

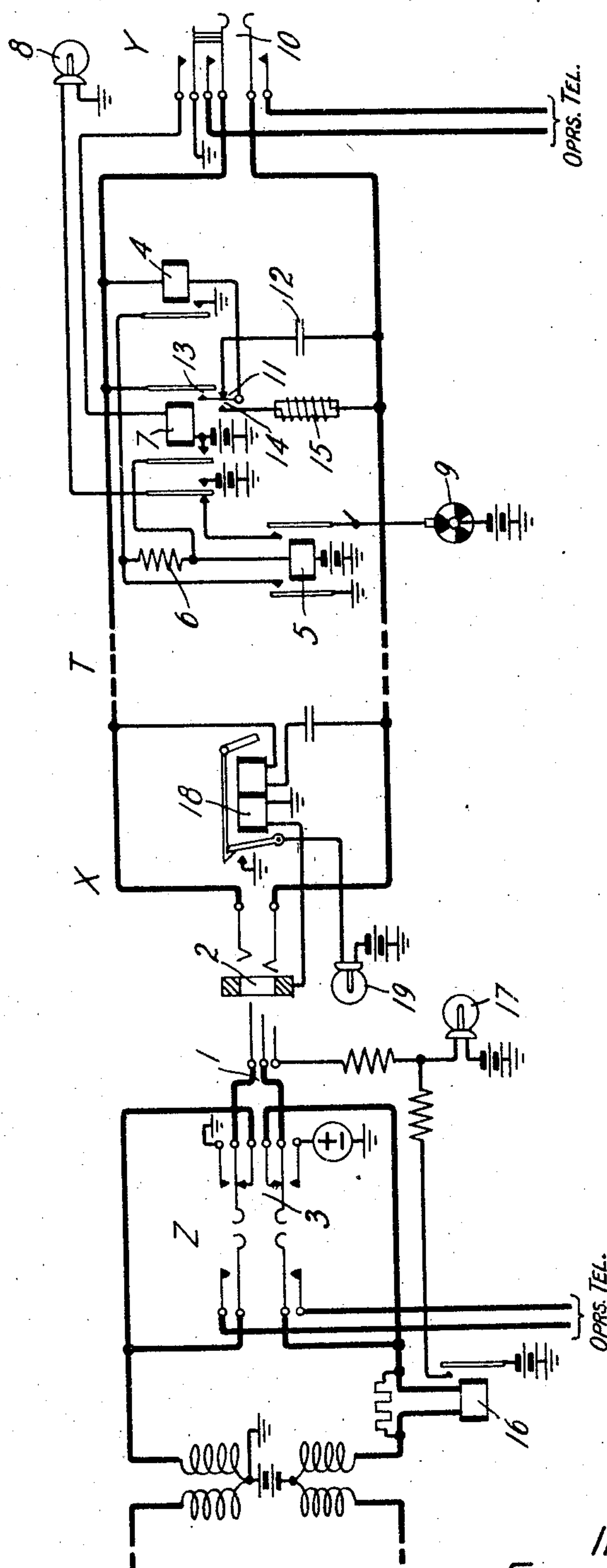
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM.

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This invention relates to telephone systems and more particularly to telephone lines which employ what is known as a ringup relay for controlling a signaling device.

5 In trunking systems, as for example trunk lines between a chief operator's desk and a test desk, which employ a ringup relay in series with a condenser bridged across the trunk line at the test desk end difficulty has
10 been experienced by the false operation of this relay when the test desk attendant disconnects from the trunk while the connection at the other end of the trunk is still established. This trouble is due to the direct current
15 potential supplied to the trunk from the chief operator's cord circuit which causes a surge of current through the relay and condenser which is usually of sufficient strength to energize the ringup relay and cause the
20 signal at the test desk to be falsely displayed.

This condition has in the past been taken care of by interposing a chain of slow acting relays between the contacts of the ringup relay and the signal device thereby requiring
25 that the ringup relay be operated for a longer time interval than the duration of the surge of current occasioned by the condenser charge in order to cause the display of the signal.

By the present invention an improved and
30 simplified circuit is provided whereby the effect of the current surge under the condition above mentioned is overcome without resorting to the more complicated slow relay arrangement referred to.

35 A complete understanding of the invention will be obtained from the following description when read in connection with the accompanying drawing which illustrates one embodiment thereof.

40 As shown on the drawing, the trunk circuit T extends from a chief operator's desk X to a test desk Y. At the desk X there is provided a cord circuit Z of the well-known battery feed type.

45 In case the chief operator desires to call the test desk, plug 1 is inserted in jack 2 of the trunk T and the ringing key 3 operated thereby connecting ringing current to the trunk and causing the operation of the ringup relay 4 at the test desk. The operation of
50 relay 4 operates relay 5 in an obvious circuit including the resistance 6. Relay 5 in operating locks up under control of cutoff relay 7 and completes a circuit to permit the flash-

ing of the line lamp 8 under control of in- 55
terrupter 9.

When the test desk attendant answers the call by operating the key 10 to the talking position an obvious circuit is completed for the operation of relay 7 which when operated
60 short-circuits the winding of relay 5 at the inner left alternate contacts of relay 7. Relay 5 is thereby released. The operation of relay 7 also breaks, at its outermost left contacts, the flashing circuit for lamp 8 and substitutes a solid battery and ground thereby
65 causing the steady illumination of lamp 8 to indicate a trunk busy condition.

Further, the operation of relay 7 opens, at its contacts 11, the AC bridge circuit across
70 the trunk which includes the ringup relay 4 and condenser 12 and at its contacts 13 short-circuits the winding of ringup relay 4 and at its contacts 14 bridges the retardation coil 15 across the tip and ring conductors of the
75 trunk thereby causing the supervisory relay 16 in the chief operator's cord circuit Z to operate thereby shunting out the supervisory lamp 17 which was lighted when the cord was first plugged into the trunk to indicate to
80 the chief operator that the test desk attendant has connected his telephone set to the trunk and that the circuit is ready for conversation.

When the conversation is completed the test desk attendant restores key 10 to normal
85 thereby releasing relay 7 which disconnects the retardation coil 15 from across the tip and ring of the trunk thereby deenergizing supervisory relay 16 in the chief operator's cord-circuit which in turn permits lamp 17 to again
90 be lighted which indicates to the chief operator that the test desk attendant has disconnected. The release of relay 7 also opens the circuit of lamp 8 which is thereby extinguished. 95

The contact spring arrangement associated with the right hand armature of relay 7 is so arranged that contacts 14 will first open and disconnect the retardation coil 15 from across the trunk conductors. Contacts 11 will next
100 make to connect condenser 12 across the trunk and lastly contacts 13 will break and remove the short circuit from the relay 4. In case battery is connected across the trunk conductors at the time the test desk attendant disconnects, due to the fact that the chief operator's cord is still connected to the trunk, the condenser 12 will be charged to the potential 105

of the battery before the short circuit around the winding of relay 4 is broken.

By this arrangement, whereby the condenser is fully charged before the short circuit is removed from relay 4, relay 4 is not falsely operated, thereby causing the lamp 8 to flash, which would be the case should the condenser receive its charges in series with the relay winding. After condenser 12 has received its charge no current flows through relay 4 when its short circuit is removed.

In case the test desk attendant desires to call the chief operator he operates key 10 to the talking position which causes the operation of relay 7, which in turn causes lamp 8 to be steadily illuminated as a trunk busy indication. Operation of relay 7 also short-circuits relay 5, opens the alternating current bridge including the relay 4 and condenser 12, short-circuits the winding of relay 4 and connects the retardation coil 15 across the trunk conductors. Ringing current is then applied to the trunk by means of a key in the test desk attendant's telephone circuit, not shown, thereby operating the drop 18 bridged across the trunk at the chief operator's end of the trunk which in turn completes an auxiliary circuit to light the lamp 19. The chief operator answers the call in the usual way and the operation of the circuit from this point is the same as previously described.

While the present invention has been described as applied to a trunk circuit between a chief operator's desk and a test desk, it should be understood as applicable in principle to any telephone lines employing bridged ringup relays which may be falsely operated due to the disconnection of the operator at that end before the operator at the other end disconnects.

What is claimed is:

1. In a telephone system a line, a relay and a condenser in series connected in bridge of said line, switching means adapted when operated to open said bridge and when released to momentarily connect said condenser in bridge of said line to the exclusion of said relay.

2. In a signaling circuit including a source of direct current, a bridge across the circuit including a relay and a condenser in series, means when operated for removing said bridge and when released for momentarily connecting said condenser across said circuit to permit it to charge from said source to the exclusion of said relay, and subsequently re-

connecting said relay in series with said condenser.

3. In a signaling circuit including a source of direct current, a bridge across the circuit including a relay and a condenser in series, switching means adapted when operated for opening said bridge circuit and short-circuiting said relay and when released for connecting said condenser across said circuit to receive a charge from said current source and subsequently removing said short-circuit to thereby restore said series bridge.

4. A signaling circuit including a source of direct current, a bridge across the circuit including a relay and condenser in series, means for removing said bridge and substituting another bridge, means for restoring the first mentioned bridge including means for connecting said condenser across the circuit to permit it to charge and subsequently placing said relay in series therewith.

5. In a telephone system, an operator's position, a line terminating thereat, a relay and a condenser in series normally bridged across said line, means responsive to the seizure of said line at said position to open said bridge circuit and responsive to the release of said line to connect said condenser in bridge of said line to the momentary exclusion of said relay.

6. In a telephone system, an operator's position, a line terminating thereat, a relay and a condenser normally bridged across said line in series, means responsive to the seizure of said line at said position to open said bridge and to short-circuit said relay and responsive to the release of said line to reestablish said bridge and to maintain said short-circuit for a momentary interval thereafter.

7. In a telephone system, a line, an operator's position at one end thereof, a condenser and a relay in a series bridge across said line at said position, a source of direct current connected across the other end of said line, means at said position for seizing said line and other means first responsive to said seizure for opening said bridge and thereafter responsive to the release of said line for restoring said bridge and for preventing said relay from being energized while said condenser is being charged from said current source.

In witness whereof, I hereunto subscribe my name this 27 day of June A. D., 1927.

FRANKLIN A. KORN.