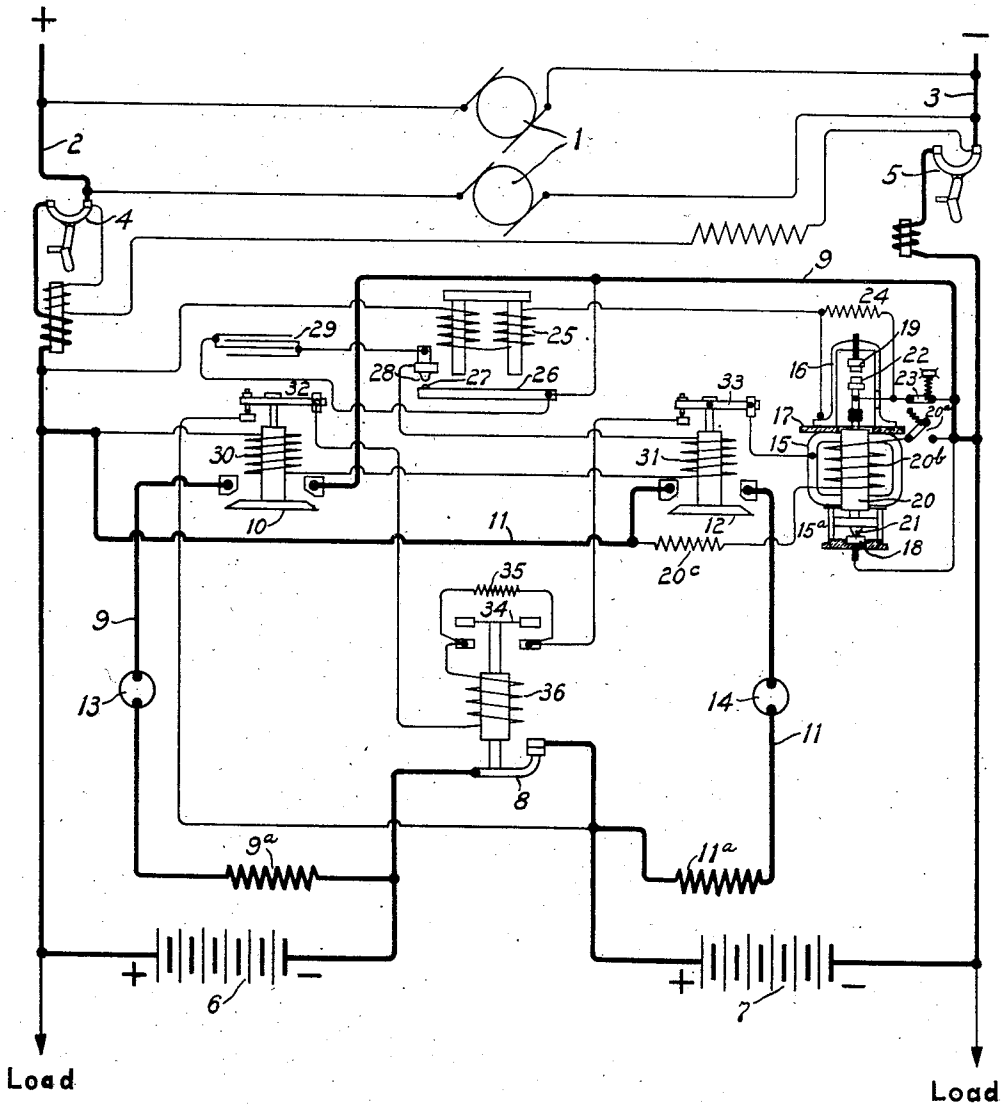
W. L. BLISS.

SYSTEM OF ELECTRICAL DISTRIBUTION.

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SYSTEM OF ELECTRICAL DISTRIBUTION.

1,400,856. Specification of Letters Patent. Patented Dec. 20, 1921.

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To all whom it may concern:

Be it known that I, WILLIAM L. BLISS, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Systems of Electrical Distribution, of which the following is a specification.

The present invention relates to systems of electrical distribution.

More particularly the invention relates to systems in which a source of electro-motive force is used to supply certain translating devices and in which it is imperative that an electro-motive force be available at once in case said source should fail.

One of the objects of the invention is to provide a novel system having a main source of supply and an auxiliary source, instantly available in case of emergency.

Another object is to provide a system having a main source of supply, a storage battery which operates as an auxiliary source in case of emergency and means whereby the battery may be charged from said main source.

A further object is to provide a system of the above mentioned class which is reduced to its simplest possible form and in which the use of boosters and machinery of that character is avoided.

Other objects will be apparent as the description proceeds.

The accompanying drawing illustrates diagrammatically one embodiment of the invention.

The numeral 1 represents a plurality of generators connected in parallel across the leads 2, 3. The lead 2 is shown as provided with the reverse current circuit-breaker 4, while the lead 3 is provided with an overload circuit-breaker 5. The leads 2 and 3 extend to the load which is to be supplied.

Connected between the leads 2, 3, is a storage battery consisting of two halves 6 and 7. These two halves are connected through the magnetically operated switch 8. As shown in the drawing, section 6 of the battery may be connected across the leads 2, 3, through connector 9, magnetically operated switch 10 and resistance 9^a. Section 7 of the battery may be connected across the leads 2, 3, through the connector 11, magnetically operated switch 12 and resistance 11^a. Ammeters 13 and 14 may be connected in circuit with connectors 9 and 11 respectively to indicate the values of current flowing.

A switch casing is provided comprising two parts 15 and 16, insulated from each other as by a gasket 17. Mounted in part 15, but insulated therefrom, is an adjustable contact 18, while mounted in part 16 is an adjustable contact 19. Slidably mounted within the casing is a plunger 20 provided with a contact 21 coöperating with contact 18 and a contact 22 insulated from said plunger, coöperating with contact 19. Said contact 22 is electrically connected with the lead 3 through the switch 23. Said plunger 20 is actuated by a solenoid 20^b connected across the leads 2, 3, by a circuit including the switch 20^a, biased to open position and a resistance 20^c. A dash-pot 15^a is preferably provided to prevent too sudden movement of the plunger 20. The movable plunger, with its associated contacts may, for convenience, be called a master switch.

Connected across the leads 2, 3, is a circuit including the switch 23, biased to closed position, a resistance 24 and a solenoid 25. Said solenoid 25 controls an armature 26, provided with a contact 27, adapted to cooperate with a fixed contact 28. A condenser 29 may be connected across contacts 27 and 28 to minimize sparking. Also, connected across the leads 2, 3, is a circuit including a solenoid 30, controlling the switch 10, solenoid 31 controlling the switch 12, contact 28, contact 27, and armature 26.

Mounted to be moved by the switch 10 is a switch 32. Switches 10 and 32 are mechanically connected, so that when switch 10 closes, it will open switch 32, and when it opens, it will permit switch 32 to close. Similarly, a switch 33 is mounted to be moved by switch 12, being opened by the closing of said switch 12 and being closed by the opening of said switch 12. Controlled by the switch 8 is a switch 34, being opened by the closing of said switch 8 and being closed by the opening of said switch 8.

Connected across the terminals of switch 34 is a resistance 35. Said switches 8 and 34 are controlled by a solenoid 36 connected across section 7 of the battery in a circuit including the switch 32, solenoid 36, switch 34 or resistance 35, switch 33 and casing part 15.

A mode of operation of the above described embodiment of the present invention is sub-

stantially as follows. The drawing represents the normal positions of the various elements, with the generators supplying the load and with the battery sections 6 and 7 connected in series across the leads, neither charging nor discharging. At this time solenoid 36 will be energized by current from section 7 of the battery, being connected across said section 7 through switch 32, resistance 35, switch 33 casing 15, plunger 20, contact 21, contact 18 and lead 3. Therefore switch 8 will be maintained closed, the resistance 35 being so chosen that it will not cut down the energization of solenoid 36 below the value necessary to hold up switch 8. The resistance 35 performs the function of cutting down the current in coil 36 when it is merely holding the switch 8 closed, thus minimizing the discharge from battery section 7 and also minimizing the heating of coil 36. When said switch 8 is open, however, said resistance 35 is short-circuited, increasing the energization of solenoid 36, giving its maximum effect for closing said switch. Should the generators 1 fail for any reason, the battery will instantly discharge through the circuit breaker 4, disconnecting the generators from circuit, but leaving the battery ready to deliver current to the load.

When it is desired to charge the battery, the operator will close the switch 20^a, which is biased to open position, and will hold same closed until he sees that the batteries are on charge. Closure of switch 20^a will energize solenoid 20^b and plunger 20 will move slowly upward, being retarded in its movement by the dash-pot 15^a. The contacts 21 and 18 are separated, deënergizing solenoid 36, causing switch 8 to open instantly. The retarding influence of dash-pot 15^a makes it certain that switch 8 will open before contacts 19 and 22 will close.

When the plunger 20 has been moved to its uppermost position, contacts 19 and 22 will close, short-circuiting the resistance 24 and impress full line voltage on solenoid 25. This will attract the armature 26, causing contacts 27 and 28 to close, energizing solenoids 30 and 31 and closing switches 10 and 12. Inasmuch as switch 8 will be open and switches 10 and 12 closed, the two sections 6 and 7 of the battery will be connected in parallel, through charging resistances 9^a and 11^a respectively, across the leads 2, 3. The two sections will then be on charge, getting their current from the generator 1. The operator may then release the switch 20^a. The batteries will remain on charge for the following reason. It will be observed that when switches 10 and 12 close, they open switches 32 and 33, opening circuit of solenoid 36, thus preventing any possibility of the switch 8 closing during the charging process. It will likewise be observed that when the operator releases switch 20^a and it opens, circuit through solenoid 20^b will be broken and plunger 20 will slowly descend, breaking contacts 19 and 22 and reëstablishing contacts 18 and 21. Breaking contacts 19 and 22 will not allow solenoid 25 to release armature 26, as the resistance 24 still permits sufficient current to circulate through solenoid 25 to maintain armature 26 in its attracted position, though such energization of the solenoid 25 would not be sufficient to overcome the reluctance of the air gap when said armature is in its lower position. As the armature 26 controls the energization of the solenoids 30 and 31, which in turn operate the switches 10 and 12, said switches will remain closed.

To stop the charge, the operator will open the switch 23, which is biased to closed position, thus breaking circuit through solenoid 25. Armature 26 will drop, breaking circuit between contacts 27 and 28 and causing switches 10 and 12 to open, thereby closing switches 32 and 33. Circuit of solenoid 36 will now be complete across the battery 7, and switch 8 will close, leaving the battery connected as a unity across the system, ready to take care of an emergency.

If, while the battery was divided into its two halves, the generators 1 should fail, the drop in voltage across the leads 2, 3, would cause the deënergization of solenoid 25 and the dropping of armature 26 in exactly the same manner as if switch 23 were opened, and the two sections of the battery will immediately be placed in series across the leads 2, 3. They will discharge through the reverse current circuit-breaker 4, breaking circuit to the generators 1 and will be ready to supply any demand on the load circuit.

If the operator should operate switch 23 and switch 20^a at the same time, no harm would result. Operating switch 20^a would close circuit through solenoid 20^b and thus cause the opening of switch 8, but the fact that switch 23 was open, would prevent solenoid 25 from being energized. The only result of operating switches 20^a and 23 at the same time, therefore, would be the harmless opening and closing of the switch 8.

One embodiment of the present invention has been described in detail. Many modifications will occur to those skilled in the art. This application is intended to cover all such modifications that fall within the scope of the invention as defined by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In combination, an electrical source of supply, means supplied thereby, a storage battery normally floating across said mains whereby to be instantly available in case of failure of said source, a switch dividing said battery into two sections, other switches for

connecting each section across the mains for charging, electro-magnetic operating means for each of said switches, and means whereby the operating means of said first mentioned switch is rendered inoperative by the movement of said other switches.

2. In combination, a source of supply, supply mains, a storage battery normally floating across said mains for emergency purposes, a switch for dividing said battery into two sections, other switches for connecting each section across the mains for charging, electro-magnetic operating means for said first mentioned switch, a master switch for disabling said operating means, charging switches for connecting each section of said battery across the mains for charging, and relay means controlled by said master switch for controlling said charging switches.

3. In combination, a source of supply, a battery normally floating across said source, whereby to be instantly available in case of failure of said source, a battery switch for dividing said battery into two sections, means for connecting said sections across the source for charging including charging switches, and a double acting switch mechanism for causing the opening of the battery switch and the closing of the charging switches.

4. In a system of electrical distribution, a source of supply, a storage battery adapted to be connected across said source, a battery switch for dividing said battery into two sections, a circuit including a solenoid for operating said battery switch, a pair of charging switches for connecting each section of said battery across said source for charging, relay means for controlling said switches, means for reducing the energization of said relay means, cut-outs controlled by said battery switches, a master switch adapted in one movement to disable said battery switch operating circuit and to disable said relay energization reducing means and by another movement to put said battery switch controlling circuit into condition to be energized upon movement of said charging switches.

5. In combination, a source of electrical supply, a storage battery normally floating across said source whereby to be instantly available in case of failure of said source, a switch for dividing said battery into two sections, connections including resistances and switches from either side of said first mentioned switch to opposite sides of said source, whereby the two sections may be placed in parallel across said source for charging purposes.

6. In a system of electrical distribution, a source of supply, a battery normally floating across said source whereby to be instantly available should said source fail, and switching means whereby said battery may be divided into two parallel sections for charging.

7. In a system of electrical distribution, a source of supply, a battery normally floating across said source whereby to be instantly available should said source fail, switching means for dividing said battery into two parallel sections for charging and electro-magnetically operated means for controlling said switching means to connect said sections in series should said source fail.

8. In a system of electrical distribution, a source, an emergency battery adapted to float across said source, a battery switch for dividing said battery into two sections, operating means therefor, charging switches for connecting each of said battery sections across said source for charging, cut-outs for said operating means controlled by said charging switches, a solenoid responsive to voltage changes across said source, a resistance in series with said solenoid, a switch controlled by said solenoid to control said battery and charging switches, a master switch controlling said operating means and said resistance, means for controlling said master switch, and means for disabling said solenoid.

9. In combination, a source of electrical supply, a pair of storage battery sections, a switch for connecting said battery sections in series across said source, other switches for connecting each section across the source for charging, and means controlled by said other switches for insuring that said first mentioned switch will be opened when said other switches are closed.

10. In a system of electrical distribution, a source, a storage battery, a battery switch for connecting said battery across said source, charging switches for connecting sections of said battery across said source for charging purposes, a master switch which in one movement causes first the opening of said battery switch and later the closing of the charging switches, and a dash-pot to delay the movement of said master switch.

11. In a system of electrical distribution, a source, an emergency battery connected across said source, a solenoid responsive to voltage changes across said source, an armature for said solenoid, a resistance in series with said solenoid whereby said solenoid with said resistance in series therewith is unable to draw up said armature at normal voltage across said source but with said resistance short-circuited is able to do so, a battery switch for connecting said battery across said source, charging switches for connecting sections of said battery across said source for charging purposes, said battery and charging switches being controlled by said armature, means for short circuiting

said resistance, and means for disabling said solenoid.

12. In a system of electrical distribution, a source, a storage battery and a work circuit, said battery being normally connected to float across said source, means for dividing said battery into two sections and for connecting each section across said source for charging, and automatic means for reconnecting said battery into one section across said work circuit.

13. In a system of electrical distribution, a source, a storage battery and a work circuit, said battery being normally connected to float across said source, means for dividing said battery into two sections for charging purposes, and means responsive to the voltage across said source for reconnecting said battery into a unit across said work circuit.

14. In a system of electrical distribution, a source, two storage battery sections normally floating in series across said source to be instantly available in case of failure of said source and a load circuit, means for connecting said sections either in parallel or in series across said source, and automatic means responsive to the voltage across said source for connecting said sections in series across said work circuit.

15. In an electrical system of distribution, a source, a storage battery, switch means for dividing said battery into sections or for connecting the complete battery across said source, other switch means for connecting each section across said source for charging, said first mentioned switch means being responsive to said second mentioned switch means.

16. In an electrical system of distribution, a source, a storage battery, switch means for dividing said battery into sections or for connecting the complete battery across said source, other switch means for connecting each section across said source for charging, said first mentioned switch means being responsive to said second mentioned switch means, and means responsive to the voltage across said source for controlling said second mentioned switch means.

In witness whereof, I have hereunto subscribed my name.

WILLIAM L. BLISS.