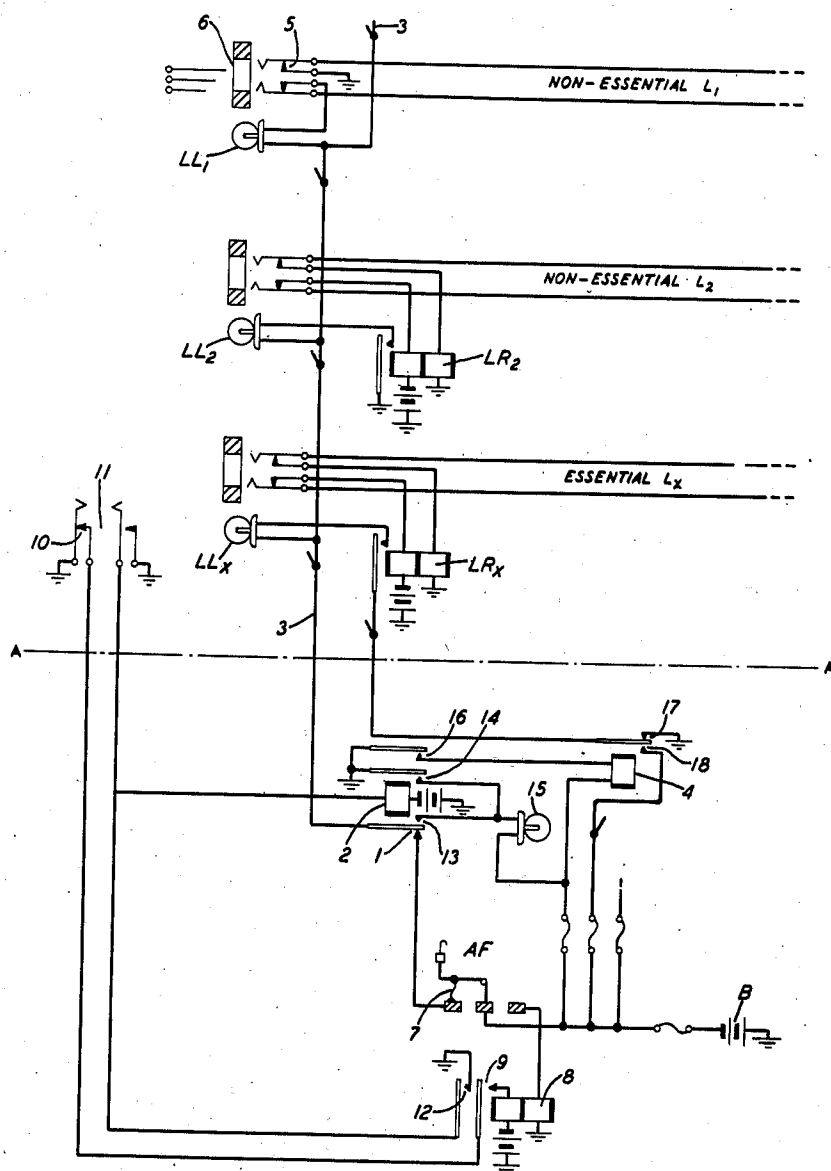


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LINE LOAD CONTROL SYSTEM

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LINE LOAD CONTROL SYSTEM

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4 Claims. (Cl. 179—51)

This invention relates to telephone systems and more particularly to what are known as line load control arrangements for manual switchboards.

An object of the invention is to safeguard and insure telephone exchange service to certain essential emergency agencies, such as the hospitals, doctors, police, fire department, newspapers, public telephones, etc., in the event of an overload on the exchange due to an avalanche of calls occasioned by some major catastrophe, which overload may be of such proportions as to seriously affect the ability of the exchange equipment and personnel to give satisfactory service to such essential agencies on demand. Such an overload may result in the rupture of certain or all of the fuses which supply the line signals of comparative large groups of lines (60, for example), thereby preventing all of the lines of these groups from signaling the operator, which groups may include lines of the aforementioned essential character which it is desirable shall be maintained in condition for immediate service.

A feature of the invention, therefore, resides in such rearrangement of the exchange line circuits, and the provision of such means, that the rupture of any fuse supplying the line signals of a group of lines will result in automatically disabling the line signals of such of the lines of the group as are deemed non-essential and in reestablishing, over an emergency circuit, a supply of current for the signals of the remaining lines of the group which have been predetermined as essential.

A further feature of the invention resides in the provision of means manually controlled by a switchboard attendant, whereby the foregoing result is attained independent of a fuse failure.

The arrangement, whereby the foregoing objects and features are attained, will be understood from the following description and accompanying drawing which schematically shows above the broken horizontal line A—A', the circuits of three subscribers' lines L_1 , L_2 and L_x which are sufficient for an understanding of the operation of the arrangement of the invention. Line L_1 is what is known as a series lamp line, i. e., the line lamp LL_1 is connected directly in series with the line L_1 and under normal conditions is lighted when the subscriber removes his receiver from the hook, and lines L_2 and L_x are equipped with the usual line relays LR_2 and LR_x whose function and operation are well known, i. e., the relay operates when a subscriber

calls and closes a local circuit to light the associated line lamps, such as LL_2 and LL_x .

Under normal operating conditions, current for the subscribers' line lamps LL_1 , LL_2 and LL_x is supplied from the exchange battery B through an alarm fuse AF (of the type disclosed and claimed in Patent 817,959, issued April 17, 1906, to E. B. Craft) over back contacts 1 of relay 2 to a so-called "bus" conductor 3. It will, of course, be understood that one fuse, such as AF, will be provided for each predetermined number of lines (usually of the order of 60) although only one fuse supplying three lines is shown.

As the present invention has for its purpose to insure the proper functions of said predetermined essential lines in the case of an emergency overload, as previously mentioned, the wiring of the line relays for such essential lines, LR_x for example, is modified to the extent of supplying ground to the armatures thereof over the upper back contacts of relay 4, whereas the wiring of the non-essential lines L_1 , L_2 , etc. remains as usual and is shown on the drawing, i. e., in the case of the series lamp line L_1 ground for the lamp LL_1 is supplied at the contacts 5 of jack 6 and in the case of the relay line L_2 ground is connected directly to the armature of relay LR_2 .

In the case of an overload on the fuse AF occasioned by an excessive number of simultaneous calls, fusible element 7 of the alarm fuse AF ruptures, thereby disconnecting the battery B from contacts 1 of relay 2 and completing a circuit to ground through the right-hand winding of relay 3 which relay thereupon operates and closes its contacts 9 to complete a holding circuit for itself, including its right-hand winding, to ground at the normal contacts 10 of emergency key 11. Relay 8 in operating also closes its contacts 12 thereby operating relay 2 which opens its contacts 1 and closes its contacts 13 and 14 thereby connecting ground to bus conductor 3 and lighting pilot lamp 15.

Relay 2 in closing its contacts 16 connects ground to operate relay 4 which in operating opens its contacts 17 thereby removing ground from the armature of relay LR_x and, by closing its contacts 18, connects battery B thereto in substitution. It will, therefore, be noted that the essential lines such as L_x are immediately reconditioned for service in response to operation of alarm fuse AF, i. e., current for lighting lamp L_x is resupplied, in a reverse direction, over contacts 18 of relay 4 to the armature of relay LR_x and ground is connected to bus conductor 3 and consequently to one side of the lamp LL_x .

by the closure of contacts 13 and 14 of relay 2. Consequently, calls on any of the essential lines whose line relays are connected in the manner of LR_x cause the respective line lamps, such as LL_x , to light, whereas due to the presence of ground potential on the bus conductor 3, instead of the usual battery potential, the line lamps LL_1 , LL_2 , etc. of the respective non-essential lines are effectively disabled and cannot light in response to a call.

The foregoing description describes the automatic manner in which the non-essential lines are disabled and the essential lines reenabled in response to an unexpected overload of the battery which causes the operation of the alarm fuse AF.

In case some advance warning may be received by the operating force that an excessive calling rate may be expected momentarily, in which case key 11 at the switchboard may be operated thereby causing operation of relays 2 and 4 without waiting for the load to build up sufficiently to operate the alarm fuse AF. Operation of relays 2 and 4 functions in the manner previously described to disconnect battery from bus conductor 3 and substitute a connection to ground therefor and to substitute a connection to battery for the normal ground connection, on the armature of the line relays, such as LR_x , of the essential lines.

When the emergency is at an end and normal service is to be resumed release of the key 11 will restore the line lamp circuits of all lines to their normal condition.

What is claimed is:

1. In a telephone system, a switchboard, a plurality of subscribers' lines terminating thereat, a calling signal associated with each line, a source of current for energizing said signals having one pole grounded and its free pole connected in multiple to one terminal of each signal, means responsive to a call on any line to ground, the other terminal of the associated signal and switching means for disconnecting the free pole

of said source from its connection to the first terminals of all of said signals, for substituting ground therefor, and for substituting the free pole of said source for the ground applied by said call responsive means associated with predetermined ones of said lines.

2. In a telephone system, a switchboard, a plurality of subscribers' lines terminating thereat, calling signals associated with each line, a common source of direct current for actuating said signals, a current supply circuit multiply connecting the line signals of said lines to said source, an alarm type fuse in said current supply circuit common to said line signals, and means responsive to rupture of said fuse for disabling certain predetermined ones of said line signals and for establishing an emergency connection from said source to others of said signals independent of said first supply circuit.

3. In a telephone system, a switchboard, a plurality of subscribers' lines terminating thereat, calling signals associated with each line, a common source of direct current for actuating said signals, a current supply circuit multiply connecting the line signals of said lines to said source, an alarm type fuse in said current supply circuit common to said line signals, and means responsive to rupture of said fuse for disabling certain predetermined ones of said line signals and for establishing an emergency connection from said source, in a reverse direction, to others of said signals independent of said first supply circuit.

4. In a telephone system, essential and non-essential lines, calling signals associated with each line, a common source of direct current for actuating said signals, an alarm fuse for disabling the calling signals of the non-essential lines and for preparing circuits to supply current from said source, in a reverse direction from normal, to the signals of the essential lines to cause their energization when their respective lines call.

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