(No Model.) 2 Sheets—Sheet 1.

W. B. LUCE.

ELECTRIC ARC LAMP.

No. 514,425. Patented Feb. 6, 1894.

Fig. 1.

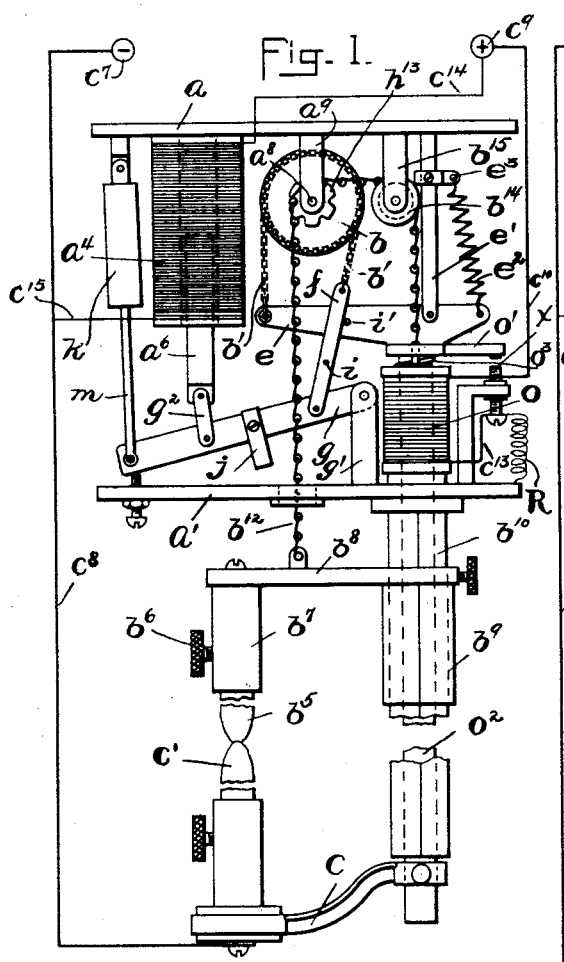


Fig. 2.

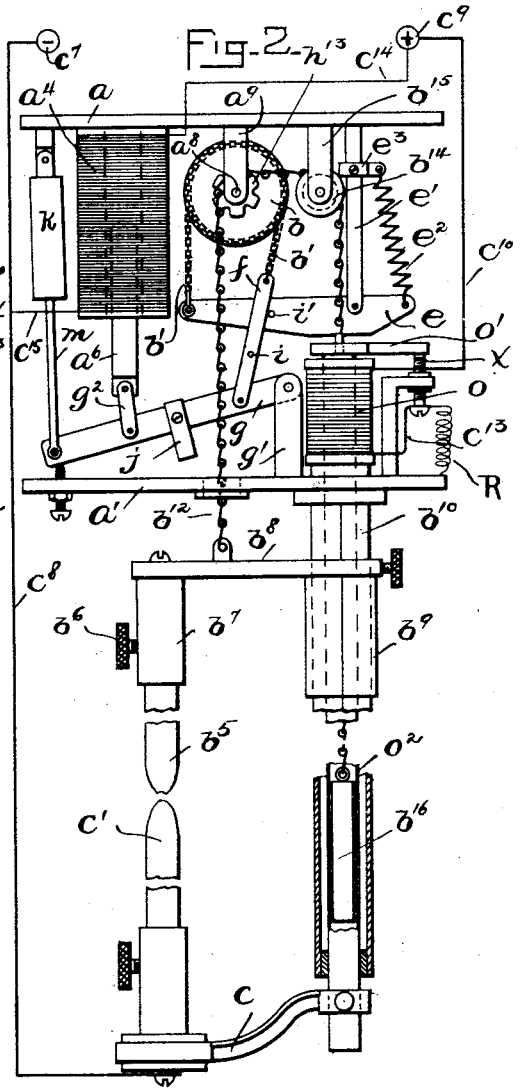


Fig. 3.

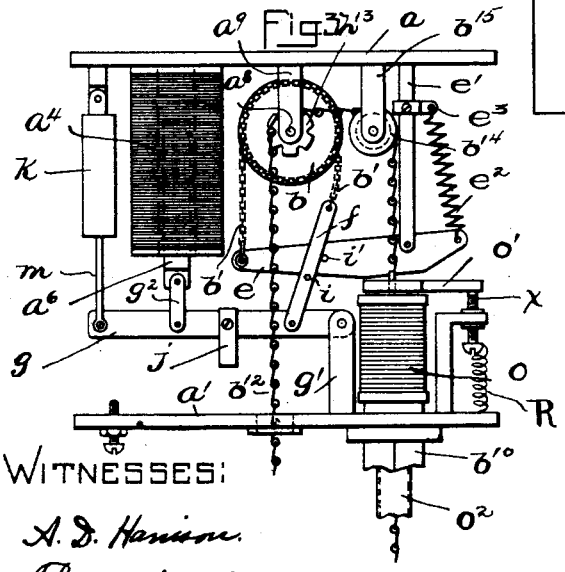
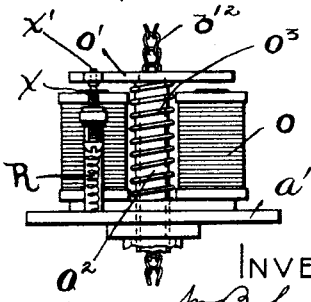


Fig. 4.



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Parker Davis,

INVENTOR:

W. B. Luce

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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

W. B. LUCE.

ELECTRIC ARC LAMP.

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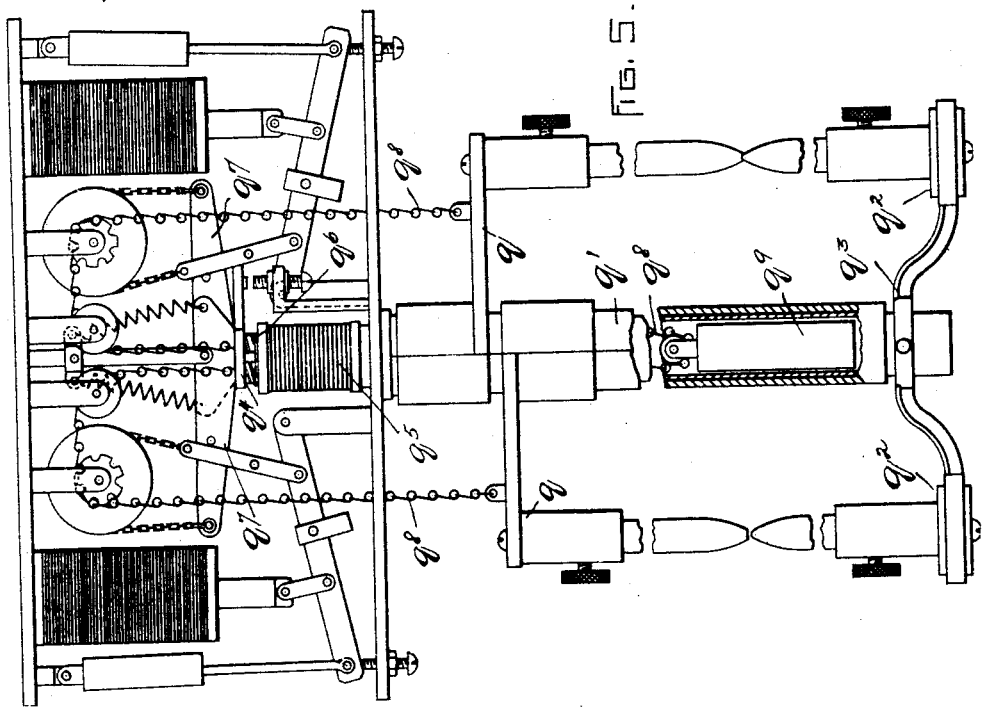

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM B. LUCE, OF BROOKLINE, MASSACHUSETTS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 514,425, dated February 6, 1894.

Application filed March 16, 1893. Serial No. 466,277. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. LUCE, of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention relates to a feed mechanism for electric arc lamps, and is an improvement on the apparatus shown in an application filed by me November 26, 1892, Serial No. 453,204.

One object of the present invention is to support the upper carbon in such manner that it will be moved to establish the arc by means of an electro-magnet in the main line circuit, and to dispense with a low resistance solenoid for raising the upper carbon.

The invention has also in view other improvements which will be fully described hereinafter.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 shows an elevation of a sufficient portion of an electric arc-lamp embodying my invention to enable it to be understood, the parts appearing as when the lamp is not in operation. Fig. 2 shows a similar view partly in section, the parts appearing as when the arc is established. Fig. 3 shows an elevation of the upper portion of the lamp illustrating the action of the friction feed. Fig. 4 shows a detail view of an electro-magnet and coacting parts employed in the lamp. Fig. 5 shows an elevation partly broken away of a duplex arrangement of lamps in accordance with my invention.

The supporting frame of the lamp comprises a pair of plates, a, a'. The friction feed mechanism is somewhat similar to that shown in my prior application referred to, and is connected with the upper carbon b^5, of the lamp. The upper carbon, b^5, is secured as by set screw, b^6, to a carbon holder, shown as a tubular socket, b^7, secured to or forming part of an arm or extension, b^8, of a sliding collar, b^9, fitted loosely on a column or guide rod or tube, b^{10}, herein shown as depending from the bottom plate, a', the said guide rod or tube, b^{10}, being preferably made polygonal in shape to prevent the sliding collar, b^9, from turning on the said rod or tube, thereby insuring correct position of the upper carbon with relation to the lower carbon, c'. The arm or extension, b^8, has attached to it one end of a flexible connection such as a chain, cord or rope, b^{12}, preferably a sprocket chain, which is passed over a sprocket wheel, h^{13}, on a shaft, a^8, supported by hangers, a^9, depending from the top plate, a, and also preferably over a loose pulley or wheel, b^{14} mounted in hangers, b^{15}, depending from said top-plate. The said chain or rope has a counterbalancing weight, b^{16}, attached to its other end and suspended within the hollow guide or column, b^{10}. A disk or drum, b, is mounted in the shaft, a^8, and a strap or band, b', is wrapped around said drum. One end of the strap is attached to one end of a lever, e, which is pivotally supported intermediate of its ends by a hanger, e', depending from the top-plate, a, and has its other end connected by a spring, e^2, with a fixed collar, e^3, on said hanger, said spring tending to draw down the strap, b', and tighten it on the drum. The other end of the strap is attached to a bar, f, which passes alongside the lever, e, and is jointed to a weighted lever, g, pivoted at one end to a standard, g', on the bottom plate, a', said lever, g, is connected by a link, g^2, with a core, a^6, of a high resistance solenoid, a^4, in a shunt circuit. A pin, i, fastened in the bar, f, is arranged to encounter the under side of the lever, e, and lift said lever, thereby loosening the strap or band on the wheel; a pin i' on the lever, e, serves to guide the bar f.

The letter, j, designates an adjustable weight attached to the lever, g, and the letter, k, designates a dash-pot receiving a plunger m which is jointed to the lever, g, whereby sudden jerky movements of said lever are prevented as will be readily understood.

An electro-magnet, o, is mounted on the bottom plate, a, and an armature, o', over said magnet is provided with a hollow stem, o^2, extending down through the guide or column, b^{10}, and forming a guide in which the counterbalancing weight, b^{16}, is contained. An arm or bracket, c, is fastened on the lower end of the stem, o^2, and supports the holder for the lower carbon, c'. A spring, o^3, surrounds the stem, o^2, and bears at one end against the armature, o', and at the other against the back plate of

the magnet, and said spring serves to hold up the armature and the stem, and consequently the lower carbon c', in contact with the upper carbon, when the lamp is not in operation.

The letter, x', designates a pin which prevents the armature from turning.

The electro-magnet is in the main line circuit being connected by a wire, c^{10}, with the positive binding post, c^9, and by another wire, c^{13}, with the insulated pin, x, which pin is connected through resistance R with the frame of the lamp. The lower carbon is connected by a wire, c^8, with the negative binding post, c^7, and the solenoid, a^4, is in a shunt circuit, one end of its coil being connected by a wire, c^{14}, with the positive binding post, and the other end of its coil being connected by a wire, c^{15}, with the wire, c^8.

The normal condition of parts in the lamp when cut out is as shown in Fig. 1, with the carbons in contact and the armature, o', up against a straight edge of the lever, e. In this normal position chain, b', is slackened allowing a free movement of the wheel, b, and upper carbon; this is brought about by the armature of magnet, o, which when it rises strikes lever, e, and raises it slightly against spring e^2.

The action of the lamp is as follows: When current is turned on the armature of magnet, o, is attracted and the right hand end of the lever, e, is drawn up by the spring, e^2, thus tightening chain and holding wheel, b, and upper carbon securely. The lower carbon is at the same time dropped, thus striking the arc. Contact is made between the armature and pin at, x, by same movement, thus cutting out resistance R and connecting coil, o, with frame of lamp direct through contact pin and armature. This resistance R is only necessary on a constant potential or incandescent circuit and not on an arc circuit. The object of providing this resistance is to prevent short circuiting through the carbons when they are in contact. As the arc increases in length by reason of burning away of carbon high resistance shunt coil, a^4, becomes active and begins to raise lever, g, allowing the wheel, b, to revolve and the upper carbon to be lowered. This movement goes on until pin, i, strikes lever, e, when any further movement of lever, g, upward raises lever, e, and slackens chain, b', slightly, allowing wheel to slip and the upper carbon to slide down. As resistance or arc becomes normal coil, a^4, becomes inactive allowing lever, g, to drop by reason of weight, j, thereby tightening the chain, b', and either holding upper carbon in position or raising it according as arc is normal or too short. This action goes on continually, the arc being kept at a constant length.

When the resistance R is used it should be equal to the resistance of the normal arc.

In Fig. 5 a duplex arrangement is illustrated. Two upper carbon holders, q, are mounted on a single center tube, q', and two lower carbon holders, q^2, are supported by a cross-arm, q^3, on said tube, which arm is connected with an armature, q^4, of an electro-magnet, q^5, as before, said magnet being actuated upwardly by a spring, q^6, so as to bear against levers, q^7, of two friction feed mechanisms of the same construction and arrangement as before described. In this duplex arrangement a single chain, q^8, is connected with the two upper carbons and passes over the friction wheels, and down into the tube, q', where it supports a counter-balancing weight, q^9. With this arrangement one part of the duplex lamp will be burned out while the other part is cut out of the line circuit, and then that other part will be set in operation. An electrical cut-out device of any suitable construction may be employed.

It is evident the construction here shown may be varied in many particulars without departing from the spirit and scope of the invention, and therefore it is to be understood that I do not confine myself to such construction.

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

1. An electric-arc lamp comprising in its construction a rotary friction part operatively connected with the upper carbon, a brake device to act on said rotary part, a solenoid in a shunt circuit and having a core which co-acts with the brake, an electro-magnet in the main line circuit, an armature for said magnet normally held away from the same and co-acting with the brake device whereby the brake is held off the rotary part, and a lower carbon connected with the said armature.

2. An electric lamp comprising in its construction an upper carbon supported by a rotary friction part; a solenoid in a shunt circuit and having a core so connected with the friction device that when lowered it locks the same and when raised it relieves it and allows the upper carbon to lower; a spring-actuated lever co-acting with the said solenoid core; an electro-magnet in the main line circuit; an armature normally held away from the magnet and against the said spring-actuated lever; and a lower carbon supported by said armature.

3. An electric-arc lamp comprising in its construction, a rotary toothed wheel; an upper carbon suspended by a counter-balanced chain passing over said wheel; a drum adapted to rotate with the toothed wheel; a strap passing around the drum; a solenoid in a shunt circuit and having a core which is connected through a lever with one end of the said strap; a spring-actuated lever connected with the other end of the strap; and a suitably supported lower carbon.

4. A duplex electric arc-lamp comprising two friction feed mechanisms, one for each lamp and each having a rotary part, a flexible connection by which each upper carbon is suspended, said flexible connection passing

over each of the rotary parts of the feed-mechanisms, and supporting a counter-balancing weight between said parts.

5. A duplex electric arc lamp, comprising in its construction a central fixed guide-rod having plain sides, a pair of upper carbon-holders fitted to slide independently on said guide-rod, and two feed-mechanisms connected with said carbon-holders respectively.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 24th day of February, A. D. 1893.

WILLIAM B. LUCE.

Witnesses:
ARTHUR W. CROSSLEY,
F. PARKER DAVIS.