

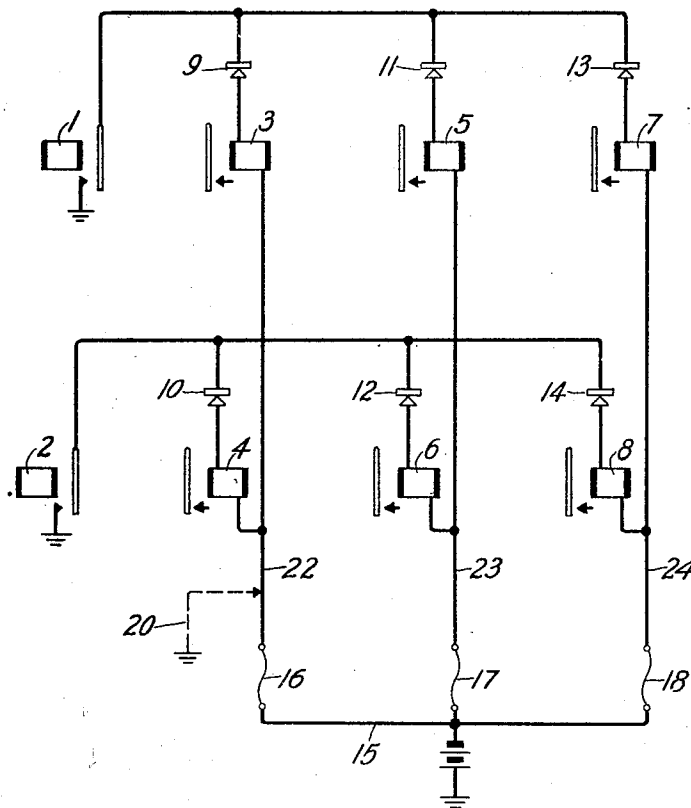
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ELECTRICAL CIRCUITS

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ELECTRICAL CIRCUITS

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This invention relates in general to protective devices and more specifically to a protective system particularly applicable to the safe guarding of parallel fused circuits.

In many applications and particularly in telephone systems, circuits comprising a plurality of parallel branches find extensive use, and in such systems it has been found advantageous to provide each portion or branch of a circuit with some means of protection, such as a fuse. Such practice, under ordinary conditions has proven very economical and substantially fire proof. However, in telephone systems where the accidental grounding of various circuit leads is not uncommon, serious damage has been experienced by the telephone equipment associated with the grounded circuits. The accidental grounding of a particular lead in a circuit comprising a plurality of parallel branches often results in the false operation of associated equipment and creates a fire hazard due to overheating of the wires caused by the excessive flow of current.

It is the object of this invention to obviate the objectionable features attendant upon the accidental grounding of one branch of a parallel fused circuit.

This object is attained in accordance with a feature of the invention by the inclusion, in each individual parallel branch of the circuit, of a unidirectional current conducting device, such as a copper oxide rectifier, between the apparatus in each parallel branch and the common connecting lead, and an individual fuse for each branch located between the apparatus and the point of connection to the common bus bar or current supply lead. Such an arrangement isolates the unstandard condition by confining the effects of the accidental ground to the particular branch so grounded and rendering the remaining parallel branches immune to the effects of any abnormal condition existing in another branch.

The invention will be readily understood from the following detailed description made with reference to the accompanying drawing which shows a circuit comprising a plurality of parallel fused branches, each of

which provided with a copper oxide rectifier. This circuit has been chosen for descriptive purposes only and applicant does not intend that his invention be limited to the particular embodiment disclosed.

Relays 1 and 2 represent control relays and upon operating in the well known manner, cause relays 3, 5 and 7 and relays 4, 6 and 8 respectively, to operate in obvious parallel circuits. Connected in series with the windings of each of the relays last mentioned, viz. relays 3 to 8 inclusive, is a unidirectional current conducting device such as a copper oxide rectifier. These rectifiers are indicated by the numerals 9 to 14 inclusive.

In each lead associated with the common bus bar or current supply lead 15 is a fuse such as is indicated by the numerals 16, 17 and 18. At 20 is indicated an unstandard circuit condition and more specifically the accidental grounding of the lead 22.

With the lead 22 grounded, it will be assumed for the sake of clearness, that the copper oxide rectifiers 9 to 14 inclusive have not been incorporated in the circuit. Under these conditions the fuse 16 obviously would blow or operate due to the excessive current flow from the bus bar 15 to the accidentally grounded lead 22. Current would also traverse the windings of relays 3 to 8 inclusive causing them to function falsely. The circuits in which these relays falsely operate may be traced as follows: bus bar 15, fuse 17, windings of relays 6 and 4 in series to the accidental ground 20; bus bar 15, fuse 17, windings of relays 5 and 3 in series to ground 20; bus bar 15, fuse 18, windings of relays 8 and 4 to ground 20 and bus bar 15, fuse 18, windings of relays 7 and 3 to ground 20.

It is obvious that these relays 3 to 8 inclusive, operate in the circuits just traced to effect the untimely operation of apparatus controlled by their armatures and contacts.

With the unidirectional current conducting devices 9 to 14 inclusive, included in the circuit, as shown in the drawing, the rectifiers 9 and 10 oppose the flow of current in the circuits just traced. It is to be understood that the arrow-like element of the recti-

fier indicates the direction in which the device will pass current.

It is apparent from the foregoing description that the accidental grounding of the lead 23 or 24 would only result in the operation of either fuse 17 or 18 and would in no way cause the false operation of relays 9 to 14 inclusive. With the lead 23 grounded the rectifiers 11 and 12 serve to protect the remaining equipment from false operation while the rectifiers 13 and 14 perform the same function when lead 24 is grounded.

What is claimed is:

1. A circuit comprising a plurality of parallel branches, a bus bar common to said branches and serving as a source of current supply thereto, a fuse intermediate said bus bar and each of said parallel branches, and a unidirectional current conducting device in each of said branches effective, upon the operation of one of said fuses caused by the existence of a grounded condition in one of said branches, in rendering the remaining parallel branches immune to the effects attendant upon the operation of one of said fuses.

2. A circuit comprising a plurality of parallel branches, a relay included in each of said branches, a bus bar common to said branches and serving as a source of current supply thereto, a fuse intermediate said bus bar and each of said parallel branches, and a unidirectional current conducting device in each of said branches, located between each of said relays and the common connecting lead of said parallel branches, effective upon the operation of one of said fuses caused by the existence of a grounded condition in one of said branches, in rendering the remaining of said branches and their associated relays immune to the effects attendant upon the operation of one of said fuses.

In witness whereof, I hereunto subscribe my name this 27th day of August, 1928.

CLARENCE B. FOWLER.

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