J. R. WARDEN & H. C. WARDEN, Jr.

AUTOMATICALLY EXTINGUISHING ELECTRIC LIGHTING SYSTEM.

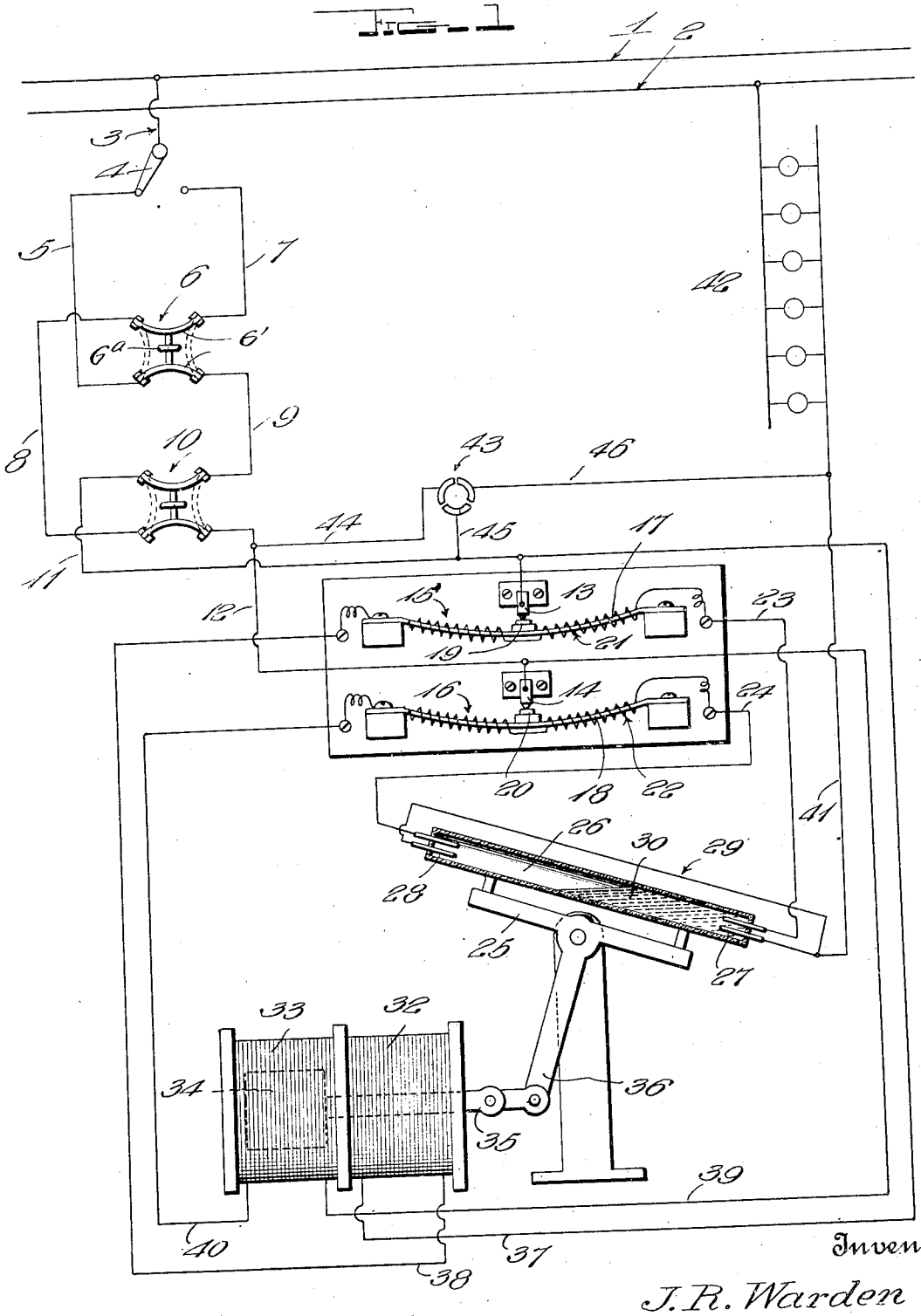
APPLICATION FILED JULY 23, 1917.

1,297,945.

Patented Mar. 18, 1919.

2 SHEETS—SHEET 1.

Fig. 1



Witness

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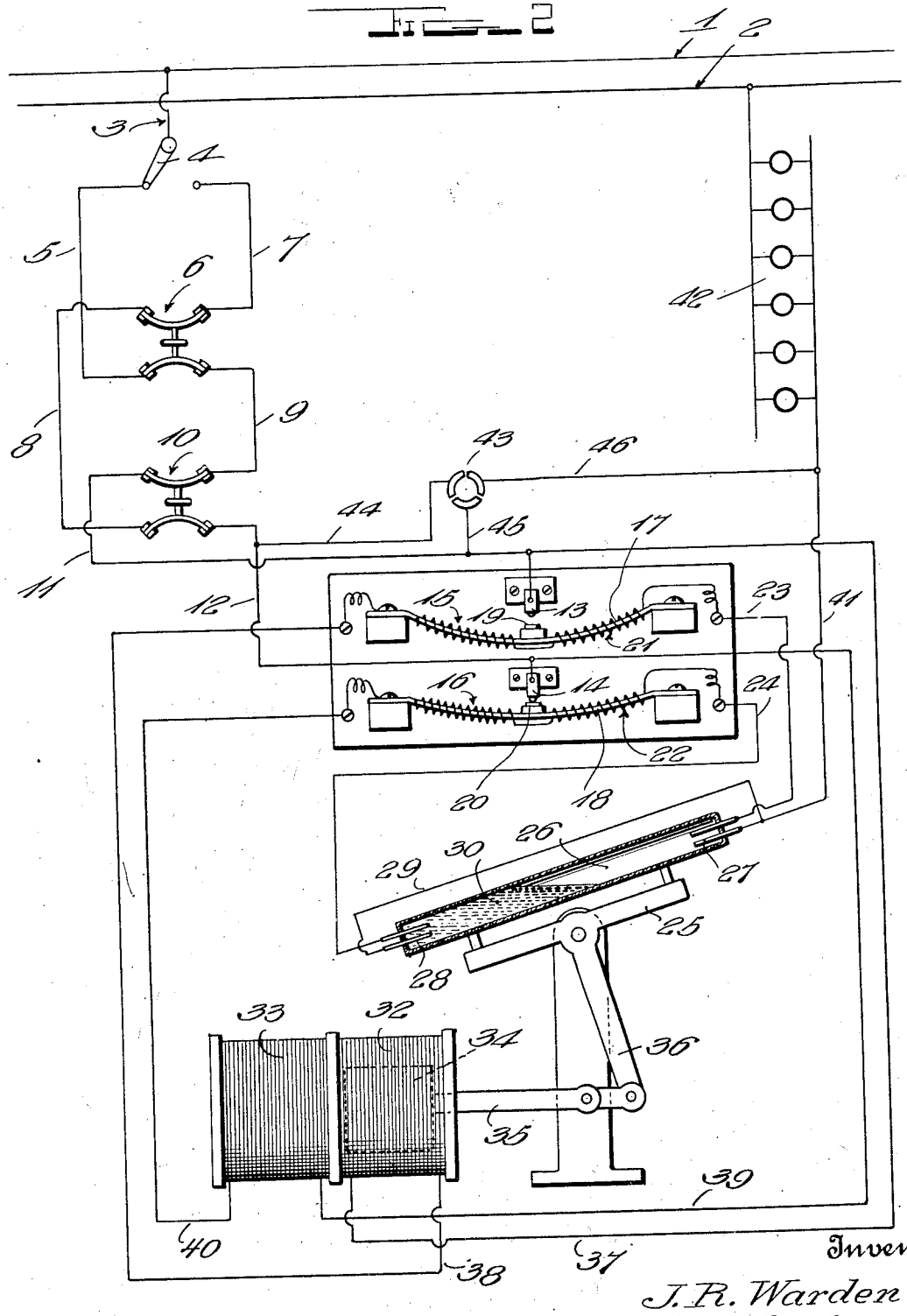
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2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

JOHN R. WARDEN AND HOWARD C. WARDEN, JR., OF PADUCAH, KENTUCKY.

AUTOMATICALLY-EXTINGUISHING ELECTRIC-LIGHTING SYSTEM.

1,297,945. Specification of Letters Patent. Patented Mar. 18, 1919.

Application filed July 23, 1917. Serial No. 182,329.

To all whom it may concern:

Be it known that we, JOHN R. WARDEN and HOWARD C. WARDEN, Jr., citizens of the United States, residing at Paducah, in the county of McCracken and State of Kentucky, have invented certain new and useful Improvements in Automatically-Extinguishing Electric-Lighting Systems; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric lighting systems, and especially to certain new and useful improvements in devices for automatically extinguishing electric lights included in a lighting system.

The primary object of the invention is to provide an electric lighting system with a circuit closing means which is automatically operable to break the circuit through the lamps a predetermined time after they are lighted.

Another object of the invention is to provide a system of this character which, after once being installed, requires no attention to keep it in working order, and in which the automatic switch may be short-circuited so as to not exert its influence upon the lighting circuit whenever its automatic control is undesirable.

A further object of the invention is to provide a new and efficient thermostatic relay for use in connection with a system of this character.

A still further object of the invention is to generally improve upon systems of this class by the provision of a comparatively simple and inexpensive arrangement of parts, and one which will be efficient and reliable in operation, and well adapted to the purpose for which it is designed.

With these and numerous other objects in view, the invention consists of certain novel features of construction and the combination and arrangement of parts as will be hereinafter fully described and claimed.

In the accompanying drawings in which similar reference characters are used to designate like parts throughout the several views:

Figure 1 is a diagrammatic view showing the various elements in operative position in a system of this character, the tilting table carrying the mercury tube switch being shown in one of its positions; and,

Fig. 2 is a similar view showing the tilting table in its other position, one of the thermostatic circuit breakers open, and the lights extinguished.

The arrangement of switches shown in these drawings is somewhat typical of a well-known arrangement whereby a lamp or lamps may be lighted by operation of any one of the several switches, for instance, where one of the switches is located on the first floor, a second one on the second floor, and a third one on the third floor.

Referring more particularly to the drawings, the numerals 1 and 2 represent a pair of mains or conductors which lead from a suitable source of electrical energy. Connected to the main 1 is a wire or conductor 3 which is connected to the pivotal point of a two-way three-point switch 4, one of the two other points of which is connected by a wire or conductor 5 to one of the points of a two-way four-point switch 6, an element 6′ of which is rotatable about a central pivotal point 6^a from the full line position to the dotted line position. The other points of the three point switch 4 is connected by a wire or conductor 7 to a second point of the four-point switch 6, the other two points of the latter being connected by wires or conductors 8 and 9 to corresponding points of a second two-way four-point switch 10 which is similar in all respects to the switch 6 and is rotatable about its central pivot from the full line position to its dotted line position. The remaining points of the four-point switch 10 are connected by wires or conductors 11 and 12 to stationary contact points 13 and 14 respectively. The purpose of these contact points will be hereinafter more fully explained.

The reference numerals 15 and 16 represent thermostatic circuit breakers or relay elements which may be of any convenient construction adapted for the purpose, but which consist preferably of slightly bowed metallic strips or straps 17 and 18 having their ends rigidly secured to suitable supports in any suitable manner. Fixed to the intermediate portions of these straps 17 and 18 are contact elements 19 and 20, which are adapted to be electrically connected to the stationary contacts 13 and 14 respectively when the straps are in their uppermost or retracted positions. Wound around the straps 17 and 18 are coils 21 and 22 of insulated wire. Each of these coils 21 and 22 has one of its ends grounded to one end of

the corresponding one of the straps 17 and 18 while their other ends are connected to wires or conductors 23 and 24 respectively. By this construction it will be seen that when the contacts 13 and 14 touch the contact elements 19 and 20, the electric current will pass through the straps to the grounded ends of the coils 21 and 22 and through these coils to the wires 23 and 24.

Pivoted in any suitable manner upon any convenient form of support or bracket is a tilting table or movable support 25 having attached thereto a closed vessel or tube 26, into the ends of which are sealed pairs of spaced contacts 27 and 28. One of the contacts 27 is electrically connected to a light-branch conductor 41 hereinafter mentioned, and one of the contacts 28 is connected to said light-branch conductor by a suitable conductor 29, but it is to be understood that any appropriate means for electrically connecting these conductors may be employed. The other contact 27 is connected to the wire 23, and the other contact 28 is connected to the wire 24. Disposed within the vessel or tube 26 is mercury 30, which alternately electrically connects the contacts of the pair 27 and the contacts of the pair 28, depending of course upon the inclined position which the tilting table 25 and consequently the vessel or tube 26 is in.

The reference numeral 31 designates as a whole a tandem electric magnet or a pair of axially alined solenoids, having two independent coils 32 and 33, and having a core 34 movable axially therein. As shown, the core 34 is of substantially the same length as each of the coils 32 and 33 so that when they are alternatively energized, the core will be drawn from a position in one of them to a similar position in the other. The core has a stem 35 projecting from one end thereof, and this stem is connected to a suitable arrangement of mechanical parts 36 for operating the tilting table 25.

One of the terminals of the coil 32 is connected by a conductor 37 to the wire 11 adjacent the contact 13, while the other terminal of this coil is connected by a wire 38 to one end of the strap 17. The terminals of the coil 33 are connected by conductors 39 and 40 to similar parts of the thermostatic switch 16.

The light branch conductor 41 has arranged therein, in any suitable manner, a light or a plurality of lights or lamps 42, and is connected to the above mentioned main 2.

43 designates a socket adapted to receive a plug for short-circuiting the thermostatic circuit breakers 15 and 16, the mercury tube switch, and the tandem magnet 31. The three parts of this socket 43 are connected by wires 44, 45 and 46 to the wires 12, 11 and 41 respectively at the places as shown in the drawings.

In Fig. 1 of the drawings, the lamps 42 are illustrated as being lighted, the current for lighting them passing from the main 1, through wire 3, three-point switch 4, wire 5, four-point switch 6, wire 9, four-point switch 10, to the wire 11. From this conductor wire 11 the current passes to the fixed or stationary contact 13, and since this is now in circuit with the contact 19, the current passes through strap 17 to the grounded end of the coil 21, thence through the coil 21 to the wire 23 and thence to one of the contacts 27. The tilting table 25 and consequently the tube 26 being tilted so that the mercury 30 is disposed in the end of the tube adjacent to the contacts 27, the current will pass through the mercury from one of these contacts to the other, and thence through conductor 41 (having the lamps 42 therein) to the main 2.

After the current has been flowing for a while through the circuit as just outlined, the electrical resistance of the coil 21 will cause the same to become heated and this heat will be transmitted to the strap 17 and cause the latter to expand or lengthen and consequently become more bowed so that its contact 19 is moved out of circuit with the stationary contact 13. The current, being thus shunted, will then pass through the conductor 37, the magnet coil 32, the conductor 38, the coil 21, the conductor 23, contacts 27, and conductor 41 to the main 2. The magnet coil 32 will be thus energized so as to draw the core 34 into the same, it being of course understood that the core 34 was disposed in the coil 33. Obviously by such a movement of the parts the tilting table 25 will be swung to its other inclined position, as shown in Fig. 2, causing the mercury to flow or fall to the other end of the tube 26, and electrically connecting the contacts 28. Since the current can no longer pass between the contacts 27, the lamps 42 are extinguished.

However, the tilting table 25 and the mercury tube 26 is now in such position that when any one of the switches 4, 6 and 10 is operated or moved to its other or dotted line position, the lamps 42 will be lighted, the current passing through the switches 4, 6, and 10, the conductors with which they are in closed circuit, wire 12, fixed contact 14, contact 20, a portion of the strap 18, coil 22, wire 24, contacts 28, wire 29, and conductor 41, including the lamps 42, to the main 2. When the strap 18 becomes heated and expands so as to cause the contacts 14 and 20 to become disengaged, the current will flow through the wire 39, the magnet coil 33, wire 40, the coil 22, the wire 24, contacts 28, wire 29, to wire 41 and through the same to the main 2. The magnet coil 33 being thus engaged will draw the coil 34 back into the same so as to swing the table from the position shown in Fig. 2 to the position shown in Fig. 1. It must be seen no matter which of

the switches 4, 6 and 10 is operated, after a predetermined length of time, the circuit through the lights 42 will be opened to extinguish the same.

It is to be understood that various instruments which are included in the system may be arranged compactly in a suitable wall box, but they need not necessarily be so arranged. Should it be desired to completely throw the automatic thermostatic switch out of operation, then a plug should be inserted in the socket 43, and the current would flow through the wires 46 and either 44 or 45 depending upon the positions of the switches 4, 6 and 10.

From the foregoing description, taken in connection with the drawing, the construction, use and operation of the device will be readily understood without a more extended explanation. It will be seen that the objects of the invention have been effectively carried out as a means for automatically extinguishing the lamps arranged in the electric lighting system, has been provided.

The tilting table and parts associated therewith comprise in reality a two-way three-point switch, and since other types of devices of this character may be employed, it is termed such in the claims with the understanding that we are to have the benefit of the doctrine of equivalents thereby.

We claim:—

1. The combination of a double-throw switch, a thermatic relay, a three-point switch, a plurality of conductors in circuit with said double-throw switch and thermatic relay and three-point switch, main conductors one of which is in circuit with said double-throw switch, a branch conductor including a medium of work and being in circuit with another one of said main conductors and in circuit with the said plurality of conductors, a pair of shunt conductors in circuit with said thermatic relay and the first said conductors, and means operable by the current on said shunt conductors and controllable by said thermatic relay for shifting said three-point switch alternately from point to point within a predetermined time after the said double-throw switch has been shifted.

2. The combination of a double-throw switch, a thermatic relay, a three-point switch, a plurality of conductors in circuit with said double-throw switch and thermatic relay and three-point switch, main conductors one of which is in circuit with said double-throw switch, a branch conductor including a medium of work and being in circuit with another one of said main conductors and in circuit with the said plurality of conductors, a pair of shunt conductors each including a magnet and being in circuit with the first said conductors and the said thermatic relay, and means operable by one of said magnets for shifting said three-point switch in one direction, said means being operable by the other of said magnets for shifting said three-point switch in the opposite direction, said magnets being controllable by said thermatic relay so as to effect an alternate energizing of the magnets.

3. In an electric lighting system, a plurality of main conductors, a double-throw switch in circuit with one of said main conductors, a thermatic relay, a three-point switch, a branch conductor including lamps and being in circuit with another of said main conductors, intermediate conductors in circuit with said double-throw switch and relay and three-point switch and branch conductors, a pair of shunt conductors in circuit with said intermediate conductors and thermatic relay, and means operable by said shunt conductors for shifting said three-point switch alternately from one to the other of its points, said means being controllable by said thermatic relay, the latter being controllable by said double-throw switch so as to alternately increase the energy of said shunt conductors.

4. In an electric current controlling system, a pair of electric conductors, a double-throw switch connected with said pair of conductors so as to switch the current from one to the other of said conductors, a second pair of conductors, a pair of thermostatic circuit breakers each operable to connect a conductor of the first said pair with a conductor of said second pair, a third pair of conductors, a branch conductor including a source of work to be accomplished, said third pair of conductors being in circuit with said branch conductor, a three-way switch operable to electrically connect one of the second said conductors with one of the third said conductors and to afterward connect the other one of the second said conductors with the other one of the third said conductors, a pair of shunt conductors each including an electro-magnet, each of said shunt conductors being electrically connected to one of the first said conductors and to one of said thermostatic circuit breakers, and means coöperative with said electro-magnets for operating said three-way switch.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

JOHN R. WARDEN.
HOWARD C. WARDEN, Jr.

Witnesses:
Gertrude E. Warden,
Reva Warden.