No. 745,715. PATENTED DEC. 1, 1903.

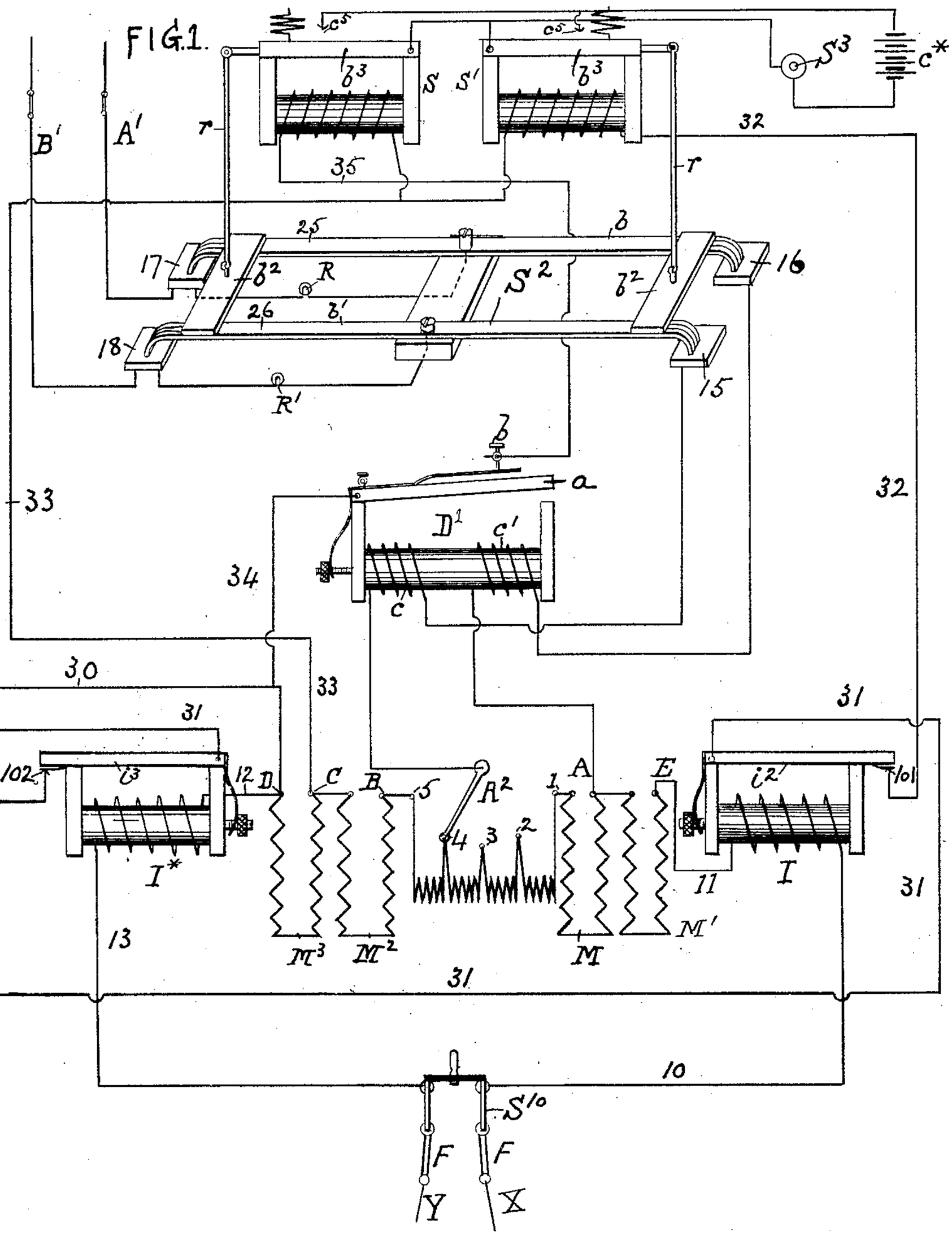
H. L. CARPENTER.

MEANS FOR MODIFYING HIGH POTENTIAL ELECTRIC CURRENTS FOR LOW POTENTIAL USE.

APPLICATION FILED MAY 15, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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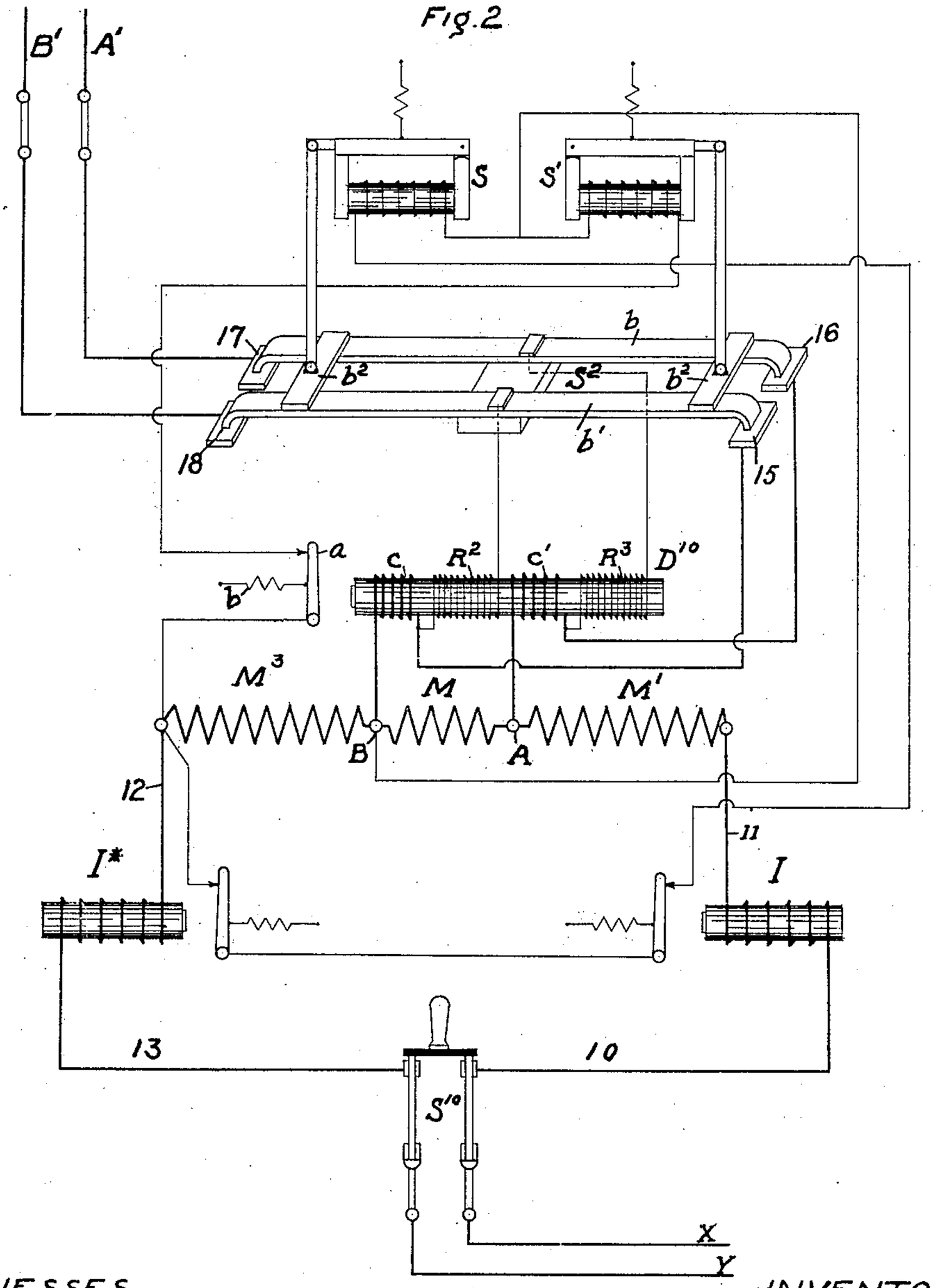
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

HERBERT L. CARPENTER, OF BROOKLYN, NEW YORK.

MEANS FOR MODIFYING HIGH-POTENTIAL ELECTRIC CURRENTS FOR LOW-POTENTIAL USE.

SPECIFICATION forming part of Letters Patent No. 745,715, dated December 1, 1903.

Application filed May 15, 1903. Serial No. 157,312. (No model)

To all whom it may concern:

Be it known that I, HERBERT L. CARPENTER, a citizen of the United States of America, residing in the city of Brooklyn, county of Kings, State of New York, have invented certain Improved Means for Modifying High-Potential Electric Currents for Low-Potential Use, of which the following is a specification.

This invention has for its main object to directly adapt and modify a comparatively high-potential current—such, for instance, as is normally used in electric lighting systems—for use in circuits which require comparatively low potential—as, for example, telephonic, telegraphic, or like circuits.

A further feature is the preventing of the existence of destructive high-potential currents in the modified circuit.

In the drawings and description I have illustrated and described an automatically-protected system for modifying a comparatively high-potential current to comply with the exacting requirements of a telephonic system, a system that must be not only of a lower electromotive force, but must also be practically free from inductive variations existing in the main circuit. It will be understood, however, that where the use to which the modified current is to be put has not the exacting requirements of a telephonic system no great care need be expended in modifying the inductive variations. The conductors of such modified circuit are in electrical and physical contact with the conductors of the high-potential circuit.

In the accompanying drawings, Figure 1 is a diagram showing the arrangements of circuits and protective devices, and Fig. 2 is a modified form of working resistance to take the place of the dead resistance of the lamps of Fig. 1.

X Y are the leads of a source of comparatively high electromotive force.

A′ B′ are the leads to the devices to be operated by the modified current, and in this instance they correspond to the battery leads for telephonic use.

I I* are impedances designed to choke the inductive variations of the main supply-current. They have a second function, however, as protective relays, to aid in protecting the modified circuit upon trouble arising, as will be described hereinafter.

The modified current and current for operating the automatic switch are taken from non-inductive resistances M M′, &c., in circuit with impedances I I*.

The high-potential mains X Y are protected by a switch S^{10} and fuses F F. A conductor 10 leads from the switch to the impedance and protective relay I by conductor 11 to terminal E of non-inductive resistance M′, to terminal A of non-inductive resistance M, to variable contact-points 1, 2, 3, 4, and 5, connected to said resistance M, to terminal B of non-inductive resistance M^2, to terminal C of non-inductive resistance M^3, to terminal D, to conductor 12, to impedance and protective relay I*, and to conductor 13 back to switch S^{10}. Each impedance-relay is provided with a circuit-breaking armature i^2 i^3, adapted to break a safety-circuit at 101 or 102, as the case may be.

The modified current is taken from the terminal A of the non-inductive resistance M, led through one coil c' of a differential relay D′ to a contact-point 16 of a switch S^2, through a blade b of said switch to contact 17, to modified current-conductor A′ used in the modified circuit, returned by conductor B′ to contact 18, blade b', contact 15, to coil c, balancing the magnetic effect of coil c' in the relay D′, and passing to the movable contact-arm A^2 to one of the contacts 1 to 5 adjacent to the resistance M.

Resistances R R′ in the form of lamps are inserted between the contacts 17 and 18 and their contacting blades 25 and 26. The switch S^2 is fashioned of two parallel spring-blades b b', secured together at both ends by insulating-blocks b^2 b^2, connected by connecting-rods r r, attached to armatures b^3 b^3 of the electromagnetic safety devices S S′, each being in a separate safety-circuit. The relay D′ controls an armature a, contacting with a contact b. One safety-circuit takes current by the common conductor 33, bridged from the terminal C of the resistance M^3 through the electromagnetic device S, by conductor 35 to the contact b, armature a, and conductor 34 to the terminal D of the resistance M^3. The second safety-circuit takes current by the

same common conductor 33, electromagnetic device S′, conductor 32, contact 101, and armature i^2 of the impedance-relay I, conductor 31, to armature i^3 and contact 102, to conductor 30, to terminal D of the resistance M^3.

Contacts c^5 c^5 adjacent to the switch-armatures b^3 b^3 connect with a signal S^3, shown operated by current from a battery c^*.

In normal operation the electromagnetic devices S S′ are closed, closing the modified circuit at switch-contacts 15, 16, 17, and 18, and they are held closed by current flowing through the safety devices S S′ and safety-circuits bridged across the resistance M^3.

If trouble creeps into the main conductors X Y—such, for instance, as a break at one fuse F—the function of the bridge M will immediately be done away with and the entire potential thrown into both sides of the modified circuit; but upon a break in the main circuit one or two of the impedance-relays I I* will release the armature i^2 or i^3, breaking the safety-circuit and releasing the armature of the safety device S′ to entirely cut out the modified circuit from all electrical connection with the high-potential circuit and operate the signal S^3.

If trouble takes place on the modified circuit, it will immediately overbalance one coil of the differential relay D′ by causing excess of flow in one of the coils c c', attract the armature a, break the safety-circuit connected therewith, release the armature of the safety device S, and break the contacts 17 18, inserting the resistances R R′, and thus preventing any excessive or destructive current from existing on the modified circuit, maintaining, however, sufficient flow of overbalancing current through one coil of the differential relay D′ to keep the armature a attracted and the safety-circuit open until such time as the trouble is removed from the modified circuit, when the flow through the two coils cc' will be equalized, thereby neutralizing the relay and releasing the armature a to reestablish the safety-circuit, close the safety device S, and reconnect the modified circuit through contacts 17 and 18. In like automatic manner upon a trouble in the main circuit the modified circuit will be cut off; but upon the removal of trouble the protective relays I I* will close the safety-circuit and operate the switch-magnet S′ to again connect the modified circuit across its bridge and to automatically restore normal conditions.

As shown in Fig. 2, in place of the lamp resistances R R′, I may wind a second set of high-resistance differential coils R^2 R^3 on the relay D^{10}, so that upon the opening of the switch at contacts 17 18 all current passing over the interposed resistance to unbalance the relay may be more effectually utilized to magnetically hold attracted the armature a.

In the drawings I have shown but one modified circuit bridged across the terminals A and A^2 of the resistance M. It will be obvious, however, that two or more independent modified circuits may be taken from one main circuit, in which case the additional circuits will preferably be bridged across the resistances M′ or M^2, each modified circuit being a duplicate of the modified circuit and its safety devices, as shown in the drawings.

I claim as my invention—

1. A high-potential supply-circuit and a modified circuit of less potential in physical and electrical connection therewith, and automatic means for preventing abnormally high potential from first said circuit from existing on the modified circuit.

2. A high-potential supply-circuit and a modified circuit of less potential in physical and electrical connection therewith, and automatic means for preventing destructive high-potential current from first said circuit from existing on the modified circuit.

3. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance and automatic means for preventing abnormally high potential from first said circuit from existing in the modified circuit.

4. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance and automatic means for preventing destructive high-potential from first said circuit from existing in the modified circuit.

5. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance, a differential relay and means operated thereby to prevent high potential from existing in the modified circuit.

6. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance, a differential relay and means operated thereby to prevent destructive high-potential current from existing in the modified circuit.

7. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance, a differential relay in the modified circuit, and means operated thereby to prevent high potential from existing in the modified circuit.

8. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance, a differential relay in the modified circuit, and means operated thereby to prevent destructive high-potential current from existing in the modified circuit.

9. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance, a differential relay and a switch operatively controlled thereby adapted to prevent the existence of high potential in the modified circuit.

10. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance, a differential relay and a switch operatively controlled thereby adapted to prevent the existence of destructive high-potential current in the modified circuit.

11. A high-potential supply-circuit, resistance therein, a modified circuit bridged across said resistance and means for automatically cutting off the modified circuit to prevent the existence of high potential from first said circuit in the modified circuit.

12. A high-potential supply-circuit, a non-inductive resistance, a modified circuit bridged across the non-inductive resistance and automatic means for preventing the existence of high potential from the first said circuit in said modified circuit.

13. A high-potential supply-circuit, an impedance and a non-inductive resistance therein, a modified circuit bridged across said non-inductive resistance, a relay, and means controlled by the relay for preventing the existence of high potential in the modified circuit.

14. A high-potential supply-circuit, an impedance and a non-inductive resistance therein, a modified circuit bridged across said non-inductive resistance, a relay, and means controlled by the relay for preventing the existence of destructive high-potential currents in the modified circuit.

15. A high-potential supply-circuit, an impedance and a non-inductive resistance therein, a modified circuit bridged across the resistance, a relay, and a switch operated thereby adapted to prevent the existence of high potential in the modified circuit.

16. A high-potential supply-circuit, an impedance and a non-inductive resistance therein, a modified circuit bridged across the resistance, a relay, and a switch operated thereby adapted to prevent the existence of destructive high-potential current in the modified circuit.

17. A high-potential supply-circuit, an impedance and resistance in circuit therewith, a modified circuit bridged across a part of said resistance and an electromagnetic safety device bridged across a part of said resistance, an armature to the impedance adapted to break the circuit to the safety device, to operate said safety device upon the existence of trouble in the high-potential circuit.

18. A high-potential supply-circuit and resistance therein, a modified circuit bridged across a part of said resistance and an electromagnetic safety device bridged across a part of said resistance, a differential relay adapted to operate said safety device.

19. A high-potential supply-circuit and resistance therein, a modified circuit bridged across a part of said resistance, a switch in the modified circuit adapted to cut off the modified circuit, a relay, an electromagnetic safety device adapted to be operated by current from a bridge from a part of said resistance and controlled by said relay.

20. A high-potential supply-circuit, impedance and resistance therein, a modified circuit bridged across a part of such resistance, a differential relay, and electromagnetic switch means, said means adapted to be controlled by the magnetic action of the impedance and by the unbalancing of the relay.

21. A high-potential supply-circuit, a protective relay and resistance therein, a modified circuit bridged to a part of said resistance, and a differential relay, in combination with safety-circuits and safety devices therein, armatures and contacts therefor in the safety-circuits and controlled by said protective relay and differential relay.

22. A high-potential supply-circuit having resistance therein, a modified circuit bridged across said resistance, a differential relay with low-resistance windings and high-resistance windings, a switch in the modified circuit adapted to insert the high-resistance windings into said modified circuit.

23. A high-potential supply-circuit, a protective relay and resistance in the circuit, a modified circuit bridged across a part of said resistance, a safety device and switch to prevent the existence of destructive high potential in the modified circuit and controlled by said protective relay.

24 A high-potential supply-circuit, a protective relay and resistance therein, a modified circuit bridged to a part of said resistance, a differential relay in said modified circuit, a switch therein having sets of contacts, electromagnetic devices to control independently the sets of contacts, a safety-circuit, an armature therein controlled by the protective relay to cut out the modified circuit at one switch-contact set, a second safety-circuit and armature therein controlled by the differential relay adapted to insert resistance at another set of switch-contacts.

25. A high-potential supply-circuit and a modified circuit in electrical connection therewith, in combination with automatic means for preventing destructive high-potential current from the first said circuit from existing in the modified circuit upon such trouble as would increase the potential therein, and means for automatically restoring normal conditions when such trouble is removed.

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

HERBERT L. CARPENTER.

Witnesses:

HUBERT HOWSON,

F. WARREN WRIGHT.