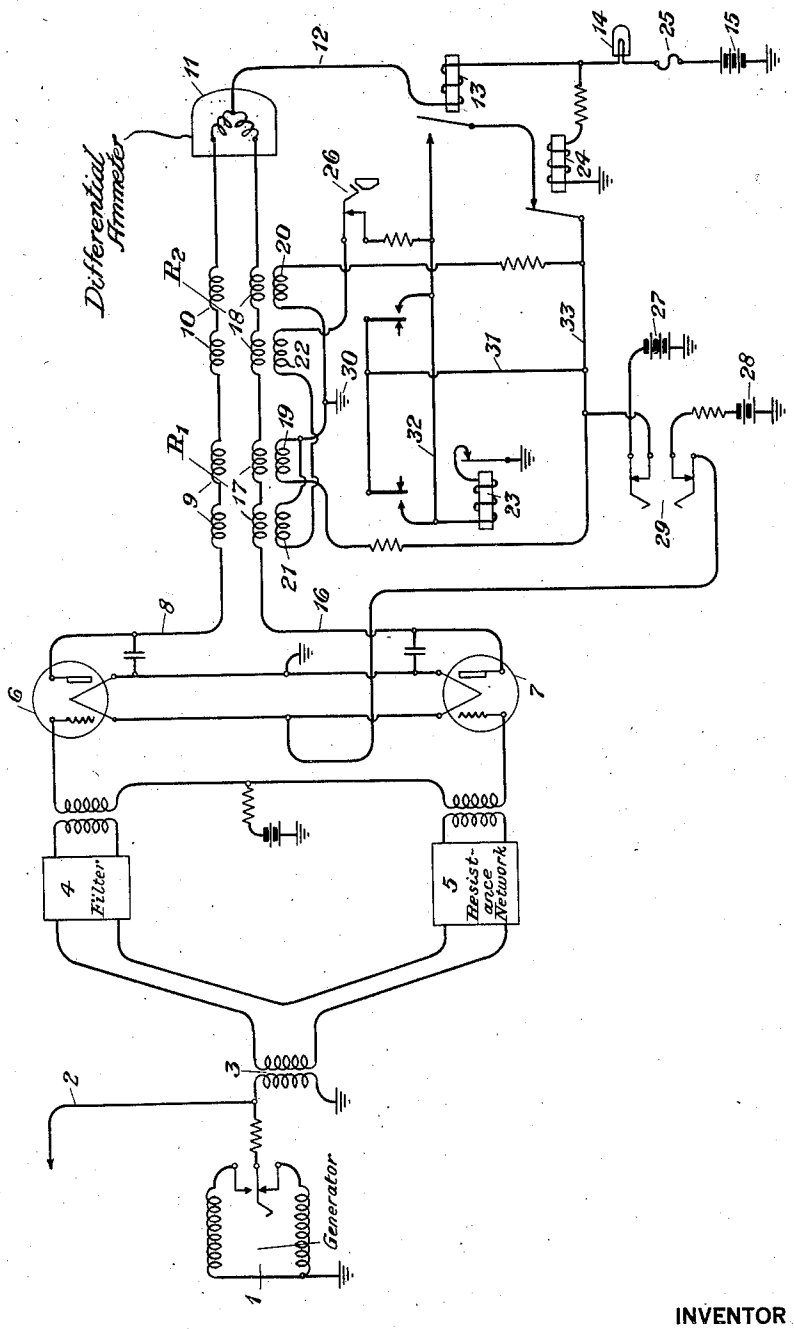
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TELEGRAPH ALARM CIRCUITS

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TELEGRAPH ALARM CIRCUITS

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This invention relates to telegraph systems utilizing voice frequency or carrier currents for transmission of signals and more particularly relates to improvements in alarm arrangements for such systems for indicating failure or undesirable variations in the output of the generating devices utilized to produce telegraph signaling currents.

In telegraph systems of the voice frequency signaling type, the generator of the signaling currents is usually connected to a frequency indicator circuit so that the characteristics of current may be observed. The output of the generator will be connected to a branched circuit having two paths, one including a filter and an amplifier and the other including a resistance network and amplifier. The plate circuits of the two amplifier tubes will be connected to a differential milliammeter and thence to a common source of plate current. Relay means will be provided having opposing windings included in each plate circuit. The relay means and branched circuits would be so adjusted that when the frequency of the generator output was of a desired value, the currents in the relay windings would oppose and neutralize each other. However, any variations in the frequency of the generator output beyond desired limits would upset the balanced condition in the relay windings and cause the relays to operate and give an alarm. The invention relates to improvements in alarm arrangements of the above type. One of the features of the invention consists in the provision of means for giving an alarm in the event of a total failure of the generator. A further feature relates to improvements in locking arrangements for the alarm device. Further objects and features of the invention will appear more fully in the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing, in the figure of which is a circuit diagram illustrating the preferred form of the invention.

In the drawing is shown generator 1 of voice frequency currents to be utilized to transmit telegraph signals over the telegraph line 2. A frequency indicator and alarm circuit would be associated with the output of the generator 1 by means of the transformer 3. This circuit would comprise two branched paths. One path would include a low-pass filter 4 and a vacuum tube amplifier 6. The other path would include the resistance network 5 and the vacuum tube amplifier 7. The plate circuit 8 of tube 6 would include the windings 9 of relay R_1, the windings 10 of relay R_2 and the windings of a differential milliammeter 11. The plate circuit 16 of tube 7 would include the windings 17 of relay R_1, windings 18 of relay R_2 and the windings of a differential milliammeter 11. The two plate circuits would be extended from the milliammeter by conductor 12, the winding of relay 13, resistance lamp 14, fuse 25 to the source of plate current 15. The two branched circuits including the filter 4 and the tube 6 and the resistance network 5 and tube 7 will have their constants so adjusted that when the generator 1 is functioning properly, currents of equal value will flow in the plate circuits 8 and 16. The windings 9 and 17 of relay R_1 will oppose each other and the windings 10 and 18 will oppose each other. Hence, if the generator 1 is functioning properly neither of the relays R_1 or R_2 will be operated. Under such conditions, current from the battery 27 flowing through biasing windings 19 and 20 to the ground 30 will hold the armatures of relays R_1 and R_2 in the position shown. This will maintain the auxiliary circuit for the alarm device 23 in an open condition and the alarm device 23 will not function.

If the frequency of the output of the generator 1 should vary beyond desirable limits, the current in the two plate circuits and in the relay windings would not, in effect, neutralize each other. For example, if the frequency of the output of the generator increased beyond desirable limits, relay R_1 would operate and if the frequency of the output of the generator decreased beyond certain limits, the relay R_2 would operate. The operation of relay R_1 would cause its armature to move to its left-hand contact and close the following circuit; from battery 27, contact of switch 29, conductor 31, armature and left-hand contact of relay R_1, winding of alarm device 23, contact and armature of alarm device 23 to ground. This would cause the device 23 to operate in an intermittent manner, such, for example, as a buzzer and give an alarm. When the relay R_1 operates, the following locking circuit will be closed therefor; from battery 27, contact of switch 29, conductor 31, armature and contact of relay R_1, conductor 32, contact of switch 26 and through the holding windings 22 and 21 to the ground 30. This will lock the relay 17 in the operated condition and cause the alarm device 23 to function until the alarm circuit is broken by operating the switch 26. The operation of relay R_2 would cause it to move its armature to its right-hand contact and close a similar operating circuit for the alarm

device 23 and the circuit for the holding windings 21 and 22.

If the generator should fail completely, no current would flow in the operating windings of relay R_1 and R_2 and current in the biasing windings 19 and 20 would hold the armatures in the position shown. The alarm device 23 would not be operated by these relays. Accordingly, the arrangements of the invention provide in the common portion 12 of the plate circuits of the tubes the relay 13. This relay is normally held operated by the current in the plate circuits of the tubes 6 and 7. If the generator output fails, the current in the plate circuits will fail and relay 13 will release. This will close the following circuit; from battery 27, contact of switch 29, conductor 33, armature and contact of relay 23, armature and contact of relay 13, conductor 32, winding of alarm device 23 to ground. Accordingly, if the generator output fails completely, the alarm device 23 will be operated by the release of relay 13. If the fuse 25 should burn out, the relay 13 would be released. In order that the release of the relay 13 for such a cause should not give an alarm, the relay 24 is provided. The burning out of the fuse 25 would also release the relay 24. Accordingly, the circuit for the alarm device 23 would be held open at the contact of relay 24 and the alarm device would not be operated by the release of relay 13. A switch 29 is provided whereby the battery 27 may be disconnected from the alarm arrangements and the battery 28 which supplies current for the filaments of the tubes may be disconnected therefrom.

While the invention has been disclosed as embodied in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. In a telegraph system a generator of signaling frequencies, a frequency indicating circuit connected to the output of said generator, said frequency indicating circuit comprising two branched circuits, one of said circuits including a low pass filter and a vacuum tube amplifier, the other of said circuits including a resistance network and a vacuum tube amplifier, individual plate circuits for said tubes connected to a milliammeter, a common plate circuit for said tubes connecting said milliammeter to a source of plate current, relays having operating windings in each of said individual plate circuits, biasing windings and holding windings for said relays, said operating and biasing windings of said relays being so adjusted that one of said relays will operate in response to an increase from the normal frequency of said generator and the other of said relays will operate in response to a decrease from the normal frequency of said generator, an auxiliary circuit controlling an alarm device, said auxiliary circuit being completed over the contacts of said relays, and means for completing a circuit for said holding windings over the contacts of said relays and said auxiliary circuit whereby said relays will remain permanently locked up until said circuit is opened.

2. In a telegraph system a generator of signaling frequencies, a frequency indicating circuit connected to the output of said generator, said frequency indicating circuit comprising two branched circuits, one of said circuits including a low pass filter and a vacuum tube amplifier, the other of said circuits including a resistance network and a vacuum tube amplifier, individual plate circuits for said tubes connected to a milliammeter, a common plate circuit for said tubes connecting said milliammeter to a source of plate current, relays having operating windings in each of said individual plate circuits, biasing and holding windings for said relays, said operating and biasing windings of said relays being so adjusted that one of said relays will operate in response to an increase from the normal frequency of said generator and the other of said relays will operate in response to a decrease from the normal frequency of said generator, an auxiliary circuit controlling an alarm device, said auxiliary circuit being completed over the contacts of said relays, means for completing a circuit for said holding windings over the contacts of said relays and said auxiliary circuit whereby said relays will remain permanently locked up until said circuit is opened, and switching means for opening said last mentioned means.

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