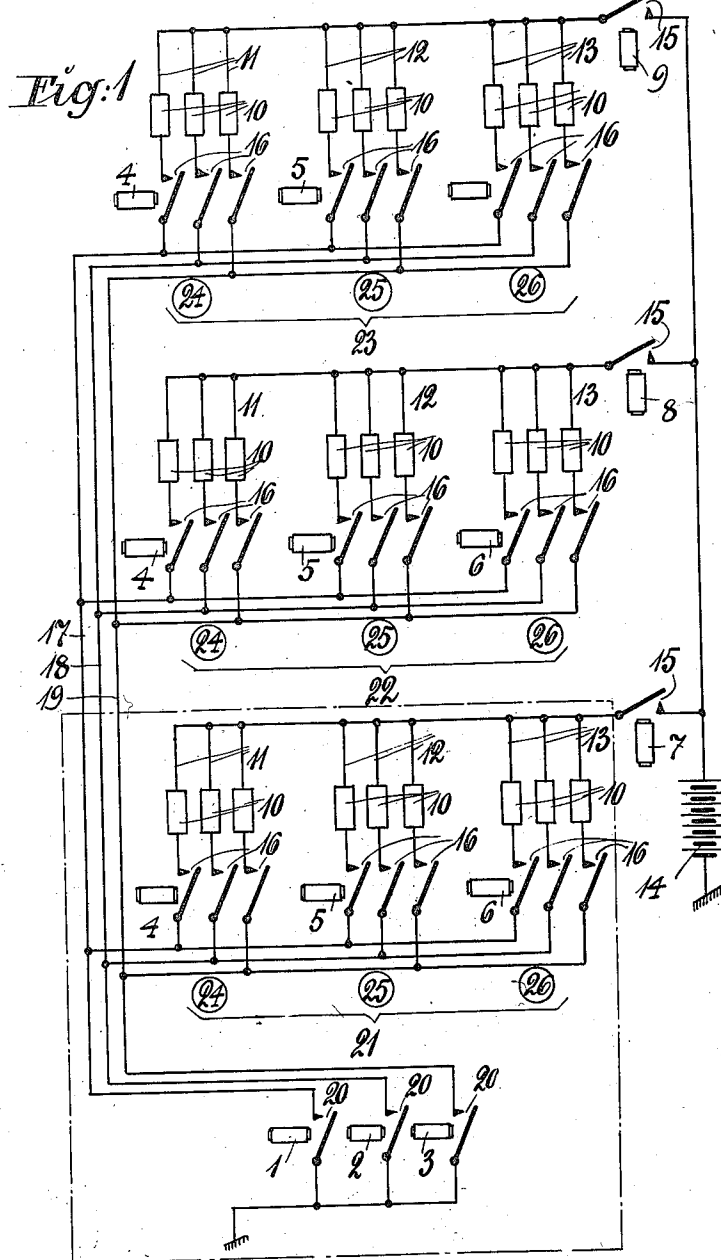


G. A. BETULANDER.
 AUTOMATIC OR SEMI-AUTOMATIC TELEPHONE EXCHANGE SYSTEM.
 APPLICATION FILED FEB. 27, 1914.

1,129,543.

Patented Feb. 23, 1915.

2 SHEETS-SHEET 1.



Witnesses:-
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 J. George Barry

Inventor:-
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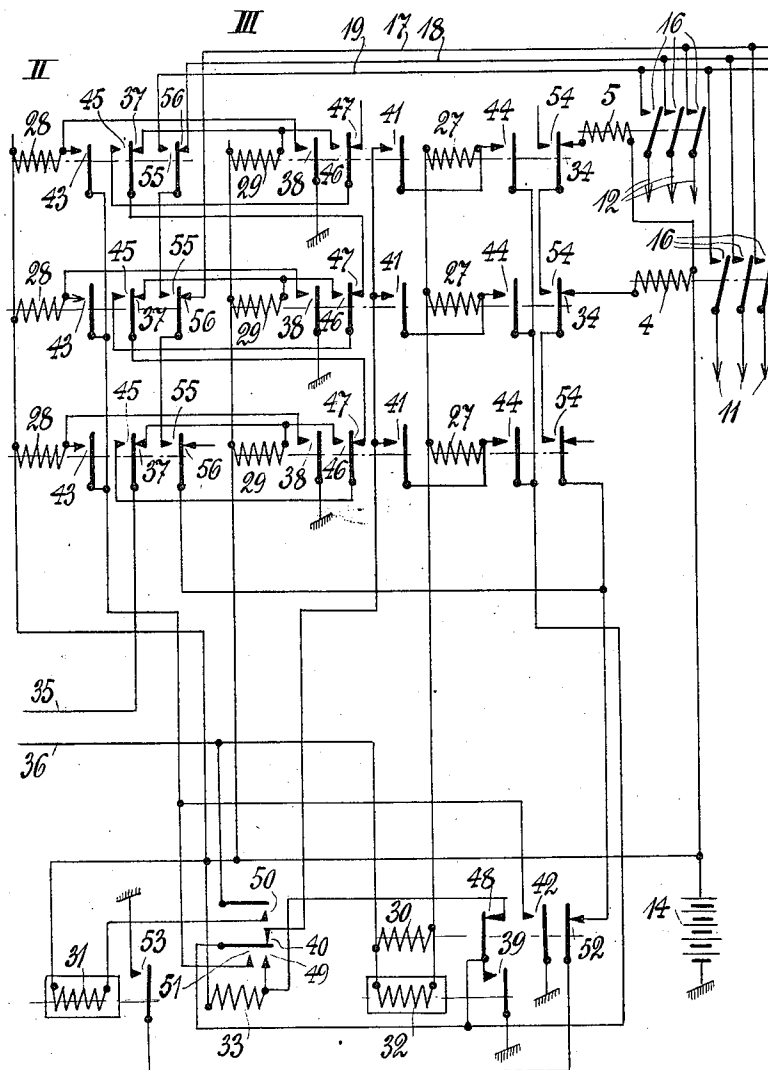
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2 SHEETS-SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

GOTTHILF ANSGARIUS BETULANDER, OF VILLA CASTOR, SÖDERTÖRNS VILLASTAD, SWEDEN.

AUTOMATIC OR SEMI-AUTOMATIC TELEPHONE-EXCHANGE SYSTEM.

1,129,543.

Specification of Letters Patent.

Patented Feb. 23, 1915.

Application filed February 27, 1914. Serial No. 821,550.

To all whom it may concern:

Be it known that I, GOTTHILF ANSGARIUS BETULANDER, a subject of the King of Sweden, and resident of Villa Castor, Södertörns Villastad, in the Kingdom of Sweden, have invented certain new and useful Improvements in Automatic or Semi-Automatic Telephone-Exchange Systems, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to automatic or semi-automatic telephone exchange systems in which lines are selected by means of relays used in different combinations, said combining relays being selected and operated by means of a selector adapted to be set by the selective impulses.

More especially the invention relates to systems in which the selecting and the connecting operations are effected separately and by separate means. In systems of that class the selecting devices are, as well known, taken into engagement only during the establishing of the connections as they are used only to select and to indicate the wanted group or the wanted subscriber, while the talking connections are established by separate connecting means. As the selecting devices are thus engaged only during a small part of the whole talking period, they may be allotted in common to groups of junction lines whereby the number of selecting devices is considerably reduced. In such systems the sets of combining relays mentioned above are to be referred to the selecting devices as they are used only for selecting or indicating purposes, and, consequently, they as well as the selectors, are provided in a reduced number.

The object of the present invention is to further reduce the number of these sets of combining relays so that one and the same set of relays may be used in common, by two or more selectors. For that purpose every selector is provided with one series of selecting relays for every digit of the numbers to be selected, said series being adapted to register the selective impulses of the appertaining digit and then to remain in the condition thus established until all figures of the number wanted have been delivered. The selectors may, consequently, be set simultaneously and independently of each other and then successively operate the com-

mon set of combining relays as the affecting of the combining relays, after the selector has been set, may be deferred for any length of time.

A form of the invention is represented in the accompanying drawing in which—

Figure 1 is a line arrangement adapted for a group of one thousand subscribers and Fig. 2 is a selector according to this invention and adapted for two figure numbers.

In Fig. 1 the relays 1 to 9 inclusive are combining relays adapted to be selected and operated by a three figure selector the relays 1, 2 and 3 corresponding to the units, the relays 4, 5 and 6 corresponding to the tens and the relays 7, 8 and 9 corresponding to the hundreds. In the line arrangement represented it is a matter of selecting and operating any one of one thousand relays which may be assigned to the different subscribers. The relays are interposed in the lines 11, 12 and 13 which may be connected to the negative pole of a battery 14 through the contacts 15 of the relays 7, 8 and 9 and further to the earthed pole of the battery through contacts 16 of the relays 4, 5 and 6, common lines 17, 18 and 19, and contacts 20 of the relays 1, 2 and 3. In this instance, for the sake of simplicity, only three hundreds groups 21, 22 and 23 and in each hundreds group only three tens groups 24, 25 and 26 of relays 10 are shown. Further, in each tens group there are only three relays 10. The operation of a certain relay 10 is effected by energizing those of the combining relays 1 to 9 inclusive which correspond to the different figures of the number of the relay 10 in question. If, for instance, the relay 10 of the subscriber No. 333 is to be operated this is effected by energizing the relay 3, the relay 6 of the third hundreds and the relay 9. A circuit is thereby established for the relay 10 in question through the contact 20 of the relay 3, line 19, contact 16 of the relay 6 of the third hundreds line 13, and contact 15 of the relay 9.

The shown arrangement may be modified in such a manner that the relays 1, 2 and 3 correspond to the tens and the relays 4, 5 and 6 to the units the lines 11 being then assigned to the first subscribers of the different tens, the lines 12 to the second subscribers of the different tens, and so on.

The part of Fig. 1 inclosed by the dotted

lines represents, evidently, the line arrangement for one hundred subscribers.

The selector shown in Fig. 2 comprises two series of selecting relays 27 and 28, viz. one tens series I for the selecting of the tens groups, one unit series II for the selecting of the special lines of the groups respectively, and one series III of switching relays 29. Each series comprises ten relays but only three of them are shown, as the connections of the relays are the same throughout. Two relays 30 and 31, the latter of which is slow acting, are adapted to effect the final emission of the marking impulse. In addition, a slow acting relay 32 and an ordinary relay 33 are provided, which together with the relay 30 control the circuit of the relay 31, so that the marking impulse is not sent out until the shifting of both series of connecting relays has been finished.

To the contacts 34 of the different selecting relays 27 of the series I the group relays 4, 5, etc., are connected, the first being adapted to connect the lines 11 with the common lines 17, 18 and 19, the second to connect the lines 12 with the same lines, etc., as also shown in Fig. 1. The remaining group relays, not shown, are arranged in an analogous manner.

The selector operates in the following manner: The two branches of the calling subscriber's line or of a junction line are first connected in any known manner with two wires 35 and 36. The shifting of the selector is then effected in such a manner, that the line branch 36 is continually current carrying, while the shifting impulses are sent through the line branch 35. The currents are effected by the line branches being connected with earth through the operation at the substation or at the operator's position. A current passes first from earth through the line branch 36 and parallelly through the relays 30 and 32 to the negative pole of the battery 14. Consequently, the relays 30 and 32 attract their armatures, at first, however, without any effect. The first subsequent shifting impulse passes from earth through the line branch 35, the contact 37 of the first selecting relay 28 of the unit series II and the corresponding switching relay 29 to the battery. The switching relay 29 energizes upon the closure of that circuit thereby closing the operating circuit of the first selecting relay 28 through the contact 38 and the operating circuit of the first relay 27 of the tens series I through the contact 39 of the relay 32, contact 40 of relay 33 and contact 41 of the first switching relay 29. The selecting relay 28 puts itself in a locking circuit through the contact 42 of the relay 30 and its own contact 43. The selecting relay 27 puts itself in a locking circuit through the contact 39 of the relay 32 and its own contact 44. After

the relay 28 has attracted its armature the first shifting impulse is maintained through the contact 45 of the relay 28 and the contact 46 of the relay 29. As the first shifting impulse ceases, the switching relay 29 releases its armature thereby closing a contact 47. Consequently, the second shifting impulse passes through the contacts 45 and 47, the contact 37 of the second selecting relay 28 and the corresponding switching relay 29. Owing to this fact the second selecting relays 27 and 28 are operated in the same manner as the corresponding preceding relays. In this manner as many selecting relays are cut in successively as there are shifting impulses sent out. After the issuing of the first series of impulses the current through the line branch 36 is interrupted for a moment the relays 30 and 32 being thereby deprived of current. The relay 30 releases its armature at once, while the slow acting relay 32 still keeps its armature in attracted position. Owing to this fact the contact 42 is broken, so that the selecting relays 28 of the series II, already cut in, are deprived of current and release their armatures. Further, a circuit is closed extending from earth through the contact 39 of the relay 32, the contact 48 of the relay 30 and the relay 33 to the battery. The relay 33 energizes upon the closure of this circuit thereby putting itself in a locking circuit through the contact 39 of the relay 32 and its own contact 49. As the line branch 36 immediately after is again connected to earth, the current passes through the relays 30 and 32 as well as through the relay 31 via contact 50 of relay 33. The subsequent shifting impulses through the line branch 38 now operate in the same manner as before the selecting relays of the series II by means of the switching relays 29 the selecting relays being thereby put in locking circuits through the contact 39 of the relay 32, contact 51 of the relay 33 and the contacts 43, which circuits are not broken until the relay 32 releases its armature. As the contact 40 of the relay 33 now is open, the selecting relays of the tens series I are not affected by the unit impulses. After the issuing of the second series of impulses, by which a number of selecting relays of the unit series II have been cut in, the current through the line branch 36 is broken. In the same moment the relay 30 releases its armature and closes the contact 52 thereby closing a circuit extending from earth through the contact 53 of the relay 31, contact 52, contacts 54 of the operated relays 27 and one of the group relays, for instance 5, to the battery. The said relay 5, upon operating, closes the contacts 16 and thereby a marking circuit through the contacts 55 of, for instance, the two first selecting relays 28 of the series II, the contact 56 of the third selecting relay 28, line 18, the

corresponding contact 16 of the relay 3 and the corresponding line 12. The current rising in the circuit last described, which is broken as the relay 31 releases its armature, effects now the desired connection. As, finally, the relay 32 releases its armature all locking circuits are broken at the contact 39 so that the relays are deenergized. The selector is thereby restored in normal condition and is immediately ready for effecting a new connection.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

In a telephone exchange system, the combination with combining relays, lines to be

selected by operating said relays in different combinations and a selector for selecting and operating said combining relays of a number of series of selecting relays, said series corresponding to the different digits of the numbers to be selected and being adapted to register the current impulses and circuits for said combining relays controlled by the selecting relays.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

GOTTHILF ANSGARIUS BETULANDER.

Witnesses:

NILS G. LUNDSTEDT,
GRETA PRIEN.