

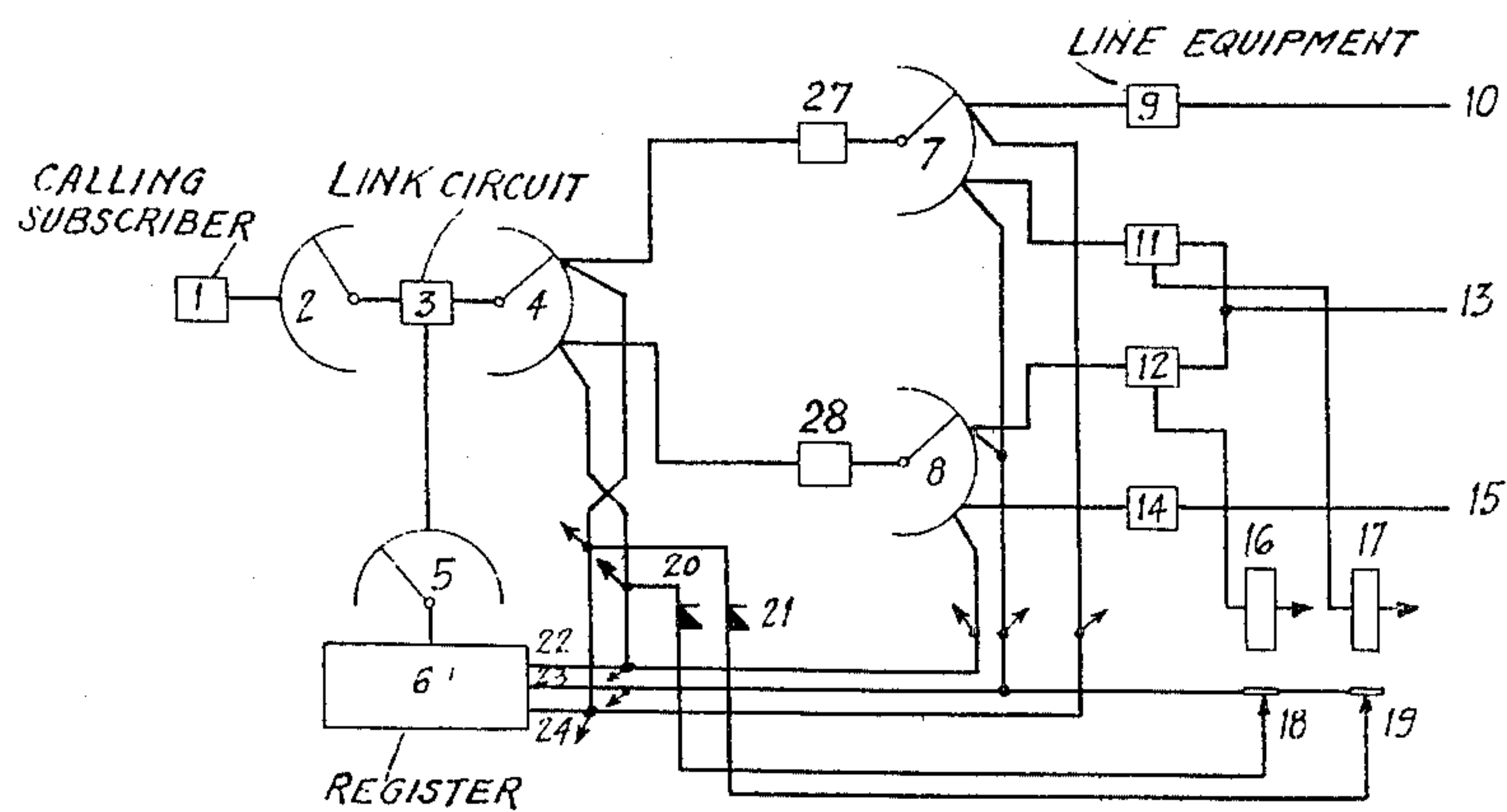
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SELECTOR MARKING SYSTEM

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## UNITED STATES PATENT OFFICE

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## SELECTOR MARKING SYSTEM

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1 Claim. (Cl. 179—18)

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This invention relates to the selection of the out lines in an automatic-switching exchange.

In the switching networks comprising several exchanges, these are connected together by bundles of lines whose installation is expensive and of which the highest possible efficiency should be obtained. The efficiency increases at the same time as the number of the lines of the bundle if these lines, the number of which is determined by the number of the calls to be transmitted, constitute a single perfect group, that is, a group wholly available to each of the selecting units; if the bundle consists of several line groups the highest possible efficiency is no longer reached.

A single perfect group would be formed if all the out lines of a bundle were connected to the banks of all the out selectors, but the capacity of these devices would then be increased beyond measure. It has also been proposed to modify the control circuits so as to allow the selections to proceed only towards selectors capable of finding a free line in the partial bundles to which they give access.

It is also known to resort to partial bundles with grading multiples but a busy signal is then sent without ground since it only relates to a partial bundle on which the hunting has taken place. Indeed a continuous hunting has been proposed should the relevant line group be found busy but the operations are then delayed until a line has become free in the partial bundle, which entails an important waste of time and a substantial wear of the devices. In no case is a single perfect group achieved.

This necessitates to increase the number of the out lines to such an extent that the probability for an out selector to find busy all the lines of the partial line bundle to which it gives access should be sufficiently low.

This invention allows of constituting out lines in a single perfect group and to thus obtain the highest efficiency from the bundles. It is applicable where the selection takes place by means of first group selectors and second group selectors, a first plurality of which gives access to some directions and a second plurality of which gives access to other directions, and where a single marking wire is multiplied on registers at one of its extremities and on selectors at its other extremity so as to permit the orientation of the selectors from the registers. Such a system has been described for instance in my U. S. Patent 2,529,166 and in the British Patent 668,261, which corresponds to my U. S. application Ser. No.

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617,379 referred to in the second paragraph of this U. S. patent and is entirely concerned with this system. In these patents the circuits in the registers and in the selectors have been described at full length. They may remain unaltered in the system of the present invention.

In the system according to the present invention, which will now be described with reference to the drawing, the lines which constitute a bundle for at least one direction are distributed over both pluralities of second group selectors but nevertheless remain all simultaneously accessible through the medium of the marking wire; the latter provides at all times for the orientation of the selectors exclusively towards the devices connected to free lines.

The accompanying figure, which represents by way of example an embodiment of the invention, shows the line of a calling subscriber 1 having access to three line bundles 10, 13, 15 corresponding to different directions by means of a circuit of connection 3 comprising a line finder 2 and a first group selector 4 which itself gives access to two second group selectors 7 and 8 whose connecting relays are shown at 27 and 28 respectively. The register 6, connected through the finder 5 to the circuit of connection, orients the selectors by means of the control wire 22 for the direction 15, the control wire 23 for the direction 13 and the control wire 24 for the direction 10. The equipments of the line bundles 10 and 15 are shown at 9 and 14 respectively; it is furthermore assumed that the bundle 13 is divided into two line groups, whose equipment 11 and 12 are connected to the selectors 7 and 8 respectively. For the purpose of simplicity the line groups themselves will be designated by references 11 and 12 in the following. The word "equipment" is here intended to mean the assembly of the terminals (line, control and test) of the different second group selectors on which each line is multiplied.

As conventional in the art, each of the lines of the line bundle 10 which lead to the same direction is multiplied to a contact of a plurality of selectors 7 similar to the single selector 7 diagrammatically shown so that any of these lines is accessible over any one of these selectors 7. Each of the lines of the line bundle 15 which lead to another direction is similarly multiplied to a contact of a plurality of selectors 8. As conventional in the art the wiper of each of selectors 7 and 8 is similarly multiplied to a contact of a plurality of first group selectors 4 similar to the single first group selector 4 which has been represented, so that any selector 7 or 8 is acces-



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sible over any one of the selectors 4 to one contact of which it is multiplied. Finally, as appears from the foregoing and from the drawing, some of the lines of the line bundle 13 which lead to a further direction are multiplied to a contact of the selectors 7 and others to a contact of the selectors 8. Each of the marking wires 22, 23 and 24 bears two arrows, one of which is directed towards the register 6 and indicates, as is conventional in the art, that the wire is multiplied to several registers and the other of which is directed towards the selectors and indicates that the wire, at its other extremity, is multiplied to the above mentioned several selectors.

Two busy relays 16 and 17 control the line groups 12 and 11 respectively. Relays 16 and 17 operate when all lines of groups 12 and 11 respectively are busy. A suitable conventional arrangement consists in mounting a relay on each trunk and in connecting in series one contact of all relays so as to close a circuit when all trunks are simultaneously busy. Such an arrangement is for example described in *Telephony* by Atkinson, London 1948, page 239, under the heading "Group Engaged Tone" and illustrated in Fig. 358 on page 240.

Relays 16 and 17 open at 18 and 19 the control wire 23 so as to render inaccessible, if desired, the selectors 8 and 7; the unidirectional-conductivity members 20 and 21 prevent the formation of common points in the control wires.

The operation is as follows:

When the subscriber calls for direction 10, the register 6 orients a selector 4 through the wire 24 on a selector 7, then it orients the latter selector through the wire 24 on one line of the bundle 10; again, for direction 15, a selector 4 is oriented through the wire 22 on a selector 8, and the latter is itself oriented on a line of the bundle 15; the selector 4 is oriented through the wire 23 and may stop on any one of selectors 7 and 8 if both line groups 11 and 12 of bundle 13 have lines free, because the wire 23 is connected either by the contact 18 and the element 20, or by the contact 19 and the element 21.

The register then orients the selector 7 or the selector 8 on any of the lines of groups 10 and 11 or 15 and 12 respectively; if all the lines of group 11 are busy, relay 17 opens 19 and the selector 4 can no longer be connected with the selectors 7, whereas the selectors 8 remain accessible to it, owing to the contact 18 held closed. The contact 19 has no influence on the wires 22 and 24; it prohibits the access to the selectors 7 only for the communications towards the bundle 13; these devices however remain accessible for the calls towards the bundle 10.

The advantageous results of the invention reside in the fact that a selector such as 4 can provide for the transmission of the communication designed for a bundle such as 13 in the same

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conditions as if it had on its bank of contact studs all the lines of the bundle 13 in a single perfect group. The risk thus disappears of seeing the selection take a way without any immediate outlet, while the communication is possible through another way.

The applications of this invention may be extended to all systems in which it may be advantageous to avoid the overcharge of the devices through communication overloads: the automatic control is here achieved by the control on the line bundles.

I claim:

Telecommunication switching system for trunking the outgoing communications from a telecommunication exchange comprising first group selectors, a first plurality of second group selectors, a second plurality of second group selectors, a first and a second plurality of outgoing lines each of which is multiplied to a position of each selector of said first plurality of second group selectors, a third and a fourth plurality of outgoing lines each of which is multiplied to a position of each selector of said second plurality of second group selectors, a marking wire dividing into a first branch multiplied on those positions of said first group selectors which give access to said first plurality of said second group selectors, a second branch multiplied on those positions of said first group selectors which give access to said second plurality of said second group selectors, a third branch multiplied to those positions of said first plurality of said second group selectors to which the lines of said second plurality of outgoing lines are multiplied and a fourth branch multiplied to those positions of said second plurality of said second group selectors to which the lines of said fourth plurality of outgoing lines are multiplied, means for cutting off said first branch when a predetermined number of lines of said second plurality of lines are busy, means for cutting off said second branch when a predetermined number of lines of said fourth plurality of lines are busy, and a unidirectional cell on each of said first and second branches.

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