(No Model.) 2 Sheets—Sheet 1.

W. E. CADY.

ELECTRIC ARC LAMP.

No. 434,175. Patented Aug. 12, 1890.

Fig. 1.

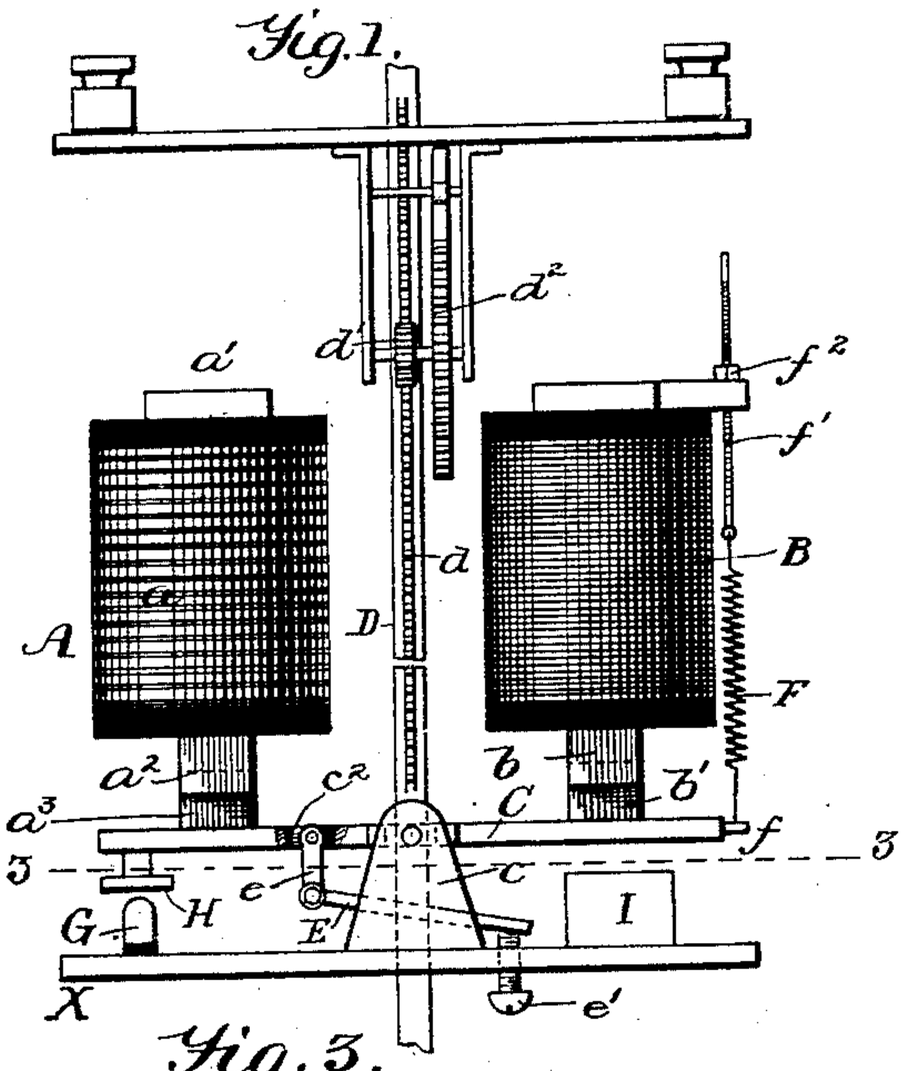


Fig. 2.

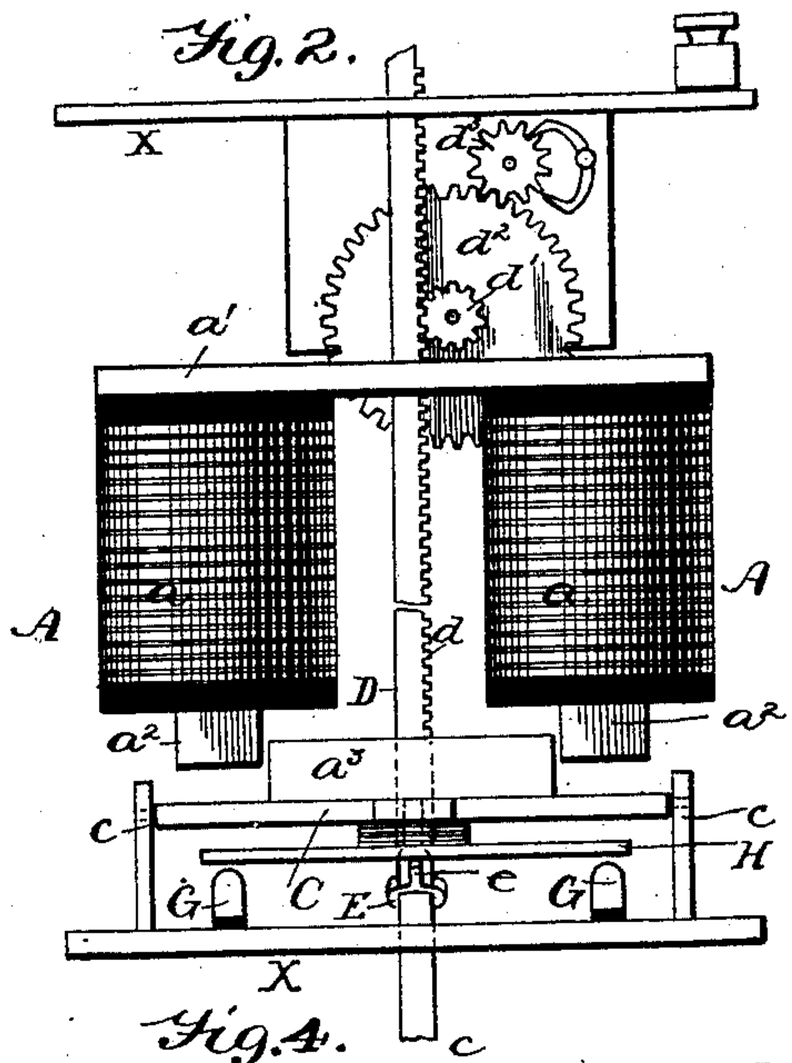


Fig. 3.

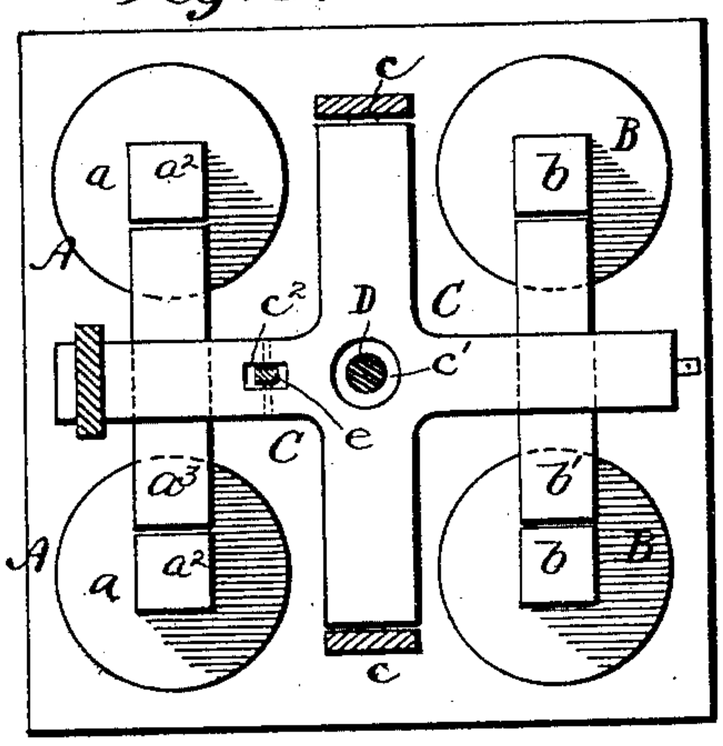


Fig. 4.

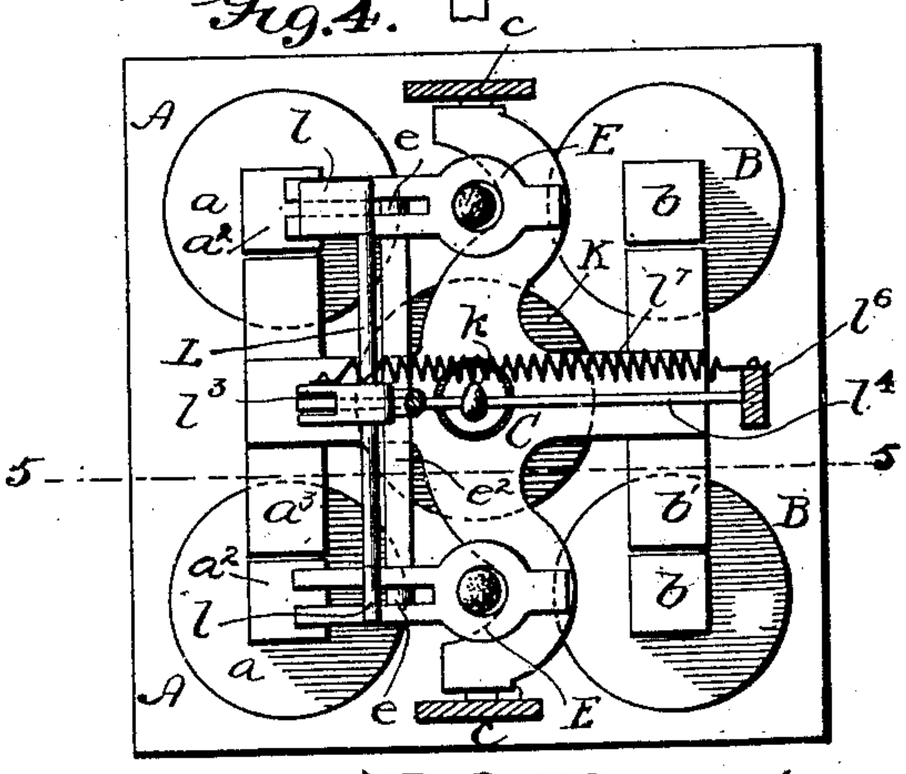


Fig. 6.

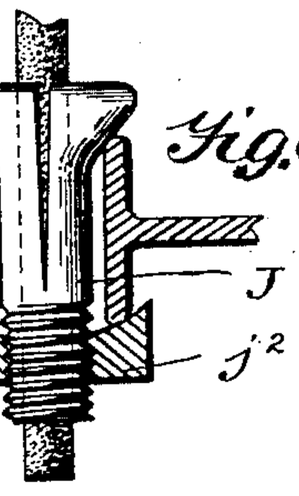


Fig. 7.

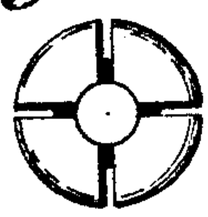
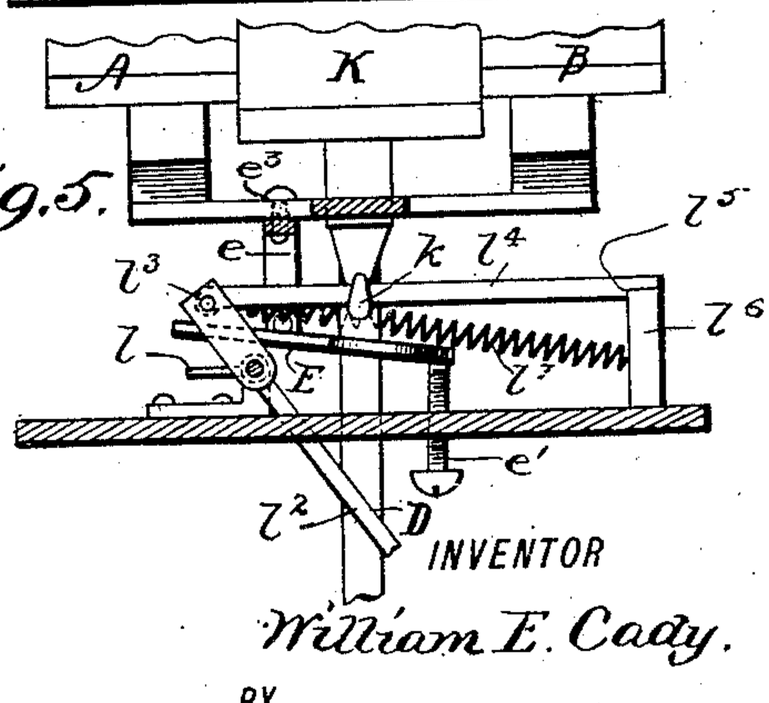


Fig. 5.



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(No Model.)

2 Sheets—Sheet 2.

W. E. CADY.

ELECTRIC ARC LAMP.

No. 434,175. Patented Aug. 12, 1890.

Fig. 8.

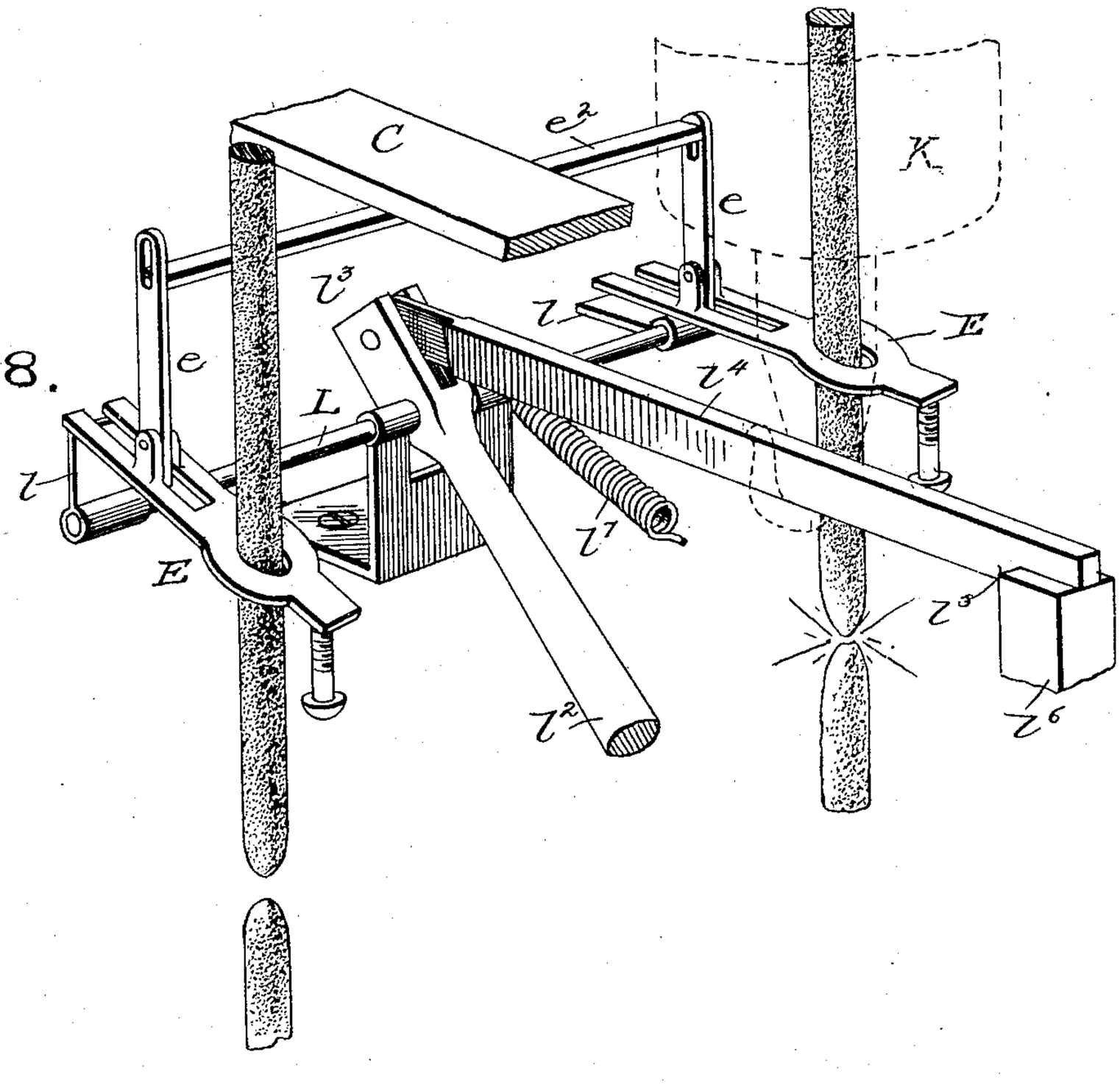
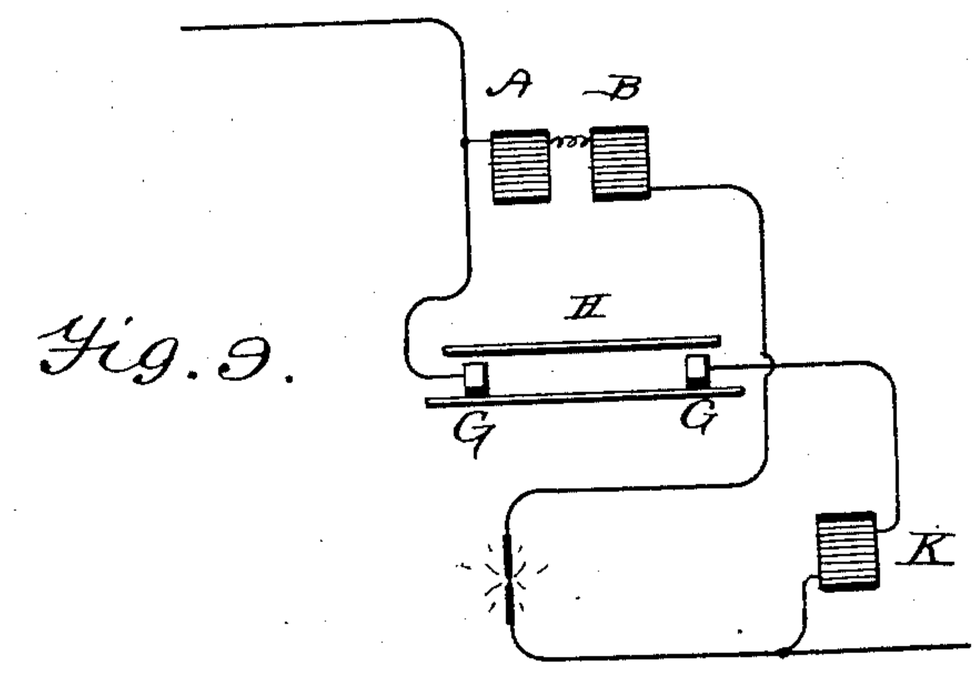


Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM E. CADY, OF CORRY, PENNSYLVANIA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 434,175, dated August 12, 1890.

Application filed March 27, 1890. Serial No. 345,560. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. CADY, a citizen of the United States, residing in Corry, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Arc Lamps, of which the following is a specification.

My invention relates to that class of arc lamps in which the upper carbon is lifted to establish the arc by means of an electro-magnet in the main circuit and is fed downward by the action of gravity controlled by the action of a shunt-magnet; and my improvements relate to the means operated by the main magnet for lifting the upper carbons, to the means for clamping the lower carbons in the frame, and the means for shifting the current in a double-carbon lamp from the burned-out set to the other set.

My invention consists in the construction and operation of parts, as hereinafter described, and pointed out in the claims.

In the drawings which accompany and form a part of this specification, Figure 1 is a side elevation of a portion of a lamp embodying some of my improvements. Fig. 2 is a side elevation of the same at right angles to Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 1, looking upward. Fig. 4 is an under plan view of the mechanism for operating the upper carbon of a double-carbon lamp. Fig. 5 is a section on line 5 5 of Fig. 4. Fig. 6 is a detail, partly in section, of the device for clamping the lower carbon; and Fig. 7 is a plan of the split screw shown in Fig. 6. Fig. 8 is a perspective detail of parts of the double-lamp-operating mechanism, and Fig. 9 is a diagrammatic view of the circuits.

Referring to Figs. 1, 2, and 3, A is the arc-striking magnet, composed of the spools a, connected by the soft-iron bar a' and supported in any suitable manner by the frame of the lamp, the pole-pieces of said magnet being shown at a^2.

B is the shunt-magnet, supported in any suitable manner in the position shown, and with its pole-pieces b in the plane of poles a^2. The armatures a^3 and b' of the magnets A and B respectively are secured to the ends of lever C, pivoted in the frame at c and having a central hole c' for the passage of the upper-carbon rod D, and a slot c^2, in which is pivoted the link e of clamp E. This clamp consists of a plate having a hole slightly larger than the rod D, which passes through it. The other end of the plate rests upon a set-screw e'. When the link e is lifted by the action of lever C and magnet A, the sides of the hole in the clamp grasp the rod D and raise it. The set-screw e' can be adjusted to vary the point at which the clamp will grasp the rod, and the action of the armature-lever is cushioned and adjusted by the coil-spring F, connected at its lower end to the lever C at f and at its upper end to a screw-threaded rod f', which passes up and through a hole in a suitable part of the frame and is provided with the adjusting-nut f^2. The rod has a rack d, meshing with the retarding-gear d' d^2 d^3, the object of said gearing being to render the descent of the upper carbon a slow movement after it has been lifted by the clamp E.

G are posts connected to but insulated from the frame of the lamp, a portion of which is shown at X, and to these posts the positive and negative wires are connected.

H is a metal strip over the post G and carried by the armature-lever C, said strip when the lamp is cut out resting on posts G and forming a circuit through the lamp.

I is a resistance-coil located under the opposite end of lever C.

In an opening j in the bottom of the frame formed by a ring or sleeve projecting above and below the frame (see Fig. 6) is a hollow split screw J, having an enlarged head j', the lower end of said screw being provided with a nut j^2, having a concave upper surface, which is greater in diameter than the ring of the opening. Through the hole in the screw a lower carbon can be passed from below the lamp without removing the globe, and said carbon is clamped by setting up nut j^2, resulting in compressing the sections of the split head on the carbon. The concavity of nut j^2 allows the clamp to hold the carbon at the proper angle to meet the end of the upper carbon.

The operation of the parts above described is as follows: The carbons being properly set and the current turned on, the action of the magnet A strikes the arc by lifting the upper carbon through the medium of rod D, clamp E, link e, and armature-lever C. As the arc increases, the magnet B increases in strength (aided, if necessary, by the spring F) and re-

verses the motion of lever C, thus lowering link *e* and releasing clamp E, the end of which will rest on screw *e'*. The descent of rod D is slow owing to the retarding-gear until the arc is normal and the current at its normal strength in magnet A and stops the fall of the carbon-rod by the action of the clamp E.

In Figs. 4 and 5 I show the mechanism for alternately operating the upper carbons of a double lamp, it being understood that the mechanism for lifting and retarding the upper carbons and for clamping the lower carbons is the same as shown and described above for the single-carbon lamp. In this double construction the four spools of the two magnets are relatively arranged the same as in the former; but instead of a resistance-coil I being employed, a magnet K in the cut-out circuit is centrally arranged relatively to the said spools. The core of this magnet K is provided at its lower end with a hook *k*. The armature-lever C is shaped, as in the other form, like a Greek cross and similarly pivoted. The arms of the lever which carry the pivots are curved, as shown in Fig. 4, to allow passage of the two carbon rods D. As shown in Fig. 4, a bar e^2, centrally secured to the lever C, carries a link *e* at each end, said link having a slot e^3 at its upper end (see Fig. 5) to receive the end of bar e^2. The object of the slot e^3 will presently be explained. The two links carry the two clamps E for the carbons, and the clamps are extended beyond the point of connection of the links to form bearing-surfaces, against the under portion of which the arms *l* of rock-shaft L are adapted to alternately bear. The rock-shaft L is mounted in bearings on the frame of the lamp under clamps E. The arms *l* are at right angles to each other, and in Figs. 4 and 5 one arm *l* is shown horizontally. The other arm does not show in Fig. 4, because it is beyond shaft L, and does not appear in Fig. 5, because said figure is a section between the two arms.

To the rod-shaft is secured a lever having an operating-handle l^2 projecting below the frame and having an upwardly-projecting arm l^3, to which is pivoted a dog l^4, which rests in hook *k* and has its end provided with a shoulder l^5, resting against post l^6. A spring l^7 connects the arm l^3 with post l^6 and keeps the shoulder l^5 in engagement with the post when in the position shown in Fig. 5.

In operation the parts are set, as shown, with one of the upper carbons lifted out of use by one of the arms *l* holding up its clamp E. When the other burning carbon is burned out or broken, the current passing through magnet K raises its core and hook *k*, and thus releases the shoulder l^5 of the dog from the post and allows spring l^7 to rock the shaft L, thus turning up the arm *l* that was down and turning down the other, and so striking the arc of the other pair of carbons. The slots e^3 in links *e* permit the lifting of one carbon rod without disturbing the other. When both carbons are burned out, the trimmer carbons first the one last burned out, and then by handle l^2 rocks shaft L, lifts that carbon, sets dog l^4, and supplies the second carbon.

In Figs. 1 to 8 of the drawings the circuit connections are omitted to avoid confusion; but for the construction in Figs. 1, 2, and 3 they will be as ordinarily used, the current passing through resistance-coil I when the lamp is cut out. For the construction shown in Figs. 4 and 5 the connections are, as shown in Fig. 9, such that the magnet K takes the place of the usual resistance-coil, while also acting to bring the arc-changing mechanism into operation.

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

1. The combination of the frame having a sleeve projecting above and below it, a hollow split screw having an enlarged head fitting the upper end of said sleeve, and a nut having a concave face fitting the lower end of the sleeve, substantially as described.

2. In a double-carbon lamp, the combination, with clamps for lifting the upper-carbon rod, of a rock-shaft having arms projecting from it at different angles, one under each clamp, and means for operating the rock-shaft, substantially as described.

3. In a double-carbon lamp, the combination, with clamps for lifting the carbon, of a rock-shaft having arms projecting from it at different angles, one under each clamp, a lever secured to the rock-shaft, a stop-dog also connected to the rock-shaft, a magnet for releasing the stop-dog, and a spring for rocking the shaft in one direction, substantially as described.

4. In a double-carbon lamp, the combination of armature-lever C, having bar e^2, slotted links *e* at the ends of said bar, and carrying lifting-clamp, and means for alternately lifting one clamp independently of the other, substantially as described.

5. The combination of magnets A and B, cut-out magnet K, having a core provided with hook *k*, lever C, having bar e^2 and two lifting-clamps E, rock-shaft L, having arms *l* under clamp C, and having also lever *l'*, spring l^7, and dog l^4, adapted to rest in said hook *k*, substantially as described.

6. In a double-carbon lamp, the combination, with mechanism for alternately changing the current from one pair of carbons to the other, of an electro-magnet for operating said mechanism, said magnet forming the resistance for the cut-out circuit, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM E. CADY.

Witnesses:
ALBERT GISEL,
ED. B. ARCHIBALD.