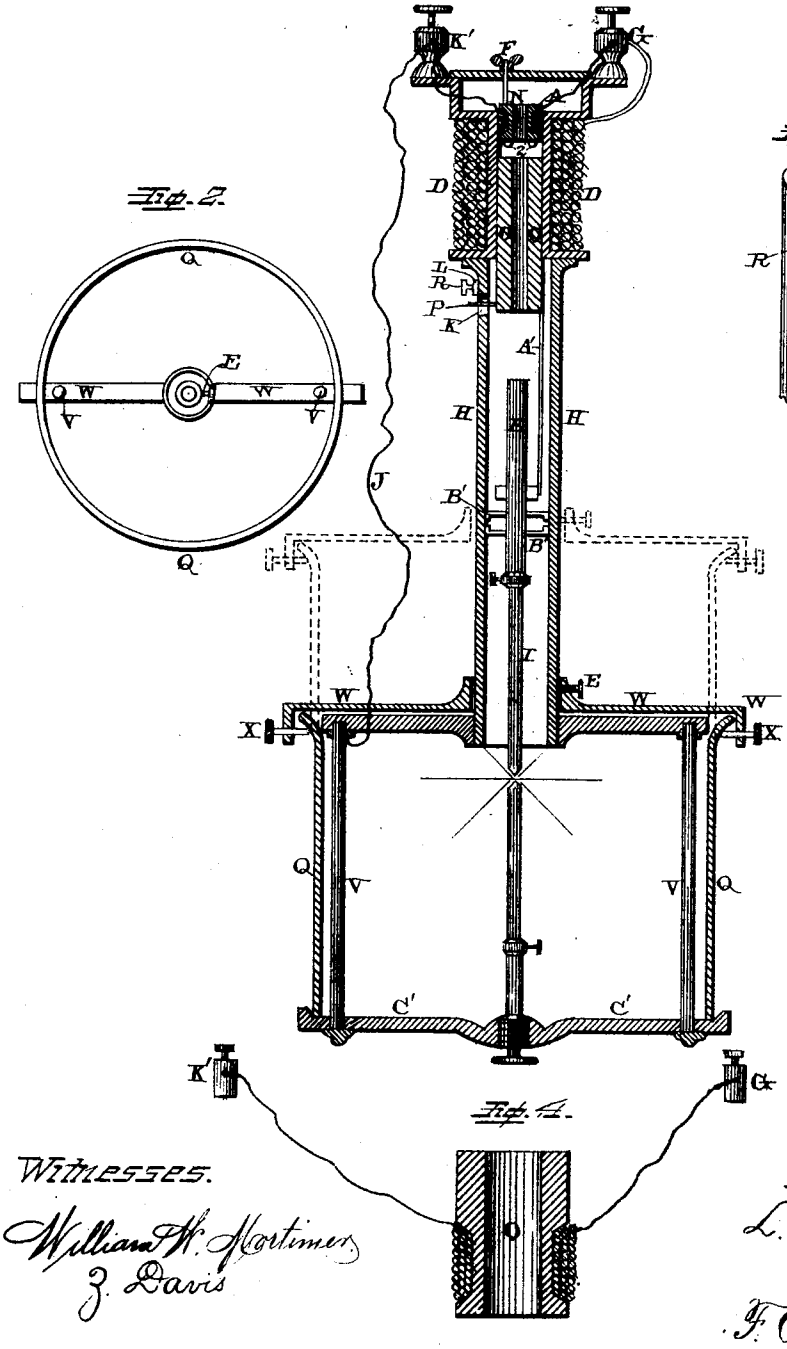

Fig. 2.

Fig. 3.

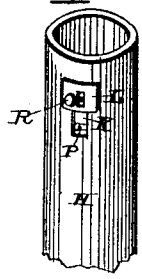

Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 269,151, dated December 12, 1882.

Application filed January 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, LEONIDAS G. WOOLLEY, of Mendon, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Electric Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in electric lamps, and is intended as an improvement upon the patent issued to me July 5, 1881, and numbered 243,748; and it consists, first, in the combination of the inclosing-tube, in which the regulating mechanism is placed, and which tube has an axial helix of low resistance applied to its upper end and a second helix or magnet of high resistance placed inside of the axial one, the wires of the helices being wound in opposite directions but fastened to the same binding-post; second, the location of the helix of high resistance inside of the axial helix applied to the upper end of the inclosing-tube, so as to protect the very fine and delicate wire with which the small helix is formed from injury and dampness and other causes which would tend to impair its working; third, in the combination of the inclosing-tube in which the regulating mechanism is placed, and which is provided with an axial helix of low resistance at its upper end, and a second helix of high resistance, which is placed inside of the axial one, and which is provided with means for vertical adjustment inside of the axial one, so as to regulate the distance which the core shall be attracted upward, and to adjust the equilibrium of all the lamps in the circuit; fourth, in the combination of the glass inclosing globe or frame, and a vertically-adjustable supporting-frame, which is attached to the upper end of the globe, whereby the globe can be raised upward to any desired height, so as to allow the carbon to be removed and replaced without removing the globe from the lamp; fifth, in the combination of the inclosing-tube, which is provided with a slot and a regulating-plate with the core, which has a stud or projection extending through the slot in the side of the tube, whereby the distance the core shall be raised upward can be readily adjusted, all of which will be more fully described hereinafter.

The object of my invention is to produce an electric lamp in which a small core of very high resistance is made to counteract the inductive force of the helix, inside of which the core is placed, and to provide a means by which the equilibrium of all the lamps in the circuit can be so regulated that all the lamps will burn with the same brilliancy.

Figure 1 is a vertical section of my invention complete. Fig. 2 is a plan view of the frame by which the globe is supported. Fig. 3 is a perspective of the slot in the inclosing-tube and the adjusting-stop. Fig. 4 is a detail view of the core, provided with a helix upon its lower end.

H represents the inclosing-tube, which has the axial helix D secured to its upper end, as shown in my patent of July 5, 1881. The wire out of which the helix D is formed is coarse and of very low resistance, and has its inner end soldered or otherwise fastened to the spool around which it is wrapped, while its outer end is secured to the binding-post G. Inside of this helix is placed the core O, which has the lifting device A′ secured to its lower end, by means of which the upper-carbon holder E will be raised upward when the core O is drawn up inside of the helix. The upper carbon, I, is intended to rest upon the lower one from its own weight, and the current passes down from the helix D through the tube H, passes through the guide B′ into the upper-carbon holder E, through the upper carbon, I, into the lower carbon, through the bottom part, C′, of the frame, and up through the post V up on one side. The posts V, to which the lower portion, C′, of the frame is secured, are insulated from the top of the frame, so that the current cannot pass through the top of the frame directly through them. To one of these posts is fastened the insulated wire J, which extends up along the side of the lamp, and has its upper end fastened to the binding-post K′.

Where but a single lamp is used the mechanism above described is all that is necessary; but where a number of lamps are to be used in the circuit it is necessary to regulate them

so that they shall not rob each other of their intensity, and thus cause every lamp to burn with the same brightness. For this purpose I place inside of the helix D a second core, N, which has a helix, A, of very fine wire and of very high resistance wound upon it. The wire of this small helix is wound in an opposite direction from the wire upon the large helix and has its ends fastened to the same binding-posts G K′, so that a portion of the current will pass through both helices at the same time, but in opposite directions, and thus cause the intensity of one current to counteract the other. As this helix A neutralizes the force of the helix D the helix D will not become so strongly magnetized, and hence will not exert such a great lifting power upon the core O as it would do if no helix A were used. This small helix serves not only to divert a portion of the current from the helix D, but causes this diverted current to weaken the force of that which is flowing through it, while the carbon I is held so high that the arc is destroyed. As long as the arc is perfect the current flows evenly through the helix D, as it offers much less resistance than the small helix A. When the electric arc between the carbon points becomes too long from too much current passing around the coarse helix D, and thus drawing the core O too far upward, the resistance of the arc will become greater, and the proportionately greater amount of the current will be forced through the fine helix A, thereby neutralizing a portion of the attractive force exerted upon the iron core O by induction from the coarse-wire helix D. By this means an arc of uniform length and resistance will be maintained at all times.

The supplementary core, A, around which the helix N is wound, is intended to be adjusted vertically inside the helix D by means of the set-screw F; and in order to prevent the two cores N and O coming in contact with each other, the core N is provided with small non-conducting points or pins 2, as shown in Fig. 1.

When a suitable number of these lamps are placed in the circuit to correspond with the quantity and intensity of the current produced from the machine or battery supplying the electricity the equilibrium of the lamps is obtained by simply raising or lowering the supplementary iron core N by means of the thumb-screw F, which simultaneously brings the differential helix M, adjustable iron core A, and iron lifting-core O in proper distance and relation to each other to quickly form a fine adjustment.

It has been common heretofore to wind the fine and coarse wire helix on the same spool or core; but such an arrangement admits of no adjustment, and requires very tedious and accurate electrical measurements as to the resistance of the two wires relative to each other.

Instead of winding the high-resistance coil on the short iron core O, the iron lifting-core may be grooved or cut away in any suitable manner and the fine-wire helix wound thereon, as shown in Fig. 4.

In order to regulate the distance which the core O shall be raised into the helix, D a stud, P, is secured to the lower end of the core, and this stud projects outward through a slot, K, made in the side of the tube H. To the side of the tube H, by means of the set-screw R, is fastened a slotted adjustable plate, L, which can be moved up and down over the slot, and thus regulate the distance which the stud P shall rise upward. The core O can then drop downward as far as the pin P can move in the slot, and can be raised upward in the helix D until the stud strikes against the lower edge of the adjusting-plate L.

In order to remove and replace the carbons without having to take away any portion of the globe or lamp-frame, I place around the tube H the frame or rod W, which has its outer end turned downward at right angles, and through which turned-down ends are passed the set-screws X. These set-screws catch under the outwardly-flaring edge of the globe Q, which entirely surrounds the light, and which globe is supported by the bottom portions, C′, of the frame.

When it is desired to have access to the carbons it is only necessary to raise the frame or rod W upward, carrying the globe Q with it, until a suitable height has been reached, and then the globe can be held suspended in this position, as shown in dotted lines, by means of set-screws E′, which is passed through the flange on the rod or frame. This set-screw catches against the side of the tube H and holds the globe suspended. As this globe entirely surrounds the light, and as the frame forms a complete protection for the light above and below, it will readily be seen the lamp can be hung out and will burn with equal brilliancy in a rain or storm as upon a clear night.

Having thus described my invention, I claim—

1. In an electric lamp, the combination of a helix of low resistance, a helix of high resistance placed inside of the axial one, an adjusting device for the helix of high resistance, and the core O, provided with a lifting device for the upper-carbon holder, the two helices having their wires secured to the same binding-posts, substantially as described.

2. In an electric lamp, a helix of high resistance placed inside of a helix of low resistance, and provided with a means for vertical adjustment, substantially as set forth.

3. In an electric lamp, the combination of a helix of low resistance, a helix of high resistance, provided with the projections 2 upon its lower end, a core provided with a lifting device, and an inclosing-tube in which the lifting device operates, substantially as specified.

4. In an electric lamp, the combination of a helix of low resistance, a helix of high resistance, provided with means for vertical adjustment, the core provided with a lifting device, and a means for regulating the distance which it shall be moved upward, substantially as shown,

5. The combination of the tube H, provided with the slot K, the adjusting-plate L, and the core O, provided with the pin or stop P, substantially as described.

6. The globe Q, provided with the outwardly-flaring edge at its top, the frame or rods W, the set-screws X E′, and tube H, whereby the globe can be raised upward and held in any desired position, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

LEONIDAS G. WOOLLEY.

Witnesses:
W. R. McDOWELL,
A. M. TOWNSEND.