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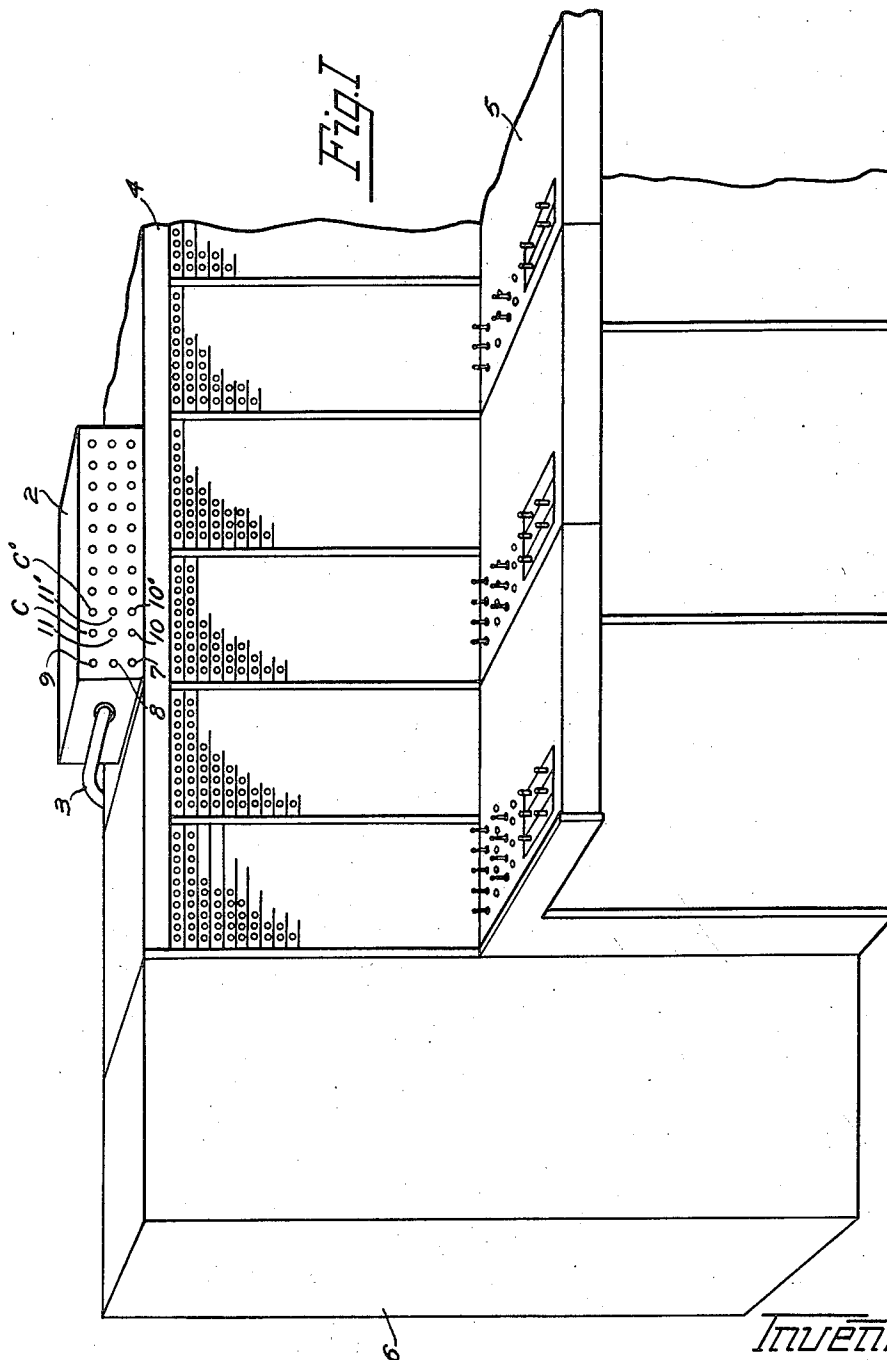
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2,374,357

GROUP-CALL TELEPHONE SYSTEM

Filed May 12, 1943

2 Sheets-Sheet 1



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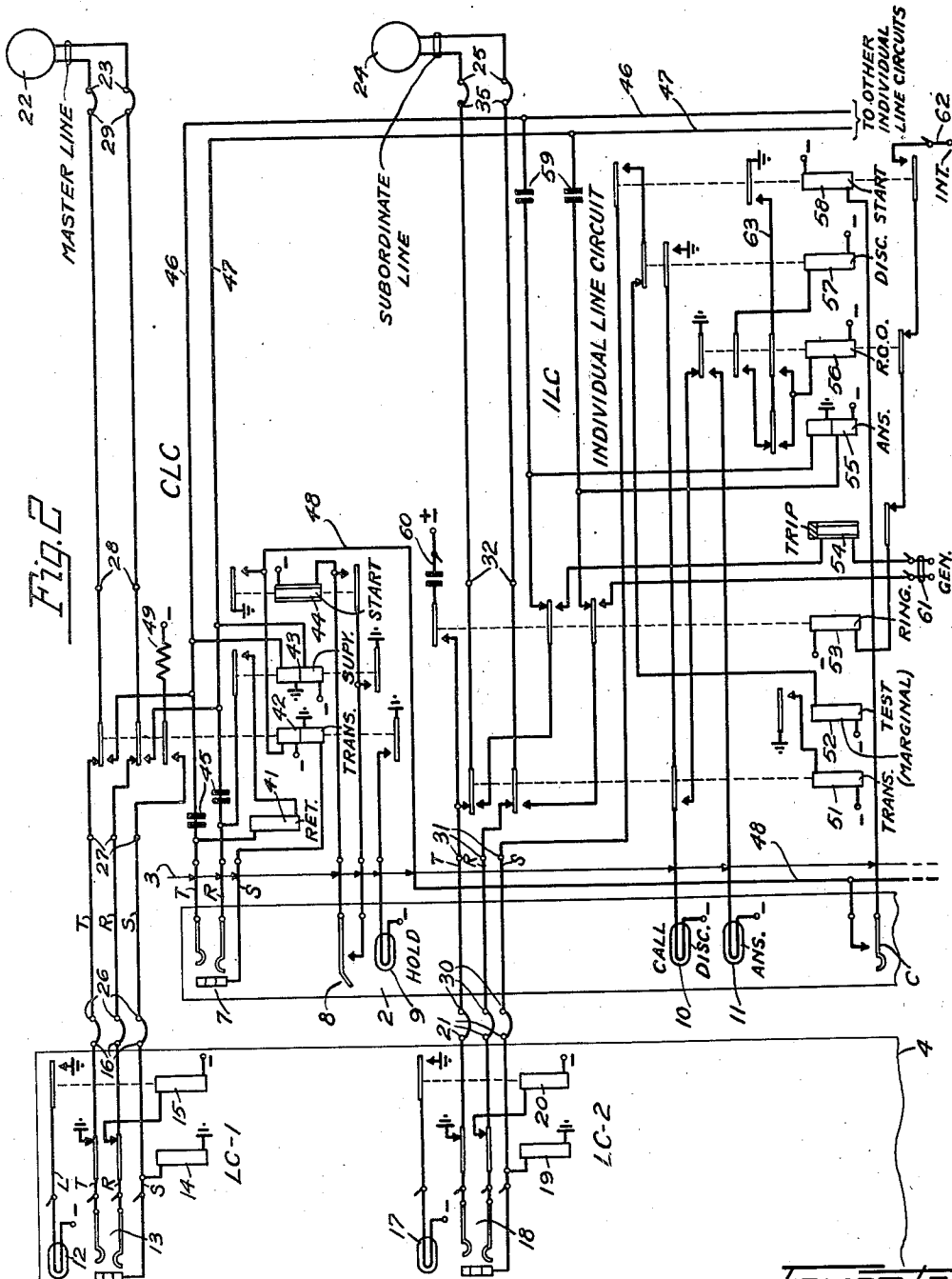
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GROUP-CALL TELEPHONE SYSTEM

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,374,357

GROUP-CALL TELEPHONE SYSTEM

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9 Claims. (Cl. 179—51)

This invention relates to group-call telephone systems, and its object is to provide a new and improved arrangement for enabling preselected subscriber lines to be called as a group.

A further object is to provide a system of this character in which only the currently desired ones of the preselected lines are called.

GENERAL DESCRIPTION

This invention is an improvement on the group-call telephone system disclosed in my prior Patent No. 2,298,489, issued October 13, 1942.

A group-call telephone system may be used in calling volunteer firemen over regular subscriber lines to inform them of the location of a fire, or for other purposes wherein information is to be imparted to, or elicited from, a preselected group of persons with considerable dispatch.

In a system of the type under consideration, a group-call line, located in the telephone exchange, is provided with branches corresponding respectively to the separate telephone lines constituting the group to be called. Each branch is provided with a line circuit containing relay equipment for transferring the corresponding line from its normal switchboard terminals to the concerned branch, for controlling the application of ringing current, and for controlling supervisory signals.

A specific object of the invention is to provide group-call equipment which can be applied to an existing telephone-exchange installation with a minimum of change therein with respect to existing equipment and permanent wiring.

A further object is to provide a group-call system wherein a line is not connected to the group-call circuit if busy, and the connection in which the concerned line is included is left intact until the line becomes idle.

A feature of the invention is that a distinctive signal current is applied to the line of an engaged group-call subscriber to inform him that he is wanted in a group call, while permitting him to carry on and terminate the conversation in which he is engaged.

A further feature of the invention is that a subscriber line which has been transferred from its normal switchboard terminals to the group-call circuit is marked busy at its normal switchboard terminals.

Other objects and features of the invention will appear as the description progresses.

The drawings

Referring now to the accompanying drawings comprising Figs. 1 and 2, they show sufficient of

the apparatus involved in a group-call telephone system embodying the features of the invention to enable the invention to be understood.

Fig. 1 shows the group-call operator's equipment applied to a standard multiple switchboard by being placed on top thereof at the position of the operator charged with the responsibility of setting the group-call equipment into operation, while Fig. 2 shows diagrammatically certain circuit arrangements, including those of the improved group-call system.

In Fig. 1, a multiple type manual switchboard is shown at 4 with the key shelf shown at 5, the switchboard being divided into operators' positions according to the usual practice. The portion 6, shown at the left-hand end of the switchboard, may be the usual cabinet for concealing the multiple cables coming up from below and passing behind the vertical face of the switchboard through which the multiple jacks and line lamps appear.

Cabinet 2, placed on top of the switchboard over the position of the operator assigned to handle the group calls, is connected with the relay equipment of the group-call circuits by means of conductors contained in cable 3. The operator's cabinet 2 is shown diagrammatically in Fig. 2. It includes the jack 7 into which the operator may place the plug of a cord circuit to make connection with the group-call circuit. It also includes the start key 8 and hold lamp 9, both associated with the jack 7. Additionally, the cabinet 2 contains supervisory lamps 10 and 11, and connect key C, for one of the individual line circuits of the group-call equipment, as well as other similar lamps 10' and 11', and other similar connect keys C' for the other individual line circuits.

As will subsequently appear, no changes are required to be made in the switchboard circuits by the arrangement disclosed, as the operator makes connection with the group-call circuit entirely through the equipment contained in cabinet 2, using an idle one of her cord circuits for this purpose.

Referring now particularly to Fig. 2, the group-call equipment includes (in addition to the cabinet 2 and the equipment contained therein) the common line circuit CLC and a number of individual line circuits ILC, corresponding respectively to the lines reached from the group-call circuit. The common line circuit CLC is provided with tip, ring, and start conductors 46, 47, and 48. Conductors 46 and 47 extend to and mul-

tiply connect with all of the individual line circuits such as ILC, while start conductor 48 connects with the individual circuits by way of the respective connect keys C, C', and so forth.

In the illustrated arrangement, the initiation of group-calls is under the control of a master line extending to the exchange from substation 22, and associated with the common line circuit CLC.

The subordinate line extending to the exchange from substation 24 is associated with the illustrated individual line circuit ILC, each of the other individual line circuits (not shown) being similarly associated with a separate subordinate line.

In addition to being accorded group-call facilities, the master line and each of the subordinate lines are accorded regular subscriber service through the switchboard 4. For this purpose, the master line associated with substation 22 normally extends to line circuit LC-1, associated with jack 13 and line lamp 12, and multiples thereof. Similarly, the subordinate line extending to the exchange from substation 24 normally extends to line circuit LC-2, associated with jack 18 and line lamp 17, and multiples thereof.

The common line circuit CLC includes retard coil 41 and transfer, supervisory, and start relays 42, 43, and 44, this line circuit being connected through certain conductors in cable 3 (Figs. 1 and 2) with the operator's cabinet 2.

The illustrated individual line circuit ILC includes transfer relay 51, test relay 52, ringing relay 53, trip relay 54, answer relay 55, ring-cutoff relay 56, disconnect relay 57, and start relay 58. This line circuit is connected, through conductors in cable 3, with lamps 10 and 11 and connect key C, in the operator's cabinet 2.

According to the usual practice, each of the line circuits is connected by permanent cable conductors to its own individual tip, ring, and sleeve terminals on the switchboard side of the main distributing frame. These terminals are shown at 16 for the line circuit LC-1 and at 21 for the line circuit LC-2. Additionally, each of the subscriber lines is extended through the outside cable plant to the cable side of the main distributing frame, where each subscriber line appears on its own pair of terminals. These terminals are shown at 23 for the line of substation 22, and at 25 for the line of substation 24. Normally, in the absence of the group-call service, the terminals 23 are cross-connected by a two-wire jumper (not shown) on the main distributing frame to the tip and ring terminals of group 16 of line circuit LC-1. Similarly, in the absence of the group-call arrangement, the terminals 25 associated with the line of substation 24 are connected by means of the two-conductor jumper to the tip and ring terminals of the terminal set 21 associated with line circuit LC-2. Normally, no jumper connections extend from the sleeve terminals of sets 16 and 21, these terminals being provided for test purposes.

INSTALLATION

When the illustrated group-call equipment is installed, the illustrated equipment representing the common line circuit CLC and the desired number of individual line circuits such as ILC may be provided on a vacant portion of an already installed relay rack, or it may be installed in a vacant floor space on a relay rack provided for that special purpose. The operator's cabinet 2 is installed at the desired operator's position as in-

dicated by way of example in Fig. 1, and is interconnected with the installed group-call relay equipment by the conductors in cable 3. Other cable conductors are then installed to connect the common line circuit and the individual line circuits with suitable terminals mounted on or associated with the main distributing frame. These latter terminals are terminals 26 and 29 for the common line circuit and terminals such as 30 and 35 for each of the individual line circuits. Cable conductors may be run from terminals 26 to terminals 27 of the common line circuit, as well as between terminals 28 and 29. Similarly, cable conductors may be extended between terminals 30 and terminals 31 of the individual line circuit ILC, as well as between terminals 32 and 35.

When the installation has been effected as above outlined, the concerned subscriber lines may then be reconnected. The reconnection for the master line associated with substation 22 is accomplished by removing the two-conductor jumper normally connected to the main frame terminals 23 and the tip and ring ones of terminals 16, following which a 3-conductor jumper is run on the main frame between terminals 16 and 26 and a 2-conductor jumper is run on the main frame between terminals 29 and 23. The reconnection for the subordinate line of substation 24 includes the removal of the main frame jumper normally connecting terminals 35 with the tip and ring ones of terminals 21, and the running of a 3-conductor jumper between terminals 21 and 30, and a 2-conductor jumper between terminals 35 and 25.

If the purpose for which the group-call circuit is installed subsequently ceases to exist, the 2-conductor and 3-conductor jumpers run on the main frame as above outlined to interconnect the concerned subscriber lines and switchboard terminals with the group-call equipment can be removed and the regular 2-conductor jumpers for the concerned lines may be replaced on the main frame to place the concerned lines back into regular normal service having no connection with the group-call equipment. When this has been accomplished, the equipment specific to the group-call service may be disposed of as desired, all without making necessary any changes in the permanent wiring and equipment of the telephone exchange.

OPERATION

With the equipment installed and connected as indicated in the drawings, calls to the master line of substation 22 can be completed by the insertion of the plug of a cord circuit into the jack 13 or any multiple thereof on the switchboard 4. When this occurs, battery potential applied to the sleeve conductor of the line circuit LC-1 through the sleeve of the plug and the sleeve of the concerned jack operates cutoff relay 14 to disconnect ground from the associated tip conductor and to disconnect line relay 15 from the associated ring conductor. The tip and ring conductors of the plug inserted into the jack are now connected through the tip and ring terminals 16, a jumper on the main frame, terminals 26, a pair of cable conductors, terminals 27, back contacts of transfer relay 42, terminals 28, a pair of cable conductors, terminals 29, conductors of a second jumper on the main frame, and terminals 23, to the tip and ring conductors of the line of substation 22. Accordingly, substation 22 can be signalled in the usual manner, and the subscriber

thereat, upon answering the call, is able to converse with the operator or with the calling subscriber, transmitter current being supplied from the cord circuit in the usual manner.

When the receiver (not shown) is removed at substation 22 to initiate a call, line relay 15 in the line circuit LC—1 is operated in the usual manner to light line lamp 12 and its multiples, following which an operator may answer the call by inserting the answering plug of a cord circuit into the jack 13 or a multiple thereof, whereupon cut-off relay 14 operates in the usual manner to clear the line. Line relay 15 thereupon restores, whereupon line lamp 12 and its multiples are extinguished.

Similarly, the substation on any subordinate line, such as substation 24, is provided with regular two-way telephone service through its associated line circuit such as LC—2 and jack 18 or multiples thereof.

Initiating a group call

When the person in authority at the master station 22 desires a group call to be made, he initiates a call over the associated master line in the usual manner, whereupon line relay 15 operates to light the line lamp 12 and its multiples as previously pointed out. Any idle operator along the multiple switchboard 4 may answer the call, through the jack 13 or any multiple thereof, whereupon sleeve relay 14 is operated to disconnect line relay 15, extinguishing the line lamps.

Transferring the master line

Upon being informed by the calling subscriber that a group call is desired, the answering operator may so inform the operator at the group-call position. Thereupon, the operator at the group-call position may insert the answering plug of an idle cord circuit at her position into the group-call jack 7 in cabinet 2. When this occurs, battery potential is applied, through the sleeve of the answering cord and the sleeve of jack 7, to the lower winding of transfer relay 42 in the common line circuit CLC, whereupon relay 42 operates. Hold lamp 9 is thereupon lighted as a signal to the operator that the transfer relay is operated. At its second and third upper armatures, transfer relay 42 disconnects the tip and ring conductors of the master line from their normal switchboard termination and transfers them into connection respectively with the tip and ring conductors 46 and 47 of the common line circuit CLC. Responsive to this operation, the initial answering operator is given a disconnect signal by reason of the disconnection of the calling line from the tip and ring conductors of the jack 13 (and its multiples), whereupon she may withdraw the answering plug from the jack. Cutoff relay 14 does not restore at this time, as it is held operated by battery potential applied to the associated sleeve lead through resistor 49 and the inner upper contacts of relay 42. This battery potential serves as a busy potential on the sleeve of the jack 13 and its multiples to inform the calling operators subsequently making the usual tip busy test that the master line is in use.

With the conductors of the master line now transferred to conductors 46 and 47 of the common line circuit CLC, the double-wound supervisory relay 43 in the common line circuit operates over the master line and through the calling bridge at substation 22. Upon operating, it bridges the retard coil 41 across the tip and ring

conductors of the group-call jack 7, thereby operating to extinguish the usual answering supervisory lamp in the answer plug inserted into the jack 7.

The group-call operator may now converse with the calling subscriber at the master station 22, the talking path including condensers 45 connected between the tip and ring conductors 46 and 47 of the common line circuit and the tip and ring conductors of the jack 7.

The group-call operator is preferably instructed to require the calling subscriber at the master station 22 to identify himself, as by giving a pre-arranged answer to a question, and the like, in order that unauthorized persons at the substation may not cause a group call to be made.

Choosing the subordinate lines

Preferably, the subscriber at the master line tells the group-call operator which of the lines of the preselected group are to be called, whereupon the operator positions the connect keys C, C', and so forth, accordingly. All of the keys in the cabinet 2 may be of the push-button type. Key 8 is preferably non-locking, while the other keys are preferably of the locking type.

Operating the common start relay

When the group-call operator has set the keys such as C and C', and so forth, as desired, she momentarily actuates the start key 8 in cabinet 2, thereby operating start relay 44 in the common line circuit through contacts of supervisory relay 43, operated over the master line. Upon operating, start relay 44 locks itself energized independent of the contacts of start key 8. Additionally, it places ground potential on start conductor 48, extending multiply to all of the individual line circuits, by way of contacts of connect keys such as C. Upon the grounding of conductor 48, the upper winding of transfer relay 42 becomes energized to maintain transfer relay 42 operated thereafter independent of the lower winding thereof, energized through the sleeve of jack 7. This provision enables the group-call operator to withdraw the answering plug from the jack 7 (to change plugs, for example), leaving the connection held under the control of supervisory relay 43, operated over the master line. Preferably, the group-call operator leaves her answering plug in the jack 7 and remains in connection with the group-call circuit to inform the initiating subscriber as to any subordinate lines of the group which are engaged in established connections, or which have not answered the group call, and the like.

Operating the individual start relays

As a further result of the application of ground potential to start conductor 48, each of the start relays (such as 58) in the individual line circuits operates, subject to the contacts of the concerned connect key (such as C) being closed.

When start relay 58 of the individual line circuit ILC operates, responsive to the grounding of start conductor 48 at a time when the contacts of key C are closed, it extends the common interrupter lead 62 through contacts of relays 56 and 54 to ringing relay 53. Consequently, each time thereafter that the common interrupter lead 62 is grounded temporarily, ringing relay 53 is temporarily operated pursuant to applying ringing current to the associated subordinate line,

if such line is idle and is transferred into the individual line circuit ILC.

Testing the subordinate lines

A further result of the operation of individual start relay 58 is the closing of a circuit from the free terminal of the battery-connected test relay 52, through contacts of relays 57 and 58, to the sleeve lead of jack 18 and its multiples, thereby closing a circuit for sleeve relay 19 and test relay 52 in series. If the concerned subordinate line is idle, relays 19 and 52 thereupon operate in series. If the subordinate line is busy, sleeve relay 19 is already operated through the sleeve of jack 18 or a multiple thereof, and relay 52 is partially shunted by the existing operating circuit of sleeve relay 19. Being marginally adjusted, as indicated on the drawings, relay 52 does not operate under this latter condition, as a result of which transfer relay 51 is not operated, and the connection in which the subordinate line is engaged (either as a calling line or as a called line) is not broken.

Signalling busy subordinate lines

Ring relay 52 nevertheless is operated intermittently over the common interrupter lead 62, but ringing current from the generator lead 61 is not applied to the associated subordinate line, for the connection thereto is maintained open at the front contacts of the third and fourth upper armatures of relay 51. On each operation of relay 53, however, a connection is established from the signal lead 60, through the associated condenser, and upper contacts of relay 53, to the tip conductor of the jack 18 and its multiples, as well as through the uppermost back contact of transfer relay 51 to the tip conductor of the line of substation 24, thereby informing the subscribers to the connection that the subscriber at substation 24 is wanted in a group call. The concerned subscribers are thereupon expected to terminate their conversation very shortly, and replace their receivers to permit such connection to be cleared out at the switchboard 4 so as to bring the concerned subordinate line to its normal idle condition to enable it to be transferred into connection with the individual line circuit ILC.

Transferring subordinate lines

When test relay 52 operates, following the operation of start relay 58 (either immediately, in case the associated subordinate line is idle when the group call is initiated, or later, when such line becomes idle), it operates transfer relay 51. At its inner contacts, relay 51 lights supervisory lamp 10 as a call lamp, its circuit including a back contact of ring-cutoff relay 56. At its second and third armatures, relay 51 transfers the tip and ring conductors of the line of substation 24 from their normal switchboard termination respectively to the second and first armatures of relay 53, and thence, through the back contacts of ringing relay 53, and through talking condensers 59, to the common tip and ring conductors 46 and 47.

Ringing

Each time ringing relay 53 operates thereafter, it disconnects the conductors of the line of substation 24 from their connection with common conductors 46 and 47 and connects them with the common generator leads 61, thereby transmitting ringing current over the associated subordinate line to substation 24. This ringing current is

transmitted intermittently until the subscriber at substation 24 answers.

Answering

If the answering occurs during an application of ringing current, when ringing relay 53 is in operated condition, trip relay 54 is operated in the well-known manner to interrupt the circuit of ringing relay 53, whereupon relay 53 restores and reconnects the conductors of the called line to the branch thereof leading to condensers 59. Answer relay 55 is connected to this branch and thereupon responds. If the call is answered during a silent interval, at which time relay 53 is in a restored condition, trip relay 54 is not affected and relay 55 operates directly.

Upon operating, answer relay 55 connects conductor 63 (grounded at contacts of start relay 58) to the winding of ring-cutoff relay 56; whereupon the latter relay operates and closes a self-locking circuit to conductor 63 at its first upper armature. At its lower contacts, relay 56 disconnects ringing relay 53 from interrupter lead 62 to prevent further operation of the ringing relay. At its second upper armature, relay 56 prepares a circuit for disconnect relay 57, while at its third upper armature it extinguishes call lamp 10 and lights answer lamp 11.

The subordinate line of substation 24 is now in talking connection with the common conductors 46 and 47 through contacts of relays 51 and 53, and through condensers 59.

By observing the lamps 10 and 11 of the individual line circuit ILC in the cabinet 2 (Figs. 1 and 2), the group-call operator is informed as to when the ringing operation starts and when answering occurs. She is similarly informed as to the other circuits through the medium of their lamps, such as 10' and 11' (Fig. 1).

Disconnect of subordinate lines

If the subscriber at substation 24 desires to disengage his line from the group-call circuit before the group call is terminated, he may do so by replacing his receiver. When this occurs, answer relay 55 restores and closes a circuit from the grounded conductor 63, through its own back contact, and through the front contact of the second upper armature of relay 56, for disconnect relay 57. Relay 57 thereupon disconnects relay 52 from the sleeve of jack 18 and its multiples, whereupon relays 52 and 19 restore. The restoration of relay 52 results in the restoration of transfer relay 51. The line of substation 24 is thereby transferred back to the tip and ring conductors of the jack 18 and its multiples. Answer relay 55 is thereby again disconnected from the line of substation 24 and cannot be reoperated; moreover, for ring-cutoff relay 56 remains locked to conductor 63 and maintains disconnect relay 57 operated until the instant group call is cleared out.

A further result of the operation of disconnect relay 57 is the relighting of lamp 10 as a disconnect signal. With lamps 10 and 11 both lighted, the group-call operator is thereby informed that the subscriber at substation 24 has answered the call but has caused his line to become disconnected and freed from the group-call circuit.

The line of substation 24 having been disconnected and freed as above pointed out, the subscriber thereat may immediately initiate and receive calls in the usual manner, through the regular switchboard terminals.

Recalling disconnected subordinate lines

Upon the request of the subscriber at the master line, the operator may recall any disconnected subordinate line, such as the line of substation 24. She does so by momentarily opening the contacts of the concerned connect key C. When the contacts of key C are opened, start relay 58 restores, followed by the restoration of all operated ones of the associated relays 51 to 57. The line circuit ILC is thereby returned to its illustrated normal condition. When the contacts of key C are re-closed, start relay 58 reoperates, with results as before described, including the operation of relays 51 and 52 if the line is idle, and the placing of a signal tone on the line (if busy) at the upper contacts of relay 53.

Terminating the group call

When the group call is to be terminated, the group-call operator removes her plug from the jack 7, thereby deenergizing the lower winding of transfer relay 42, leaving the upper winding thereof still energized from the still-grounded start conductor 48. When the receiver is subsequently replaced at the master station 22, supervisory relay 42 restores, followed a moment later by the restoration of slow-restoring start relay 44. When start relay 44 restores, it removes ground potential from start conductor 48 thereby deenergizing the upper winding of transfer relay 42, whereupon such transfer relay restores, transferring the conductors of the master line back to their regular switchboard terminals. At this time, resistor 49 is disconnected from the associated sleeve conductor, whereupon cutoff relay 14 restores.

In the individual line circuit ILC, the removal of ground potential from start conductor 48 results in the restoration of start relay 58. Ring-cutoff relay 56, if operated, is thereby restored, along with disconnect relay 57, if operated. The connection between test relay 52 and cutoff relay 19 (if still intact) is broken at the upper contacts of start relay 58, whereupon relays 19 and 52 restore, along with transfer relay 51. The disconnection of interrupter lead 62 at the lower contacts of relay 58 completes the clearing out of the individual line circuit ILC.

All lighted ones of the lamps such as 9 to 11 in the cabinet 2 are now extinguished.

If the subscriber at master station 22 replaces his receiver to terminate the group call before the group-call operator has withdrawn her plug from the jack 7, relays 43 and 44 of the common line circuit CLC restore notwithstanding. Relay 44 removes ground potential from start conductor 48 to clear out the individual line circuits and it deenergizes the upper winding of transfer relay 42. Transfer relay 42, however, remains operated over its lower winding until the plug has been removed from jack 7. The opening of the upper contacts of supervisory relay 43 at this time disconnects retard coil 41 thereby giving the operator the usual disconnect supervisory signal in association with the plug which she has placed in the jack 7.

When the operator subsequently removes the plug from the jack 7, transfer relay 42 restores to return the master line to its illustrated normal condition.

I claim:

1. In a group-call telephone system, normally separate subscriber lines, switchboard means including separate terminals for each of said lines through which regular telephone service may be

rendered, a group-call line, a switching device, and means responsive to an actuation of said device for disconnecting each of said subscriber lines from its associated switchboard terminals and transferring it to the group-call line, subject to such subscriber line being idle.

2. In a group-call telephone system, subscriber lines, switchboard means including separate terminals for each of said lines through which regular telephone service may be rendered, a group-call line, a switching device, and means responsive to an actuation of said device for connecting each of said subscriber lines to the group-call line, subject to such subscriber line being idle.

3. In a group-call telephone system, subscriber lines, switchboard means including separate terminals for each of said lines through which regular telephone service may be rendered, a group-call line, a switching device, means responsive to an actuation of said device for connecting each of said subscriber lines to the group-call line, subject to such subscriber line being idle, and means for transmitting a distinctive group-call signal over any of said subscriber lines which is in use when wanted in a group call.

4. In a group-call telephone system, subscriber lines, switchboard means including separate terminals for each of said lines through which regular telephone service may be rendered, a group-call line, a switching device, and means responsive to an actuation of said device for connecting each of said subscriber lines to the group-call line, subject to such subscriber line being idle, said connecting means, for a line which is in use when said switching device is actuated, being rendered effective responsive to such line subsequently becoming idle.

5. In a group-call telephone system, subscriber lines, switchboard means including separate terminals for each of said lines through which regular telephone service may be rendered, a group-call line, a switching device, means responsive to an actuation of said device for connecting each of said subscriber lines to the group-call line, and means for imposing a busy condition on the said switchboard terminals of the subscriber lines connected to the group-call line.

6. In a group-call telephone system, subscriber lines constituting a preselected group, switchboard means including separate terminals for each of said lines through which regular telephone service may be rendered, a group-call line, control devices associated respectively with the lines of said group, each control device being operable between two positions, a switching device, and means responsive to an actuation of said device for connecting each of the lines of said group to the group-call line, depending upon the associated control device being in a certain one of its two said positions.

7. In a group-call telephone system, subscriber lines constituting a preselected group, switchboard means including separate terminals for each of said lines through which regular telephone service may be rendered, a group-call line, control devices associated respectively with the lines of said group, each control device being operable between two positions, a switching device, means responsive to an actuation of said device for connecting each of the lines of said group to the group-call line, depending upon the associated control device being in a certain one of its two said positions, means for calling over each connected line, means controlled over any connected line for answering the group call and for

thereafter causing such line to become disconnected from the group-call line while said switching device remains actuated; and means thereafter effective, responsive to an operation of the associated control device from its instant position to the other position, and back, for reconnecting the concerned line to the group-call line.

8. In a group-call telephone system, subscriber lines constituting a preselected group, a group-call line, a switching device, and means responsive to an actuation of said device for connecting any one of said subscriber lines to the group-call line, and line-selecting means operable as desired to predetermine which lines of the preselected group will become connected to the group-call line responsive to an actuation of said switching device.

9. In a telephone system including a manual switchboard, a group-call line, and means associated with said switchboard but forming no part thereof for enabling an operator at said switchboard to interconnect said group-call line with a predetermined group of the subscriber lines terminating in said switchboard, said means including connecting and control relay equipment installed at a location remote from said switchboard and control equipment installed in an enclosure located at said switchboard within reach of an operator thereat, and control conductors interconnecting said control equipment with said relay equipment.

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