R. M. PALMER.

CLOSED SYSTEM OF ELECTRICAL DISTRIBUTION.

APPLICATION FILED MAR. 1, 1909.

972,468.

Patented Oct. 11, 1910.

3 SHEETS—SHEET 1.

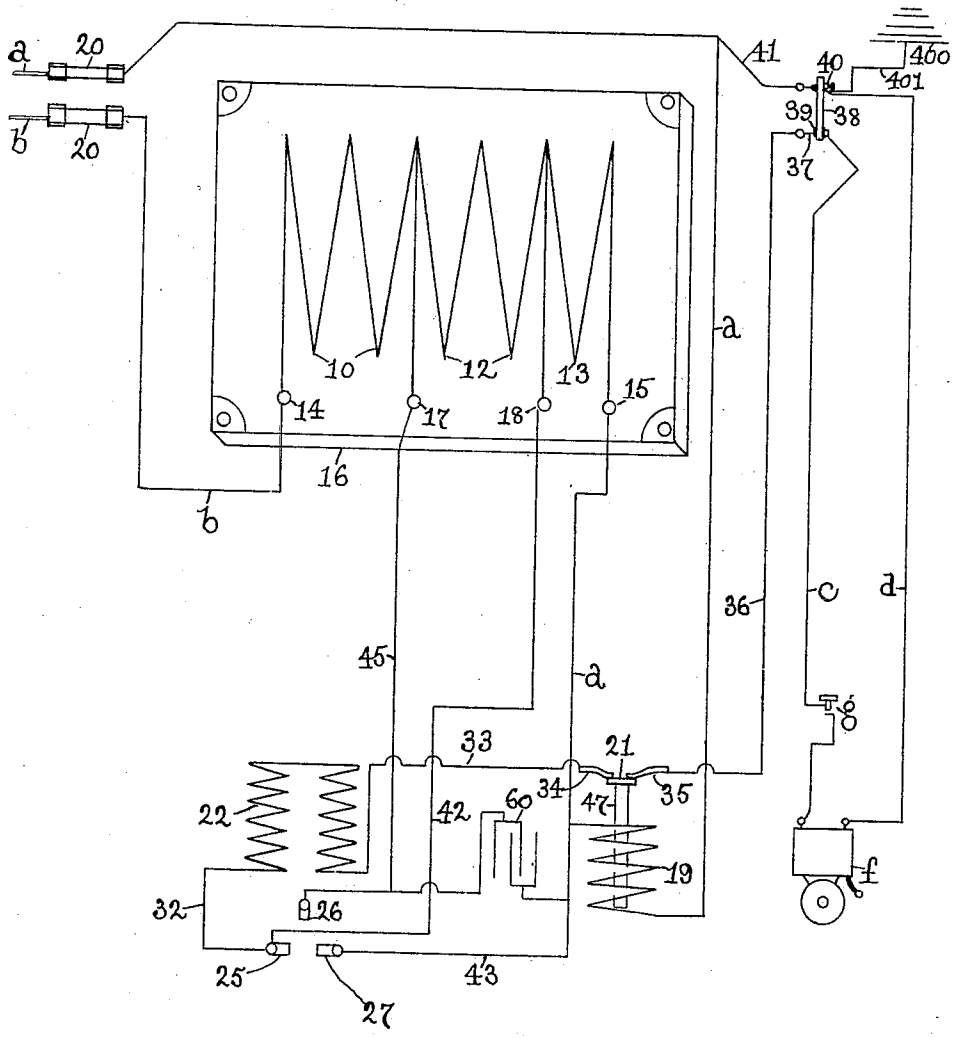

Fig. 1.

Witnesses.
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J. Murphy

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by Jas. H. Schmehill
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3 SHEETS—SHEET 2.

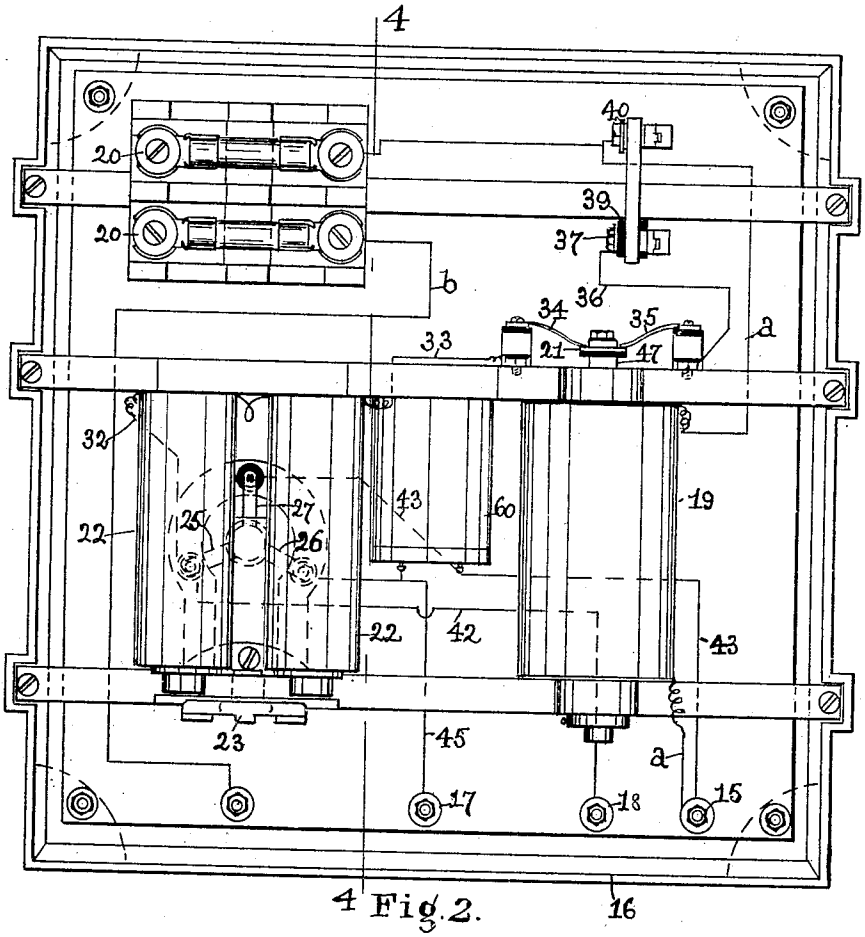

Fig. 2.

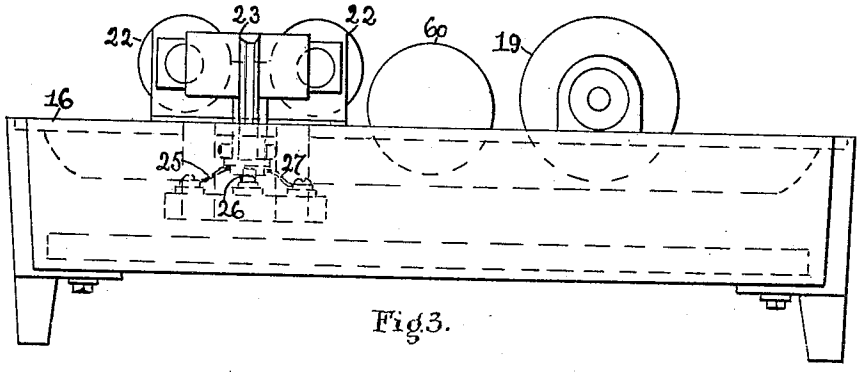

Fig. 3.

Witnesses.
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3 SHEETS—SHEET 3.

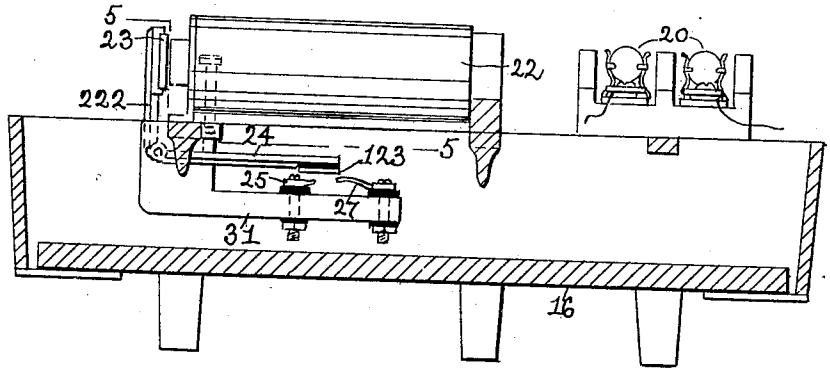

Fig. 4.

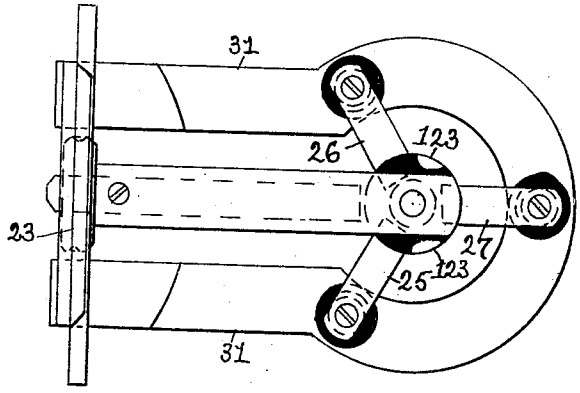

Fig. 5.

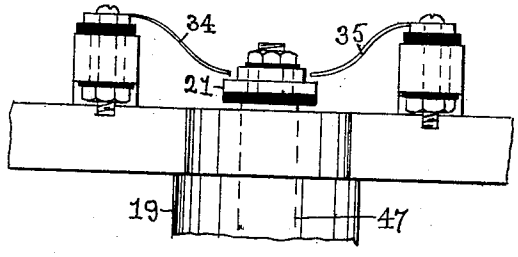

Fig. 6.

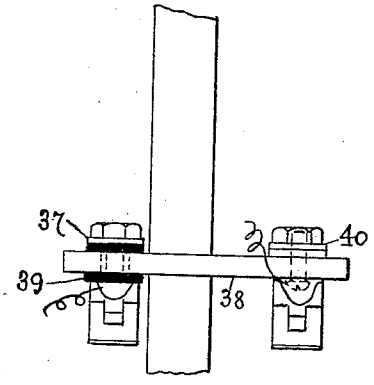

Fig. 7.

Witnesses.
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J. Murphy

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Roderick M. Palmer
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UNITED STATES PATENT OFFICE.

RODERICK M. PALMER, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO GEORGE O. G. COALE, TRUSTEE, OF CAMBRIDGE, MASSACHUSETTS.

CLOSED SYSTEM OF ELECTRICAL DISTRIBUTION.

972,468. Specification of Letters Patent. **Patented Oct. 11, 1910.**

Application filed March 1, 1909. Serial No. 480,643.

To all whom it may concern:

Be it known that I, RODERICK M. PALMER, a citizen of the United States, residing in Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Closed Systems of Electrical Distribution, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a system of electrical distribution in which a current of relatively high voltage may be used with safety with translating devices operated by a current of relatively low voltage, and is an improvement upon the system shown and described in U. S. Patent No. 807,960 granted to me December 19, 1905.

The present invention has for its object to provide a system of the class described, in which the high voltage circuit, such as an incandescent lamp circuit carrying a current of 110 volts is normally closed, and the low voltage circuit is normally open, and yet the amperage of the current flowing over the closed circuit is reduced to a minimum and is practically nothing so as to avoid waste of current. Provision is also made whereby on the closing of the low voltage circuit, the voltage of the current flowing over the said circuit is maintained low while the amperage may be varied to suit the particular work to be performed.

The system is especially adapted among other uses for ringing bells in a building and thereby dispensing with the ordinary batteries.

By the present system, the high voltage circuit wires may practically terminate in the basement of the building at a switchboard located therein, and only the low voltage circuit or circuits extended throughout the building, whereby the danger of fire from the use of the high voltage current in the building is avoided.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a diagrammatic view of a system of electrical distribution embodying this invention. Fig. 2, a front elevation of the switch-board employed in the system shown in Fig. 1. Fig. 3, an end elevation of the board shown in Fig. 2. Fig. 4, a section on the line 4—4, Fig. 2, and Figs. 5, 6 and 7, details to be referred to.

Referring to the drawings and more particularly to Fig. 1, *a*, *b* represent the line wires of a relatively high voltage circuit, such for instance as an incandescent lamp circuit having a current of 110 volts. *c* and *d* represent lines of a relatively low voltage circuit which include a translating device, herein shown as a bell *f*, which is designed to be operated by a current of low voltage, say for instance 10 volts, and a normally open circuit controller, such as an ordinary push button *g*, which will be hereinafter referred to as the service switch.

The present invention has for its object to provide for maintaining the high voltage circuit closed, and for reducing the voltage and amperage of the high voltage current, so that when the low voltage circuit is closed, a current of low voltage and low amperage flows over the same initially, and then the amperage is varied to suit the requirements of the low voltage circuit. For this purpose, I employ a series of resistances and a governing means as will be described, the said resistances and governing means being preferably mounted upon or connected with a support which may be designated the switchboard, which is designed to be located in the basement of the building in which the system is employed.

For convenience the high voltage circuit will hereinafter at times be referred to as the primary circuit and the low voltage circuit as the secondary circuit.

In the present instance I have shown the system as including three resistances 10, 12 and 13 which are connected in series between two terminals or binding posts 14, 15 on the switchboard 16 which is also provided as shown with additional binding posts 17, 18 to which resistances 10, 12 are respectively connected. The binding post 14 has connected with it the line wire *b* of the high voltage circuit, the other line wire *a*, which includes an electro-magnet or solenoid 19, also forming a resistance. The line wires *a*, *b* may be provided with fuses 20 of any suitable or usual construction. It will accordingly be seen that the high voltage or primary circuit is closed at all times. The circuit may be traced as follows:—by wire *b* to binding post 14, thence through

the resistances 10, 12, 13 in series to the binding post 15, thence over the other line wire *a* through the solenoid 19.

Attached to the terminal 18 of the resistance 12 is a wire 42 which runs to a contact arm or terminal 25 of a three point switch, to which reference will hereinafter be made. From the terminal 25 there extends a wire 32 connecting with an electro-magnetic device or relay 22 having an armature 23 which connects by a wire 33 with a terminal 34. The terminal 34 connects with the terminal 35 by a circuit breaker 21 normally held closed by an armature 47 governed by the solenoid 19. Connecting with the terminal 35 is a wire 36 which connects with a binding post 37 carried by a supporting bar 38 and separated from said bar by insulation 39. The binding post 37 has also secured to it the wire *c* of the secondary circuit, the other wire *d* of which is connected with a binding post 40 carried by the bar 38 and which is connected by wire 41 with the wire *a* of the primary circuit. The binding post 40 may be connected with the ground 400 by wire 401 to adapt the system to a grounded three wire high voltage system. It will accordingly be seen that the secondary circuit is a normally closed circuit except at the point of the service switch *g*. This circuit may be traced as follows:—line wire *b* to binding post 14, thence by resistances 10, 12 to binding post 18, thence by wire 42 to terminal 25, wire 32, electro-magnetic device 22, wire 33, terminals 34, 35 and connected circuit breaker 21, wire 36 to binding post 37, thence by wire *c*, switch *g*, bell *f*, wire *d*, binding post 40 and wire 41 to line wire *a*.

Connecting with the terminal 17 of resistance 10 is a wire 45 which connects with a terminal 26. Adjacent the terminal 26 but normally separated therefrom is a terminal 27, the three terminals 25, 26 and 27 forming the three contact arms or terminals of a three point switch. From the terminal 27 there extends a wire 43 which connects with the line wire *a* of the primary circuit at a point back of the solenoid 19 and preferably between it and the binding post 15.

The circuit just referred to is what may be termed and will hereinafter be referred to as the auxiliary circuit and it is a normally open circuit, being normally open at the points between the terminals 26 and 27. The circuit may be traced as follows:—from the line wire *b* and binding post 14 through the resistance 10 to binding post 17, thence by wire 45 to terminal 26, thence to terminal 27, when these two terminals are closed, and by way of wire 43 to the point on the line wire *a* above noted.

As already stated, the terminals 25, 26 and 27 form contact arms or terminals of a three point switch and when the circuit is closed through the terminals 26 and 27 it is also closed through the terminals 26 and 25 with the effect that the current entering the auxiliary circuit will divide and a portion thereof be shunted to pass over the secondary circuit by way of the terminal 25, as will hereinafter be explained more fully in describing the operation of the machine.

For closing the circuits between the terminals 25, 26 and 26, 27, there is employed a bent lever 222 to one arm of which is attached the armature 23 of the electro-magnetic device or relay 22 contained in the secondary circuit. The other arm of the lever 24 carries a contact member or disk 123 which coöperates with the three contact arms or terminals 25, 26 and 27 as the lever is turned. The terminals or arms 25, 26 and 27 are insulated from their supporting frame 31 and the disk 123 is insulated from the lever arm 24 so that when the disk 123 is moved into a position, by the operation of the bent lever, to contact with the three contact arms or terminals 25, 26 and 27 the circuit will accordingly be closed between the respective terminals 25, 26 and 26, 27 by means of the contact member or disk. In connection with the terminal 26 attention is directed to the fact that, as shown, the terminal is preferably connected with the wire 43 through a condenser 60 which serves to reduce to a minimum sparking at the three point switch when the latter is open.

In the normal condition of the apparatus the service switch *g* in the secondary circuit is open. The circuit breaker 21 is closed and the three point switch controlled by the electro-magnetic device 22 in the secondary circuit is open. Under these circumstances the operation of the machine is as follows:—It will first be evident that under normal conditions the high voltage circuit being closed through the resistances 10, 12 and 13 and the solenoid 19, the amperage of the high voltage circuit will accordingly be reduced to a very low point by reason of such resistance, as for example, to an amperage of 2/10 of an ampere, depending of course upon the amount of resistance. It will now be assumed that the service switch *g* is closed closing the secondary circuit. To understand what follows it should first be observed that the secondary circuit, connecting as it does with the primary circuit or resistance therein at the point of the terminal 18 and also with the primary circuit beyond the point of the resistances therein, accordingly bridges the primary circuit and resistance therein in such manner that the resistance 13 and solenoid 19 are cut out from the secondary circuit with the effect that a current of relatively low voltage and low amperage (depending upon the amount of resistance exerted by resistances 13 and

19) will be shunted off and directed to pass over the secondary circuit when this circuit is closed by the closing of the service switch *g*. Now while the voltage of current thus initially directed to pass over the secondary circuit may be a proper one yet the amperage of this initial current may be too low for operating the bell *f* or other translating device in the secondary circuit. In fact the initial current passing from the secondary is merely for the purpose of operating the electro-magnetic device 22 contained in the secondary and armature thereof to operate the bent lever 222 and bring its contact member 123 into coöperation with the contact terminals 25, 26 and 27 of the three point switch. The closing of this switch acts to bring into the secondary circuit a current of proper voltage and amperage for operating the bell *f* or other translating device in the secondary circuit from the current introduced to pass over the auxiliary circuit. This circuit connecting as it does with the terminal 17 to the resistance 10 of the primary circuit and also with the primary circuit at a point back of the solenoid 19 so bridges the resistance in the primary circuit that the resistances 12 and 13 therein are cut out when accordingly a current is taken off the primary circuit and directed to pass over the auxiliary circuit of higher voltage and higher amperage than the current initially passing over the secondary circuit. When the current passing over the auxiliary circuit reaches the three point switch, this switch being now closed, the current divides and a portion of the current of proper amperage and voltage for operating the bell or other translating device in the secondary circuit, is shunted off by way of the terminal 25 into the secondary circuit, the remainder of the current passing by way of the terminal 27, wire 43 and solenoid 19 to the line wire *a* of the primary circuit.

The circuit breaker 21 actuated by the solenoid 19 serves to safeguard the low voltage circuit and prevents a current of higher voltage than that desired flowing over the secondary circuit, in case of any possible break-down or damage t othe resistances 12, 13 or to the solenoid 19, for as soon as the circuit of the solenoid 19 becomes open for any reason, then the circuit breaker 21 is moved by gravity or otherwise to its open position, and when the circuit of the solenoid is restored to its normal or closed condition, the circuit breaker 21 is automatically closed and the secondary circuit restored to its normal condition.

Claims.

1. In a system of electrical distribution, the combination of a primary closed high voltage circuit having a resistance therein, a secondary circuit connected with a portion of the resistance in said primary circuit where a current of low amperage will initially be supplied to said secondary circuit when closed, and means for automatically connecting said secondary circuit upon the closing thereof with another portion of said resistance to vary the amperage of current supplied to said secondary circuit.

2. In a system of electrical distribution, the combination of a primary closed high voltage circuit having a resistance therein, a secondary circuit connected with a portion of the resistance in the high voltage circuit for initially supplying to the secondary circuit a current of low amperage when said secondary circuit is closed, and means whereby a current having a higher amperage than that of the current initially supplied to said secondary circuit may automatically be supplied thereto from said primary circuit upon closing said secondary circuit.

3. In a system of electrical distribution the combination of a primary closed high voltage circuit having a resistance therein, a secondary circuit connected with a portion of the resistance in the high voltage circuit for initially supplying to the secondary circuit a current of low amperage when said secondary circuit is closed, a normally open auxiliary circuit connecting with a portion of the resistance in said primary circuit where there will be supplied to said auxiliary circuit when closed a current of higher amperage than that initially supplied to said secondary circuit, and means whereby upon the closing of said secondary circuit said means may be actuated to close said auxiliary circuit and connect the same with said secondary circuit and a portion of the current passing over said auxiliary circuit be shunted off to pass through said secondary circuit.

4. In a system of electrical distribution, the combination of a primary closed high voltage circuit having a resistance therein, a secondary circuit connecting with a portion of the resistance in said primary circuit where a current of low amperage will initially be supplied to said secondary circuit when closed, an electro-magnetic device in said secondary circuit energized by the current passing therethrough when said circuit is closed, a normally open auxiliary circuit connected with a portion of the resistance in said primary circuit where there will be supplied to said auxiliary circuit a current of higher amperage than initially supplied to said secondary circuit, and means actuated by said electro-magnetic device for closing said auxiliary circuit and for connecting the same with said secondary circuit whereby a portion of the current entering said auxiliary circuit may be shunted off to pass through said secondary circuit.

5. In a system of electrical distribution, a primary closed high voltage circuit having a

resistance therein, a normally open secondary circuit bridging said primary circuit from a point of resistance therein from which a current of low amperage will pass through said secondary circuit when closed, means for closing said secondary circuit, a normally open auxiliary circuit bridging said primary circuit from a point of resistance therein from which a current of higher amperage will pass than the amperage of current normally supplied to said secondary circuit when closed, and means whereby said auxiliary circuit may automatically become closed and connected with said secondary circuit upon the closing of said secondary circuit and a portion of the current supplied to said auxiliary circuit be shunted off to pass through said secondary circuit.

6. In a system of electrical distribution, a primary closed high voltage circuit having a resistance therein, a normally open secondary circuit bridging said primary circuit from a point of resistance therein where a current of low amperage will pass through said secondary circuit when closed, means for closing said secondary circuit, a normally open auxiliary circuit bridging said primary circuit from a point of resistance therein from which a current of higher amperage than the amperage of current normally supplied to said secondary circuit when closed, and means operated by the current initially supplied to said secondary circuit when closed will pass and operating to close said auxiliary circuit and connect the same also with said secondary circuit.

7. In a system of electrical distribution, a primary closed high voltage circuit having a resistance therein, a normally open secondary circuit having an electro-magnetic device therein, said secondary circuit bridging said primary circuit from the point of the resistance therein where a current of relatively low amperage will be supplied to said secondary circuit for energizing the electro-magnetic device therein when said secondary circuit is closed, means for closing said secondary circuit, a normally open auxiliary circuit bridging said primary circuit from a point of resistance therein from which a current of higher amperage than the amperage of current initially supplied to said secondary circuit when closed will pass, and means operated by said electro-magnetic device for closing said auxiliary circuit and connecting the same with said secondary circuit.

8. In a system of electrical distribution, a primary closed high voltage circuit having a resistance therein, a normally open secondary circuit having an electro-magnetic device therein, said secondary circuit bridging said primary circuit from a point of resistance therein from which a current of relatively low amperage will be supplied to said secondary circuit for energizing the electro-magnetic device therein when said secondary circuit is closed, a normally open auxiliary circuit bridging the resistance in said primary circuit from a point in said resistance from which a current of higher amperage than the current initially supplied to said secondary circuit when closed will pass, and a switch operated by said electro-magnetic device operating to close said auxiliary circuit and connect the same with said secondary circuit whereby a portion of the current supplied to said auxiliary circuit may be shunted off to pass over said secondary circuit.

9. In a system of electrical distribution, a primary closed high voltage circuit having a resistance therein, a portion of said resistance forming an electro-magnetic device, a normally open secondary circuit bridging said primary circuit from a point of resistance therein where a current of low amperage will initially be supplied to said secondary circuit when closed, said secondary circuit having therein a circuit breaker normally held closed by the electro-magnetic device in said primary circuit, said secondary circuit having also therein an electro-magnetic device, means for closing said secondary circuit, a normally open auxiliary circuit bridging the resistance in said primary circuit back of the electro-magnetic device therein and from a point where there will be supplied to said auxiliary circuit a current of higher amperage than initially supplied to said secondary circuit, and means automatically operated by said electro-magnetic device in said secondary circuit upon the closing of said secondary circuit and operating to close said auxiliary circuit and connect the same with said secondary circuit.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

RODERICK M. PALMER.

Witnesses:

CHARLES H. GASSETT,

MARSHAL CUTTING.