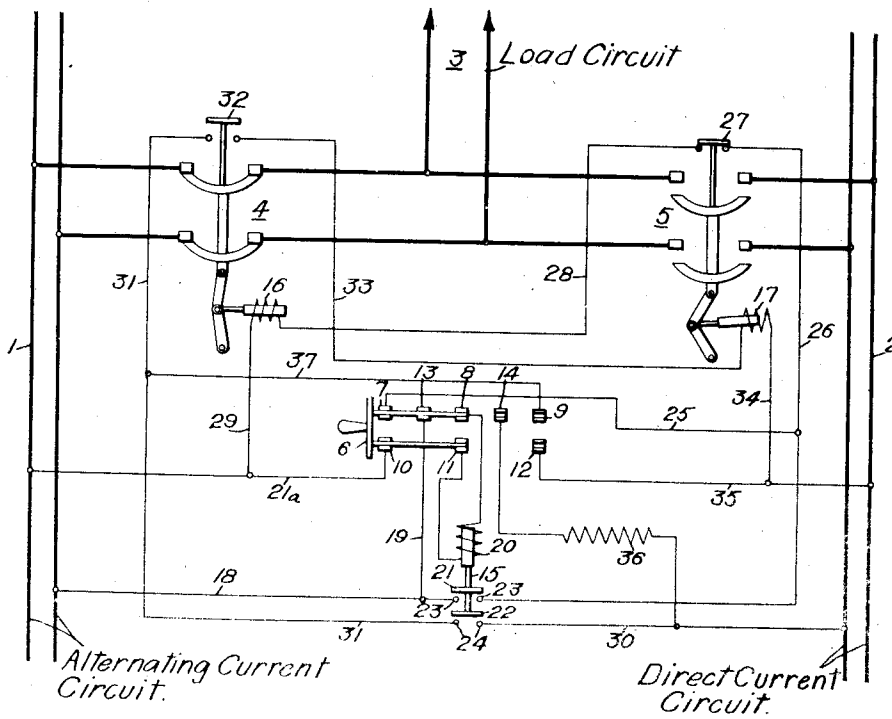


E. PUXON.
CHANGE OVER SWITCH.
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WITNESSES:

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CHANGE-OVER SWITCH.

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To all whom it may concern:

Be it known that I, EDGAR PUXON, a subject of the King of Great Britain, and a resident of Hamilton, in the Province of Ontario, Canada, have invented a new and useful Improvement in Change-Over Switches, of which the following is a specification.

My invention relates to electrical switching systems and particularly to systems wherein load and supply circuits are provided with automatically-connected auxiliary or emergency sources of supply.

The object of my invention is to provide a system of the above indicated character in which either of the circuits, ordinarily known as main and auxiliary supply circuits, may be utilized as the chief sources of supply and the other be automatically substituted and the original connection re-established, under predetermined conditions.

Heretofore, it has been usual, in systems of this kind, to provide electrically-actuated drop-out switches or other means for transferring a load to an emergency circuit upon the failure of the main supply circuit. These systems have usually comprised a main-supply or feeder circuit and a battery or other auxiliary circuit which was effective only as an emergency circuit, thereby offering no other alternative than the employment of the one main supply circuit for the load.

In practicing my invention, I provide means whereby either of two main feeder circuits, such as an alternating-current circuit and a direct-current circuit, may be utilized as the principal source of supply and the other as the emergency circuit. All of the circuits are so correlated as to permit the load, by the simple throwing of a single switch, to be connected to either supply circuit, and thereafter, to be automatically transferred to the other supply circuit, in case of the failure of the first circuit selected.

Upon the re-energization of the first selected supply circuit the load is again connected thereto.

The single figure of the accompanying drawing is a diagrammatic view of an electrical system embodying my invention.

Supply circuits 1 and 2, which may be

of any character but which will be here designated as alternating and direct-current circuits, respectively, are connected to a load circuit 3 through electrically-actuated switches 4 and 5, respectively.

A double-throw double-pole switch 6, having usual contact members 7, 8, 9, 10, 11 and 12 and auxiliary contact members 13 and 14, is connected, in either position, to a relay 15 and, in conjunction with other conductors, which will be designated in the hereinafter description of the operation of the system, controls holding coils 16 and 17 of the switches 4 and 5, respectively.

In the position of the switch 6, shown in the drawings, current flows from the circuit 1, through a conductor 18, a conductor 19, the auxiliary contact member 13, the contact member 8, a coil 20 of the relay 15, the contact members 11 and 10 and a conductor 21, back to the opposite side of the circuit 1, thereby energizing the coil 20 and maintaining movable bridging contact members 21 and 22 of the relay 15 out of contact with stationary contact members 23 and 24, respectively. At the same time, the current also flows from the circuit 1 through the conductors 18 and 19, the auxiliary contact member 13, the contact member 7, conductors 25 and 26, an auxiliary switch 27, on the switch 5 and which is closed when the latter is open, a conductor 28, the coil 16 of the switch 4, thereby energizing the coil 16 and holding the switch 4 closed to supply the load circuit 3 from the circuit 1, and, through a conductor 29 and the conductor 21, back to the opposite side of the circuit 1.

Should the current in the circuit 1 be interrupted, the coils 16 and 20 will be de-energized, the switch 4 opened and the contact members 21 and 22 dropped into contact with the contact members 23 and 24, respectively. This will establish a current path from one side of the circuit 2, through a conductor 30, the contact members 22 and 24, a conductor 31, switch 32 on the switch 4 and which is closed when the latter is open, a conductor 33, the coil 17 of the switch 5, thereby closing the latter and connecting the load circuit 3 to the supply circuit 2, and conductors 34 and 35, back to the opposite side of the circuit 2.

When the circuit 1 again becomes ener-

gized, the coils 16 and 20 will actuate the switch 4 and the relay 15 to resume their former positions and thus reestablishing the initial connections effected between the circuits 1 and 3 by having the switch 6 in the position shown.

When it is desired to utilize the circuit 2 as the main source of supply, the switch 6 is thrown to the right, as viewed in the drawing, to establish a substantially similar arrangement of connections and relation of the switches to the circuits as in the above described system.

In case the circuits 1 and 2 are both of a similar usual standard voltage, a resistor 36 may be inserted between the switch 6 and the circuit 2 to compensate current differences between the alternating and direct-current circuits.

With the switch 6 thrown to the right, current flows from one side of the circuit 2, through the conductor 30, the resistor 36, contact members 14 and 8, the coil 20, contact members 11 and 12 and the conductor 35, back to the opposite side of the circuit 2 and from the contact member 14, through the contact member 9, a conductor 37, the conductor 31, the switch 32, the conductor 33, the coil 17, the conductors 34 and 35, back to the opposite side of the circuit 2, thus again causing the relay to assume the position shown and closing the switch 5 to supply the load circuit 3 from the circuit 2.

As in the first described arrangement, where the load is supplied by the circuit 1 and, in the event of the failure thereof, is automatically transferred to the circuit 2, here, also, where the load is supplied by the circuit 2 it will be automatically transferred to the circuit 1 and back to its initial connection when the circuit 2 is again active. The switch 4 being then open, the switch 5 is closed and the switch 6 thrown to the right, failure of the circuit 2 will de-energize the coils 17 and 20 to open the switch 5 and engage the relay contacts, and cause current to flow from one side of the line 1, through the conductor 18, contact members 21 and 23, conductor 26, the switch 27, the conductor 28, the coil 16, and the conductors 29 and 21 back to the opposite side of the line 1, thereby closing the switch 4 and connecting the load circuit across the circuit 1. With the re-energization of the circuit 2, it will again become the source of supply for the load.

The arrangement provides an extremely flexible system, is simple and effective and, where two supply lines are available, eliminates the usual extra auxiliary source of supply, thereby affording many advantages, such as economy of material and space.

While I have shown and described a particular form of my invention, changes may be effected therein without departing from

the spirit and scope thereof, as indicated in the appended claims.

I claim as my invention:

1. The combination with two supply circuits and a load circuit, of connecting means for initially selecting either of said supply circuits as the main source of supply for said load circuit, and means for automatically transferring the load circuit to the other supply circuit when the selected circuit fails and back to the selected circuit when the latter again becomes operative.

2. The combination with two supply circuits and a load circuit, of means for connecting the load circuit to either of said supply circuits and means for controlling the connecting means to automatically transfer the load circuit to the other supply circuit when said first selected supply circuit fails and back to said first supply circuit when the latter again becomes operative.

3. The combination with two supply circuits and a load circuit, of means for connecting the load circuit to either of said supply circuits and means for automatically transferring the load circuit to the other supply circuit upon the occurrence of a certain circuit condition and back to said first supply circuit when said condition no longer prevails.

4. The combination with two supply circuits and a load circuit, of means for connecting the load circuit to either of said supply circuits and means for automatically transferring the load circuit to the other supply circuit and back to said first supply circuit in accordance with predetermined different circuit conditions in the first supply circuit.

5. The combination with three circuits, of means for connecting one of said circuits to either of the other two and means for automatically transferring said first connected circuit to the other of said two circuits and then back to its initial connection under predetermined conditions in one of the initially selected of said two circuits.

6. The combination with three circuits, of means for effecting selective connections between two of said circuits and automatically changing the connections to between one of the initially connected circuits and the third circuit and back to the initial connections under predetermined conditions in the other of said initially connected circuits.

7. The combination with a plurality of circuits, of means for effecting connections between a selected plurality thereof and means for automatically changing to other connections under predetermined faulty conditions in one of said selected circuits, and back to the initial connections under normal conditions in the same one of said selected circuits.

8. The combination with a plurality of

circuits, of means for establishing certain co-operative connections therebetween and means for automatically changing to other co-operative connections and re-establishing said first connections under predetermined electrical conditions in said circuits, the sequence of connection changes being similarly effected irrespective of which of said co-operative connections are established first.

9. The combination with a load circuit, an alternating-current supply circuit, and a direct-current circuit, of means for connecting the load circuit to either of said supply circuits and means for automatically transferring the load circuit to the other supply circuit upon the occurrence of abnormal conditions in the first supply circuit and back to said first connected supply circuit upon the return of normal conditions in said circuit.

10. The combination with two supply circuits and a load circuit, of electrically-actuated switches for connecting the load circuit to the supply circuits, a double-throw control switch and a relay connected across said control switch for closing either one of said electrically-actuated switches when said control switch is closed and, in response to circuit changes, automatically transferring said load circuit to the other supply circuit and back to its initial connection.

11. The combination with a circuit to be energized and a plurality of sources of energy therefor, of means for selecting a preferred source of energy, thereby determining the preferred sequence of selection of said sources of energy, and means responsive to the electrical condition of the preferred source of energy for connecting the circuit to the next source, in the preferred sequence, upon the occurrence of abnormal conditions in the preferred source and until said source again becomes normal.

12. The combination with a circuit to be energized and a plurality of sources of energy therefor, of means for selecting a preferred source of energy, means for controlling the connection of the circuit to all the

sources of energy, and means controlled by the selective means for controlling the energization of the controlling means.

13. The combination with a circuit to be energized and a plurality of sources of energy therefor, of means for selecting a preferred source of energy, means for controlling the connections of the circuit to the sources of energy and means whereby said controlling means is rendered responsive to the condition of the preferred source of energy.

14. The combination with a circuit to be energized, two sources of energy therefor, and connecting means between the circuit and the sources of energy, of means for selectively actuating either of the connecting means to connect the circuit to the associated source as a preferred source, an electromagnetic switch connected by the selective means to the preferred source to be energized in accordance with the electrical condition thereof, and co-operating means controlled by said electromagnetic switch and by the operative or actuated connecting means for controlling the actuation of the connecting means associated with the second source of energy.

15. The combination with a circuit to be energized, two sources of energy therefor, and connecting means disposed between the circuit and the respective sources and provided with operating coils, of a switch for initially connecting the circuit to either source by effecting the energization of the operating coil of the associated connecting means, a relay switch actuated in accordance with the condition of the connected source, and a switch controlled by the connecting means associated with the preferred source for controlling the circuit of the operating coil of the connecting means associated with the other source of energy.

In testimony whereof, I have hereunto subscribed my name this 21st day of June 1919.

EDGAR PUXON.