P. C. HEWITT.

STARTING AND CONTROLLING DEVICE FOR ELECTRIC VAPOR APPARATUS.

APPLICATION FILED DEC. 10, 1910.

1,110,548. Patented Sept. 15, 1914.

2 SHEETS—SHEET 1.

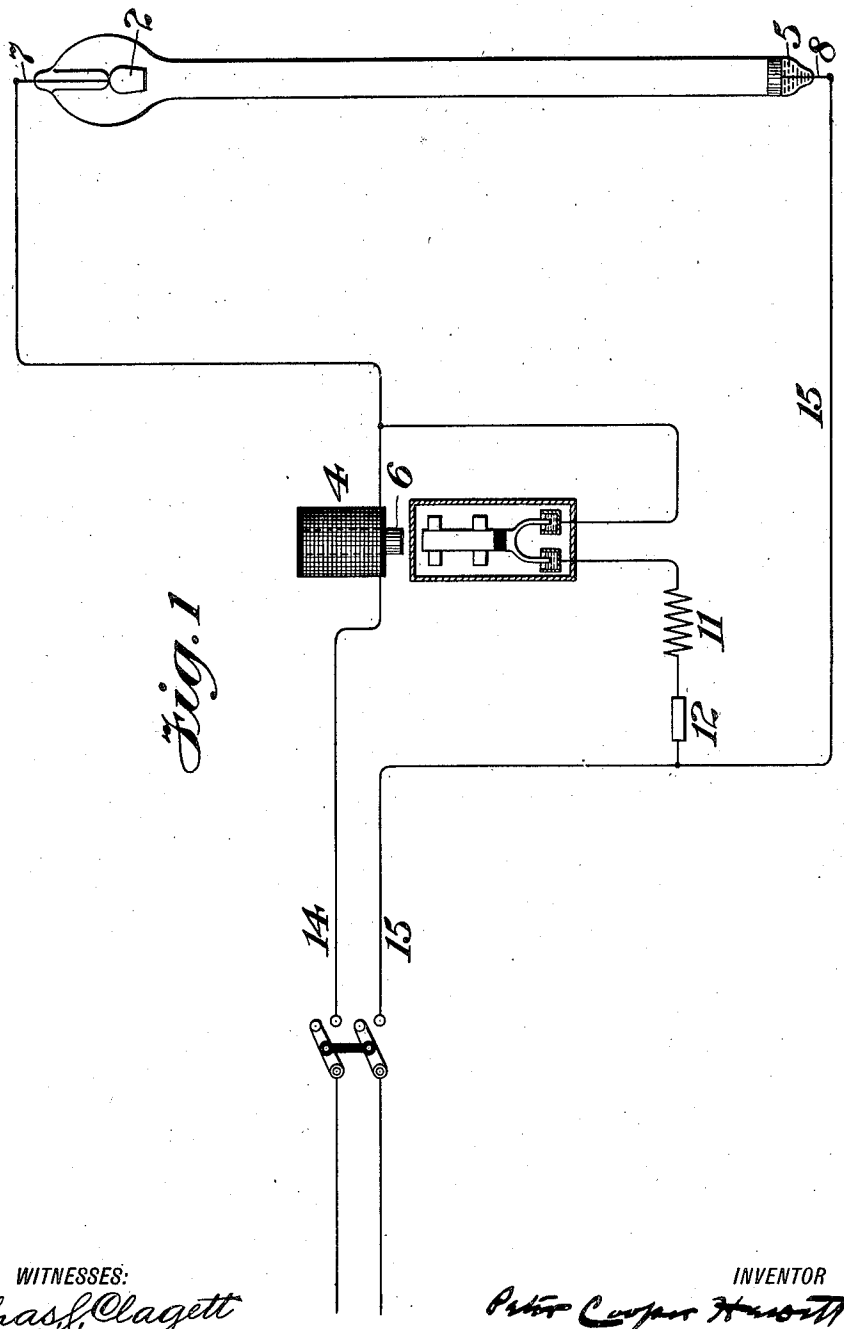

Fig. 1

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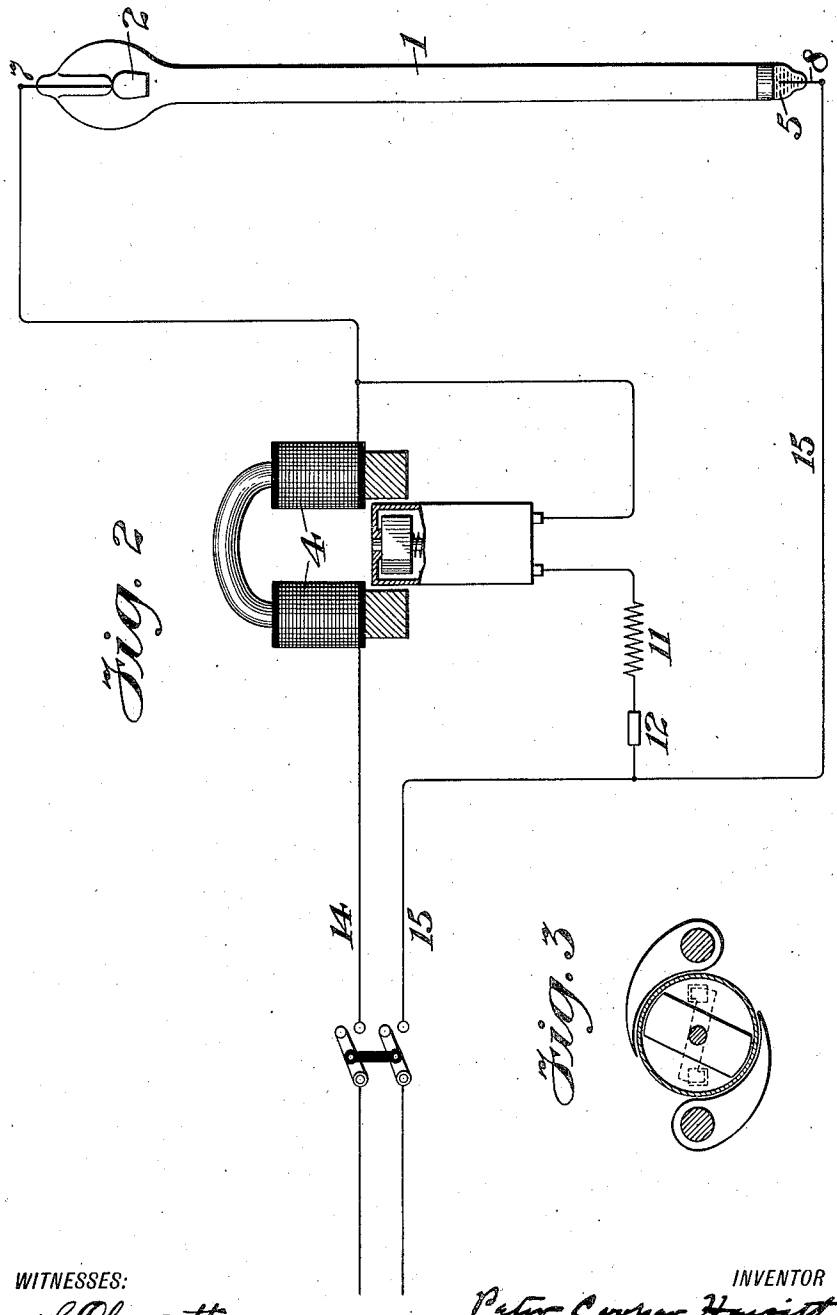

Fig. 2

Fig. 3

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UNITED STATES PATENT OFFICE.

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STARTING AND CONTROLLING DEVICE FOR ELECTRIC VAPOR APPARATUS.

1,110,548. Specification of Letters Patent. Patented Sept. 15, 1914.

Original application filed April 11, 1902, Serial No. 102,336. Divided and this application filed December 10, 1910. Serial No. 596,601.

To all whom it may concern:

Be it known that I, PETER COOPER HEWITT, a citizen of the United States, and resident of Ringwood Manor, county of Passaic, State of New Jersey, have invented certain new and useful Improvements in Starting and Controlling Devices for Electric Vapor Apparatus, of which the following is a specification.

This invention relates to improvements in starting and controlling apparatus for electric vapor lamps of the class described in certain United States patents issued to me on the 17th day of September, and the 3rd day of December, 1901. In operating lamps of this class, a convenient way of starting the lamp is by causing a quick or sudden electrical impulse to be impressed upon the lamp terminals, such impulse being of higher potential than that of the current with which the lamp is to be operated after starting. This initial or starting impulse may be caused by creating a quick break in the circuit of a reactance device in series with the lamp, the circuit thus broken forming, before the rupture, a short-circuit around the lamp. I have found that by causing a quick rupture of such a circuit between electrical contacts submerged in a non-conducting liquid such as oil, it is possible to produce a sufficient impulse for the purpose indicated without the use of large or cumbersome reactance coils and by very simple manipulations. In general, I have employed a main switch for closing the original short-circuit and an auxiliary snap switch for breaking the said circuit and producing the initial starting impulse, the contacts of the snap switch, or the entire switch being inclosed in oil within an oil-tight receptacle. The coils of the reactance device may remain in the lamp circuit and serve as a steadying-resistance for the lamp.

By my present invention, I provide a starting switch which is operated automatically when the main switch is turned on, the automatic switch being so arranged as to have the electrical contacts covered with oil as in the hand switch already described. I utilize the coils of the reactance device for bringing about this automatic action, by forming them into windings for a solenoid or an electro-magnet, the actuating part of which is located outside an oil-tight receptacle within which the actuated part, whether core or armature, is contained. Through the instrumentality of the core or armature, electrical contacts are actuated, generally through the medium of a quick-break electric switch. The actuating coils are arranged in series with the lamp, but between the coils and the lamp a short-circuit is provided, including the contacts operated by the coils and also when need be including a suitable resistance. If desired, the coils may be so adjusted that the duration of contact will be timed so as to have a predetermined perodicity for a given flow of current. Moreover, a time cut-out may conveniently be located preferably in the shunt circuit. As soon, therefore, as the actuating coils are energized sufficiently to separate the contacts, the short-circuit is broken and when this rupture takes place, an electrical impulse of higher potential passing through the lamp circuit causes the lamp to start. The described starting device may be combined with a conducting band or coating surrounding the lamp near the negative electrode and connected by a suitable conductor to the leading-in wire of the positive electrode or to the gound. Whether this is done or not, the reactance of the magnet or solenoid coils, when they are properly proportioned may be enough to generate the required starting impulse; and by virtue of the arrangement described, this action is automatic. After the lamp is started, the described short-circuit remains broken during the normal operation of the lamp, and the actuating reactance coils remain in series with the lamp, holding the contacts apart, and incidentally serving as a steadying-resistance for the lamp. Should the lamp circuit be broken or the lamp be extinguished for any reason, thereby interrupting the circuit of the actuating coils, the movable contacts of the switch will be released and re-engaged with the stationary contacts thereof, thus closing the original short-circuit and restoring the initial conditions of the circuit. A second separaton of contacts will then take place, which, if the lamp has simply gone out, may cause a renewed starting of the lamp, whereupon the lamp will continue to operate as before. If, however, the lamp

should be broken, or fail to relight, the switch actuating coils will be alternately energized and reënergized after the manner of a vibrating bell-magnet. The action of the time cut-out in the short-circuit then comes in to permanently disrupt the short-circuit when the alternate closing and opening thereof, as described, has continued for a predetermined length of time. The time cut-out may be any suitable form of cut-out for the purpose, such, for instance, as the well-known time fuse.

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

Figure 1 is a diagram of circuits and apparatus embodying my invention; Fig. 2 illustrates means whereby the actuating reactance coils may operate a snap or quick-break switch; and Fig. 3 is a detail view.

In the drawings, 1 represents an electric vapor lamp in which electrodes 2 and 5 are suitably connected by leading-in wires 7 and 8, respectively, to the external circuit represented by the wires 14 and 15. A switch 3, of any desired construction, controls the circuit of the wires 14 and 15. This is the main switch referred to in the foregoing part of the specification and is generally operated by hand. The wire 14 includes the coils 4 of an electro-magnet having an iron core, 6, adapted to act upon an armature, 71, in proximity thereto. The armature 71 supports movable contacts, 72, 72, which are so related to the stationary contact-points, 81, 81, of an electric switch that when the coil 4 is energized so as to attract the armature 71, the circuit is interrupted between the movable and the stationary contacts. The contacts referred to are included in a shunt or short-circuit starting from between the coil 4 and the lamp 1 and extending from the wire 14 to the wire 15 through a resistance 11 and a time cut-out 12. When the main switch 3 is turned on, the current from the line passes through the short-circuit which includes the coil 4, contact points 72, 72, and 81, 81, resistance 11, and time cut-out 12, the resistance of the lamp circuit being too high to be traversed by the current on the line before the lamp has once been started. By the passage of the current as described, the coil 4 is energized, magnetizing the core 6 and attracting in that way the armature 71. The armature is attracted and the short-circuit is broken. In Fig. 2, I illustrate the means whereby this rupture of the circuit is caused through the medium of a snap-switch so that a quick break is produced, causing a sudden reactance in the coil 4. This causes an electrical impulse of high potential to traverse the lamp circuit and results in the lighting up of the lamp. In Fig. 2, the coils 4 are wound upon a core of horse-shoe shape, the poles of the core being arranged outside a cylindrical casing, 16, containing oil. The shape of the poles is clearly shown in Fig. 3. Inside the casing the armature 71 is arranged, the same being mounted on a spindle, 17, and being normally held in the position illustrated in Fig. 3, by a spring 18. The spindle 17 is the actuating spindle of an ordinary snap switch, the details of which need not be fully illustrated. The principal point is that when the spindle is moved in one direction by the magnetization of the poles of the magnet 4, the circuit shall be broken by a quick movement; while on the rotation of the spindle in the opposite direction by the spring 18, the circuit shall be restored. This being the action of the apparatus, it follows that should the lamp 1 become broken, or be temporarily extinguished, the circuit between the points 72, 72, and 81, 81, which remains open during the normal operation of the lamp, will be restored but immediately broken again through the energization of the magnet 4. This may relight the lamp, but in case of a permanent derangement of the lamp, the armature 7 will vibrate back and forth owing to the operation of the magnet 4 and the spring 18 alternately affecting the contacts. When the armature has thus vibrated for a predetermined length of time, the cut-out 12 permanently breaks the short-circuit and the entire system remains out of operation until it is properly restored to its original condition.

This case is a division of my application Serial Number 102,336, filed April 11, 1902.

I claim as my invention:

1. The combination with an electrical translating device requiring an initial current of high potential and a reactance device in series therewith, of a shunt across the circuit between the translating device and the reactance device, an automatic switch adapted to cause a continuous succession of makes and breaks, and a time cut-out in the circuit of the reactance device.

2. The combination with an electric vapor lamp requiring an initial current of relatively high potential, a shunt around the said lamp, means for holding the shunt open when the lamp is in operation, and time cut-out for breaking the shunt circuit when it remains closed for a predetermined period.

3. The combination with a gas or vapor electric apparatus requiring an initial or starting current of relatively high potential, and a reactance device in series therewith, of a shunt across the circuit between the vapor apparatus and the reactance device, an oil circuit breaker or vibrator in said

shunt, and a time cut-out breaking the shunt circuit after the vibrator has operated a predetermined length of time, the said circuit breaker or vibrator and the said reactance device being placed in such relation to each other that the reactance device will actuate the said circuit breaker or vibrator whenever the vapor apparatus fails or ceases to operate.

4. In an electric system, an electric vapor lamp, a main switch controlling the circuit thereof, a reactance device in series with the lamp, a shunt across the circuit between the reactance device and the lamp, a switch in the shunt circuit controlled by the reactance device, a time cut-out controlling the shunt circuit, the switch and the reactance device being so combined that when the reactance device is energized the circuit of the switch will be broken, and when reactance device is deënergized, the switch circuit will be closed.

5. A vapor device comprising an exhausted container, electrodes in said container, included in the main operating circuit of the device, one of such electrodes being a vaporizable liquid electrode, automatic means for connecting the electrodes when no current flows in the device and automatic means for breaking the conductive connection between the said electrodes, said last named means including a magnet coil whereby said coil acts as an inductive resistance to the main circuit.

6. A vapor device comprising an exhausted container, electrodes in said container included in the main operating circuit of the device, one of such electrodes being a vaporizable liquid electrode, automatic means for connecting the electrodes when no current flows in the device and automatic means for breaking the conductive connection between the said electrodes including a reactance in series with said electrodes.

7. A mercury vapor device comprising an exhausted container for mercury, electrodes in said container included in the main operating circuit of the device, and electro-magnetic means operated by the main current adapted to make and break metallic connection between the electrodes and maintain the rupture of the said connection until the main current is interrupted.

Signed at New York, in the county of New York, and State of New York, this 7th day of December, A. D. 1910.

PETER COOPER HEWITT.

Witnesses:
WM H. CAPEL,
THOS. H. BROWN.