

July 14, 1942.

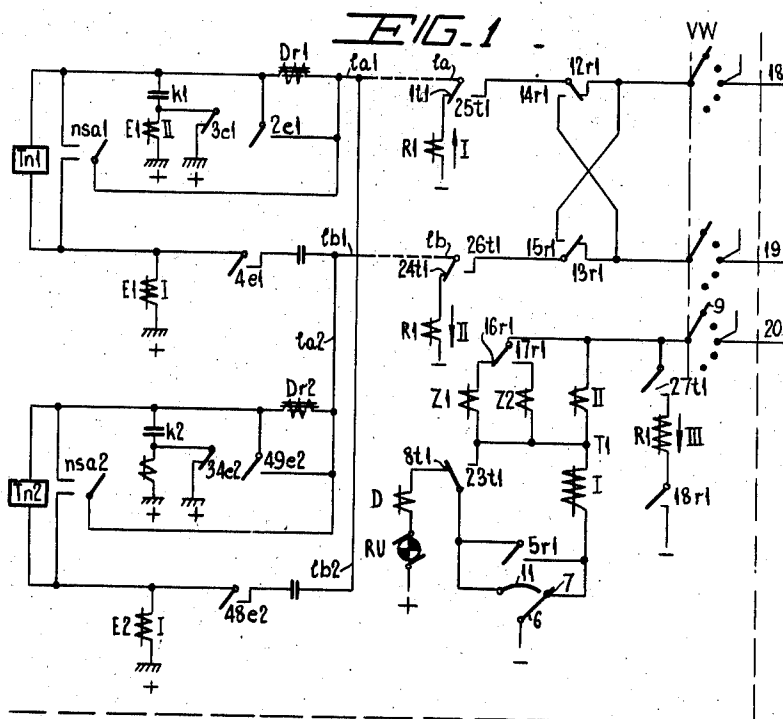
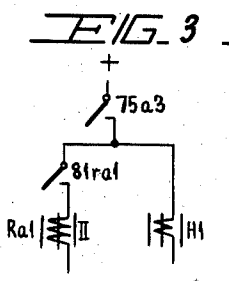
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2,289,505

TELEPHONE SYSTEM

Filed May 27, 1939

4 Sheets-Sheet 1



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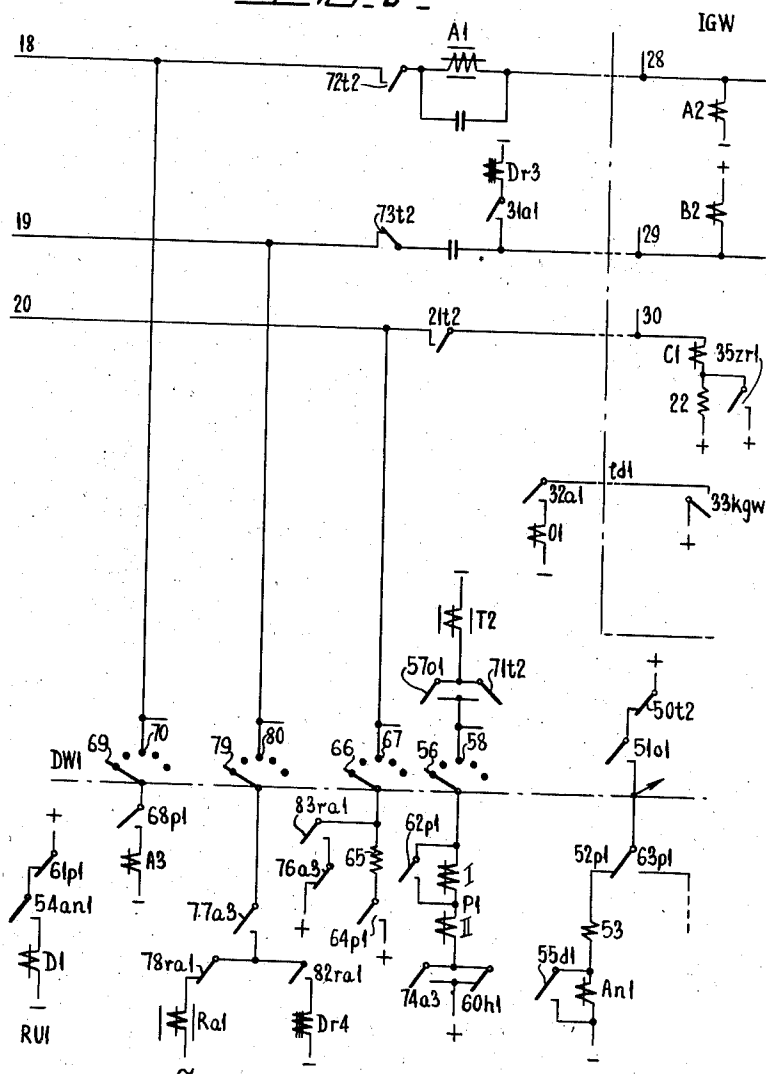
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2,289,505

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FIG. 2



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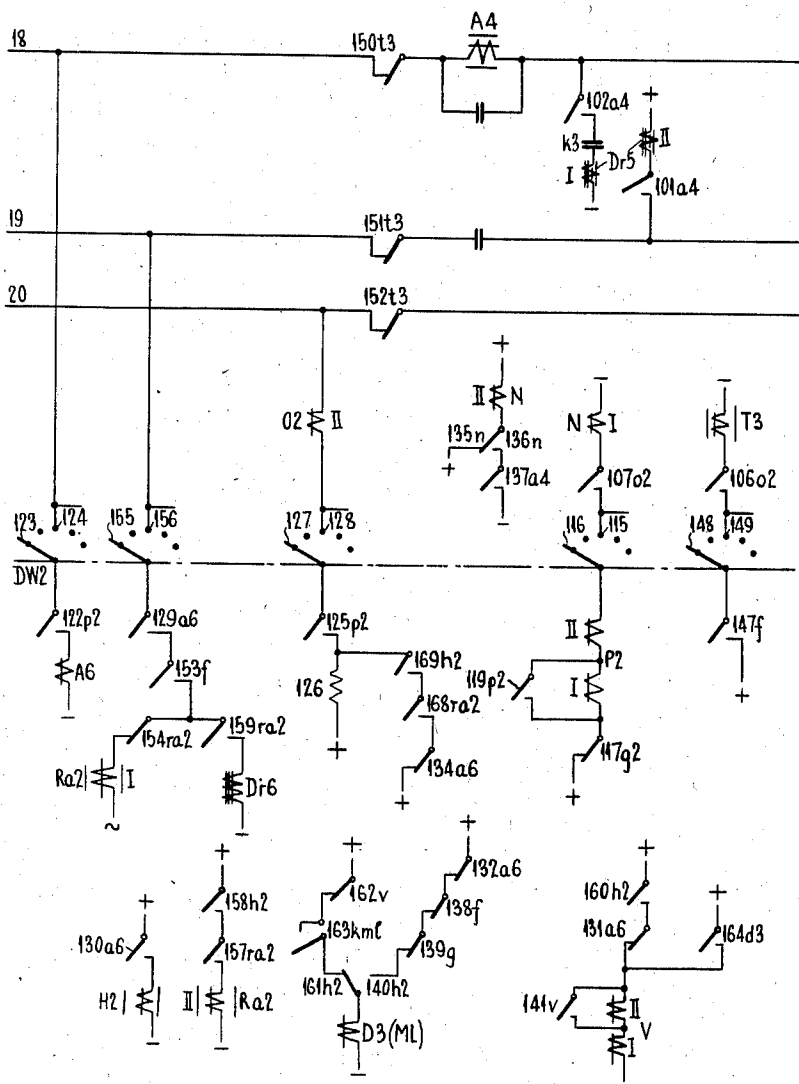
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FIG. 4.



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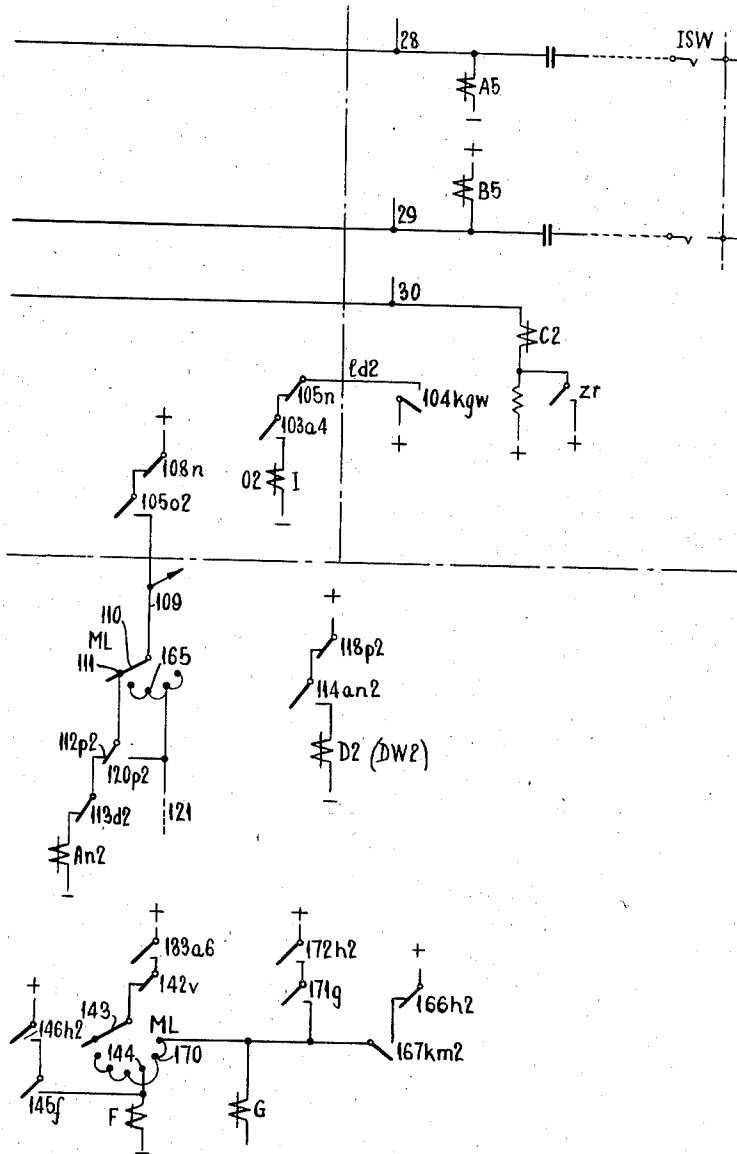
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FIG. 5.



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UNITED STATES PATENT OFFICE

2,289,505

TELEPHONE SYSTEM

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Application May 27, 1939, Serial No. 276,139
 In Germany May 30, 1938

11 Claims. (Cl. 179-17)

The present invention relates to automatic telephone installations, in which a group of subscribers is connected to an exchange by one single connecting line.

In known systems of this type it is necessary, in order to establish a connection between two subscribers of such a group, either to establish and to maintain a connecting path which extends over all or part of the digit impulse receivers, at the exchange, used for connection with other groups of subscribers, or to arrange special discriminators, consisting of groups of relays or of step-by-step switch mechanisms, associated with a connecting path seized by a call from one of the subscribers or the common junction line of the groups of subscribers. These discriminators, after selection of the marking digit of the group of the ringing subscriber, switch the connection to the special switching apparatus used for establishing and maintaining internal connections.

These known arrangements are in many cases uneconomical, particularly if internal connections between the subscribers of a group are relatively rare. The present invention discloses an economical and, at the same time, perfectly reliable manner of establishing connections between two subscribers of a group of subscribers which is connected to an exchange by a common junction line. According to the invention the selection of the marking number for connections between two subscribers of the group (internal connection) causes a selector arranged for communication with other subscriber groups of the installation to effect, at a point of the connection path preceding the group selector, the connection to the connection path of a switching mechanism (revertive call transmitter) utilised only for establishing and maintaining internal connections.

The drawings illustrate, by way of example, two embodiments of the invention, all the switching means and circuits which are not necessary for explaining the invention having been omitted.

The embodiments illustrate the internal connection for two-conductor junctions. The group of subscribers which is connected to the exchange by a common connecting line may consist of more than two subscribers. The invention is therefore applicable to party lines having a greater number of branch stations and for group stations. In these instances the switch mechanisms (revertive transmitters) which, in accordance with the invention, are arranged to be switched into use for internal communication are merely associated with switching means

which, under the control of the calling subscriber, effect the selection of the desired branch station (of party lines) or the desired group station subscriber.

Fig. 1 illustrates the circuit arrangement of two subscribers' stations (two-conductor junction) forming a group which is connected to an exchange by a common junction line (party line) and the preselector associated in the exchange with the common junction line.

Figs. 2 and 3 illustrate a path to a group selector IGW to which a switching mechanism for internal connections (revertive transmitter) may be connected by a service selector. This embodiment requires the selection of a one-digit marking number for initiating internal connections.

Figs. 4 and 5 illustrate a further embodiment, wherein a marking number comprising a plurality of digits must be selected for initiating internal connections, a two-digit marking number being assumed. Figs. 4 and 5 illustrate only the access means to a first group selector, reached over a preselector, and a revertive transmitter RU2 adapted to be connected to this access means. The wiring of the subscriber stations and the associated preselector in the exchange to the party line corresponds to that shown in Fig. 1.

I. EMBODIMENT ACCORDING TO FIGURES 1, 2, AND 3

1. Internal connection, the subscriber Tn1 making a call

The subscriber Tn1 removes his receiver, closing the following call circuit: earth (+), winding I of the start relay E1, subscriber's station, choke Dr1, conductors 1a1, 1a, contact 111, winding I of relay R1, (-). The relays E1 and R1 operate. The relay E1 controls the blocking circuit which includes the condenser K1 and the choke Dr1, and which prevents overhearing or cutting in on an existing connection when the party line is engaged, and over which the subscriber Tn1 is connected to its conductor 1a1 and, thence to the conductor 1a of the party line. At the contact 2e1 the choke Dr1 is short-circuited. Contact 3e1 opens and breaks the direct earthing to the condenser K1, earth being now connected to the condenser over the winding II of the start relay E1, establishing the symmetry of the subscriber's conversation loop. At the contact 4e1 the subscriber Tn1 is connected to his second conductor 1b1 and, consequently, to the second conductor of the party line.

In the exchange, the relay R1 closes the cir-

cuit of the rotary magnet D of the preselector VW, at the contact 5r1: —, wiper 6, rest contact 7 of the preselector, contacts 5r1, 8t1, rotary magnet D, interrupter RU, +. The preselector leaves its rest position, the wiper 6 passing on to the contact segment 11, over which the circuit of the rotary magnet extends, independently of the contact 5r1.

By opening contacts 12r1 and 13r1 and closing contacts 14r1 and 15r1 the relay R1 has, moreover, crossed over the conversation conductors. Whether the conversation conductors remain crossed after the preselector is set on an extension line, depends on which of the two subscribers is calling. As the call is initiated by the subscriber Tn1, the line connections are subsequently reversed again, the meter Z1 is again connected at the contact 16r1 and meter Z2 is again disconnected at the contact 17r1. At the contact 18r1 the connection of a winding III of relay R1 is prepared.

When the wipers of the preselector reach the contacts of a connecting means 18, 19, 20 to a free group selector, the test relay T1 operates in series with the seizing relay C1 of the group selector: —, wiper 6, contact segment 11, contact 5r1, windings I and II of the test relay T1, wiper 9, conductor 20, contact 21t2, seizing relay C1, resistance 22, +. The seizing relay C1 prepares, in the known manner, for setting the group selector IGW. The test relay T1 arrests the preselector by opening of contact 8t1 and short circuits its own high resistance winding I, at the contact 23t1, whereby the access means 18, 19, 20 and by it the group selector IGW are locked against seizing by any other preselector. The contacts 1t1, 24t1 open and cause the ringing coils I and II of the relay R1 to be disconnected, and at the contacts 25t1, 26t1 the talking conductors are switched through. At the contact 27t1 the high-resistance winding III of relay R1 is connected to the locking circuit. The winding III is a differential winding to winding I. The relay R1 is restored and its contacts are restored to the positions illustrated in the drawings. The crossing of the conversation conductors is reversed, and the meter Z1 of the subscriber Tn1 is again in parallel with the locking winding II of relay T1.

The group selector IGW is equipped with two different access means. Over the line 18, 19, 20 this group selector can be engaged only by preselectors of two-conductor junctions, while it may be seized over the access 28, 29, 30 by preselectors of connection lines of other subscribers, for example single line subscribers.

Switching means are arranged in the access means 18, 19, 20 which permit the normal operation of the group selector when engaged by a two-conductor junction line. The microphone feeding circuit for a subscriber in a two-conductor junction line passes, contrary to that of a single-line-subscriber, only over a talking conductor (18) and the relays A1, in the access means, and A2, in the group selector. The bridge relay B2 in the group selector is connected by the relay A1 at contact 31a1: —, choke Dr3, contact 31a1, relay B2, +. At the contact 32a1 the relay O1 is put under the control of the off normal contact 33kgw, which, however, is closed only on the selection of a special marking digit, for example "0."

In order to provide a connection with the subscriber Tn2 of the two-conductor junction, the subscriber Tn1 must select a special marking digit, for example "0." The contact 33kgw in the

group selector is then closed. If another cipher for example "3" is to be used as a marking digit for internal connections instead of "0," a contact of the control relay which is only energized during transmission of current impulses is connected in series with the contact 33kgw, in order that when the contact 33kgw is temporarily closed, during the setting of the group selector by a current impulse series comprising more than three impulses, the relay O1 in the special access means to the group selector will not be energized and induce a service selector of a free revertive transmitter to operate.

When the marking digit for internal connections is transmitted, the relay O1 operates as follows: —, relay O1, contact 32a1, conductor 1d1, contact 33kgw, +. The start relay An1 of the service selector DW1 of a free switching mechanism (revertive transmitter RU1), provided for the two subscribers of a two-conductor junction, is energized: +, contacts 50t2, 51o1, 52p1, resistance 53, relay An1, —. The rotary magnet D1 of the service selector DW1 is connected over contact 54an1. The service selector makes one step. At the contact 55d1 the relay An1 is short-circuited; is de-energized and disconnects the rotary magnet D1. The alternate reciprocal connection and disconnection of An1 and D1 continues until the test wiper 56 of the service selector is connected with the access means 18, 19, 20 since then the following test circuit is completed: —, relay T2, contacts 57o1, 58, wiper 56, windings I and II of relay P1, contact 60h1, +. Contact 61p1 opens and arrests the service selector DW1. At the contact 62p1 the high resistance winding I of relay P1 is short-circuited locking the access means 18, 19, 20 against seizure by another service selector. The relay An1 is disconnected at contact 52p1 and the start line is switched through to the next revertive transmitter at contact 63p1. Contact 64p1 closes and connects + to the conductor 20 over the resistance 65, the wiper 66 and contact 67, establishing a new circuit which holds the relays T1 and R1 at the preselector energized. Contact 68p1 closes and connects the relay A3 to conductor 18 over the wiper 69 and contact 70, so that relay A3 is energized.

In the access means to group selector IGW which has been seized relay T2 is energized. At the contact 71t2 it locks up independently of contact 57o1, releasing the group selector IGW, which had been seized at the ringing of the subscriber Tn1, by opening contacts 21t2, 72t2 and 73t2. The relays A1, A2, C1, B2, O1 are restored. The group selector returns into its rest position and can be seized again also during the interval, in which the access 18, 19, 20 is included in an internal connection, as the switching means of the access 18, 19, 20 cannot exert any influence on the group selector. The relay A3, energized in the feeding circuit of the subscriber Tn1, closes the contact 74a3 arranged parallel with contact 60h1 in the circuit of the test relay P1, and energizes, over contact 75a3, the relay H1 which opens contact 60h1. The contact 76a3 is opened preventing a premature short circuit of resistance 65. At the contact 77a3 the following ringing circuit is completed: Ringing current source, winding I of relay Ral, contacts 78r1, 77a3, wiper 79, contact 80, conductor 19, contact and wiper of the preselector, contacts 13r1, 26t1, conductor 1b, 1a2, choke Dr2, bell of the subscriber's station Tn2, relay E2, earth (+). A small portion of the ringing current flows to earth

over the condenser K2 and contact 34e2. The relay E2 does not chatter, as its winding II is short-circuited at the contact 34e2. In the revertive transmitter the relay Ra1 does not operate.

The calling of the second subscriber of the two-conductor junction therefore takes place automatically, from the revertive call transmitter and without any further selective action on the part of the calling subscriber.

When the subscriber Tn2 answers the call, relays E2 and Ra1 arranged in series are energised by the direct current path established at his station. Relay E2 effects the connection to the conductor lb2 and switches over the blocking circuit. At the contact 49e2 the choke Dr2 is short-circuited, and by the opening of contact 34e2 the direct earthing of the condenser K2 is discontinued. Earth is connected to the condenser K2 over winding II of relay E2. The symmetry of the conversation loop of the subscriber Tn2 is established. The relay Ra1 locks up over its winding II at the contact 81ra1 in a circuit dependent on contact 75a3, connects the potential (—) required for the feeding of the microphone to conductor 19 over choke Dr4, contacts 82ra1, 77a3, wiper 79 and contact 80 and disconnects its winding I, at the contact 78ra1. The short-circuit for resistance 65 is prepared at the contact 83ra1.

When at the termination of the conversation, the calling subscriber Tn1 hangs up, the relay A3 is de-energised. Contact 76a3 closes and short-circuits the resistance 65, so that the current in the blocking circuit over the conductor 20 is increased to such an extent that the meter Z1 is enabled to operate. At the contacts 75a3 and 74a3 the circuits for the relays Ra1, H1, P1, T2 are broken. The relay T2 has a longer delay before release than the relays Ra1 and P1, so that during a short time interval all the contacts 64p1, 83ra1 and 21t2 which control the flow of current through the conductor 20 are open. The relay T1 of the pre-selector, therefore, restores and returns the pre-selector to its rest position.

2. Internal connection, the subscriber Tn2 making a call

When the subscriber Tn2 removes his receiver, his start relay E2 operates in series with the winding II of relay R1: earth, winding I of relay E2, subscriber's station Tn2, choke Dr2, conductors la2, lb, contact 24t1, winding II of relay R1, —. The relay E2 effects the previously described switching over of the blocking circuit and connects the subscriber Tn2 to the conductor lb2.

The relay R1 starts the pre-selector and effects a crossing of the conversation conductors by opening contacts 12r1, 13r1, and closing contacts 14r1, 15r1. Moreover, it connects the meter Z2 over contact 17r1 and disconnects the meter Z1 at the contact 16r1. When the subscriber Tn2 initiates a call, relay R1 remains energised during the connection as the winding II of relay R1 is so connected that the relay cannot be disconnected over this winding after being energised if current flows through the winding III after a free access 18, 19, 20 to a group selector is seized.

The microphone feeding circuit for the subscriber Tn2 after the pre-selector VW is set is as follows: —, relays A2, A1, contact 72t2, conductor 18, contact and wiper of pre-selector VW, contacts 15r1, 26t1, conductor lb, la2, contact

49e2, subscriber's station Tn2, winding I of relay E2; earth (+).

The group selector IGW is set in accordance with the marking number for internal connections. This marking number is the same, for example "0" which the subscriber Tn1 must select, in order to call the subscriber Tn2. The relay O1 is energised and a free revertive transmitter RU1 connected to the access means 18, 19, 20.

Since the talking line is crossed in the pre-selector, the ringing circuit passes over conductor 19, contacts 14r1, 25t1, conductors la, la1, the bell of subscriber Tn1, winding I of relay E1, earth (+).

When the subscriber Tn1 answers the call, the ringing current is switched off in the manner described.

II. EMBODIMENT ACCORDING TO FIGURES 1, 4, AND 5

1. Internal connection, subscriber Tn2 making a call

The subscriber Tn2 removes his receiver, causing the connection to the conductor lb2/la, the switching over of the blocking circuit and the setting of the pre-selector VW, as described. Relay R1 remains energised.

In the feeding circuit the relay A4 in the access means to the group selector IGW and in the group selector IGW the relay A5 are energised. On the contact 101a4 a circuit over choke Dr5, winding II, and relay B5 is closed. At contact 102a4 the condenser K3 and the winding I of the choke Dr5 are connected to the upper talking conductor. The circuit over a winding I of relay O2 is prepared at the contact 103a4.

For initiating an internal connection the selection of a two-digit marking number is necessary. The connection of the revertive transmitter RU2 is effected after the emission of a train of current impulses corresponding to the first digit of the marking number, while the release of the group selector IGW and the associated number impulse receiver set by the second train of number impulses is effected only when the second train of number impulses corresponds to the second digit of the marking number for internal connections.

After termination of the first train of impulses contact 104kgw is closed and relay O2 is energised: +, contact 104kgw, conductor ld2, contacts 105n, 103a4, winding I of relay O2, —. Relay O2 closes its contacts 105o2, 106o2, 107o2. The impulse for connecting a free revertive transmitter is transmitted over: +, contacts 108n, 105o2, start conductor 109, wiper 110, contact 111 of discriminator ML, contacts 112p2, 113d2, relay An2, —. At the contact 114an2 the rotary magnet D2 of the service selector DW2 is connected whereby the circuit of relay An2 is opened at the contact 113d2 and the wipers of the service selector DW2 are advanced by one step. The magnet D2 is disconnected and the circuit of the start relay An2 is re-established. The alternate reciprocal connection and disconnection of the magnet D2 and the start relay An2 continues, until the wipers of the service selector DW2 reach the junction of that access means to a group selector IGW from which the impulse for the connection of the revertive transmitter is transmitted. The relays P2 and N then operate: —, winding I of relay N, contacts 107o2, 115, wiper of service selector DW2, windings II and I of relay P2, contact 117g, +. Contact 118p2 opens and arrests the service selector DW2. The seized access means is locked at the contact 119p2

against seizure by another service selector by a short circuit of the high-resistance winding I of relay P2. At the contact 112p2 the relay A2 is disconnected and at the contact 120p2 the start conductor 109 is switched over to the start conductor 121 leading to the next revertive transmitter. Contact 122p2 closes and connects the relay A6 over the wiper 123 and contact 124 of the service selector to conductor 18 so that it operates in parallel with the relays A4 and A5. By the closing of contact 125p2 the winding II of relay O2 is connected in parallel with relay C2; +, resistance 126, contact 125p2, wiper 127, contact 128 of the service selector DW2, winding II of relay O2, conductor 20.

The relay A6, when operated, prepares at the contact 129a6 the calling of the subscriber Tn2 of the two-conductor junction. It opens at the contacts 131a6 and 132a6, the circuit of the control relay V and the rotary magnet D3 of the discriminator ML, connects the relay H2 at the contact 130a6 and prepares at the contact 133a6 the circuits for the relays F and G. The contact 134a6 is used for the operation of the meter of the calling subscriber, after termination of a revertive connection.

The relay N opens at the contact 105n the circuit of relay O2 (winding I) and at the contact 108n the access means to the start conductor 109. By opening contact 135n the short circuit is removed from winding II of relay N, and at the contact 136n a locking circuit controlled by contact 137a4 is established over the winding II of relay N.

When the calling subscriber Tn2 sends out a train of numerical impulses corresponding to the second digit of the marking number for an internal connection, the impulses are received by both relays A5 and A6. The setting of the numerical impulse receiver arranged subsequent to the group selector IGW is here without interest. The discriminator ML associated with the revertive transmitter RU2 is set: +, contacts 132a6, 138f, 139g, 140h2, rotary magnet D3 of the discriminator, -. At the contact 131a6 the connection of relay V takes place and the relay short-circuits its winding II at the contact 141v, so that its armature is held attracted during the train of impulses. Contact 142v is opened, whereby any action on relays F and G by the wiper 143 of the discriminator ML during the setting thereof is prevented.

After the number has been selected the wiper 143 of the discriminator is set on contact 144. The relay V restores as contact 131a6 remains open. Contact 142v is closed and relay F operates. It locks up at contact 145f in a circuit dependent on contact 146h2 and closes at the contact 147f a circuit for the cut-off relay T3 which passes over the wiper 148, contact 149 of the service selector DW2 and contact 106o2. Relay T3 operates and opens at the contacts 150t3, 151t3 and 152t3 the conductors 18, 19, 20 of the access means to the group selector IGW. The relay A4 of this access means and the relays A5, B5 and C2 in the group selector are restored. The group selector and the subsequent similarly arranged numerical impulse receiver of the connection path set are released and may thereafter be engaged for completing a new connection. The seizure of group selector IGW is only possible by an access means 28, 29, 30, since the access means 18, 19, 20 for party line subscribers is locked at the preselector VW.

In addition to the switch operations described

above the relay F has opened the contact 138f in the circuit of the operating magnet D3 of the discriminator and has established the ringing circuit at the contact 153f: source of alternating current, winding I of relay Ra2, contact 154ra2, 153f, 129a6, wiper 155 and contact 156 of the service selector DW2, conductor 19, contact and wiper of the preselector VW, contacts 14r1, 25t1, conductors 1a, 1a1, choke Dr1, bell of the subscriber station Tn1, winding I of relay E1, earth (+). A small fraction of the ringing current flows over the condenser K1 and the contact 3e1 of the blocking circuit previous to the subscriber station Tn1. The operation of the bell is thereby not influenced in any appreciable manner. The relay Ra2 does not energise in the ringing circuit.

When the called subscriber Tn1 answers, the relays E1 and Ra2 operate, relay E1 performing the above described switch-over actions. The relay Ra2 locks itself energised at the contact 157ra2 in a locking circuit controlled by contact 158h2 and passing over its winding II. It disconnects its winding I by opening contact 154ra2, effecting a connection, over contact 159ra2 and the choke Dr6, to the feeding circuit of the subscriber Tn1 over conductor 19.

The subscribers Tn2 and Tn1 are now connected with each other. If, upon termination of the conversation, the calling subscriber Tn2 hangs up, relay A6 will be restored and return its contacts to their rest position. Since the relay H2 which is directly controlled by relay A6 is a slow relay the contacts 169h2 and 168ra2 remain in their operative position for a short period of time after the contact 134a6 has been closed. The resistance 126 is short-circuited whereby the current through conductor 20 is increased, so that the meter Z2 of the calling subscriber Tn2 which is connected over contact 17r1 and the wiper 9 of the preselector to the conductor 20, can energise.

The relay V operates, because the contact 131a6 is closed. When the contacts of the slow to release relay H2 restore, relay F is disconnected and restored. At the contact 160h2 the relay V is disconnected and at the contact 161h2 the circuit of the operating magnet D3 is prepared. When the relay V is restored, the following circuit is closed: +, contact 162v, off-normal contact 163km1 of the discriminator, contact 161h2, rotary magnet D3, -. The discriminator takes one step. At the same time the relay V is switched-in over contact 164d3, opening at the contact 162v the circuit of the rotary magnet, thus de-energising it. The relay V and the rotary magnet, D3 are alternately connected by their mutual interaction until the discriminator reaches its position of rest in which the off-normal contact 163km1 is open and the circuit of the rotary magnet D3 is finally interrupted.

When the relay H2 is restored, relay G is connected over contacts 166h2 and 167km2 (off-normal contact of discriminator). The circuit over relay P2 and the winding I of relay N is broken. At the contact 125p2 the locking circuit over the windings II of the relays O2 and T1 is opened. As the contact 125t3 of the relay T3 which is disconnected at the contact 147f by the release of relay F and which has a long delay when restoring, is still open for some time, the relay T1 in the pre-selector VW can restore and step the pre-selector round into its rest position.

A seizure of the revertive transmitter RU2 cannot take place during the release movement of

the discriminator ML because the start conductor 109 is connected to the start relay An2 only in the rest position of the discriminator (wiper 110 on contact 111). In all the operative positions of the discriminator the start conductor 109 is connected to the extension start-conductor 121 over the wiper 111 and one of the inter-connected contacts 165.

Testing on the service selector DW2 during the release movement of the discriminator ML is also prevented, because the relay G is energised and keeps the contact 117g in the circuit of the testing relay P2 opened.

The marking number for internal connections can obviously also have more than two digits. In such an instance the revertive transmitter is associated with a discriminator which releases the set connection selectors only after the current impulses corresponding to all the digits of the marking number have been sent out and which effects the calling of the second subscriber of the two-conductor junction.

2. *The calling subscriber sends out an impulse train which does not correspond to the second digit of the marking number of internal connections*

Over that bank of the group selector IGW, the marking number of which corresponds to the first digit of the marking number for internal connections, connections also extend to other stations of the system. After the selection of this bank and the sending out of a further train of impulses which does not correspond to the second digit of the marking number for internal connections, the release of the revertive transmitter RU2 connected to the access means 18, 19, 20 takes place.

The wiper 143 of the discriminator ML is set on one of the interconnected contacts 170, by the second train of impulses. After the release of the relay V re-energised during this train of impulses relay G operates and locks itself energised at contact 171g, in a circuit dependent on contact 172h2. It opens the circuit of relay P2 and the winding I of relay N at the contact 117g. Relay N remains energised over its winding II, as this winding is included in a locking circuit controlled by contact 137a4. Relay P2 is restored and disconnects relay A6 at the contact 122p2 and relay O2 at the contact 125p2. Both relays restore. Relay H2 is disconnected. The discriminator is stepped on to its rest position. During the release movement of the discriminator ML relay G remains energised.

I claim:

1. In a telephone system, a first switch, a second switch, party lines and individual lines, means for seizing said first switch over any of said lines to extend a call and for transmitting thereto a signal code, said first switch effective upon receipt of said code if same comprises any of one or more predetermined codes to extend the call in a direction dependent upon said received code, said direction being the same regardless of whether the calling line is a party line or an individual line, said first switch effective upon receipt of said code if same comprises a predetermined code different from all of said one or more codes and if the calling line is a party line to cause said second switch to seize the calling line, means in said second switch operated to signal the wanted subscriber, thereby to extend the desired call, and means operated to release said first switch to make same available for another call before said first call is terminated.

2. In a party line telephone system, a party line, an automatic switch, reverting call equipment, means controlled by a calling subscriber at any substation on said line to extend a connection over said line to said switch, means for then operating the switch over said connection either to further extend the connection or to cause said reverting call equipment to connect with the connection at a point intermediate said calling substation and said switch, and means in said equipment for transmitting a signal to another substation on said party line.

3. In a telephone system, a party line, an automatic switch, reverting call equipment, means controlled by a calling subscriber at any substation on said line to extend a connection from said line to said switch, means in said switch then operated variably over said connection and effective if operated in one way to cause the switch to further extend said connection, means controlled by said switch in response to the operation of said last means in another way to connect said reverting call equipment to the connection at a point intermediate the calling substation and said switch, and means in said equipment for transmitting a signal to another substation on said party line.

4. A telephone system as claimed in claim 3, wherein said last means is automatically operated to transmit said signal responsive to said equipment being connected to said connection.

5. In a telephone system, a two-party line terminating in an exchange, an automatic switch, ring-back equipment, means in the exchange operated responsive to the initiation of a call on said line to seize said switch, a ringing circuit prepared by said means upon said operation thereof, said prepared circuit extending from the exchange over one or the other side of said line depending upon which of the substations on said line is calling, means in said switch operated variably over said line by the calling subscriber and effective if operated in one way to cause said switch to extend a connection therefrom, means controlled by the switch in response to the operation of said last means in another way to connect said ring-back equipment to said ringing circuit, and means in said equipment operated responsive to said equipment being connected to said ringing circuit for automatically impressing ringing current thereupon.

6. In a telephone system, a plurality of party lines, a plurality of automatic switches each accessible to all of said lines, reverting call equipment common to said switches and also common to said lines, means responsive to a call on any of said lines for completing a connection from the calling line to one of said switches, means in said switch then operated variably over the calling line and effective if operated in one way to cause the switch to further extend said connection, and means controlled by said switch in response to the operation of said last means in another way to connect said reverting call equipment to the connection extended to said switch from the calling line.

7. In a party line telephone system, a party line substation, an automatic switch, reverting call equipment, means controlled by a calling subscriber at said substation to extend a connection from that substation to said switch, means in said switch then operated variably over said connection by the calling subscriber and effective if operated in one way to cause the switch to further extend the connection, means con-

trolled by said switch in response to the operation of said last means in another way to connect said reverting call equipment to the connection at a point intermediate the calling substation and said switch, and discriminating means in said reverting call equipment thereafter controlled over the connection by the calling subscriber and effective at times to cause said switch and the portion of said connection extended thereby to release.

8. In a party line telephone system, a party line substation, an automatic switch, reverting call equipment, means controlled by a calling subscriber at said substation to extend a connection from that substation to said switch, means in said switch then operated variably over said connection by the calling subscriber and effective if operated in one way to cause the switch to further extend the connection, means controlled by said switch in response to the operation of said last means in another way to connect said reverting call equipment to the connection at a point intermediate the calling substation and said switch, and discriminating means in said reverting call equipment thereafter controlled over the connection by the calling subscriber and effective at times to cause said equipment to be disconnected from the connection.

9. In a party line telephone system, a plurality of party lines, an automatic switch, reverting call equipment, means for seizing said switch over any calling one of said lines and for controlling the switch thereover either to extend a connection or to cause said reverting call equipment to connect with the calling line, means operated to release said switch if said equipment is caused to connect with said calling line, said equipment being maintained connected with said line independently of said switch, means in said equipment then operated to transmit a signal back over said calling line, and means for seizing said

switch over another one of said lines to extend a call while said reverting call equipment is still connected with said first calling line.

10. In a telephone system, party lines and individual lines, an automatic switch, reverting call equipment, means for seizing said switch over any of said lines to extend a call and for transmitting thereto a signal code, said switch effective upon receipt of said code if same comprises any of one or more predetermined codes to extend the call in a direction depending upon the received code, said direction being the same regardless of whether said calling line is an individual line or a party line, said switch effective upon receipt of said code if same comprises a predetermined code different from said one or more codes and if the calling line is a party line to cause said reverting call equipment to seize the calling line, means then operated to release said switch to make same available for another call before said first call is terminated, means for preventing said switch from being seized by another party line for a call before termination of said first call, and means for seizing said switch over an individual line for another call before termination of said first call.

11. In a telephone system, a two-party line terminating in an exchange, a source of signaling current, means at the exchange responsive to the initiation of a call on said line, said means operated variably dependent upon which of the substations on said line is calling and effective, upon said operation, to automatically prepare one or the other side of the line to be connected to said source depending upon which of the substations on said line is calling, and means operated at times by the calling subscriber after one or the other side of the line has been so prepared to cause the prepared side of the line to be connected to said source.

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