No. 668,868. Patented Feb. 26, 1901.

M. H. BAKER.

ALTERNATING CURRENT SERIES ARC LAMP.

(Application filed Sept. 5, 1899. Renewed Oct. 4, 1900.)

(No Model.)

Fig. 2

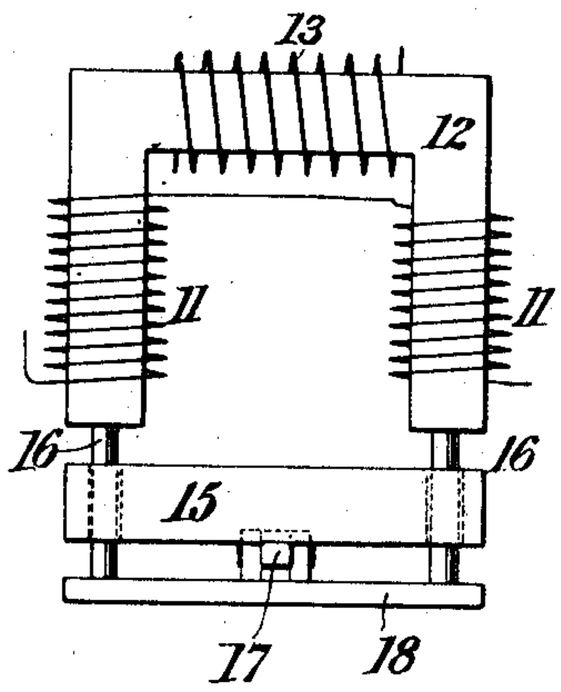


Fig. 3

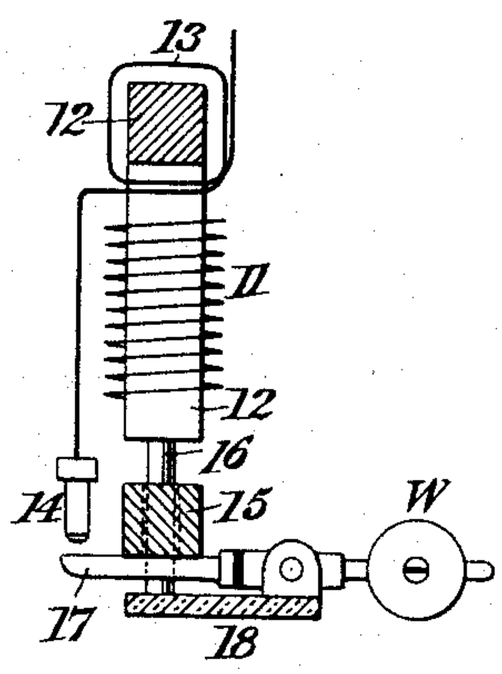
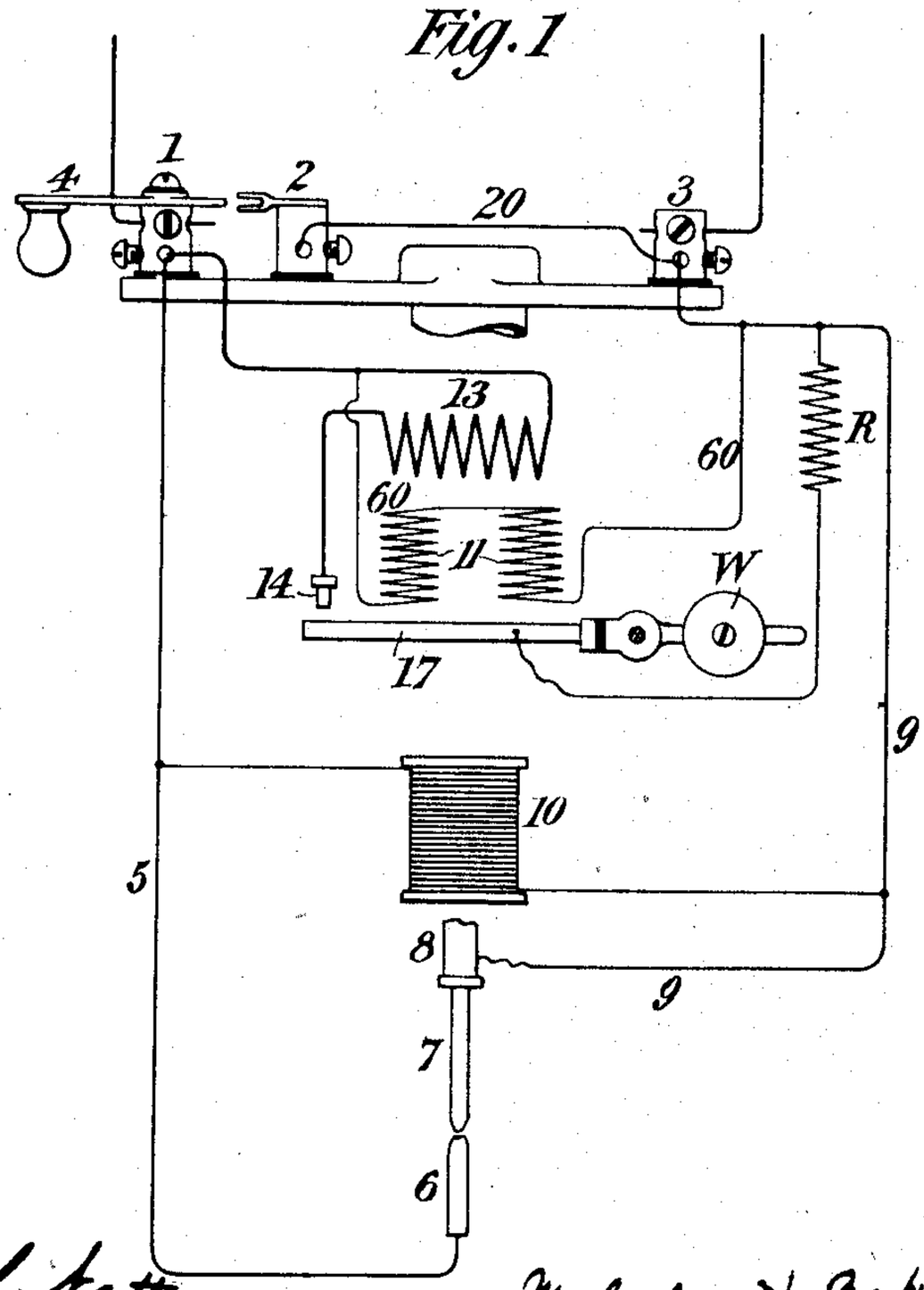


Fig. 1



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UNITED STATES PATENT OFFICE.

MALCOLM H. BAKER, OF NEW YORK, N. Y., ASSIGNOR TO THE MANHATTAN GENERAL CONSTRUCTION COMPANY, OF NEW YORK.

ALTERNATING-CURRENT SERIES ARC-LAMP.

SPECIFICATION forming part of Letters Patent No. 668,868, dated February 26, 1901.

Application filed September 5, 1899. Renewed October 4, 1900. Serial No. 32,011. (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 New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Alternating-Current Series Arc-Lamps, of which the following is a specification.

Automatic cut-out devices have long been in use on direct-current arc-lamps, the usual arrangement being to connect the active fine-wire coil of the cut-out in series with the shunt-magnet winding of the lamp, so that an excessive voltage across the arc would cause the cut-out to act by forcing more current through the fine-wire coil. The application of this form of cut-out to an alternating series lamp is impracticable for two reasons—first, because the current flowing through the shunt-magnet varies according as the position of the iron magnet-core causes a greater or less choking effect, thus producing a varying current value for the same arc voltage, and, second, because the moving parts of the cut-outs being themselves part of the device which closes the cut-out circuit for the lamp are subject to the vibrations of the electric current, and thus cause imperfect contact or sparking, or, in some instances, a welding together of the contact-surfaces of the circuit-closer.

I have devised an improved cut-out for alternating-current series arc-lamps which has the special features, first, of being included in a shunt across the arc independent of the usual shunt-magnet circuit; second, of making use of a moving element which forms no part of the circuit-closer for the cut-out circuit and which, though subject to the action of the current vibrations, is after its initial movement is accomplished mechanically remote from the contact devices, so that it does not affect the contacts injuriously nor contribute toward producing sparking or a welding of the contact-surfaces, and, third, of furnishing a live-load effect to separate positively these contact-surfaces when the lamp is restored to use.

The invention referred to forms the subject of the present application.

In practice I make use of a soft-iron weight or armature as the element which is directly affected by the magnetic action of the cut-out. This weight traverses vertically upon guides and when the cut-out is inactive serves to hold down one end of a contact-lever, so as to keep it out of contact with the coöperating fixed terminal of a shunt-circuit across the arc. The said lever end is normally actuated toward the said fixed terminal by means of a counterweight, and when the cut-out acts the first-named weight is lifted, thus releasing the said contact-lever end and allowing it to rise until it makes contact with the coöperating fixed terminal and closes the circuit across the lamp through a wire-coil resistance and also through a few turns of coarse wire on the core of the cut-out. The weight or armature is drawn up into close contact with the ends of the horse-shoe iron core of the cut-out and there held by the action of the coarse-wire turns, which are energized by the closing of the cut-out circuit of the lamp. The weight is lifted far enough to be completely out of mechanical connection with the said contact-lever, whence it follows, although the weight is itself acted upon by the current vibrations, these vibrations are not transmitted to the contact-surfaces and a positive contact is assured. When the circuit is reëstablished through the carbons, so that the lamp is ready to start again, the wire resistance-coil practically causes the current to flow entirely through the carbons, thus deënergizing the coarse-wire turns of the cut-out. The core of the cut-out is thus demagnetized and the weight is allowed to fall against the contact-lever with considerable impetus, thus acting as a live load and insuring a sharp and positive separation of the contact-surfaces. Inasmuch as the fine-wire coil of the cut-out is arranged as an independent shunt to the arc, it follows that the action of the cut-out is positive and depends solely upon the difference of potential at the arc.

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

Figure 1 is a diagram of the circuits of an alternating-current series arc-lamp having my improved cut-out applied thereto. Fig. 2 is a side elevation of my cut-out detached from the lamp structure; and Fig. 3 is an end

elevation of my cut-out, also detached from the lamp structure.

In the drawings, 1, 2, and 3 are the usual insulated lamp binding-posts, and 4 is a hand-switch for connecting the binding-post 1 directly with the binding-post 2 in the usual manner. The said binding-post 2 is permanently connected to the binding-post 3 by a wire 20. The incoming circuit enters at 1 and passes by way of the wire 5 to the lower carbon 6. The main lamp-circuit is completed by upper carbon 7, the carbon-holding tube 8, and the wire 9, extending to the binding-post 3, and thereby connected to the external circuit. A shunt-circuit including the usual shunt magnet or solenoid 10 appears in the drawings, as well as an independent high-resistance shunt 60 across the arc, including the fine-wire coils 11 11, which are wound upon a laminated horseshoe-magnet core 12, the yoke of which is wound with a few turns of coarse wire 13, connected at one end to a fixed contact-terminal 14. The opposite end of the said coarse-wire coil 13 is connected to the binding-post 1.

The magnet 12 is provided with a soft-iron armature 15, which constitutes a weight and is adapted to slide up and down upon guides 16 16, of brass or similar material. Below the said weight or armature 15 the contact-lever 17 is pivoted in a suitable frame 18. The said lever is provided at one end with a counter-weight W, which tends to press the opposite end of said lever 17 against the end of the fixed terminal 14. This tendency is overcome when the cut-out is inactive by the superior weight of the armature 15. The guides 16 are connected at opposite ends to the poles of the magnet 12 and to the frame 18. The weight of armature 15 is accordingly not mechanically connected to the lever 17, but is a separate and mechanically-independent piece of mechanism.

In circuit between the contact-lever 17 and the binding-post 3 for the return lamp-circuit 9 is a wire-coil resistance R. If this starting-resistance be made as great as the resistance of the normal arc, the few turns of coarse wire upon the core of the cut-out may be dispensed with.

The action of the apparatus will now be apparent. The lamp may be cut into and out of circuit by manipulating the hand-switch 4 in a manner that is well understood. When, however, the need of an automatic cut-out intervenes, as when the arc becomes exceedingly long by the rupture of one of the carbons or from any other cause, the magnet 12 is strongly energized by the fine-wire coils 11 11 and the weight or armature 15 is lifted. When this happens, the lever 17 follows the said weight or armature until contact is made between the said lever and the fixed terminal 14. The lever then comes to rest, while the weight 15 is carried still farther toward the poles of the magnet 12, thus passing completely out of mechanical contact with the said lever and having room enough to move a considerable resistance without renewing its contact therewith. As soon as the contact-lever 17 has made contact with the terminal 14 a circuit is completed from the binding-post 1 to the binding-post 3 by way of the coarse-wire coil 13, the fixed terminal 14, the lever 17, and the resistance R. This circuit being energized now serves to hold the weight or armature 15 in its raised position and continues to do so until the excessive resistance through the main lamp-circuit including the carbons is removed. Meanwhile the shunt-magnet 10 is holding the carbon-rod 8 in its lowermost position, so as to permit the descent of the upper carbon in case after being ruptured there is still enough of said carbons left to feed properly. In any case when the normal conditions are restored at the arc and the lamp starts in operation again the described shunt-circuit through the coarse-wire turns 13 will be deënergized and the weight 15 will drop suddenly and with a quick sharp impact against the contact-lever 17. The said weight will thus act as a live load and cause a complete rupture of the shunt-circuit by moving the lever 17 out of contact with the terminal 14 through a quick positive movement.

I claim as my invention—

1. In an arc-lamp, a closed shunt across the arc including a magnetic coil, a moving armature operated by the said coil, and a circuit-closer in a normally open shunt across the arc operating to close the said open shunt when the coil is energized, the said moving magnet being independent of the said circuit-closer.

2. In an alternating-current arc-lamp, a normally open shunt-circuit and a circuit-closer therefor, a closed shunt-circuit including the magnetic coil and an armature for the said coil normally in contact with the said circuit-closer, the said armature being independent of the said circuit-closer.

3. In an alternating-current arc-lamp, a normally open shunt-circuit across the arc, a circuit-closer therefor, a closed shunt including a magnetic coil, and an armature for the said coil independent of the said circuit-closer and constituting, when released, a live load for opening the said circuit-closer.

Signed at New York city, in the county of New York and State of New York, this 7th day of August, A. D. 1899.

MALCOLM H. BAKER.

Witnesses:
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