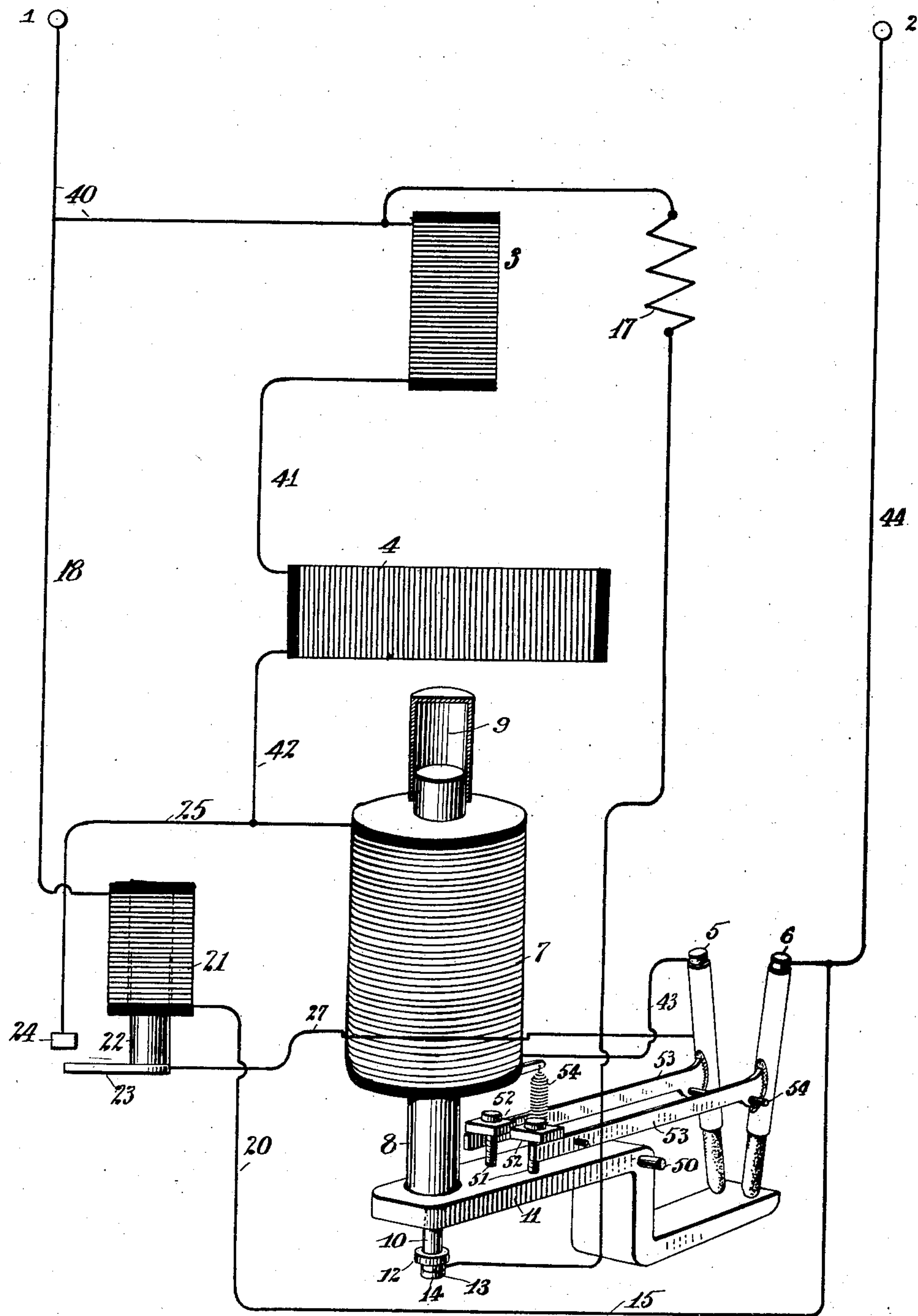


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ELECTRIC ARC LAMP.

APPLICATION FILED JUNE 28, 1902.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## ELECTRIC-ARC LAMP.

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Application filed June 28, 1902. Serial No. 113,599. (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 East Liberty, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

The present invention relates to improvements in electric-arc lamps of the Bremer type. Among the main features of one of the common types of these lamps is a pair of electrodes, one or both of which comprises a mixture of carbon with a suitable percentage of metallic salts or metalloids. These electrodes may point downward and converge toward each other, and the usual form of Bremer lamp is constructed in this way, so that the arc is formed between electrode-points which have little or nothing below them to shut off the light-rays emanating from the arc or the points. In order to utilize the luminosity of the arc itself, Bremer usually provides a large blow-out magnet for steadying and controlling the arc and assisting in giving it a crescent or fan shape between the electrode-points, and he also usually employs a small blow-out magnet, one pole of which is so located with relation to the electrode-points or the arcing-space between them that as the electrodes burn away the arc will gradually approach the pole of the small blow-out magnet, and when the length of the arc has become excessive and the resistance of the lamp too high the magnetic blast from the small blow-out magnet will finally extinguish the arc altogether. Thereupon a shunt-magnet forming part of the Bremer lamp is brought into operation to release the electrode-clutches and at the same time or a little earlier to throw forward a striking-arm or igniter into the path of the electrodes, which are now free to descend by gravity, thus reestablishing the circuit between the electrode-points by means of the igniter and causing current to flow again through the electrodes. The shunt-magnet then releases the clutch mechanism and the igniter into the power of one or more springs, whereby the clutches are again ap-

plied to the electrodes, and the igniter is retracted by a sudden movement away from the electrode-points. Because of this sudden retraction of the igniter the electrode-points have little time to become heated, and when the lamp is first started after disuse the igniter is apt to be thrown forward a number of times before the arc is actually established, during which process one or both of the electrodes is liable to become broken off. There are many other characteristic details of the Bremer lamp; but the present invention is concerned with the matter of improving the details already mentioned or rather with the matter of improving the operation of the Bremer lamp as a whole by supplying the insufficiencies of the devices mentioned in the foregoing.

My invention aims, first, to secure a comparatively slow withdrawal of the striker or igniter from the electrode-points, and, second, to insure the feeding of the electrodes under all conditions of service. Respecting the latter point, while it is found that the small blow-out magnet employed by Bremer is sufficient to extinguish the lengthened arc when only two or three lamps are in series in the circuit, yet in high-tension series work, where a larger number of lamps is to be included in a circuit, the arc practically cannot be extinguished, so that each lamp would be likely to reach an excessive voltage before feeding would take place.

One feature of my invention consists in arranging the igniter to stand normally in contact with the electrode-points and to operate the withdrawal of the igniter through the medium of a series magnet whose core or armature is retarded by a dash-pot. In this way the igniter is withdrawn from the electrode-points by a comparatively slow movement, yet during the operation of the lamp it is held out of the way by the positive action of the series magnet.

Another feature of my invention consists in providing a short circuit for the series magnet when the resistance at the arc becomes too great. By virtue of this arrangement the feeding of the electrodes is accom-



plished independently of the blow-out magnet, and the lamp voltage is never permitted to become excessive.

My invention is illustrated in the accompanying drawing, which is a diagram of the circuits, apparatus, and connections of my improved lamp.

In the drawing, 1 and 2 are the binding-posts or terminals of the lamp. 3 is a small blow-out magnet, and 4 the large blow-out magnet. The electrodes are illustrated at 5 and 6, while the series magnet is shown at 7. The parts thus far mentioned are connected in series with the electrodes and are included in the lamp-circuit by wires 40, 41, 42, 43, and 44 when the lamp is in operation.

The magnet 7 is of solenoid form and has a core 8, which normally stands in the position illustrated in the drawing when the lamp is not in operation. The act of energizing the magnet 7 serves to draw up the core 8, the movement of which is restrained by a dash-pot 9. A narrowed extension 10 of the core 8 passes through one end of the striker 11 and is provided at its lower end with a button 12, of conducting material, which may serve the mechanical purpose of tripping the striker when the core 8 is moved upward and also the electrical purpose of making contact with stationary contact-piece 13, joined by wires 14 15 to the wire 44, leading from the electrode 6 to the binding-post 2.

In a shunt-circuit leading from the wire 40 to the button 12 is a resistance 17, serving as the starting resistance for the lamp. In another shunt-circuit, including wires 18 and 20 and the wire 15, is included a high-resistance magnet 21, which serves indirectly as a feeding-magnet for the electrodes by acting to close a short circuit around the magnet 7. The magnet 21 is brought into operation whenever the lamp-voltage becomes excessive, as by the too great lengthening of the arc. When this takes place, the magnet 21 is energized, draws up its core 22, carrying with it a contact-piece 23, and brings the latter into electrical connection with a stationary contact-piece 24. The contact-piece 24 is connected by a wire 25 with the main-circuit wire 42. The movable contact 23 may be connected by a wire 27 with the electrode 5. Accordingly whenever the magnet 21 acts to draw up its core and establish contact with the parts 23 and 24 the magnet 7 is short-circuited, resulting in an action which will be explained farther on.

The general operation of the lamp is as follows: Before current is turned on the lamp-circuit is closed through the series magnets 3, 4, and 7, the electrodes, and the striker 11. The shunt-circuit, including the starting resistance 17 and that including the magnet 21, are also closed. On closing the line-circuit the lamp starts into operation by the passage of current through the series magnets, whereupon the magnet 7 draws up its core 8 and

removes the remote end of the striker or igniter 11 from the electrode-points, the withdrawal being caused by a comparatively slow movement. It will be seen that the button 12 is so arranged upon the stem or extension 10 as to permit considerable lost motion before the button begins to impinge upon the striker or igniter arm. This allows time for the electrode-points to become somewhat heated before the igniter leaves them. When now the electrodes burn away and the lamp voltage becomes high, the magnet 21 acts, as described, to close a short circuit around the magnet 7, whereupon the core 8 falls, carrying with it one end of the striker or igniter 11 and moving the other end up into contact with the electrode-points, thereby reestablishing the lamp-circuit, it being understood that the deenergizing of the magnet 7 serves also to release the electrode-clutches, as will now be explained.

It will be noted that the striker 11 is pivoted at 50 and that a bolt or stem 51 is rigidly secured within the upper horizontal arm of the striker. At the upper end of the bolt 51 is a button 52. The bolt 51 passes through the end of a clutch 53, which is pivoted at 54 and adapted to press against the electrode 5 through an opening in the duct or tube through which it passes. The clutch-arm 53 is drawn up by a spring 54, the opposite ends of which are attached, respectively, to the magnet 7 and the arm 53. When the magnet 7 is short-circuited and the core thereof is released, its action, as already described, is to bring the striker toward the electrode-points. At the same time, however, or a little later, the other end of the striker will act through the bolt 51 and the button 52 to draw down the clutch-arm 53 and release the electrode 5. It will be understood that there are two bolts 51, two buttons 52, and two clutches 53, one for each of the electrodes. Accordingly both electrodes will be released by a single movement of the striker, and by virtue of the fact that the striker is held for an appreciable time against the points there is little danger of the lamp failing to light or relight on the first operation of the striker.

It will be noted that the described lamp structure serves not only to secure a comparatively slow withdrawal of the igniter from the electrode-points, but also to insure the proper feeding of the electrodes whenever the lamp voltage become high enough to demand it.

I claim as my invention—

1. In an electric-arc lamp, the combination with a pair of electrodes, and a striker or igniter normally in contact therewith when the lamp is out of operation, of an electromagnet adapted to withdraw the striker when the lamp begins to operate, and means for retarding the effective action of the electromagnet.
2. In an electric-arc lamp, the combination with a pair of electrodes and a striker or ig-



5 niter normally in contact therewith when the lamp is out of operation, of an electromagnet acting to withdraw the said striker when the lamp begins to operate, the moving part of the electromagnet being connected to the striker through a lost-motion device.

10 3. In an electric-arc lamp, the combination with a pair of electrodes and a striker or igniter normally in contact therewith when the lamp is out of operation, of an electromagnet whose core or armature is connected with the striker and whose coils are in series with the electrodes, and a dash - pot connected with the core or armature for retarding its motion.

15 4. In an electric-arc lamp, the combination with a pair of electrodes and a striker or igniter normally in contact therewith, of a clutch or clutches controlling the electrodes, an electromagnet controlling both the clutch and the striker, and means brought into operation  
20 by a rise of voltage in the lamp whereby the said magnet is cut out.

25 5. In an electric-arc lamp, the combination with a pair of electrodes and a striker or igniter normally in contact therewith when the

lamp is out of operation, of an electromagnet acting to withdraw the said striker when the lamp begins to operate, and means brought into operation by a rise of voltage in the lamp whereby the said magnet is short-circuited, 30 such means consisting of a shunt - magnet and suitable short-circuit connections.

6. In an electric-arc lamp, the combination with a pair of electrodes and a striker or igniter normally in contact therewith when the lamp is out of operation, of an electromagnet in series with the electrodes acting to withdraw the striker by a retarded movement when the lamp begins to operate, a short circuit, and a shunt-magnet controlling the same, whereby a rise of voltage in the lamp causes a short-circuiting of the series magnet. 35 40

Signed at New York, in the county of New York and State of New York, this 18th day of June, A. D. 1902.

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