

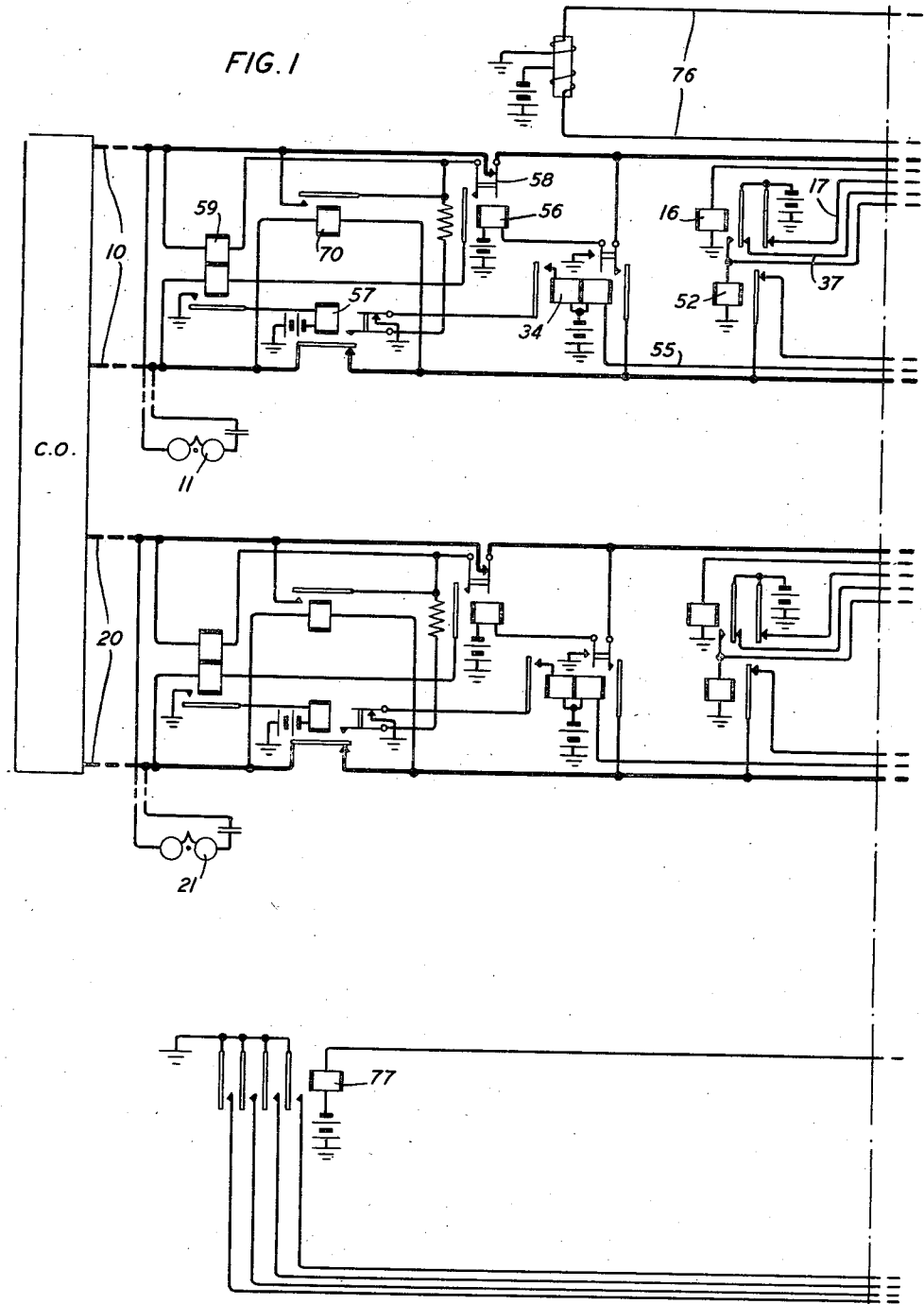
Feb. 16, 1937.

W. M. BEAUMONT
TELEPHONE SYSTEM

2,070,642

Filed March 23, 1934

3 Sheets-Sheet 1



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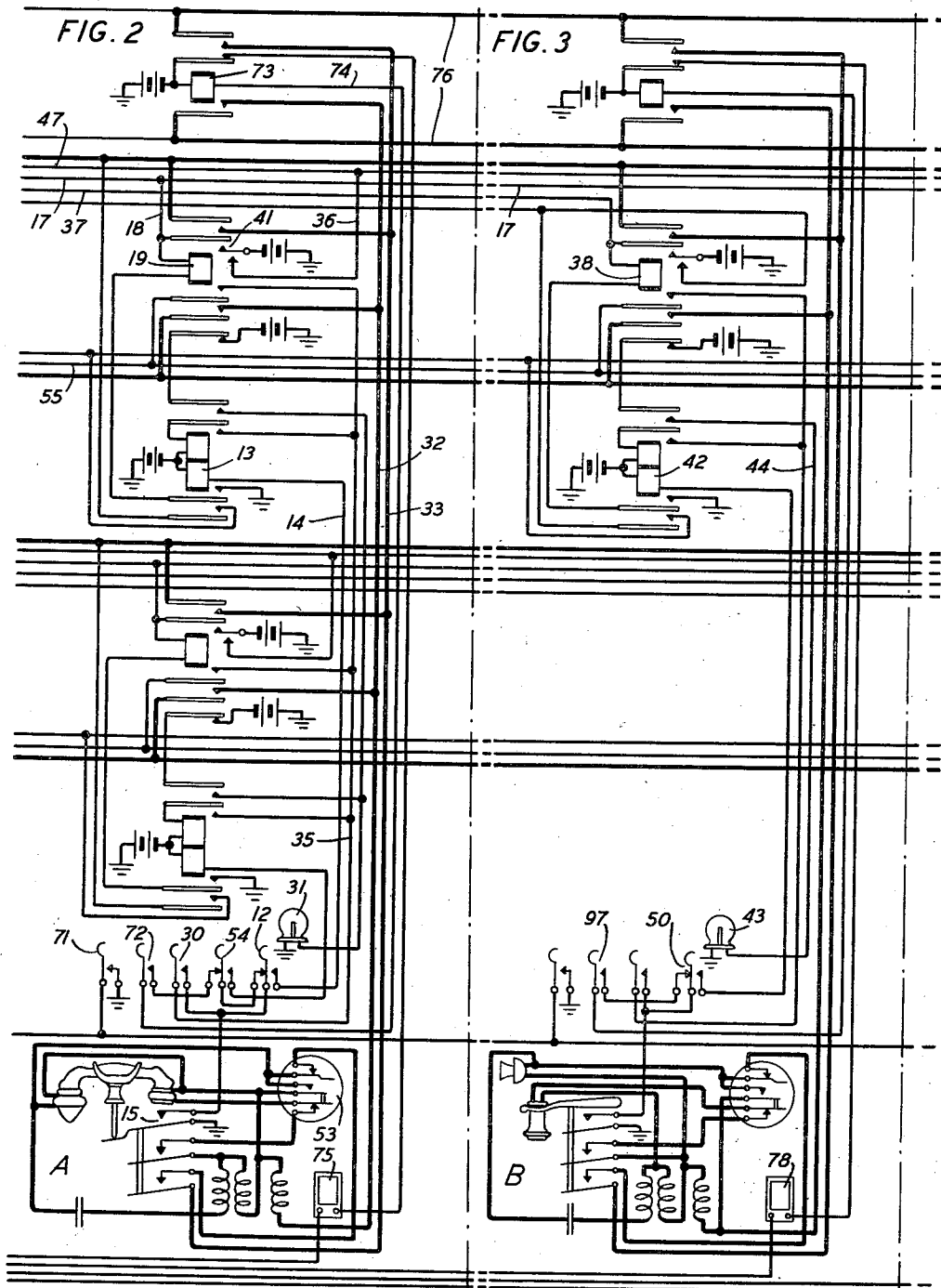
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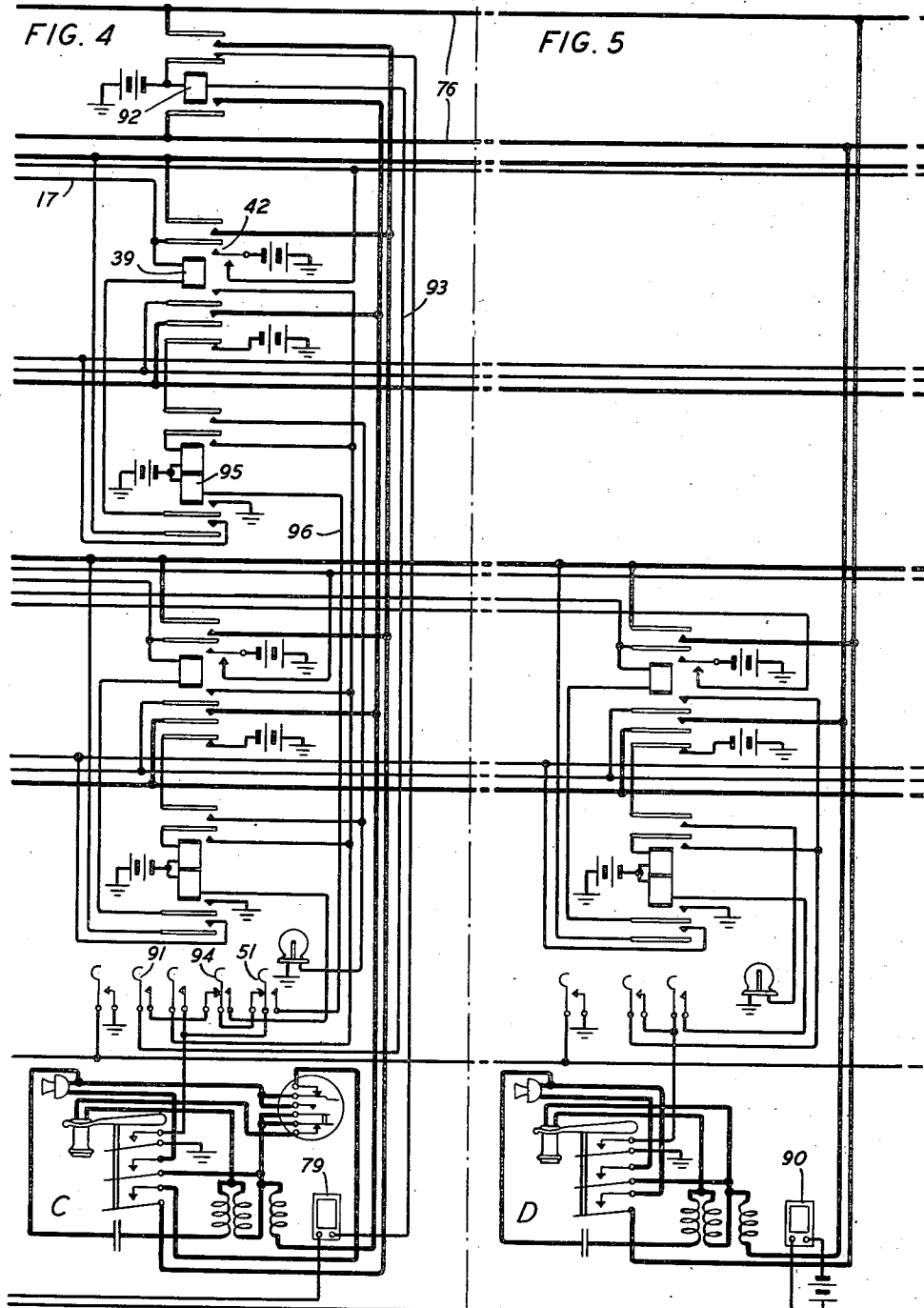
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2,070,642

TELEPHONE SYSTEM

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13 Claims. (Cl. 179—30)

This invention relates to telephone systems and more particularly to intercommunicating systems of the type which provide for trunk connections to an outside exchange or central office.

5 The object of this invention is to provide the subscribers of an intercommunicating system with facilities for establishing one or more telephone connections with an outside exchange, either central office or private branch.

10 This object is attained in accordance with a feature of the invention by the provision of switching equipment at each substation by means of which any subscriber of an intercommunicating system may answer or originate a central office call.

15 Another feature of the invention resides in a novel circuit arrangement which prevents certain subscribers of an intercommunicating system from interfering with or seizing a central office line after one of certain other subscribers has the line in use, either in answering an incoming call or originating an outgoing call.

20 Still another feature of the invention is embodied in a circuit arrangement whereby certain subscribers of an intercommunicating system may cut off certain other subscribers, but not each other.

25 A further feature of the invention is found in an arrangement of circuits whereby a subscriber may answer a call incoming over a line circuit from an outside exchange, hold the connection and communicate with a second subscriber, on an intercommunicating line and whereby the second subscriber may release the holding connection and associate his own telephone with the line circuit.

30 These and other features of the invention will be readily understood from the following detailed description made with reference to the accompanying drawings in which:

35 Fig. 1 shows two central office lines incoming to a subscriber's station and terminating at a central office;

40 Fig. 2 shows a master station, such as a residence living room and switching equipment individual thereto for associating the substation equipment with either of the central office line circuits of Fig. 1;

45 Fig. 3 represents a substation, such as a residence kitchen, and switching equipment individual thereto for associating the substation with but one of the central office line circuits;

50 Fig. 4 discloses a substation, such as a master bedroom, and switching equipment individual

thereto for associating the substation with either of said central office line circuits; and

Fig. 5 represents a substation, such as a garage, and switching equipment for associating the substation with but one of the central office line circuits.

Central office call incoming on line 10

On a call incoming on line 10, the ringer 11, which is individual to line 10 and located at a central point in the residence, is sounded, upon the application of ringing current to the line 10.

This call may be answered by any substation associated with the line 10, as for example substations A, B or C, the substation D having been shown as having access to central office line 20, merely to illustrate the flexibility of the system.

Call answered at station A

Assuming the master of the house is available and located in the living room at the time the ringer 11 is sounded, he would proceed to answer the call by actuating key 12 which is individual to line 10 and remove the handset from its switchhook at station A. It is to be understood that the ringers 11 and 21 associated with lines 10 and 20, respectively, are distinctively pitched so as to enable the person answering the call to determine which line the call is on.

Upon removal of the handset at station A and the actuation of key 12, relay 13 operates in a circuit extending from grounded battery, lower winding of relay 13, conductor 14, front contact of key 12, to ground by way of the contacts 15 of the handset switchhook at station A. At its outer lower armature and front contact, relay 13 short-circuits the line 10, to prevent excessive clicks being induced in the receiver at station A. At its inner lower armature and front contact, relay 13 establishes a circuit extending from grounded battery, outer armature and back contact of relay 16, conductor 17, conductor 18, winding of relay 19, to ground on the inner lower armature and front contact of relay 13. Relay 19 operates in this circuit.

At its inner upper armature and front contact relay 13 connects its own upper winding in circuit with the holding key 30 and at its outer upper armature and front contact closes a circuit to busy lamp 31 which is associated with the station A. This lamp, however, does not light at this time owing to the operation of relay 19.

Relay 19, operated, connects the talking circuit through to the subscriber's set by way of its upper outer and lower middle armatures and front con-

tacts and conductors 32 and 33. At its lower innermost armature and front contacts, relay 19 closes part of the operating circuit of relay 34 by way of conductor 35. This circuit is open at 5 holding key 30. At its lower armature relay 19 opens the circuit to the busy signal 31 and at its upper inner armature and front contact, establishes an energizing circuit for the cut-off relay 16 by way of conductors 36 and 47 and also 10 establishes a locking circuit for itself which is under the control of relay 13 which is held operated by the actuated line key 12 and switchhook at station A.

Cut-off feature

15 Cut-off relay 16 operating removes, at its armatures and back contacts, battery from conductors 17 and 37, thereby rendering the line relay 38, associated with the kitchen station B, inoperative should line key 50 be operated at this station in an 20 attempt to answer the incoming call. By this means, station A is provided with a lockout feature by virtue of which no other station normally having access to the central office line 10 and belonging to another group of stations may be connected 25 with this line when in use by the subscriber at station A. Station C is shown belonging to the same group as station A and is not prevented from seizing line 10 as will be described later.

30 The operation of cut-off relay 16 does not, however effect the release of relay 19 as this relay is now locked under control of relay 13.

Relay 16 at its inner armature and front contact causes relay 52 to operate in an obvious circuit. 35 Relay 52, operated, opens the short which had been placed across the line 10 by the operation of relay 13. Relay 52 is slow operating in order to insure a good connection at the contacts of relay 19 and maintains the connection of station A to the line 10 before the short is removed.

40 The subscriber at station A is now ready to converse with the calling party, all other stations such as station B of another group being locked out from association with the line 10.

Originating call from substation A

45 In originating a call from substation A the circuit functions in the same manner as previously described in connection with the answer of an incoming call, the operation of the ringer 11, of course, being omitted. In the case of an outgoing 50 call that requires dialing, the dial is operated in the usual manner.

55 When the conversation on line 10 is terminated all operated relays restore to normal when the subscriber at station A restores key 12 or replaces the handset on its switchhook.

60 It will be noted that the subscriber at station A, in the system disclosed also has access to central office line 20. In initiating or answering a call over line 20, the key 54 is operated in place of key 12. It is believed unnecessary to describe the details of a connection over line 20 as the equipment associated with this line is identical to that 65 associated with line 10 and functions in the same manner.

Holding

70 In case the call incoming over line 10 is answered at station A and is intended for someone located in the bedroom station C, the party at station A will operate the holding key 30 which releases key 12. This insures relay 13 being held operated when the ground at key 12 is removed 75 from its lower winding. Relay 13 is now held

operated to ground at the handset switchhook contacts by way of the holding key 30.

Holding relay 34 now operates in a circuit extending from grounded battery, right-hand winding of relay 34, conductor 55, lower innermost 5 armature and front contact of relay 19, conductor 35, to ground by way of the closed contacts of key 30 and the handset switchhook contacts at station A.

Relay 34 in operating establishes an obvious 10 circuit for relay 56 and places a short across line 10 to prevent excessive clicks being induced in the receiver at this time. At its left-hand armature and front contact, relay 34 locks up under control of relay 57 to insure the holding circuit functioning in case the holding key 30 is momentarily 15 operated.

At its contact 58, relay 56 opens the line 10 20 towards the station A and at its armature and front contact bridges relay 59 across the line 10 causing this relay to operate from central office battery. Relay 59, operated, establishes an obvious energizing circuit for relay 57.

When key 30, which is non-locking, is released, 25 relays 13 and 34 release. Relay 34, released, causes relay 56 to restore to normal whereas relay 13, released, causes relay 19 to release. Relay 56 may release before relay 19 releases which will close a circuit through relay 70 which relay may operate momentarily and, in turn, may release 30 relay 59. Relay 57, which is slow to release, will not release under this condition, thus preventing the opening of the bridge across the line 10.

Relay 19, released, opens the talking circuit to the station A and releases the cut-off relay 16, 35 which in turn releases relay 52. Relay 56, released, also opens the lower winding of relay 59.

Transferring calls

40 When a call is to be transferred, the line 10 must be held as just described by actuating the holding key 30, otherwise the line will be momentarily opened which may cause the call to be lost. This applies to either an inward or an outward 45 call.

To transfer the call on line 10 from station A 45 to station C, the party after having actuated the holding key as just described now actuates keys 71 and 72. Key 72, operated, causes relay 73 to operate by way of conductor 74 to ground by way 50 of the closed contacts of key 72 and the normally closed contacts of keys 54 and 12 and the handset switchhook contacts at station A.

At its upper inner armature and back contact, relay 73 opens the circuit to buzzer 75 55 located at station A. At its two outer armatures and front contacts relay 73 connects the talking leads 32 and 33 to station A with the intercommunicating line 76.

The operation of key 71 causes relay 77 to operate over an obvious circuit. Relay 77 applies 60 ground to all the buzzer leads with the result that the buzzers 78, 79 and 90 at stations B, C and D, respectively, are sounded. By the employment of a signaling code the party at station A may be informed that she or he is being signaled from 65 another station. Either code signaling or selective signaling may be employed without departing from the spirit of the present invention.

In response to the operation of buzzer 79 at 70 station C, the party thereat actuates the key 91 and removes the receiver from its switchhook whereupon relay 92 operates in a circuit extending from grounded battery, winding of relay 92, conductor 93, closed contacts of key 91, normally 75

closed contacts of keys 94 and 51, to ground at the receiver switchhook contacts.

Relay 92, operated, opens the circuit to buzzer 79 and connects the subset at station C to the intercommunicating line 76. The parties at stations A and C may now converse over line 76.

Release of holding circuit

If the central office call is of such a nature that the party at station C desires to converse with the outside party, the line key 51 will be operated. This causes relay 95 to operate in a circuit extending from grounded battery, lower winding of relay 95, conductor 96, right-hand contacts of key 51 to ground at the receiver switchhook contacts at station C.

The operation of key 51 releases key 91 whereupon relay 92 releases, disconnecting the telephone set at station C from the intercommunicating line 76.

The operation of relay 95 causes relay 39 to operate in the same manner as does the operation of relay 13 cause relay 19 to operate as already described, and relay 39 performs the same function as does relay 19.

When the line 10 is closed through to station C by the operation of relay 39, relay 70, which is included in the talking circuit, operates, causing relay 59 to release by short-circuiting the upper winding of this relay. Relay 59, released, causes relay 57 to release which in turn releases relay 70 by short-circuiting its winding. The release of the relays just described releases the holding connection established by the party at station A and cuts through the party at station C to the central office.

The party A, of course, would replace the handset and restore key 72 upon being informed that the party at station C would take over the call.

Upon completion of the call the party at station C replaces the receiver on the switchhook whereupon all operated relays restore.

As set forth in the drawings, the stations A and C are to be considered as one type of group, whereas stations B and D are to be considered as another type. This is done merely to illustrate the flexibility of the system and to show how a station of one group may cut off stations of another group but not stations of the same group. For example, the particular disclosure chosen by applicant illustrates how stations A and C of the same group cut off other stations, such as station B, normally having access to the line 10, but do not cut off each other.

As described in connection with the answer or initiation of a call by the party at station A over line 10, relays 13 and 19 operated, the latter causing cut-off relay 16 to operate causing battery to be cut off from the conductors 17 and 37 which constitute links in the original energizing circuits for relays 19 and 39 and 38, respectively. It will be noted that when relay 19 operated as a result of a circuit connection to line 10 being established by the party at station A, this relay locked up to battery associated with the contact 41 thereof. This battery is connected to conductor 17 by way of conductor 18, the conductor 17 leading directly to the winding of relay 39 at station C. It follows, therefore, that should the party at station C attempt to cut in on line 10 when station A is associated therewith, he would be able to do so by virtue of the fact that relay 39, individual to station C would operate from

battery associated with the contact 41 of relay 19 when relay 95 operated as a consequence of the actuation of key 51 at station C and the removal of the receiver thereat. Relay 39 in operating connects the telephone set at station C across the line 10 in the same manner as does relay 19 connect the telephone set at station A across the line 10. It is readily seen, therefore, that though station A cuts off station B of another group of stations it does not cut off station C which is of the same group.

In establishing a connection, however, with line 10 when this line is idle, the relay 39 finds battery on conductor 17 by way of the outer armature and back contact of the cut-off relay 16. It is only when the line 10 is in use by the party at station A or a station of the same group that the battery at contact 41 of relay 19, for example, is substituted for the battery associated with the outer armature of relay 16 for the purpose of permitting relay 39, for example, to be operated should the party at station C desire to get in on line 10 when this line is in use.

Should the line 10 be in use by the party at station C the party at station A is not prevented from getting in on the line. The battery at contact 42 of relay 39 provides the energy for relay 19 in this case, relay 16 having been operated as a consequence of the operation of relay 39.

It is to be understood that the cut-off feature is available on calls on line 20 as well as on line 10.

Should the party at station B attempt to establish a central office connection on line 10 when this line is in use, relay 42 would operate as a consequence of the actuation of key 50 and the removal of the receiver from its switchhook at station B. Relay 38, however, would not operate as battery has been removed from conductor 37 as a result of the operation of relay 16 incidental to the seizure of line 10 at a station of another group. In this case, the busy lamp 43 at station B is lighted in a circuit extending from grounded battery, back contact and lower outermost armature of relay 38, upper outer armature and front contact of relay 42, conductor 44, to ground through the filament of lamp 43. The lighted lamp 43 indicates to the party at station B that the line 10 is in use.

Non-cut-off feature

Stations, such as stations B and D of one group may be cut off by other stations, such as stations A and C of another group but cannot cut off these other stations.

When the party at station B, for example, removes the receiver from its switchhook and actuates key 50, the relays 42 and 38 operate in the same manner as do relays 13 and 19 as described in connection with a call originating or answered at station A. It will be noted now that where relay 19 caused cut-off relay 16 to operate in the first description, relay 16 is not affected by the operation of relay 38 in this case. Hence, relays, such as 19 and 39, may operate should the parties at stations A and/or C attempt to establish a connection with line 10 when this line is in use by a party of another group, such as the party at station B. In this case, however, where the party at station B is the first to establish a connection with line 10, station B is not disconnected from the line by a subsequent seizure of the line by a party at either station A or C until the party at station B replaces the receiver on the switchhook. This is due to the fact that re-

lays 42 and 38 are locked up to ground at the receiver switchhook contacts at station B. This prevents the cut-off station, such as station A or station B, from cutting off the connection.

5 Intercommunication between any of the stations of the system is possible. The operation of keys 72, 97 or 91 at stations A, B or C, respectively, or the removal of the receiver at station D will associate the respective telephone sets with
10 the intercommunicating line 76 and signaling may be effected in the manner previously described in connection with the transfer of a call from station A to station C.

In the circuit arrangement disclosed applicant
15 shows two central office lines 10 and 20 and four stations A, B, C and D, the stations A and C having access to both lines, station B having access to line 10 only and station D having access to but line 20 and also discloses a system wherein
20 stations A and C may cut off stations B and D but not each other, stations B and D being arranged to be cut off by stations A and C but not to cut off these stations. It is readily apparent from the foregoing description that stations B
25 and/or D may be given access to both central office lines and be provided with the cut-off features attributed to stations A and C in the disclosure of this application if desired.

What is claimed is:

30 1. In a telephone system, a plurality of stations, a line circuit normally accessible to each of said stations, a relay for each of said stations, means at each of said stations for causing the energization of its respective relay to effect the
35 seizure of said line circuit and a relay operating upon the seizure of said line circuit at one of said stations for rendering said line circuit inaccessible to certain other but not all other of said stations.

40 2. In a telephone system, a plurality of stations, a line circuit normally accessible to each of said stations, a relay for each of said stations, means at each of said stations for causing the energization of its respective relay to effect the
45 seizure of said line circuit and a relay operating in response to the seizure of said line circuit by one of said stations for rendering the station relays of certain other but not all other of said stations inoperative upon the actuation of their
50 respective energizing means.

3. In a telephone system, a group of stations, a second group of stations, a line circuit normally accessible to the stations of both said groups, a relay for each of said stations, means at each of
55 said stations for causing the energization of its respective relay to effect the seizure of said line circuit, and a relay normally controlling the energization of all said station relays and operative in response to the seizure of said line circuit
60 by a station of said first group for preventing the subsequent operation of the station relays of said second group in response to the actuation of their respective energizing means.

4. In a telephone system, a group of stations,
65 a second group of stations, a line circuit normally accessible to the stations of both said groups, a relay for each of said stations, means at each of said stations for completing an energizing circuit for its respective relay to effect
70 its operation, the operation of said relays effecting the seizure of said line circuit, and a relay normally controlling the energizing circuits for said station relays and operative only upon the seizure of said line circuit by a station of said
75 first group to prevent the completion of an en-

energizing circuit for the station relays of said second group.

5. In a telephone system, a first group of stations, a second group of stations, a line circuit accessible to all the stations of said groups when
5 said line circuit is idle, means responsive to the seizure of said line circuit by a station of said first group for rendering said line circuit busy to the stations of said second group only, and means at each station of said second group for
10 indicating the busy condition of said line circuit, said means operating in response to an attempt to seize said line circuit at a station of said second group.

6. In a telephone system, a group of stations,
15 a second group of stations, a line circuit normally accessible to the stations of both said groups, a relay for each of said stations operative in response to the seizure of said line circuit, a relay associated with said line circuit and
20 normally controlling the operation of all said station relays, said relay operating in response to the seizure of said line circuit by a station of said first group for rendering the station relays of said second group inoperative, and means
25 controlled by the operated station relay of said first group for maintaining the other station relays of said first group operative.

7. In a telephone system, a group of stations,
30 a second group of stations, a line circuit, a relay for each station of both said groups for effecting the seizure of said line circuit, a common relay, the normal energizing circuits for each of said station relays being under the control of said common relay and means controlled by a station
35 relay of said first group for operating said common relay upon the seizure of said line circuit by a station of said first group whereupon the control of the station relays of the other stations of said first group only is transferred to the
40 operated station relay of said first group.

8. In a telephone system, a group of stations, a second group of stations, a line circuit normally accessible to each station, a station relay
45 individual to each station and normally controlled thereat for effecting the seizure of said line circuit, and a line relay operable from the stations of said first group only, for removing the control of the station relays of said second group from their respective stations whereby
50 said line circuit is rendered inaccessible to the stations of said second group when said line relay is operated.

9. In a telephone system, a group of stations, a second group of stations, a line circuit normally accessible to each of said stations, a station relay for each station for effecting the seizure of said line circuit, a line relay, an energizing circuit for each of said station relays under the control of said line relay, circuit closing means at each of said stations for completing the energizing circuit for its respective station relay, the operation of said means at the stations of said first group also causing the operation of said line relay whereupon the station relays of
65 said second group are rendered inoperative from their respective stations.

10. In a telephone system, a group of stations, a second group of stations, a line circuit normally accessible to all of said stations, a station
70 relay for each station for effecting the seizure of said line circuit, an energizing circuit for the station relays of the first group of stations, an energizing circuit for the station relays of the second group of stations, a line relay controlling
75

both said energizing circuits and means at each station of said first group for operating its respective station relay and said line relay, the operation of said line relay opening both said energizing circuits and the operation of said station relay preparing a substitute energizing circuit for the other station relays of said first group whereby said line circuit is maintained accessible to the other stations of said first group and rendered inaccessible to the stations of said second group.

11. In a telephone system, a plurality of substations, a line circuit, signals located in the vicinity of said substations for indicating an incoming call over said line circuit, means at each of said stations for answering an incoming call, means for establishing a holding connection for said line circuit, said means being operable from the station answering the call, and means operable at a second station for releasing the holding connection established by the means operable at the answering station and for connecting said second station with the line circuit.

12. In a telephone system, a plurality of substations, a line circuit, signals located in the

vicinity of said substations for indicating an incoming call over said line circuit, means at each of said stations for answering an incoming call, means for establishing a holding connection for said line circuit, said means being operable from the station answering the call, means for maintaining the holding connection independent of said last mentioned means and means at a second station for releasing the holding connection and connecting said second station with said line circuit.

13. In a telephone system, a line circuit, a first station, a second station, both said stations normally having access to said line circuit, a signal at said second station, means controlled from said first station for seizing said line circuit and for preventing the seizure of said line circuit by said second station, and means controlled at said second station and operable incidental to the removal of the receiver thereat for actuating said signaling device when said line circuit has been seized at said first station to indicate to the subscriber at said second station the busy condition of said line circuit.

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