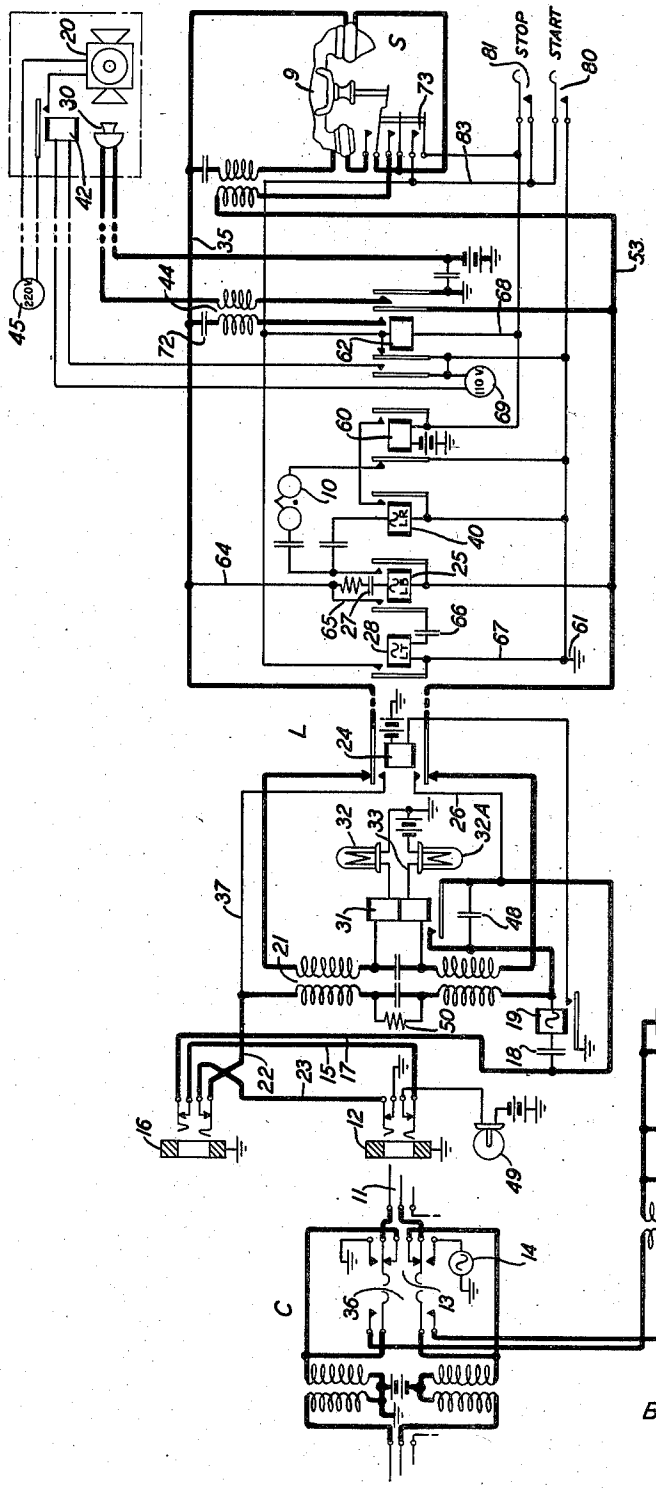
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COMBINED TELEPHONE AND FIRE ALARM SYSTEM

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COMBINED TELEPHONE AND FIRE ALARM SYSTEM

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10 Claims. (Cl. 179—5)

This invention relates to systems of remote control and particularly to combined telephone and fire alarm signaling systems and constitutes an improvement over a similar system disclosed in the patent application of R. C. Bradford, Serial No. 4,545, filed February 1, 1935.

In the above-identified application there is disclosed a system of remote control in which a telephone line circuit, normally adapted for the transmission of speech currents between a central office and subscriber's station, is utilized as the medium over which signaling devices located at a point remote from the central office may be controlled by a central office operator.

It is the object of this invention to provide an improved system of the above character.

This object is attained in accordance with a feature of the invention by the provision of means at the subscriber's station for rendering possible the actuation of a fire alarm signal by the subscriber, which heretofore, was capable of operation only by an operator at the telephone exchange.

Another feature of the invention resides in a circuit arrangement which permits a central office operator to effect the operation of the fire alarm for test purposes and to subsequently silence the alarm without causing the operation of the station signal to give a false ringing signal.

These and other features of the invention will be readily understood from the following detailed description made with reference to the accompanying drawing which discloses the telephone line circuit L of this invention and an operator's cord circuit C and associated equipment, by virtue of which signaling equipment located at a substation S and at a point remote from the substation may be controlled.

The line L terminates at the central office in a pair of jacks, one of which is utilized by the operator in establishing a telephone connection with the substation S which is provided with the usual type ringer 10 and telephone set, and the other of which is employed by the operator in transmitting a fire signal to the station S or to some remote point at which the fire siren 20 is located. The station S may be located at a fire headquarters or fire house and the siren 20 may constitute part of the station equipment or may be located at some central point in a locality in which the fire headquarters or fire house is situated. A monitoring microphone 30 located in close proximity to the siren 20 is furnished for a purpose which will be indicated hereinafter.

The invention will be best understood from the following detailed description of the operation of the system disclosed in the drawing.

Assuming that an operator at a central office desires to establish a telephone connection with the substation S, she inserts the calling plug 11 of a cord circuit, such as C, into the jack 12 associated with the line circuit L which is individual to the station S, and actuates a ringing key 13. A circuit is thereupon established which may be traced from the grounded ringing current source 14, lower alternate contacts of key 13, ring contacts of plug 11 and jack 12, conductor 15, normal ring contacts of jack 16, ring conductor 17 of line L, condenser 18, winding of relay 19, left-hand section of repeating coil 21, tip conductor 22 of line L, normal tip contacts of jack 16, conductor 23, tip contacts of jack 12 and plug 11 to ground by way of the upper alternate contacts of key 13.

Relay 19 operates in this circuit and at its armature and armature contact establishes an obvious energizing circuit for relay 24 which relay operates causing the substation end of the line circuit L to be disconnected from the right-hand section of repeating coil 21 and connected directly to the jack terminals.

Relay 25 now operates in a circuit extending from ringing current source 14, lower alternate contacts of ringing key 13, ring contacts of plug 11 and jack 12, conductor 15, normal ring contacts of jack 16, ring conductor 17 of line circuit L, conductor 26, front contact and lower armature of relay 24, winding of relay 25, condenser 27, conductor 64, upper armature and front contact of relay 24, conductor 37, tip conductor 22 of line circuit L, tip contacts of jack 16, conductor 23, tip contacts of jack 12, and plug 11 to ground at the upper alternate contacts of key 13. Relay 25, in operating, connects the ringer 10 and the winding of relay 40 to the ring conductor of the line circuit L by way of its right-hand armature and front contact, and at its left-hand armature and front contact it connects relay 28 to the tip side of the line. Relay 40 and ringer 10 operate at this time. It will be noted that the tip side of the line L is grounded at the upper alternate contact of key 13 so that relay 28 is effectively shunted and therefore does not operate at this time. The ringer 10 and relay 40, as before stated, however, being connected to the ring side of the line operate on current from the source 14. Relay 40, however, merely prepares a shunt path from ground on the conductor 61 to the right-hand front contact of

relay 60 to lock out relay 62 and prevent it from accidentally operating on cross-ring surges.

In response to the actuated signal 10, the handset 9 at station S is removed from its switchhook, effectively bridging the telephone set across the line L in the well known manner. Removal of the receiver shunts relay 25 which releases should the attendant continue to ring after the receiver is removed from the switchhook.

Relay 31 now operates in a circuit extending from grounded battery, filament of lamp 32A, conductor 33, lower winding of relay 31, lower right-hand winding of repeating coil 21, back contact and lower armature of relay 24, conductor 53, through the closed subscriber's line loop, conductor 35, upper armature and back contact of relay 24, upper right-hand winding of repeating coil 21 to ground through the upper winding of relay 21 and filament of lamp 32. Relay 31 operates in this circuit, short circuits the condenser 48 and completes the ring side of the line. An indication of the response of the subscriber is given to the attendant by a supervisory lamp (not shown) in the cord circuit C which is lighted by the operation of a cord supervisory relay (not shown). The cord supervisory lamp operates as a consequence of the closed supervisory loop through resistance 50 and the armature contacts of relay 31.

If the operator desires to communicate with the subscriber, she actuates talk key 36 which connects her telephone set across the cord circuit C. At the termination of the conversation, the operator withdraws plug 11 from jack 12 and the subscriber at station S replaces the receiver on its switchhook whereupon the operated relays release and the circuit restores to normal.

Should the central office operator wish to broadcast a fire signal, she proceeds in the manner hereinbefore described in signaling a subscriber at station S except that the alarm jack 16 is employed in place of the jack 12.

The actuation of ringing key 13, as in the previous case, causes relay 19 to operate and close an obvious circuit to relay 24. Relay 24, operated, excludes the repeating coil 21 from the ringing circuit and connects relay 25 directly to the jack terminals of the line L. Relay 25 operates and at its right-hand armature and front contact connects ringer 10 and the winding of relay 40 to the ring side of the line and at its outer armature and front contact connects the winding of relay 28 to the tip side of the line. Relay 40 and the ringer 10 are effectively shunted and do not operate.

Relay 28, however, does operate in a circuit extending from the source 14, lower alternate contacts of key 13, ring contacts of plug 11 and jack 16, tip side of line L, conductor 37, front contact and upper armature of relay 24, conductors 64 and 65, front contact and left-hand armature of relay 25, condenser 66, winding of relay 28, conductors 67 and 61 to ground. Relay 28, operated causes relays 60 and 62 to operate in series in a circuit extending from grounded battery, winding of relay 60, conductor 68, winding of relay 62, front contact and armature of relay 28, conductors 67 and 61 to ground. At its inner left-hand armature relay 62 establishes an obvious locking circuit for itself and relay 60. At its outer right-hand armature and front contact relay 62 connects the right-hand winding coil and the monitoring microphone 30 in series to ground and battery. At its inner right-hand armature and front contact relay 62 connects the left-hand winding of coil 44 across the tip and ring conductors of the line L. At its outer left-hand armature and front contact relay 62 connects the siren control relay 42 to the supply 69 which relay thereupon operates.

Relay 42, operated, closes the circuit between the siren 20 and the alternating current source 45.

Relay 60, at its left-hand armature disconnects ground from the ringer 10 and at its right-hand armature prepares a shunt path across relay 62 from the winding of relay 40.

The siren 20 or other audible signal is actuated when relay 42 operates and its sound is picked up by the microphone 30 and sent over the line through the induction coil 44 to the attendant at the exchange who listens immediately after ringing to make certain that the siren is functioning. Actuation of key 36 in cord C connects the operator's or attendant's telephone across the tip and ring conductors of the connection.

The operator may now withdraw the plug 11 from jack 16 without affecting the operation of the audible signal 20 since relays 62 and 60 are locked up. Condenser 72 in series with the secondary of induction coil 44 prevents the transmission of a line or cord signal and leaves the line clear for a call from the station S to the exchange.

If the subscriber at station S desires to silence the siren 20, he removes the handset 9 from its switchhook thereby closing contacts 73. The closure of contacts 73 causes relay 62 to be shunted so that this relay releases, opening the circuit to relay 60 which relay also releases. Release of relay 62 disconnects battery from the microphone 30, releases relay 42 and disconnects the secondary of induction coil 44 from the line L. This removes tone from the siren immediately, as it slows down gradually and the tone would otherwise interfere with the telephone conversation should the subscriber at station S desire to converse with the attendant at the exchange.

Release of relay 60 reconnects ground to the station ringer 10 and opens the shunt across relay 62 from relay 40.

Should the attendant at the exchange desire to test the siren he would cause the operation of the siren in the manner just described in connection with the broadcast of a fire signal and listen in on the line. After listening for a few moments the attendant withdraws the plug 11 from jack 16 and inserts it in jack 12 and rings out on the line. Relay 25 accordingly operates in the manner hereinbefore described and causes relay 40 to operate. The station ringer does not operate at this time as its circuit to ground is held open at the left-hand armature of relay 60

Relay 40, operates, completes a shunt path across the winding of relay 62, including the front contact and left-hand armature of relay 60. Relay 62 accordingly releases, disconnecting the induction coil 44 from the line, opening battery to the microphone 30 and causing relay 42 to release. Release of relay 42 causes the siren 20 to be silenced.

Relay 60 does not release when relay 62 is shunted out but remains locked up until ringing current is cut off at the exchange. When ringing current is cut off, relay 40 releases and cuts off ground from the left-hand armature and front contact of relay 60 thereby permitting relay 60 to release.

The subscriber at station S is provided with

"start" and "stop" buttons by virtue of which the subscriber may initiate and terminate a fire signal. Pressing the "start" button 80 completes a circuit extending from grounded battery, winding of relay 60, conductor 68, winding of relay 62, conductor 83, closed contacts of button 80 to ground. Relays 60 and 62 operate in this circuit and lock in the same manner hereinbefore described and perform the same functions, one of which is to effect the operation of the siren 20. When the siren is started locally in this manner, no supervisory signal is transmitted to the attendant due to the presence of the condenser 72 in the induction coil circuit.

Pressing the "stop" button completes a shunt circuit about the winding of relay 62 which relay releases and causes the release of relay 60. The siren is accordingly silenced and the equipment restored to its normal condition.

What is claimed is:

1. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, and a switching device for causing the operation of said signal, said switching device being controlled from the central office by way of said line circuit or from the subscriber's station.

2. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, and a relay adapted, when operated, to cause the operation of said signal, said relay being controlled either from said central office by way of said line circuit or from said subscriber's station.

3. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, a relay adapted, when operated to cause the operation of said signal, means at said subscriber's station for causing the operation of said relay and means at said central office for causing the release of said relay subsequent to its operation from said subscriber's station.

4. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, a relay controlling the operation of said signal, a second relay, means at said subscriber's station for causing said relays to operate and lock in a series circuit, said second relay preparing a shunt for said first relay and said first relay causing the operation of said signal, and means controlled from said central office for completing the shunt prepared by said second relay to cause the release of said first relay and the effacing of said signal.

5. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, a relay adapted, when operated, to effect the actuation of said signal, means at said subscriber's station for causing the operation of said relay and other means at said subscriber's station operable to shunt said relay.

6. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, a relay adapted, when operated, to effect the actuation of said signal, switching means at said subscriber's station for causing the operation of said relay and a pair of independent switching means at said subscriber's station for shunting said relay to cause the deenergization of said signal, one of said independent switching means being controlled by the receiver switchhook at said subscriber's station.

7. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, a signal located at a point remote from said subscriber's station, a relay controlling the operation of said signal, a second relay, means at said subscriber's station for causing said relay to operate and lock in a series circuit, said second relay preparing a shunt for said first relay and said first relay causing the operation of said signal, a source of signaling current at said central office and means responsive to the transmission of current from said source over said line circuit for completing the shunt prepared by said second relay whereupon said first relay releases and causes the deenergization of said signal.

8. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, means for transmitting signal current over said line circuit by way of either the tip or ring conductors thereof, a signal normally responsive to the transmission of signaling current over said line circuit by way of the ring conductor thereof and means effective upon the transmission of signaling current over the tip conductor of said line circuit for rendering said signal unresponsive to a subsequent transmission of signaling current over said line circuit by way of the ring conductor thereof.

9. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, means for transmitting signaling current over said line circuit by way of either the tip or ring conductors thereof, a signal at said subscriber's station, signal connecting means operating in response to the transmission of signaling current over the ring side of said line circuit for connecting said signal to the line circuit for operation, a second signal, and means including a pair of relays operating in response to the transmission of signaling current over the tip side of said line circuit for operating said second signal, one of said relays operating to render said signal connecting means ineffective, upon a subsequent transmission of signaling current over the ring side of said line circuit, in connecting said first-mentioned signal to said line circuit.

10. In a combined telephone and fire alarm system, a central office, a subscriber's station, a line circuit interconnecting said central office and said subscriber's station, means for transmitting signaling current over said line circuit by way of either the tip or ring conductors thereof, a signal at said subscriber's station, means operating in response to the transmission of signaling current over the ring side of said line circuit for connecting said signal to said line circuit for operation, a second signal, means in-

cluding a pair of relays operating in response to the transmission of signaling current over the tip side of said line circuit, one of said relays operating to effect the operation of said second signal and the other to disconnect said first signal from the line circuit and prepare a shunt for the said one of said relays, and means responsive to a subsequent transmission of signaling current over the ring side of said line for completing the shunt prepared by the other of said relays and to effect a locking circuit for said other of said relays whereby said second signal is disabled and said first signal maintained disconnected from said line circuit.

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