Jan. 29, 1935. R. H. LESOINE 1,989,621

FRAUD PREVENTING TELEPHONE SYSTEM

Filed April 26, 1933

Fig. 1.

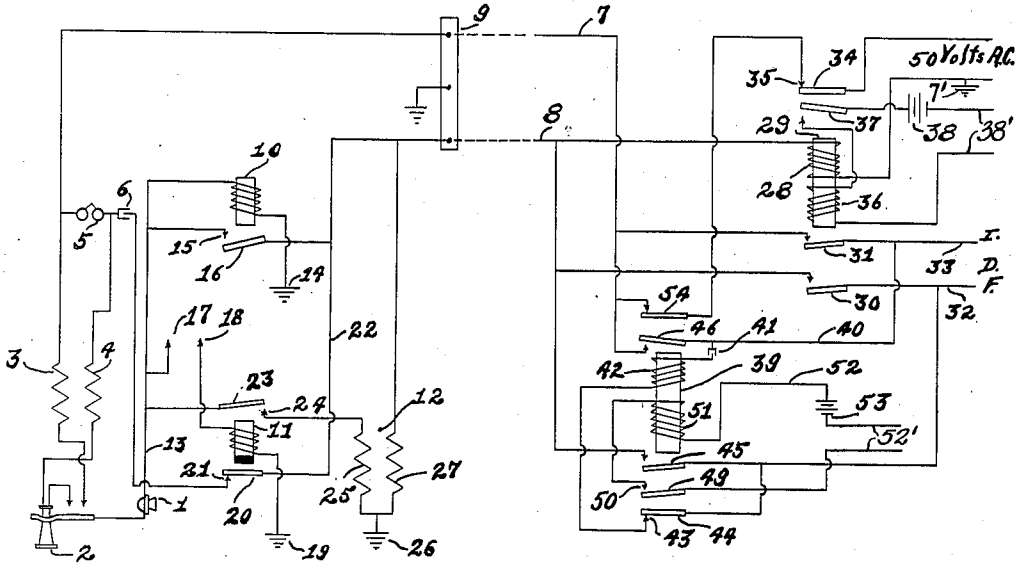
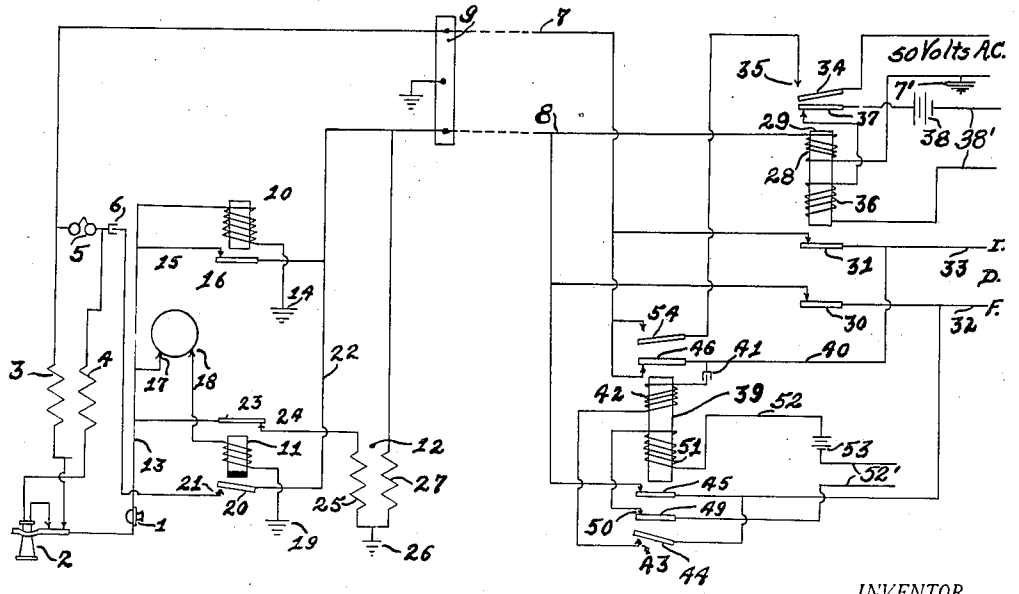


Fig. 2.



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FRAUD-PREVENTING TELEPHONE SYSTEM

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13 Claims. (Cl. 179—6.4)

This invention relates to a telephone system, and more particularly to a telephone system wherein it is necessary to deposit a coin before a desired connection may be fully established.

In systems of this character, it is customary to provide the substation of a subscriber's line with a coin box and to effect the establishment of a desired connection by the deposit of a coin in the coin box. The coin box is ordinarily provided with a magnet for causing the refunding or collection of the coin, and with contact means operated by the deposit of the coin for connecting the magnet from one conductor of the line to ground. Various forms of mechanical devices have been devised in a manner to be tripped by the coin. In systems now in use, it has been the practice frequently for unscrupulous subscribers to "beat" the coin box and avoid payment by simulating the deposit of a coin by merely establishing a connection in a manner to ground one side of the line independently of the coin box.

The main object of my invention is to provide a system wherein it is impossible to establish a desired connection except by actual deposit of a coin in the box.

Another object is to simplify the coin actuating mechanisms which have heretofore been employed in prepayment systems.

Another object is to provide a system wherein the central office switching devices are entirely free from the line until put into the line circuit upon operation of a relay responsive to the deposit of a coin.

Another object is to provide a system wherein an auxiliary circuit is employed to permit operation of the call bell therethrough as well as the use of this circuit for a normal talking circuit.

Other objects will become apparent from a study of the detailed description which follows when considered with the accompanying drawing, wherein—

Figure 1 is a view showing circuit connections prior to deposit of a coin; and

Fig. 2 is a view showing circuit connections set up by deposit of a coin as well as a ringing and auxiliary talking circuit.

Referring to the drawing in detail, the well known subscriber's station comprises the transmitter 1, receiver 2, primary 3, secondary 4, call bell 5, and condenser 6. The main talking circuit includes conductors 7 and 8 and the associated protector 9. In accordance with my improved system, the station shown is provided with supplemental equipment which comprises relays 10 and 11 and a transformer device 12. The conductors 7—8 are energized from a source of 50 volts alternating current at the central station. The conductor 8 is grounded at 7' at the exchange. The coin controlled relay 11 is responsive to the 50 volts A. C., whereas the relay 10 is responsive only to the direct current and voltage which is impressed on the conductors 7—8 during use of the station shown. The return line 13 from the transmitter is connected in series with the coil of relay 10 to ground at 14. A shunt circuit from line 13 to conductor 8 will be closed at contact 15 when the armature 16 pulls up. A coin controlled gap is formed by contacts 17—18, contact 17 being connected to line 13, and contact 18 is connected through coil of relay 11 to ground at 19. The armature 20 normally closes the ringing circuit from condenser 6 to a contact 21 and through conductor 22 to conductor 8. The line 13 is also connected to the armature 23 which normally breaks circuit at contact 24 when the relay 11 is deenergized. Closing of contact 24 permits alternating current to pass from line 13 through the primary 25 of the transformer 12 to ground at 26. The relay 11 is made slow acting to permit contacts 23—24 to remain closed until certain other relays are operated. The secondary 27 is connected to conductor 8. The current generated in this secondary will pass over conductor 8 through a coil 28 on a relay 29 at the central station. The function of this relay 29 is to break the A. C. circuit through line 7, and to connect the main direct current talking circuit to conductors 7—8 at the central station.

When relay 29 is energized, its armatures 30, 31 are pulled up to connect conductors 32, 33 from the intermediate distributing frame to the main line conductors 7, 8. At the same time, the armature 34 is pulled in to open up the A. C. supply to conductor 7 at contact 35. The relay 29 is retained energized by a holding coil 36 in circuit with an armature 37, and a battery 38. The terminals 38' of this circuit lead to a clearing or like relay in the central station which is operated when both subscribers hang up after a call and in a manner to open this holding circuit.

Ordinarily, when no call has emanated from the subscriber's station, the main talking circuit is open at armatures 30, 31 and I have provided an auxiliary ringing and talking circuit to be used when a call is transmitted from the central station. A multiple armature relay 39 is used to control this ringing circuit. Ringing current may pass from conductor 33 through line 40, condenser 41, coil 42, normally closed contact 43, armature 44 and back to conductor 32. This cur-

rent will energize relay 39 to pull in armatures 45 and 46 to connect conductors 32 and 33 to main conductors 7, 8. A holding circuit for relay 39 is made by an armature 49, through its contact 50, holding coil 51, conductor 52 and battery 53. The terminals 52' of this holding circuit lead to a clearing or like relay in the central station in a manner to open this circuit when subscribers hang up after a call. An armature 54 is provided to be pulled in by energization of relay 39 to break the circuit to conductor 7 to remove A. C. energization therefrom.

In operation, the subscriber must first remove his receiver to initiate his call, after which he will deposit a required coin which is shown in Fig. 2 as shunting the contacts 17, 18. Alternating current will then pass from line 7, through the primary 3, receiver hook, transmitter 1, line 13, and coil of relay 11. This will cause armatures 20 and 23 to pull in. The ringing circuit will be broken at contact 21. The primary 25 will be energized from line 13 through the armature 23 and contact 24. The transformer 12 is so wound that 50 volts on its primary will generate about 150 volts in the secondary 27. The relay 29 is designed to operate on about 150 volts but not at 50 volts the normal line current. Operation of relay 29 is effective to pull in armatures 30, 31 to connect conductors 32, 33 to main conductors 7, 8 and, simultaneously, the A. C. supply to line 7 is broken at contact 35. At this instant, the subscriber will receive the dial tone and may proceed with his call. When armatures 30, 31 are pulled up, the usual direct current and voltage is impressed on lines 7, 8 and direct current will pass through coil of relay 10, pull in its armature 16 and connect lines 7 and 13 to return line 8, and this operation will afford a direct current supply to the circuit of transmitter 1. When central puts through a call, ringing current is impressed on conductors 32, 33 and relay coil 42 to pull in its armatures 45, 46, which, in turn, will connect conductors 32, 33 to lines 7, 8 and permit operation of call bell 5.

It will be noted that the 50 volt circuit closed at contacts 17, 18 will be broken an instant later at contact 35. Prior to this operation, however, no station switching devices are connected to main lines 7, 8 which are open at armatures 30, 31. It is important to note that no circuit or conductor is available at the subscriber station that can be grounded to impress 50 volts on the primary 25. Furthermore, in case a short circuit is established across lines 7, 8, this would merely impress 50 volts on relay 29 which would not be sufficient to operate this relay. It should be obvious from this disclosure that no opportunity nor means are offered that would permit a subscriber to make connection for a call in any manner except by deposit of a required coin.

What I claim is—

1. In a telephone system, the combination of a central station, a substation, a line connecting the central station and substation, and a coin controlled device at the substation, a line switching device comprising a relay at said central station, a return circuit between said stations and in series with a winding of said relay, and means at said substation operably responsive to deposit of a coin for impressing alternating current on said return circuit and winding to operate said switching devices.

2. In a telephone system, the combination of a central station, a substation, a line connecting the central station and substation, and a coin controlled device at the substation, a step-up transformer at said substation comprising primary and secondary coils, means at said substation responsive to deposit of a coin for passing alternating current from said line through the transformer primary, a line switching device comprising a relay at said central station, and a return circuit in series with the transformer secondary and a winding of said relay.

3. In a telephone system, the combination of a central station, a substation, a line connecting the central station and substation, and a coin controlled device at the substation, a line switching device comprising a relay at said central station, a return circuit between said stations and in series with a winding of said relay, means at said substation responsive to deposit of a coin for impressing alternating current on said return circuit and winding, and means operably responsive to operation of said relay for connecting said line to said line switching devices.

4. In a device as set forth in claim 1, means operably responsive to operation of said relay for cutting off the supply of alternating current to said line.

5. In a device as set forth in claim 1, a holding circuit for said relay, and means responsive to energization of the relay for energizing the holding circuit to maintain said switching devices in operative position.

6. In a telephone system, the combination of a central station, a substation, a line connecting said stations and connected to an alternating current supply, a coin controlled device at the substation, a relay at the substation and operable in response to the deposit of a coin, an alternating voltage on said line, a return circuit between said stations, an inductive coupling between said line and return circuit, means to energize said coupling upon operation of said relay, a relay at said central station in series with said return circuit, a distributing frame, and means for connecting said line and return circuit to said frame upon operation of said last named relay.

7. In a telephone system, the combination of a central station, a substation, a line connecting said stations, and a coin controlled device at the substation, means for impressing an alternating voltage on said line, a line switching device comprising a relay at said central station, said relay being responsive only to voltages higher than the voltage impressed on said line, a return circuit, means at said substation responsive to deposit of a coin for stepping up the alternating voltage and impressing the increased voltage on said return circuit, said circuit being connected in series with a winding of said relay.

8. In a telephone system, the combination of a central station, a substation, a line connecting said stations, and a coin controlled device at the substation, means for impressing an alternating voltage on said line, line switching devices comprising a relay at said central station, a return circuit between said stations and in series with a winding of the relay, means at the substation responsive to deposit of a coin for energizing said relay to connect the line and circuit to said switching devices, and a ringing circuit at said central station for impressing ringing current on said line and circuit while said relay is inoperative to connect said switching devices.

9. In a system as set forth in claim 8, a ringing relay, said ringing circuit being open to said line and circuit at said ringing relay, said ringing

relay being operably responsive to ringing current to connect the ringing circuit to the line and return circuit.

10. In a system as set forth in claim 8, a ringing relay having an exciting coil, an auxiliary circuit in shunt with the ringing circuit, said auxiliary circuit including said coil and a condenser, the ringing current being effective to operate the ringing relay, and means for connecting the ringing circuit to said line and return circuit upon operation of the ringing relay.

11. In a system as set forth in claim 8, a ringing relay, said ringing circuit being open to the line and return circuit at said ringing relay, said ringing relay being operably responsive to ringing current to connect the ringing circuit to the line and return circuit, and a holding circuit for said ringing relay for permitting talking currents to pass through said ringing circuit.

12. In a telephone system, a central station and a substation, line conductors forming a circuit between said stations, a relay at said central station and in series with one line conductor, means for impressing a low alternating voltage across said lines, said relay being unresponsive to normal low voltage alternating current in said lines due to a short circuit between said lines, and means operably responsive to the deposit of a coin at the substation for increasing said voltage sufficiently to permit operation of the relay.

13. In a system as set forth in claim 12, a ringing relay, an auxiliary ringing circuit, the latter circuit being normally open at the ringing relay, said ringing relay being operably responsive to ringing current to connect the ringing circuit to the line conductors, and means operably responsive to operation of the ringing relay for disconnecting the source of alternating voltage from the lines.

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