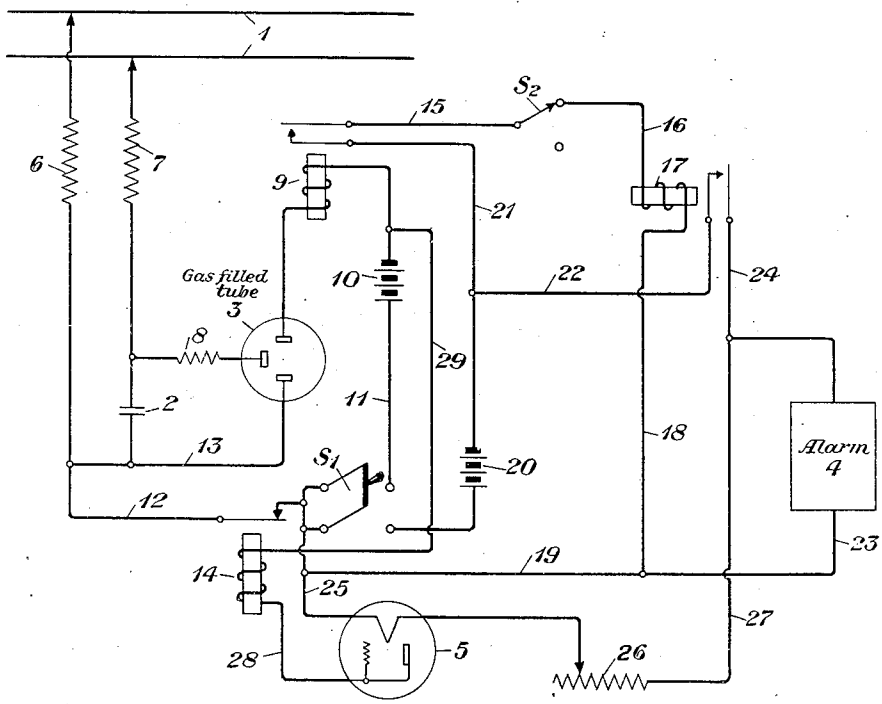
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SIGNALING DEVICE

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SIGNALING DEVICE

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This invention relates to transmission systems and more particularly to signaling or alarm arrangements adapted to be associated with such systems.

One of the uses to which the arrangements of the invention would be particularly adapted would be to convey a signal from a test desk operator to a lineman operating on a telephone line or cable in the field. The arrangements of the invention are readily portable and could be carried by the lineman and attached to the transmission line in the vicinity where he was working. The test desk operator by applying a voltage to the line would cause the arrangements to give any desired one of a variety of signals to tell the lineman to communicate with the test desk operator. A further feature of the invention consists in providing arrangements whereby the throwing of a switch in the device by the lineman will render the alarm silent if he is going without the range of the alarm and whereby the restoring of the switch upon his return to the device will give him an indication that the test desk operator has been signaling him in his absence even though the test desk operator had by that time ceased to apply a signaling voltage to the line. While the device of the invention is particularly adapted for signaling from a test desk operator to a telephone lineman in the field, it could be used with other types of transmission lines or merely for signaling from one point to another. Other objects and features of the invention will appear more fully from the detailed description thereof, hereinafter given.

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

In the drawing the signaling arrangements of the invention are shown connected to a transmission line 1, which, for purposes of illustration may be considered a telephone line. After the lineman connects the set to the telephone line 1 he would close the master switch S_1 and the switch S_2. If the test desk operator now desires to signal the lineman for any desired reason, such as to tell him to call the desk, he will apply a voltage to the line. This will cause a charge to accumulate on condenser 2, which, when it reaches sufficient magnitude, will cause the operation of a gas filled discharge 3 and complete a circuit through the tube. This in turn will cause the completion of a second circuit which will complete a circuit for an alarm device 4. The completion of the last circuit will complete a circuit which after an interval will operate a vacuum tube 5. When this tube operates it will cause the first mentioned circuit for the gas filled tube 3 to be broken. The foregoing cycle of events will then be repeated. It is pointed out that all of the circuits of the device are completed over the contacts of the master switch S_1 and as this switch will be open when the device is not in use there will be no unnecessary drain on the battery supply. In this way, as will be pointed out hereinafter in more detail, distinctive signals of variable kinds may be transmitted from the test desk operator to the lineman in the field.

The invention may be more fully understood from the following detailed description of its operation. As heretofore pointed out, the lineman will bridge the signaling device of the invention across the telephone line 1. In the connection illustrated are shown the resistors 6 and 7 in series with a condenser 2. The resistors 6 and 7 have their constants so chosen that the signaling device will not interfere with transmission over the telephone line. The condenser 2 is connected through resistance 8 to the control electrode of a gas filled tube 3. The capacity of condenser 2 is such that, together with the resistors 6 and 7, it will form a delay circuit which will prevent transient disturbances on line 1, such as static or cross fire of shorter duration than two seconds, from causing false operation of the equipment. If the test desk operator desires to signal the lineman he will apply a voltage to the line 1. This will cause a charge to accumulate on condenser 2. Its capacity is such that after approximately two seconds the magnitude of this charge will be sufficient to break down the gas filled tube 3 and cause it to be conductive. This will close the following circuit: From the upper electrode of tube 3, winding of relay 9, battery 10, conductor 11, the upper contacts of switch S_1, contact and armature of relay 14, conductors 12 and 13 to the lower electrode of tube 3. The closing of this circuit will operate relay 9, which will close the following circuit: From contact and armature of relay 9, conductor 15, contact arm and upper contact of switch S_2, conductor 16, winding of relay 17, conductors 18 and 19, lower contacts of switch S_1, battery 20, conductor 21 to the contact and armature of relay 9. The closing of this circuit will operate the relay 17, which will close the following circuit: Armature and contact of relay 17, conductor 22, battery 20, lower contacts of switch S_1, conductors 19 and 23, through alarm device 4, and over conductor 24 to the armature and contact of relay 17. This will cause the alarm device 4 to function. The alarm device 4 may be any desirable type of alarm and may be either a visual or audible type of alarm. The operation of relay 17 will also close the following circuit: From contact and armature of relay 17, conductor 22, battery 20, lower contacts of switch S_1, conductor 25, filament of vacuum tube 5 through the variable resistance 26 and over conductor 27 to the armature and contact of relay 17. This will cause the filament of the tube 5 to heat up and after a certain interval,

which may be determined by the variable resistance 26, the tube 5 will become operated and close the following circuit: From battery 10, conductor 11, upper contacts of switch S_1, conductor 25, the filament and plate of tube 5, conductor 28, winding of relay 14, and over conductor 29 to battery 10. This will operate the relay 14 which will open at its armature and contact the previously traced circuit through the gas filled tube 3. When the circuit through the gas filled tube 3 is opened, the relay 9 releases and this in turn releases the relay 17. The release of relay 17 opens the previously traced circuit for the alarm device 4 and causes it to cease functioning and also opens the previously traced filament circuit of the tube 5 and will cause the tube 5 to cease functioning. This in turn will release relay 14 and will restore the arrangements to their initial condition. The voltage from line 1 will then again build up a charge on the condenser 2 until the tube 3 again breaks down. This will cause the aforementioned cycle of events to be repeated. Accordingly, the arrangements of the invention will cause the alarm device 4 to function in an intermittent manner to give a distinctive signal to the lineman. The resistance 26 is shown as variable and its value may be utilized to control the period of pulsations delivered to the alarm device 4.

A further feature of the arrangements of the invention consists in the provision of the switch S_2 with a second or "absent alarm" position. If after the lineman has connected the device of the invention to the telephone line he finds that he has to move outside of the range of the device, he will throw the switch S_2 to the lower position or "absent alarm" position. When the test desk operator applies a voltage to line 1, the condenser 2 will charge up and break down the gas filled tube 3 and close the previously traced circuit through relay 9. As the switch S_2 is on the "absent alarm" position the operation of relay 9 at this time will not operate the relay 17, and hence relay 14 will not be operated to open the circuit through the gas filled tube 3. Hence the relay 9 will remain locked up even though the test desk operator may remove her signaling voltage from the line. Due to the fact that relay 17 is not operated the alarm 4 is not operated at this time. When the lineman returns to the device he will move the switch S_2 from the "absent alarm" position to its normal position. As the relay 9 is operated this will cause relay 17 to operate and close the previously traced circuit for the alarm device 4. Eventually the tube 5 will operate and cause relay 14 to operate, which in turn will break the circuit through the gas filled tube 3 and release relay 9. However, one cycle of operations will have been started up and completed in the arrangements and the alarm device 4 will give an indication of this. This will signify to the lineman that the test desk operator has been in his absence attempting to communicate with him.

While the arrangements of the invention have been disclosed as embodied in certain specific forms which are deemed desirable, it is understood that they are 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. A signaling device adapted to be connected to a transmission line including a master switch, a plurality of different circuits all including contacts of said master switch, means in the first of said circuits operable after a voltage has been applied to said transmission line for a definite interval of time for completing said first circuit over contacts of said master switch, a relay in said first circuit operable when said circuit is completed, means controlled by the operation of said relay for completing the second of said circuits over contacts of said master switch, a relay in said second circuit operable when said second circuit is completed, an alarm device controlled by said last mentioned relay, slow operating means for interrupting said first circuit controlled by said last mentioned relay, and a second switch for opening or closing said second circuit.

2. A signaling device adapted to be connected to a transmission line including a master switch, a plurality of different circuits all including contacts of said master switch, means in the first of said circuits operable after a voltage has been applied to said transmission line for a definite interval of time for completing said first circuit over contacts of said master switch, a relay in said first circuit operable when said circuit is completed, means controlled by the operation of said relay for completing the second of said circuits over contacts of said master switch, a relay in said second circuit operable when said second circuit is completed, means controlled by the operation of said last mentioned relay for completing the third and fourth of said circuits, an alarm device in said third circuit, delay means and a responsive device in said fourth circuit, said responsive device being adapted when operated to complete the fifth of said circuits, a relay in said fifth circuit operable when said fifth circuit is completed, and means controlled by the operation of said last mentioned relay for opening said first circuit.

3. A signaling device adapted to be connected to a transmisison line, said signaling device including a condenser arranged to accumulate a charge when a voltage is applied to said line, a master switch, a gas filled discharge tube, a first circuit including a source of voltage greater than the sustaining voltage of said tube and including two of the electrodes of said tube and contacts of said master switch, means for connecting the control electrode of said tube to said condenser whereby when the charge thereon reaches a certain value said tube will break down and complete said first circuit, a second circuit including contacts of said master switch, a second switch controlled by the completion of said first circuit for completing said second circuit over the contacts of said master switch, a signaling circuit including contacts of said master switch, means operative when said second circuit is completed for completing said signaling circuit over the contacts of said master switch, and slow-operate means connected to contacts of said master switch and controlled by the completion of said second circuit for opening said first circuit whereby said second circuit will be reopened.

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