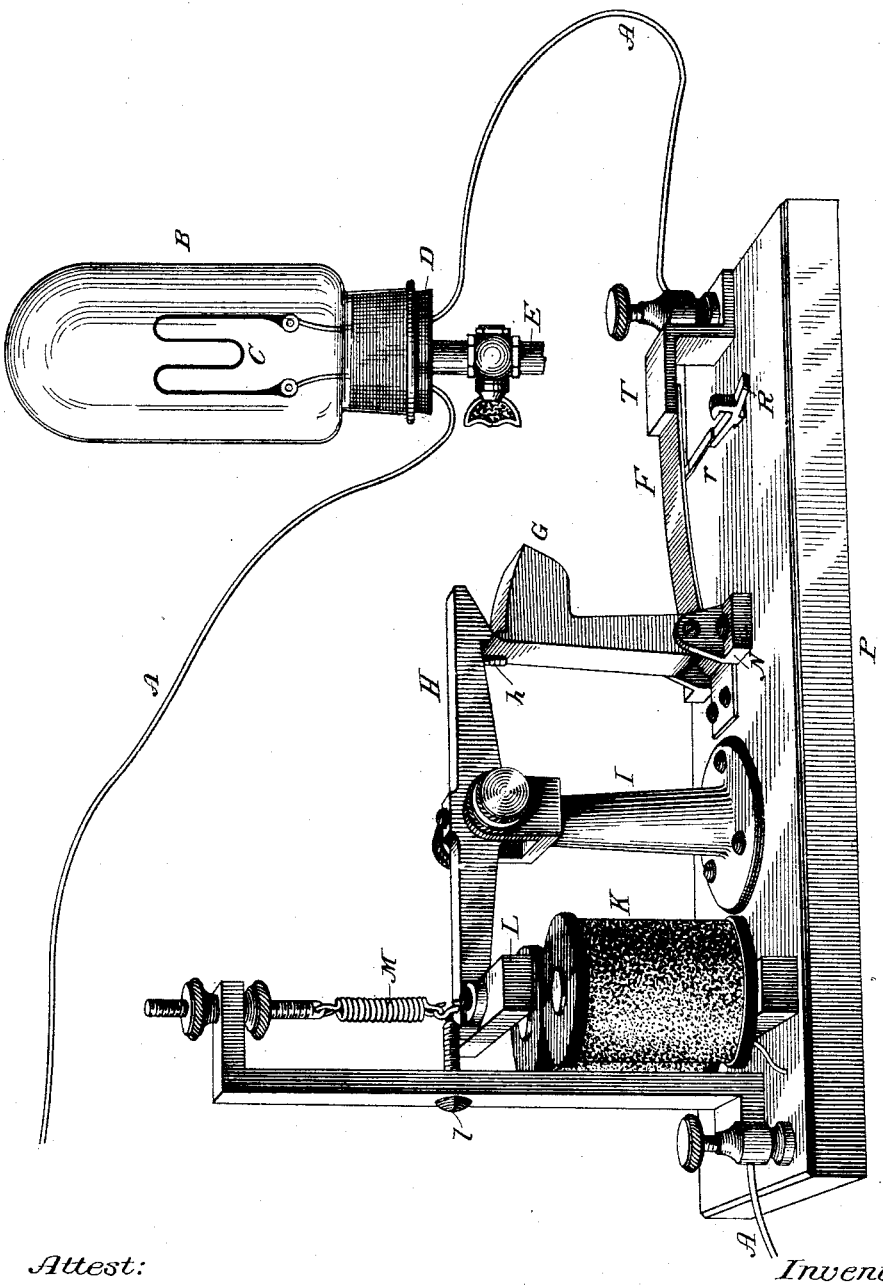
(No Model.)

H. S. MAXIM.

APPARATUS FOR MAKING INCANDESCENT LAMPS OF EQUAL RESISTANCE.

No. 264,951. Patented Sept. 26, 1882.



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APPARATUS FOR MAKING INCANDESCENT LAMPS OF EQUAL RESISTANCE.

SPECIFICATION forming part of Letters Patent No. 264,951, dated September 26, 1882.

Application filed November 15, 1881. Renewed August 19, 1882. (No model.)

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Making Incandescent Lamps of Equal Resistance, of which the following is a specification, reference being had to the drawing accompanying and forming a part thereof.

My invention pertains to a method of treating carbons, particularly those intended for incandescent lamps, wherein the said carbons are heated by an electric current while surrounded by an atmosphere of hydrocarbon vapor, or by a body containing carbon, such as an oil or gas. This treatment, as is now generally known, is for the purpose of reducing and equalizing the electrical resistance of the carbons, thus rendering them more serviceable as conductors in the lamp. It is very desirable that all the carbons, after treatment, should be of the same resistance, as upon this depends the amount of light which they produce for a given strength of current, and for this reason the heating in the presence of the carbon-bearing gas or vapor should be stopped at the instant when a certain predetermined or standard resistance has been reached.

The subject of my present invention is a device for accomplishing this automatically, the said device consisting of a circuit-breaker adapted to be actuated by magnetic or electrical action, and thereby break the circuit flowing through the carbon at the instant when its resistance has been reduced to a predetermined standard.

The accompanying drawing represents the embodiment of my invention in a convenient and practicable form, the same being shown in a circuit including also a carbon to be treated.

The letters A A represent the circuit. In practice a number of carbons are treated simultaneously, each being included in an independent circuit formed between two main conductors from a powerful generator; but as the circuits are similar in every respect and contain devices of the same character only one is represented.

C is the carbon to be treated; B, a jar or vessel provided with a stopper, D, and tube E, by means of which the air is primarily exhausted and a hydrocarbon vapor then introduced and partially withdrawn. When a strong current is passed through the carbon conductor it is heated to redness and effects a dissociation of the carbon from the surrounding vapor, a portion of which is deposited upon the conductor, thus lowering its resistance. As its resistance is lowered the amount of current which passes through it is correspondingly increased, and this increase I take advantage of in the following manner:

In the circuit A is included an electro-magnet, K, in face of the poles of which is an armature, L, carried by a lever, H, which latter is pivoted to a suitable upright or post, I. An adjustable tension-spring, M, is connected with the armature on the lever, and a stop, *l*, is employed for limiting their upward movement. The end of the lever H opposite to that carrying the armature is provided with a catch conveniently formed by an indentation, or, as shown, by cutting away a portion of the lever and employing a pin, *h*. With this catch the end of a pivoted arm, G, weighted on one side, is arranged to engage when in a vertical position. This arm may be of any desired shape, and is weighted, as shown, so that when in a vertical position it will have a tendency to fall always to one side. It is pivoted in bearings N.

F is a stout brass spring, clamped to the base P and bent with a tendency to bear firmly against the under side of a plate, T.

R is a pivoted catch, which engages and holds the spring F when the latter is bent down beyond it, *t* being a spring acting to maintain the catch in proper position for this purpose.

The circuit is to and through the coils of magnet K, then by a wire (not shown in the drawing) to spring F, thence to plate T, and on through the carbon C. The circuit is complete through the carbon when the spring F is in contact with plate T, but broken when these two do not touch.

The operation of the devices is as follows: The weighted arm G is made to engage with the catch in the end of lever H and the spring F allowed to bear on plate T. The current for heating the carbon C may then be directed through the circuit A A. At first the resistance of the carbon is such as to permit the

passage of only a small amount of current, so that the armature L, the retractile force of which has been adjusted properly by the spring M, is not affected. As the operation continues the resistance of the carbon decreases and more current flows until the attraction of magnet K becomes sufficiently strong to draw down the armature L. When this takes place the lever H releases the arm G, which falls heavily upon spring F, carrying it down sufficiently to be retained by the catch R. By this means the spring is prevented from vibrating and no arc can form between itself and the plate T.

It is evident that the spring M may be set for any resistance of the circuit that may be desired, so that the carbons, some of which require longer treatment than others, may all be easily brought to an exact standard. A weighted arm, G, is shown for the reason that this is the most easily and accurately tripped. I desire to state, however, that any form of tripping mechanism may be employed in its stead, and also that the invention which I have described by reference to a particular device is not limited thereto, but comprehends broadly the combination of elements which I have hereinafter claimed.

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

1. The combination, in an electric circuit, of a carbon conductor inclosed in a receiver containing a carbon-bearing gas or liquid, an electro-magnet, and mechanism adapted to be actuated by the same, and thereby break the circuit when the carbon has acquired a predetermined resistance, as set forth.

2. The combination, in an electric circuit, of a carbon conductor surrounded by a carbon-bearing gas or liquid, an electro-magnet and adjustable armature, and mechanism adapted to be actuated by the same, and thereby break the circuit when the carbon has acquired a predetermined resistance, as set forth.

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Witnesses:
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