

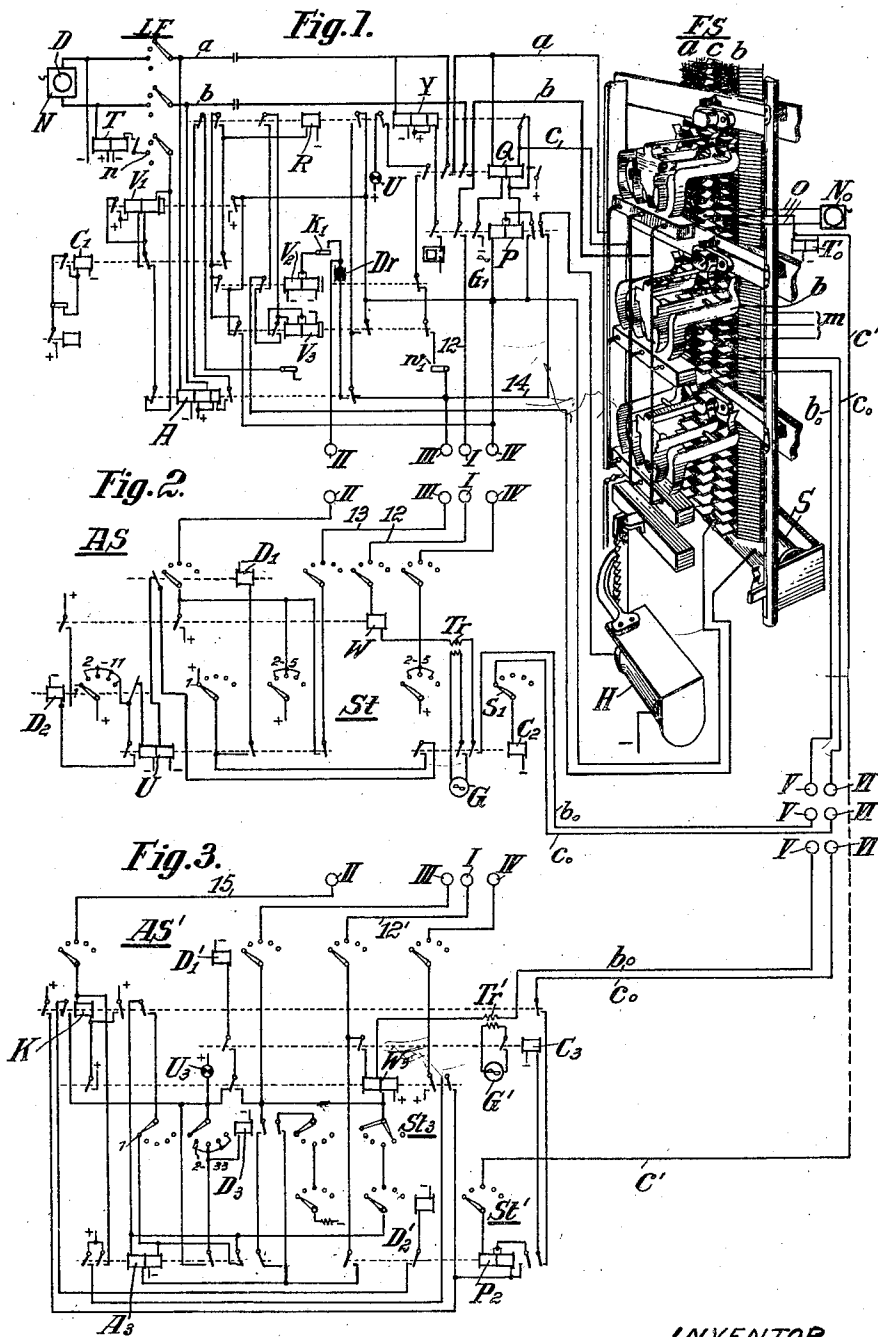
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AUTOMATIC TELEPHONE SYSTEM

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AUTOMATIC TELEPHONE SYSTEM

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The invention relates to automatic telephone systems and, in particular, to so-called final selectors or connectors. It relates to means on these selectors, by which it is possible to select a free final connecting line when adjusting the selector to the call number of a subscriber, whose station is connected to the contact area of the line selector by a plurality of the subscribers' lines. The invention provides for improvements in the arrangements proposed for this purpose.

According to the invention a single auxiliary switching device is used for a set of line selectors, to the contacts of which the same subscribers' lines are connected in multiple connection, this device being brought into action when adjusting the line selector to the starting line allotted to the subscriber's station concerned and automatically causing the adjustment of the line selector concerned to a free subscriber's connecting line.

The invention is hereinafter described with reference to the accompanying circuit diagrams which diagrammatically represent two constructional forms of the invention, and particularly for a small automatic telephone system in which the subscribers are directly connected, by means of so-called line finders, with connectors, which the calling subscriber adjusts, in a manner well-known to the expert, to a definite subscriber's number. That the invention may be used for larger systems, in which other types of selectors are connected in series with the connectors, is apparent to the expert in the art.

Referring to the drawings, Fig. 1 shows the circuit arrangement of a line finder with a line selector, in which the line selector is of the so-called panel type, in which the adjustment to groups of subscribers and individual lines is done by a step-by-step movement in a vertical direction.

Fig. 2 shows the circuit arrangement of an auxiliary switch according to the invention which is allotted to a set of line selectors as shown in Fig. 1 that is, to a set of selectors in which the bank contacts are in multiple connection, as usual, with the same subscribers' lines.

Fig. 3 shows another circuit arrangement

of an auxiliary switch which can be used for this purpose. It is to be observed that the switching device according to Fig. 1 can cooperate either with an auxiliary switch according to Fig. 2 or with an auxiliary switch according to Fig. 3. In this case the ends of the lines in Fig. 1 indicated by I—VI and emphasized by small circles may be assumed to be connected either with the ends of the similarly indicated lines in Fig. 2 or with those in Fig. 3.

The mechanical part of the line selector is diagrammatically shown in the drawing for better representation. Line selectors of the type assumed here are described in British Patent No. 275,255. The invention is not bound to this particular type of line selector, but it appeared appropriate for simple illustration, to use such a line selector as a basis for the description of the invention.

It may be assumed that the subscribers' lines are combined in groups of 100 subscribers and that the bank contacts of a set of, for instance, 10 line selectors are connected in multiple in the well-known manner, so that each line selector of a set can make connection with each subscriber's line of the associated 100 group of subscribers.

Further, it may be assumed that not only a single line leads from the contact banks of the associated set of line selectors to a particular subscriber but a whole group of such lines, for example, four, five or six lines, making it immaterial to the calling subscriber as to which line of this plurality of lines he selects, since he can speak over any of the lines to the subscriber's station required.

The different subscribers' lines which lead to the one point of connection which is connected to the contact banks of the line selectors, in the above mentioned manner, by several lines, may obviously either be connected to points located in succession in the contact area or may be distributed irregularly in the contact area, as desired. The connecting with a free line of the multiple-connection subscriber is effected in the first case by means of the auxiliary arrangement according to Fig. 2, and in the second case by the aid of the auxiliary arrangement according

to Fig. 3, as described in detail in the following.

It may be assumed that a subscriber N of a telephone exchange desires to make connection with a subscriber who is connected to the contact area of a line selector FS with a plurality of lines. It may then be assumed that the several connections are successively connected to the bank contacts and that only one definite call number is allotted to the subscriber.

When the calling subscriber N picks up his receiver, a relay T, connected to his line in the office, is operated in a well-known manner, which relay, in a manner likewise well-known to the expert, causes a line finder LF, which need not be described here in detail, since it is absolutely well-known to the expert and forms no part of the invention, to set itself on the contacts of the calling line. This line finder as usual, consists of three rotatable brushes which are diagrammatically indicated in the drawing in the usual way. The devices which cause the mechanical adjustment of the line finder have not been represented for the sake of simplicity. When the testing brush of the three mentioned movable brushes of the line finder engages with the contact *n*, which is allotted to the calling subscriber N, then a current flows from the negative pole of the battery through the right winding of the relay T, the closed working contact of the relay, the contact *n*, the testing brush of the line finder, the right winding of a relay V₁, the closed inner right working contact of a relay C₁, (which, in a manner of no interest here, is only excited during the operation of the line finder) the left winding of the relay V₁, to the positive pole of the battery. It may be mentioned here that, for the sake of clearness, the working contacts belonging to each relay are shown separated from the relays. The association with the relay is indicated everywhere by a fine dotted horizontal line. In the circuit just mentioned, the relay V₁ operates and, through its left working contact, directly connects its right winding to the positive pole, so that it now becomes independent of the condition of the relay C₁.

The relay V₁ connects, through its right working contact, a current circuit from the positive pole of the battery through the contact mentioned and the left outer resting contact of a relay V₂, the closed right outer working contact of the relay C₁, (excited as mentioned above) and the winding of a relay R, to the negative pole of the battery. The relay R is excited.

At the same time, a relay A, bridged across the speaking wires, is connected with the subscriber's line through the other two brushes of the line finder, located in the speaking wires of the line, and is excited by a current, which flows through its left and middle wind-

ing in series connection. The relay A is the so-called impulse relay of the subscriber which, in a well-known manner, is repeatedly deenergized by operating the dial at the calling subscriber's station. At each deenergization, it closes, through its right outer resting contact, the current circuit for the working magnet of a line selector FS allotted to the line finder.

The current for the working magnet H flows as follows: from the positive pole of the battery through the closed right working contact of the excited relay V₁, the closed inner right working contact of the relay R, the closed right resting contact of the relay A, the closed right outer resting contact of the testing relay P, the winding of the magnet H to the negative pole of the battery. The magnet H is repeatedly energized and deenergized and lifts the movable contacts of the selector FS, in a well-known manner. At the first lifting step, the movable part of the line selector FS allows the foot contact *k*₁ to close (which is shown separated from the movable part of the line selector for the sake of clearness), whereby a current circuit is provided for the relay V₂, which is connected to the outer right working contact of the impulse relay A, which circuit is closed at the attraction of the armature of the relay A, following the first falling off of the armature, as follows:—from the negative pole of the battery, through the two windings of the relay V₂ arranged in parallel, the contact *k*₁ a choke coil D_r, the right outer working contact of A, the right inner working contact of R, the right working contact of V₁, to the positive pole of the battery. The special arrangement of the parallelly connected windings and the series connection of the choke coil D_r in this circuit prevent the relay V₂ from being operated by the current impulses flowing during the dialling operation, so that it only responds if, at the end of the first series of impulses, the right outer contact of A remains closed for a longer period.

The first series of impulses moves the movable part of the line selector FS as far as the lower group (comprising ten lines), in which the several connections of the wanted subscriber must be located. It may be assumed, for example, that these lines are located in the third tens group: it is unimportant, however, whether the connections are located in the first, second or a following group.

When the corresponding series of impulses is completed, the relay V₂ will operate in the circuit explained above. Due to the excitation of V₂, a current circuit is completed from the positive pole of the battery, through the right working contact of V₁, the magnet S in the line selector, the left inner working contact of the relay V₂, the left inner working contact of the relay R, the left inner rest-

ing contact of the relay V_3 , the right winding of V_3 , to the negative pole of the battery. In this circuit, the magnet S and the relay V_3 are excited. The magnet S is the so-called brush releasing magnet of the line selector which, in the well-known manner, operates that set of the different movable parallelly-connected contact brushes of the line selector, which co-acts with the selected tens-group of lines, as explained in detail in the above-mentioned British patent.

The relay V_3 , by its left inner resting contact opening, opens the short circuit of its left high-ohmic winding, so that the latter is now inserted in the current circuit indicated through the magnet S , which thus becomes deenergized. By again operating his dial D , the subscriber sends out a second series of impulses by means of which the movable set of brushes of the selector FS , selected by the magnet S , is brought to the desired connection number of the subscriber with multiple connection.

It may be assumed that the first contact allotted to this called subscriber is the second contact in the selected tens-group. This tens-group is the second one from the bottom in the diagrammatic illustration. Whilst, as usual, each connecting point in the contact area has three contacts and consists of the two speaking wires a and b and a test line connection c , only two wires are connected to the contacts of the multiple connection which correspond to the adjusted number, in the assumed case 32, and the two wires are really connected to the contacts of series of contacts b and c . This two-wire line, as indicated in Fig. 1 to the right at b_0 and c_0 , is the so-called starting line.

When the subscriber, for the purpose of adjustment to this starting line b_0 , c_0 , sends out current impulses, in the case assumed, two current impulses, then he again causes repeated deenergization of the relay A and thus immediate deenergization of the relay V_2 (which slowly attracts according to the above but is of such a construction that it quickly releases its armature at the interruption of the current). The relay V_3 however, holds its armature firmly, since it is traversed by current in a circuit from the positive pole to the magnet S , in the manner described above, and, from here, through the inner left resting contact of the relay V_2 and its own left working contact as well as its two windings in series connection to the minus pole. At the same time, due to the deenergization of V_2 , the relay R , connected to the left outer working contact of V_2 , is deenergized, which was previously kept energized in a current circuit from the negative pole through the winding of the relay R , its own middle left working contact, the mentioned contact of V_2 , and the right working contact of V_1 to

the positive pole, after the relay C_1 had released its armature.

On the completion of the second series of impulses, the relay V_2 again slowly attracts its armature in the manner already indicated and by this means interrupts, at its left inner resting contact, the current circuit for the relay V_3 which as mentioned, is a slowly releasing relay. In the period between the disconnection of the relay V_3 and the falling off of the armatures of V_3 , the relay P is connected in the following current circuit: positive pole of the battery, right working contact of the relay V_1 , left outer working contact of V_2 , left outer working contact of V_3 , both windings of the relay P in series, right resting contact of the relay Y , testing wire c and testing brush of the line selector FS , testing wire c_0 of the above described starting line, at VI to the testing wire c_0 in Fig. 2 and through the right arm S_1 of a control switch St (of the auxiliary switch AS , Fig. 2 and having, for example, five brushes) in the first position as shown, the relay C_2 , to the negative pole of the battery. The five brushes of the control switch St are diagrammatically illustrated next to one another and, by means of small figures on the contacts wiped over by the brushes, the position in which a control brush touches the corresponding contacts is indicated. At the twelfth step, the control switch again comes into the position 1. In this circuit, the relays P and C_2 respond. The relay P , which is the normal testing relay of the line selector FS , short-circuits its left winding with its right inner working contact and thus makes the testing line C_0 of the starting line set for further calls.

The relay C_2 in Fig. 2 connects, through its left outer working contact, a current circuit for a relay U which circuit extends from the negative pole of the battery, through the right winding of the relay U , the left resting contact of the working magnet D_1 , for the switching arms of the auxiliary switch AS , the outer left working contact of the relay C_2 , the second control switch arm in the first position, as shown, to the positive pole of the battery. In this circuit relay U responds and completes the circuit for the working magnet D_1 mentioned through its right inner working contact. The working magnet D_1 consequently moves its four contact arms forward by one step. At the same time, the left resting contact of the magnet D_1 is opened, so that relay U becomes deenergized and due to its right inner working contact opening, the magnet D_1 also becomes deenergized. By this means, the resting contact of D_1 is again closed, relay U is again excited and the working magnet D_1 likewise again inserted, so that the brushes of the switch are moved forward step-by-step over the contacts, due to the repeated energizing and deenergizing of the

magnet D_1 , until the third brush comes on the line 12 which leads over the connecting point I to the line selector FS adjusted to the starting line. At this moment a current circuit is made from a transformer T₇, through the relay W, third brush of the switch AS, line 12, left middle working contact of the relay P of the line selector FS, starting line b_0 , left inner working contact of the relay C₂, to the transformer. To the primary winding of the transformer, a source of alternating current G is connected through the middle working contact of the relay C₂, so that an alternating current, which energizes the relay W, flows in the current circuit completed according to the above. The relay W connects, with its left outer working contact, a current circuit for the working magnet D_2 of the control switch St which moves the control switch brushes into the second position. In position 2—11 of the control switch St, a current circuit for the relay U is now closed through the first control switch arm, which runs from the negative pole of the battery, through the left winding of the relay U, the right resting contact of the magnet D_2 , the first control switch brush, to the positive pole of the battery. By moving the switch St forward into the position 2, the current circuit for the working magnet D_1 of the switch AS is interrupted at the second control switch brush, so that the brushes of this switch remain in the selected position. Furthermore, the current circuit for relay C₂ and relay P has been interrupted at the fifth brush S, of the control switch St, so that relay P is deenergized and its middle left working contact opens, whereby the current circuit for relay W is interrupted.

The working magnet D_2 of the control switch St, in spite of the opening of the left outer working contact of the relay W, is again energized in a current circuit which runs from the negative pole of the battery, through the winding of the working magnet D_2 , the left working contact of the relay U, the left brush of the control switch St in the position 2—11, to the positive pole of the battery. When the working magnet D_2 responds, the latter opens its resting contact and thus interrupts the current circuit of the relay U, which, in turn, again interrupts the current circuit of the magnet D_2 by the opening of its left working contact. By this means the magnet D_2 again closes its resting contact and again excites relay U, so that in this changing operation the relay U periodically excites the working magnet D_2 , and this latter then moves the brushes of the control switch St each time by one step. At each excitation of the relay U, a current circuit for the working magnet H of the line selector FS is closed, which runs from the positive pole of the battery, third brush of the control switch St in positions 2—5, the

right outer working contact of the relay U; second brush of the switch AS, line 13, point III, line 14, right outer resting contact of the relay P, working magnet H, to the negative pole of the battery. It may be assumed that, in the contact area of the line selector FS connected to the starting line c_0 , b_0 , four lines are arranged in succession, these lines leading to the same subscriber. In this case, the current circuit (just described) for the working magnet H of the line selector is completed in the four positions 2—5 of the control switch St, so that the brushes of the line selector are moved successively over the individual lines of the wanted subscriber. Such a line is diagrammatically represented by three wires, indicated by m , in the centre of the contact area of the line selector FS. If the brush of the line selector engages with a free line, then the testing relay P responds in well-known manner, and the testing current flows from the testing line connected with the negative pole of the battery through the testing contact of the line selector, the testing brush, the line c , the right resting contact of the relay Y, the two windings of P in series connection, the point IV, the fourth contact arm of AS, the fourth brush of the control switch St in the positions 2—5, to the positive pole. The relay P short-circuits its left winding with its right inner working contact and thereby prevents, in the well-known manner, any further connections to the line laid through the line selector FS. A source of calling current G₁ is connected to the wanted subscriber's line through the inner and middle left working contact of the relay P. In the calling current circuit is located, in well-known manner, the left winding of a relay Q, which only responds when the called subscriber lifts his receiver. When the relay Q becomes energized due to the communication of the subscriber, it connects the speaking lines through its inner and middle left working contacts, so that the feeder relay Y becomes energized, which, due to the opening of its right resting contact, inserts the right winding of the relay Q in the current circuit through the line c . The relay Q connects the positive pole of the battery to the line c with its right contact, so that the line is now prevented, in the well-known manner, against further wiring, independent of the condition of the testing relay P.

The responding of the relay P in the line selector FS when the brushes of the line selector meet against a free line m , causes no alteration whatever in the auxiliary switch AS in Fig. 2. The working magnet D_2 of the control switch is further excited step-by-step in its current changing operation with the relay U, and switches the brushes of the control switch St further as far as the resting position. This may be, for instance, the position 12 which corresponds to

the position 1. In this position of the control switch S_t , the current circuit for the working magnet D_2 is interrupted, since the first brush connected with the positive pole of the battery, is, in this position, no longer connected with the line leading over the left working contact of the relay U to the working magnet D_2 .

If the connecting lines leading to the same subscriber are not all arranged in succession in the same line group, of the contact bank of the line selector and connected to the starting line c_0 , b_0 , then, according to my invention, the auxiliary switch illustrated in Fig. 3 is used, the line connections I—VI of which are supposed to be connected in the same way with the correspondingly indicated line connections of Fig. 1, as was previously the case with Fig. 2.

It may be assumed that the starting line to which the line selector is adjusted by means of the numerical current impulses of the subscriber, corresponding to the number of the wanted subscriber, is again the line (indicated by the wires b_0 and c_0) in the middle group of lines of the line selector FS, and that one of the connecting lines leading from the various lines (not represented) to the same subscriber is connected in the upper contact area group, as is diagrammatically indicated by the lines O leading to the station N_0 .

On adjusting the line selector to the starting line, the relay P of the line selector FS and a relay C_3 again become energized through the wire c_0 . With its left outer working contact, relay C_3 closes a current circuit for the working magnet D_1 of the four-armed switch AS' of Fig. 3, this circuit running from the positive pole of the battery, through an interrupter U_3 (Fig. 3), the middle resting contact of a relay W_3 , the left outer working contact of the relay C_3 , the winding of the working magnet D_1' , to the negative pole of the battery. In this current circuit, the working magnet D_1' is intermittently excited and moves the four brushes of AS' forward step-by-step, until the third brush meets the line 12' leading over I, which line is connected with the line selector FS which is adjusted to the starting line c_0 , b_0 . At this moment a current circuit is completed, which runs from the transformer Tr' , through the left winding of the relay W_3 , the middle working contact of the relay C_3 , the third brush of AS' , the line 12', the left middle working contact of the relay P in the selector FS, the line and the brush b of this selector, the wire b_0 of the starting line to the transformer Tr' . An alternating current generator G' is connected to the primary coil of the transformer Tr' through the left inner working contact of the relay C_3 , so that an alternating current flows in the current circuit mentioned and excites the

relay W_3 which, due to its left inner resting contact opening, interrupts the current circuit for the working magnet D_1' , so that the brushes of the switch remain on the lines leading to the adjusted line selector FS. The relay W_3 completes, with its left outer working contact, a current circuit, in which a relay K is excited and which runs from the negative pole of the battery through both windings of the relay V_2 in Fig. 1 and the closed foot contact k_1 of the line selector FS, line 15, the left brush of the switch AS' , winding of relay K, left outer working contact of the relay W_3 to the positive pole of the battery. The relay K is energized and with its left inner working contact completes a current circuit for the working magnet D_2' of a three-armed control switch S_t' from the positive, through the interrupter U_3 , the left inner working contact of the relay K, the left inner resting contact of a relay P_2 , the working magnet D_2' to the negative pole of the battery.

In this current circuit, the working magnet D_2' is intermittently energized and moves forward the brushes of the switch S_t' step-by-step. Connected to the contacts wiped over by the third brush of the switch S_t' are lines c' which emanate from the testing wires of the different connecting lines o leading to the subscriber N_0 . These lines lead, in a well-known manner, to the c contacts in the contact area of the line selector allotted to the connecting line, and also, to the one winding of the relay T_0 of each connecting line o , the other end of which is connected with the negative pole of the battery. As soon as the brush contacts on a line c' to which a line selector is not already connected, a current circuit is completed in which relay P_2 is energized. This current circuit runs from the negative pole of the battery, through the left winding of the relay T_0 , line c' , third brush of S_t' , both windings of the relay P_2 , the left outer working contact of the relay K, to the pole of the battery. The relay P_2 becomes energized and, with its left inner resting contact, interrupts the current circuit for the working magnet D_2' so that the switch S_t' remains in this position. Relay P_2 short-circuits its right winding with its right inner working contact and by this means bars the line c' against further connection.

When the relay K responds the current circuit for the relay P in line selector FS and for the relay C_3 due to the opening of the right outer resting contact of the relay K, had already been interrupted. Thus the relay P has fallen off and, with its right outer resting contact, completes a current circuit for the working magnet H of the line selectors FS. This current circuit runs from the positive pole of the battery through an interrupter U, the right outer resting contact of relay R, the left outer resting contact of relay Q, the right

resting contact of the relay V_2 , the right outer resting contact of V_3 , a closed running contact w_1 , (which is closed in a well-known manner when the selector FS leaves the resting position and is opened when it is moved as far as the maximum position), the line 14, the right outer resting contact of the relay P, the working magnet H, to the negative pole of the battery. The working magnet H is intermittently energized and moves the brushes of the line selector FS as far as the end position, in which the contact w_1 is opened, in a well-known manner, by mechanical means, and the switch pawl of the magnet H is removed from the rack, so that the brushes of the line selector fall back into the normal position. On reaching this position, the foot contact k_1 of the line selector is opened, in well-known manner, so that the previously described current circuit of the relay K is interrupted and the relay K falls off. With its middle right resting contact the relay K completes a circuit for the relay A_3 from the negative pole of the battery, through the right winding of the relay A_3 , the left arm of a further four-armed switch St_3 in the first position, the middle right resting contact of the relay K, the left winding of the relay A_3 , the left outer working contact of the relay P_2 , the third brush of the switch AS' , line 12' point I, line 12, magnet S of the line selectors FS, right working contact of the relay V_1 , to the positive pole of the battery. In this current circuit the control magnet S of the line selector FS does not respond, but the relay A_3 is energized, which, with its right inner working contact, closes a current circuit for the working magnet D_3 of the switch St_3 , from the positive pole of the battery through an interrupter U_3 the right inner working contact of the relay A_3 , the working magnet D_3 , to the negative pole. The working magnet D_3 is thus intermittently energized and moves the brushes of the switch St_3 forward step-by-step. After the first step, the current circuit for the working magnet D_3 is kept closed directly in the position 2—33 of the switch St_3 , over the second brush of the latter. The connection of the contacts, which are wiped over by the third brush of the switch St_3 and by the first brush of the switch St' is made in such a way that the switch St_3 must carry out a number of steps corresponding to the tens figure of the connecting line c' connected through the third brush of the switch St' , in order to be conductively connected with the first brush of the switch St' . The connection of the contacts which are wiped over by the fourth brush of the switch St_3 and the second brush of the switch St' is likewise made in such way, that from the moment when the third brush of the switch St_3 has been connected with the first brush of the switch St' , the switch St_3 must carry out a number of steps corresponding to the units figure of the

line, in order to be connected with the second brush of the switch St' .

The switching steps of the switch St_3 act on the working magnet H of the line selector FS in a current circuit from the positive pole of the battery, through the right outer working contact of the relay A_3 , the right inner work contact of the working magnet D_3 , the second brush of the switch AS' , point III, line 14, right outer resting contact of the relay P, working magnet H, to negative pole.

At each excitation of the working magnet D_3 , this current circuit is completed through the right inner working contact of this magnet, so that, at each step of the switch St_3 , the line selector FS is also switched forward one step, and thus a current circuit is completed from the positive pole through the left inner working contact of the relay A_3 , the first brush of the switch AS' , line 15, point II, the contact k_1 , both windings of the relay V_2 , to the negative pole. The relay V_2 is energized and, at its right resting contact, prepares the circuit for the restoration of the line selector.

At the moment when the third tens-brush of the switch St_3 meets on the contact which is connected with the negative pole through the corresponding (first) brush of the switch St' , the magnet S of the line selector FS is energized in a current circuit from the negative pole, through the two brushes mentioned, right outer resting contact of the working magnet D_3 , left outer working contact of the relay P_2 third brush of AS' , line 12', line 12, magnet S, right working contact of the relay V_1 , to the positive pole. As already described herein, the magnet S operates that brush set of the line selector FS which corresponds to the group of lines in which the desired connecting line is located.

When, after further current impulses, the fourth (units) brush of the switch St_3 engages with the contact to which the corresponding brush of St' is connected, then a current circuit is completed from the positive pole, through the right winding of the relay W_3 , the two mentioned brushes of the switches St_3 and St' , the right middle working contact the relay A_3 , the right winding of the relay A_3 to the negative pole. In this current circuit, relay W_3 is energized and, with its right inner working contact, completes a current circuit from the positive pole of the battery, through the contact mentioned and through the fourth arm of AS' , point IV, both windings of the relay P, right resting contact of the relay Y, line c , c -brush of the line selector FS, c -wire of the connecting line, left winding of the relay T to the negative pole. The relay P responds and sends, through its inner and middle left working contacts, a calling current from the source G_1 , into the speaking line, whereupon the

further completion of the connection is effected as previously described.

The calling subscriber is thus connected with one of the connecting lines O distributed to the contact area of the line selector FS, these lines being quite free at the time of his call.

The energizing circuit of W_3 is immediately again interrupted when the switch St_3 is switched forward into the normal position, that is until the position 33 is passed, in which its second arm disconnects the interrupter U_3 . All the relays of the auxiliary switch of Fig. 3 are now again in their normal positions, so that the auxiliary switch AS' , St_3 , St' is available for another call.

I claim:

1. An automatic telephone system comprising lines of calling subscribers and lines of subscribers to be called; line selectors having contact areas with which the lines of the subscribers to be called are connected; means for connecting the lines of a calling subscriber with a free line selector; a plurality of subscribers' lines from the station of a subscriber to be called, which lines lead to contacts in the said contact areas of the line selectors; a starting line allotted to said station and connected to the contact area of the line selector; an auxiliary switch connected to said starting line; means for connecting the auxiliary switch to the line selector connected to the starting line; and means in the auxiliary switch for effecting the connection of said line selector to a free line of the said plurality of lines of the subscriber to be called.

2. An automatic telephone system comprising lines of calling subscribers and lines of subscribers to be called; line selectors having a contact area with which the lines of subscribers to be called are connected; means for connecting the lines of calling subscribers with a free line selector; a plurality of subscribers' lines from the station of a subscriber to be called, which lines lead to contacts in the said contact areas of the line selectors; a starting line allotted to said station and connected to the contact area of the line selector; an auxiliary switch connected to said starting line; contacts in said auxiliary switch; lines leading from these contacts to the different line selectors, with the contact area of which said lines to be called are connected; means for moving the contact arms over said contacts of the auxiliary switch; a testing current circuit which is completed when the contact arms are adjusted to the line selector connected to said starting line; means for stopping the contact arms in the adjusted position; and means in auxiliary switch for effecting the connection of said line selector to a free one of said plurality of lines of the subscriber to be called.

3. An automatic telephone system com-

prising lines of calling subscribers and lines of subscribers to be called; line selectors with contact areas to which the lines of subscribers to be called are connected; means for connecting the lines of calling subscribers with a free line selector; a plurality of subscribers' lines from the station of a subscriber to be called, which lines lead to contacts in the contact areas of the line selectors; a starting line allotted to said station and connected to the contact area of the line selector; an auxiliary switch connected to said starting lines; contacts in said auxiliary switch; lines leading from these contacts to the different line selectors, with the contact area of which said lines to be called are connected; means for moving the contact arms over said contacts of the auxiliary switch; a testing current circuit which is completed when the contact arms are adjusted to the line selector connected to said starting line; means for producing a flow of alternating current in said testing circuit for testing purposes; means for stopping the switching arms in the adjusted position; and means in the auxiliary switch for effecting the connection of said line selector to a free one of said plurality of lines of the subscriber to be called.

4. An automatic telephone system comprising lines of calling subscribers and lines of subscribers to be called; line selectors with contact areas to which the lines of subscribers to be called are connected; means for connecting the lines of calling subscribers with a free line selector; a plurality of subscribers' lines from the station of a subscriber to be called, which lines lead to contacts in said contact areas of the line selectors; a starting line allotted to said station and connected to the contact area of the free line selector; an auxiliary switch connected to said starting line; means for connecting the auxiliary switch to the line selector connected to said starting line; means in the auxiliary switch for effecting the connection of said line selector to a free one of said plurality of lines of the subscriber to be called; and means for releasing and restoring the auxiliary switch to the normal position directly after the connection of the line selector to a free line.

5. An automatic telephone system comprising lines of calling subscribers and lines of subscribers to be called; line selectors with contact areas to which the lines of subscribers to be called are connected; means for connecting the lines of calling subscribers with a free line selector; a plurality of subscribers' lines from the station of a subscriber to be called, which lines lead to contacts in said contact areas of the line selectors; a starting line allotted to said station and connected to the contact areas of said line selectors; an auxiliary switch connected to said starting line; means for connecting the auxiliary switch to the line selector connected to the

starting line; means in the auxiliary switch for testing the plurality of subscribers' lines from said station of the subscriber to be called; means in the auxiliary switch for effecting the connection of said free line selector to a free one of said plurality of lines; and means for releasing and restoring said auxiliary switch to normal position directly after the connection of said line selector to a free line.

6. An automatic telephone system comprising lines of calling subscribers and lines of subscribers to be called; line selectors with contact areas to which the lines of subscribers to be called are connected; means for connecting the lines of calling subscribers with a free line selector; a plurality of subscribers' lines from the station of a subscriber to be called leading to contacts in said contact areas of the line selectors; a starting line allotted to this station of the subscriber to be called and connected to the contact areas of the line selectors; an auxiliary switch connected to said starting line; means for connecting said switch to the line selector connected with the starting line; means in the auxiliary switch for restoring said line selector; means in said switch for automatically testing the plurality of subscribers' lines; means in the switch for setting the line selector onto the contacts of a tested free line of said plurality of lines; and means for releasing and restoring the switch to normal immediately after connection of the line selector with a free line.

In testimony whereof I have hereunto affixed my signature.

FRIEDRICH MERK.