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M. H. BAKER.

CIRCUIT AND CUT-OUT FOR ELECTRIC ARC LAMPS.

(Application filed June 10, 1901.)

(No Model.)

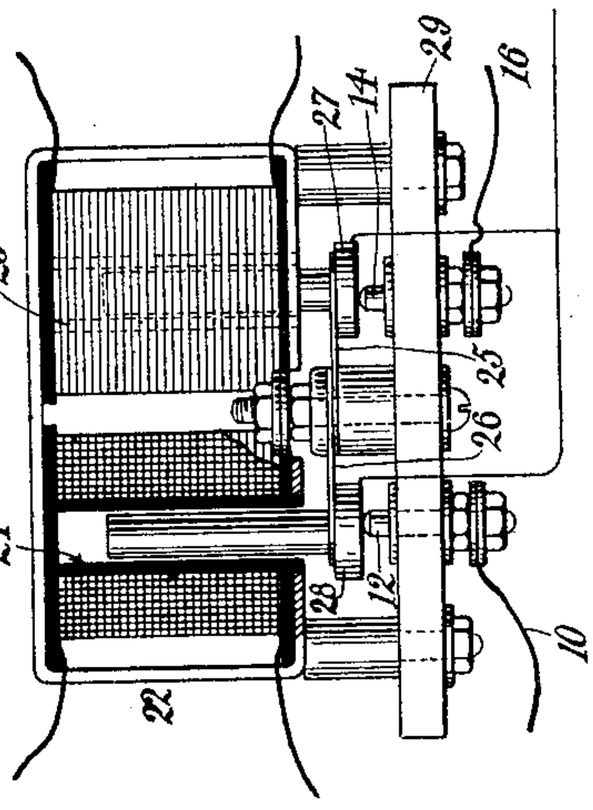

Fig. 2.

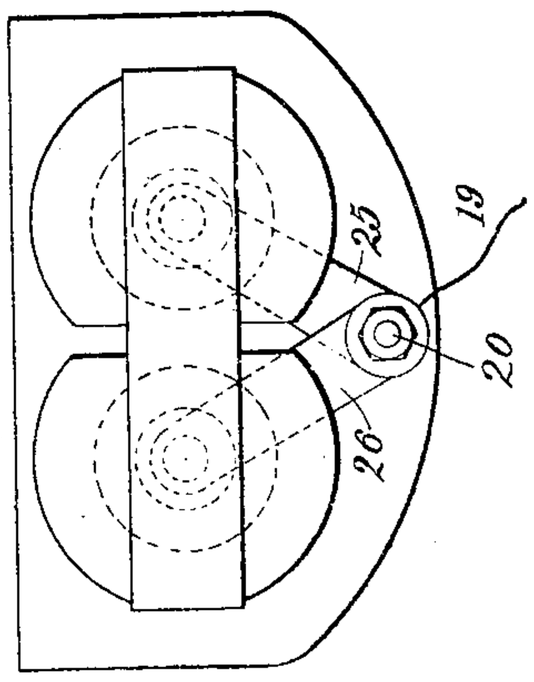

Fig. 3.

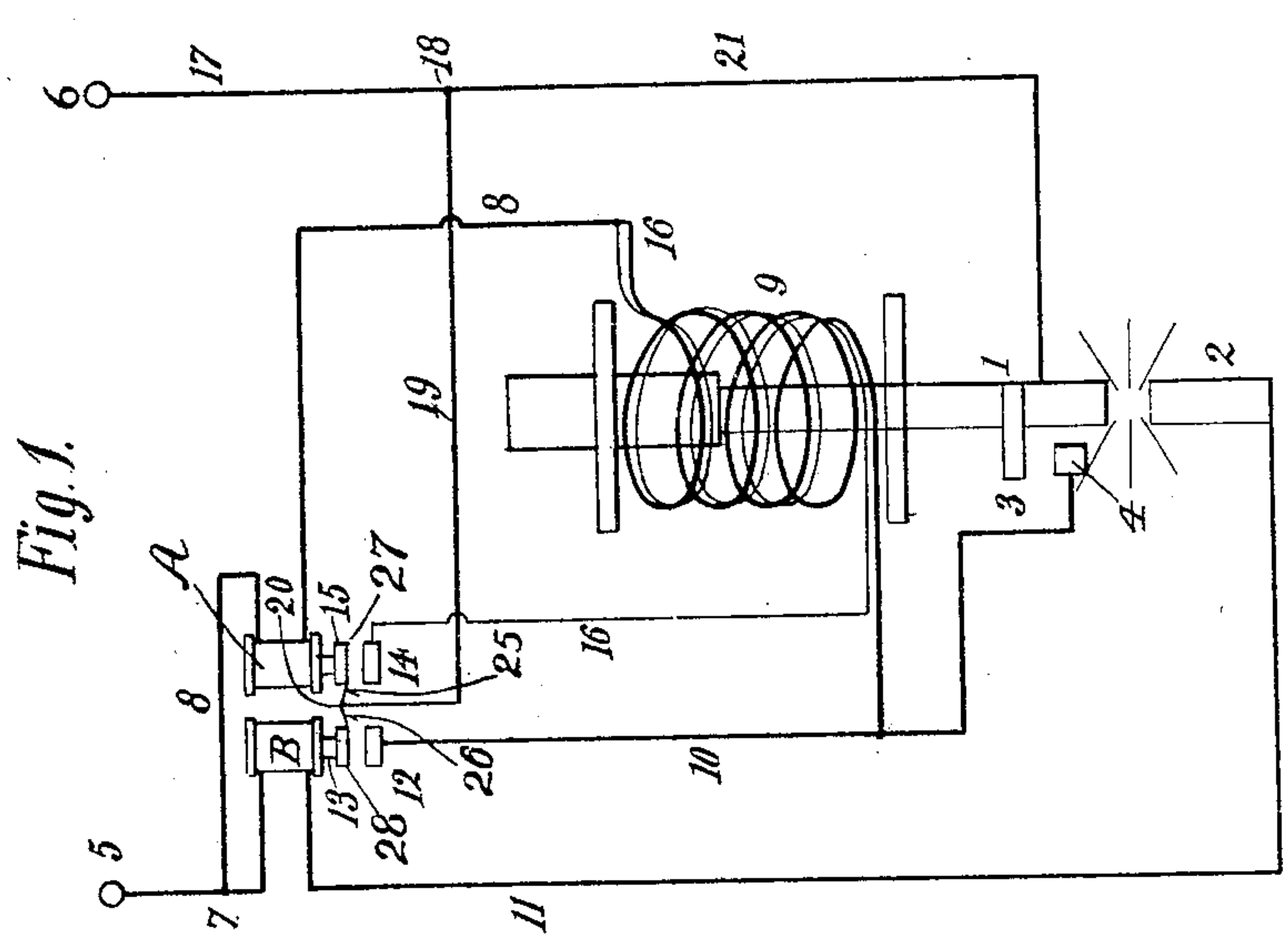

Fig. 1.

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UNITED STATES PATENT OFFICE.

MALCOLM H. BAKER, OF NEWARK, NEW JERSEY, ASSIGNOR TO MANHATTAN GENERAL CONSTRUCTION COMPANY, A CORPORATION OF NEW YORK.

CIRCUIT AND CUT-OUT FOR ELECTRIC-ARC LAMPS.

SPECIFICATION forming part of Letters Patent No. 702,392, dated June 17, 1902.

Application filed June 10, 1901. Serial No. 63,836. (No model.)

To all whom it may concern:

Be it known that I, MALCOLM H. BAKER, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Circuits and Cut-Outs for Electric-Arc Lamps, of which the following is a specification.

My invention relates to a novel arrangement of circuits in an arc-lamp, whereby the danger of excessive tension in the lamp-circuit, particularly at starting, is obviated. In carrying out my invention I have constructed a novel lamp cut-out which, combined with a special winding of the shunt-magnet of the lamp, assists in accomplishing the object above set forth. Incidentally I provide means for preventing noise in the operation of the cut-out. This becomes an important feature of the invention when it is understood that the cut-out is specially designed for use upon alternating-current circuits containing arc-lamps in series.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a diagram of an arc-lamp, showing my novel arrangement of circuits and also showing my improved cut-out in diagrammatic form. Fig. 2 is an elevation of my improved cut-out, taken from the side; and Fig. 3 is a plan of my cut-out.

In Fig. 1, 1 and 2 are respectively the upper and lower carbons of an arc-lamp. Connected with the upper carbon or its carrier is an arm 3, adapted to make contact with a terminal 4 when the carbons stick and fail to feed or are burned out or broken. This arrangement of parts constitutes a means for shunting the arc through the coarse-wire winding of the shunt-magnet of my lamp and cutting out the lamp, as will appear later on.

At 5 and 6 I show the usual lamp binding-posts. It will be observed that the circuit passing from the binding-post 5 divides at the point 7, one of the subordinate circuits, as 8, passing through the shunt-magnet 9 as a coarse winding therefor and connecting beyond the said shunt-magnet with a wire 10, leading to the terminal 4. The wire 8 also passes through the coil of a magnet A, constituting one of the magnets of my cut-out apparatus. The other branch 11 of the circuit proceeding from the binding-post 5 extends to the lower carbon 2, traversing on its way the coils of a magnet B, constituting the second magnet of my cut-out. The wire 10 is connected to the back-stop 12 for the core 13 of the magnet B, while the back-stop 14 for the core 15 of the magnet A has connected to it a wire 16, which constitutes an extension of a fine-wire winding for the shunt-magnet 9, being joined on the remote side of the said magnet to the wire 8, as shown. To the binding-post 6 is connected a wire 17, which branches at 18, one branch, 19, passing to a point 20, which is in connection electrically with the cores 13 and 15 of the magnets B and A, respectively. The other branch wire below the point 18 passes, as a wire 21, to the upper carbon 1.

The details of my improved cut-out apparatus are illustrated in Figs. 2 and 3. Here the magnets A and B are shown as being in the form of solenoids mounted within an iron frame 22 of rectangular form. The cores 13 and 15 are arranged to have considerable play inside the bushings 23 and 24, on which the coils A and B are respectively wound. The bushings referred to are preferably of micanite; but they may be of any other good insulating material.

The part described in connection with Fig. 1 as "a point 20" appears in Fig. 3 as a binding-post, from which two flat springs 25 and 26, which may be of phosphor-bronze, extend to the respective cores of the magnets A and B. As a matter of fact these springs are secured by screws or other means to buttons 27 and 28, attached to the lower ends of the cores 13 and 15. These buttons constitute contact-pieces on the lower ends of the cores and may be made of brass. Below the contact-pieces 27 and 28 are the terminals 14 and 12, to which, respectively, the wires 16 and 10 lead.

The parts of the cut-out described are mounted upon an insulating-base 29—say of vulcabeston. The tip or point of the contact-piece or terminal 12 I prefer to make of brass. The tip of the other terminal 14 will

generally be of platinum in order to insure good contact for the passage of the shunt-current while the lamp is in operation.

When the lamp-circuit is first closed, the cores of the magnets A and B are in their lowermost positions and the button 28 is in contact with the terminal 12 and the button 27 is in contact with the terminal 14. It will be understood that the springs 25 and 26 tend to hold them in this position and also that they tend to restore them to this position when unresisted by the attraction of the magnets A and B. In other words, the springs 25 and 26 act in opposition to the magnetic pull of the magnets A and B. At the starting of the lamp current passes through the lamp-circuits from the binding-post 5 to the binding-post 6 along two paths, as follows: first, by way of the wire 8 through the magnet A and the coarse-wire winding of the shunt-magnet 9 to the wire 10, terminal 12, button 28, spring 26, post 20, and wires 19 and 17; second, through wire 8 and magnet A and through the fine-wire windings 16 of the shunt-magnet 9 to the terminal 14, button 27, spring 25, post 20, and wires 19 and 17. Owing to the local induction in the magnet 9, the shunt-magnet does not draw down the upper carbon into contact with the lower until after the magnet A has acted to break contact between the terminals 14 and 27; but when such action takes place the fine-wire winding of the shunt-magnet is cut out, thus removing the inductive effects in the shunt-magnet and permitting the coarse-wire coil thereof to accomplish the initial contact between the lamp-carbons. Current now passes through the lamp by way of the magnet B, wire 11, carbons 2 and 1, and wires 21 and 17. When this happens, the terminals 28 and 12 are separated and the magnet A is short-circuited sufficiently to permit its core to drop and contact to be restored between the terminals 27 and 14. By reason of the new conditions thus brought about the circuit of the coarse-wire winding of the shunt-magnet is broken and the circuit of the fine-wire winding thereof is restored. The lamp now operates as an ordinary shunt-lamp.

By reason of the fact that the solenoid-cores have considerable play inside the coils and that when lifted so as to break their contacts they are spring-suspended and out of actual contact with anything except the springs all audible vibration is avoided and the apparatus works without noise.

The invention claimed is—

1. In an arc-lamp, a shunt-magnet having a high-resistance winding and a low-resistance winding, means for cutting out the high-resistance winding and starting the lamp through the low-resistance winding, and means for restoring the high-resistance winding and cutting out the low-resistance winding when the lamp begins to operate.

2. In an electric-arc lamp, an initial circuit of low resistance for starting the lamp, inductive restraining means applied to the said circuit for preventing the premature starting of the lamp, and means for cutting out the restraining means and permitting the low-resistance circuit to operate without hindrance.

3. In an electric-arc lamp, means for preventing excessive tension in the lamp-circuit at the starting of the lamp, such means consisting of a low-resistance starting-circuit, inductive restraining means applied thereto, means for automatically cutting out the restraining means, and devices for cutting out the starting-circuit when the lamp begins to operate.

4. In an electric-arc lamp, a divided initial circuit one part of which is of low resistance and the other part of which constitutes an inductive restraint upon the low-resistance circuit, and automatic means for cutting out the restraining means and permitting the low-resistance part of the circuit to operate without hindrance.

5. In an electric-arc lamp, a high-resistance initial circuit and a low-resistance initial circuit, means for cutting out the high-resistance circuit and starting the lamp through the low-resistance circuit, and means for restoring the high-resistance circuit and cutting out the low-resistance circuit, when the lamp begins to operate.

6. In an electric-arc lamp, means for preventing excessive tension in the lamp-circuit at the starting of the lamp and for operating the lamp as an ordinary shunt-lamp, such means consisting of a low-resistance starting-circuit, a high-resistance initial circuit acting as an inductive restraint upon the first-named circuit, devices for temporarily cutting out the high-resistance initial circuit, devices for cutting out the starting-circuit when the lamp begins to operate, and devices for cutting in the high-resistance circuit alone as a shunt to the arc for carrying on the operation of the lamp.

7. In an electric-arc lamp, a high-resistance initial circuit connected through a shunt-magnet to one terminal of an electromagnetic cut-out, a second initial circuit of low resistance connected through the same shunt-magnet to one terminal of a second electromagnetic cut-out, means for operating the first-named cut-out, at the starting of the lamp, and thereby breaking the high-resistance circuit, means operated by the low-resistance coils of the shunt-magnet for breaking the circuit of the second cut-out and permitting the restoration of the high-resistance initial circuit for controlling the further operation of the lamp.

8. In an electric-arc lamp, a high-resistance initial circuit connected through a shunt-magnet to one terminal of an electromagnetic cut-out, a second initial circuit of low resistance in inductive relation to the first-named circuit, connected through the shunt-magnet to one terminal of a second electromagnetic cut-out, means for operating the first-named cut-out and thereby breaking the high-resist-

ance circuit, means operated by the low-resistance coils of the shunt-magnet for breaking the circuit of the second cut-out and thereby breaking the low-resistance circuit, and means for short-circuiting the first-named cut-out, and restoring the contacts thereof, whereby the lamp will continue to operate as an ordinary shunt-lamp.

9. The combination with an electric-arc lamp, of a double cut-out consisting of a pair of solenoids arranged side by side, a pair of cores therefor, and a pair of springs, each supporting one of the said cores, the cores having free movement within the solenoids, one of the solenoids being in series with the carbons and the other in shunt thereto.

10. The combination with an electric-arc lamp, of a double cut-out consisting of two solenoids arranged side by side, cores for the said solenoids having free movement within the same, and separate springs attached to and supporting the cores, the springs being themselves secured to a common support, one of the said solenoids being in series with the carbons and the other in shunt thereto.

Signed at New York, in the county of New York and State of New York, this 7th day of June, A. D. 1901.

MALCOLM H. BAKER.

Witnesses:
WM. H. CAPEL,
J. H. JONES.