

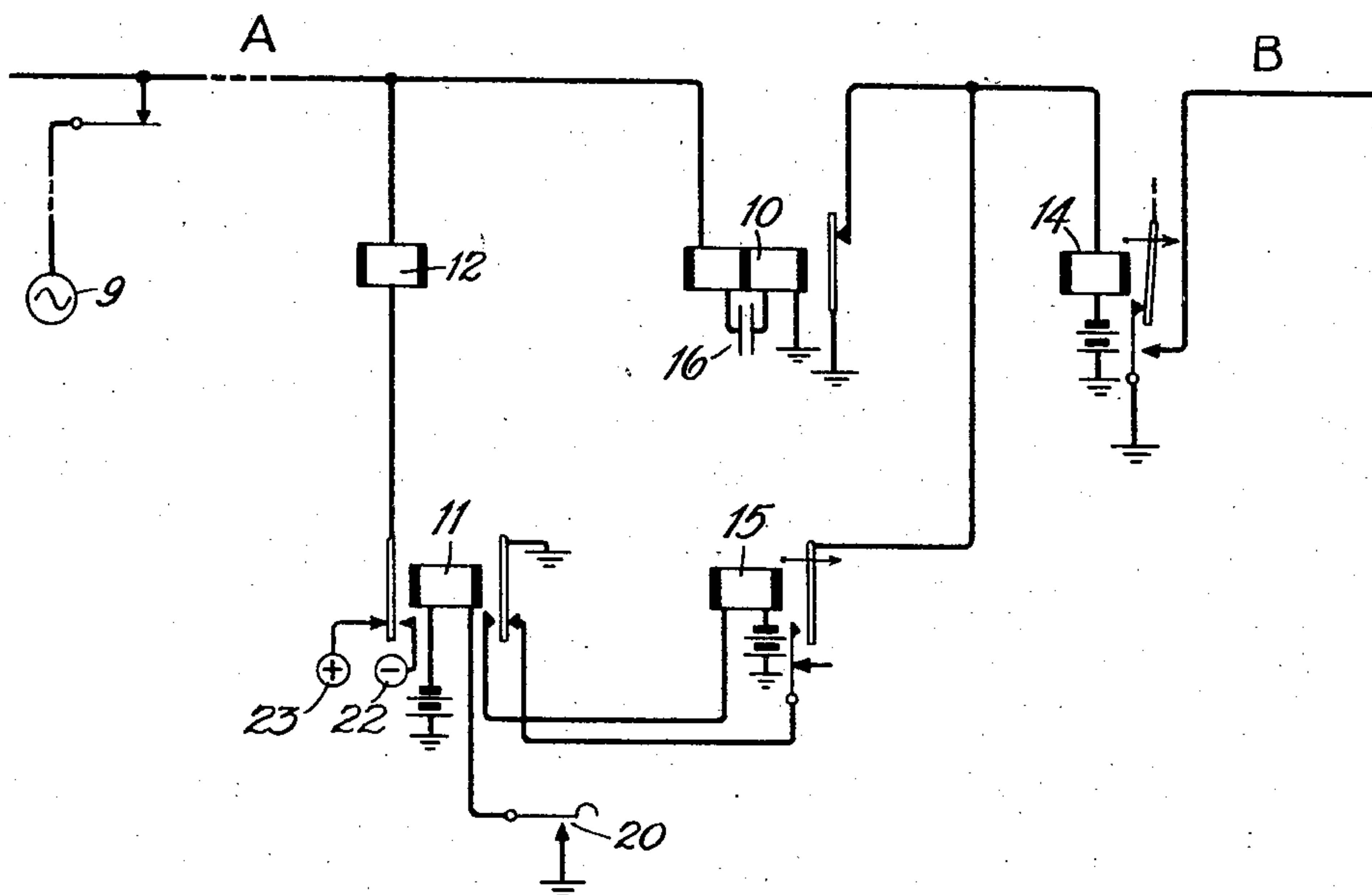
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J. B. SHIEL

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TELEPHONE SYSTEM

Filed March 31, 1926



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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

Application filed March 31, 1926. Serial No. 98,662.

This invention relates to telephone systems, and more particularly to signal transmitting and receiving arrangements.

In prior telephone systems, of the general type disclosed in the copending application of Lewis A. Mortimer, Serial No. 667,788, filed October 11, 1923, which became Patent 1,617,413 dated Feb. 15, 1927, the circuit conditions may under certain circumstances be such that various supervisory signals will cause the usual ringing control relays to produce false ringing signals. It is evident that such false signaling is not likely to occur except in rare instances when, for example, the electrical characteristics of supervisory signals are practically the same as those of the standard currents employed for the operation of the ringing control relays.

It is an object of this invention to prevent false ringing signaling being produced by supervisory or other signals in systems of the above mentioned type.

To attain this object there is provided, in accordance with one feature of the invention, a circuit, including a line and a ringing control relay responsive to standard ringing signals transmitted over the line in one direction, so arranged that other signals, such for example as busy or supervisory signals, when transmitted over said line in the opposite direction will not interfere with the operation of the ringing control relay, even though such signals may have the same characteristics as said ringing signals.

Other objects and features of the invention will become apparent from the following description and claims.

The accompanying drawing illustrates an embodiment of the invention in its simplest aspects. The invention has not been applied to any particular system as it is capable of being used with any telephone system in which the circuit conditions are such that busy signals or other signals that might have the same characteristics as ringing signals, may be transmitted to the same line over which ringing signals are received.

This drawing shows a line A over which it is assumed ringing signals are received for the operation of the ringing control relay 10 and to which supervisory signals may be transmitted through the operation of the control relay 11. If the supervisory signals, produced by the operation of relay 11 and intended for signaling out over the line A,

happen to be of the same general character as ringing signals incoming over the line A from source 9, relay 10 may be affected by such signals. As this ringing relay controls the transmission of ringing signal indications over line B through the operation of relay 14 it is evident that some means must be provided to prevent these ringing signal indications from being effected under the above mentioned circumstances. To this end the circuit arrangement including relay 15 and controlled by relay 11 is provided.

To make clear the functions of this circuit in detail, a description will first be made of the production of signal indications outgoing over line B by ringing signals incoming over line A; second, a description of the functioning of the circuit when supervisory signals are transmitted out over the line A; and third, a description of the functioning of the means to prevent the production of signal indications over line B if outgoing supervisory signals are of the same character as incoming ringing signals.

Assuming that ringing signals are incoming over the line A from source 9 the characteristics of relay 10 are such that it will readily respond, due to the alternate charging and discharging of the condenser 16 through the two windings of the relay, in a manner well known in the art. Relay 10 in operating opens an obvious circuit for the slow-to-release relay 14 which in releasing closes a connection to ground for line B. In other words, ringing current signals incoming over line A will operate relays 10 and 14 to establish a connection to ground for line B. This application of ground to line B may be employed for the establishing of ringing signal indications in associated circuit connections in various manners well known in the art.

Referring now to the transmission of signals out over the line A, it will be noted that the manipulation of key 20 will close and open an obvious energizing circuit for relay 11. On each operation of relay 11, current from the negative source 22 is transmitted through the left hand armature and front contact of relay 11 to line A and on each release of this relay, current from the positive source 23 is transmitted through the left hand armature and back contact of relay 11 to line A.

If key 20 should happen to be actuated at

the same or approximately the same frequency as the frequency at which ringing signals are received over line A, the impulses from sources 22 and 23 would naturally occur at the same frequency and consequently have the same effect on relay 10 as the regular ringing signals. Under these circumstances, therefore, relay 10 would operate but, as presently will become apparent, this would have no effect on relay 14 and consequently, no signal indications would be transmitted over line B.

Relay 14 will be held energized through circuit connections established by relay 11 and relay 15. On the first operation of relay 11 an obvious energizing circuit for relay 15 is closed through the right hand armature and front contact of relay 11 to ground and as relay 15 is slow to release it will ordinarily remain operated during the succeeding alternate release and operation of relay 11. On the first release of relay 11, a circuit will therefore be established for holding relay 14 energized as follows: battery, winding of relay 14, armature and front contact of relay 15, right hand armature and back contact of relay 11 to ground, and as relay 14 is also slow to release, it will remain operated during the succeeding alternate operation and release of relay 11. The operation of relay 10 due to the impulses from sources 22 and 23 will therefore not produce any signal indications on line B.

The operation of relay 11 need not necessarily be caused by the key 20 but various circuit connections may be made so that relay 11 will respond to busy signals or other supervisory signal operations, such as the operations of a connected subscriber's switch-hook.

It is often desirable that the line A should be a part of a circuit where other signals, such as dialing signals, are incoming over the line to operate a dialing or line relay 12. In this case the dialing signals would merely be a connection to ground at the opposite end of line A and relay 12 would operate from currents supplied from source 23 or 22, depending on whether relay 11 is operated at the time. Under these conditions, it may occur that these incoming signals are

of the same general character as the ringing signals. However, as dialing signals incoming over line A are considerably weaker than current signals directly from sources 23 and 22, their effect on relay 10 is not likely to be very disturbing. Furthermore, each group of dialing impulses is limited in number so that the likelihood of any prolonged similarity in the frequency of these impulses to the frequency of the ringing signals, is rather remote. In any event it has been demonstrated in the practical application of this invention that ordinary dialing impulses or other isolated signals incoming over line A will not produce any effect on relay 14, as even though relay 10 might occasionally be momentarily operated, relay 14 being slow to release would not be disturbed.

The conditions to be met by a circuit of this type are, therefore, as follows: Ringing signals incoming over line A must produce signal indications over line B, whereas other similar incoming signals over line A of a weaker nature and similar signals outgoing over line A of a stronger nature, must not effect signal indications over line B.

What is claimed is:

1. In a telephone system, a line, a relay connected to said line responsive to alternating current of a certain character, means responsive to said relay for actuating a signal, means for transmitting signaling impulses over said line of a character to which said first relay will respond, and relay means controlled by said last means for preventing the response of said first means to said relay.
2. In a telephone system, a line, a first relay connected to said line responsive to alternating current of a certain character, a second relay responsive to said first relay for actuating a signal, a third relay for transmitting signaling impulses over said line of a character to which said first relay will respond, and a fourth relay controlled by said third relay for preventing the response of said second relay to said first relay.

In witness whereof, I hereunto subscribe my name this 30 day of March, A. D. 1926.

JOHN B. SHIEL.