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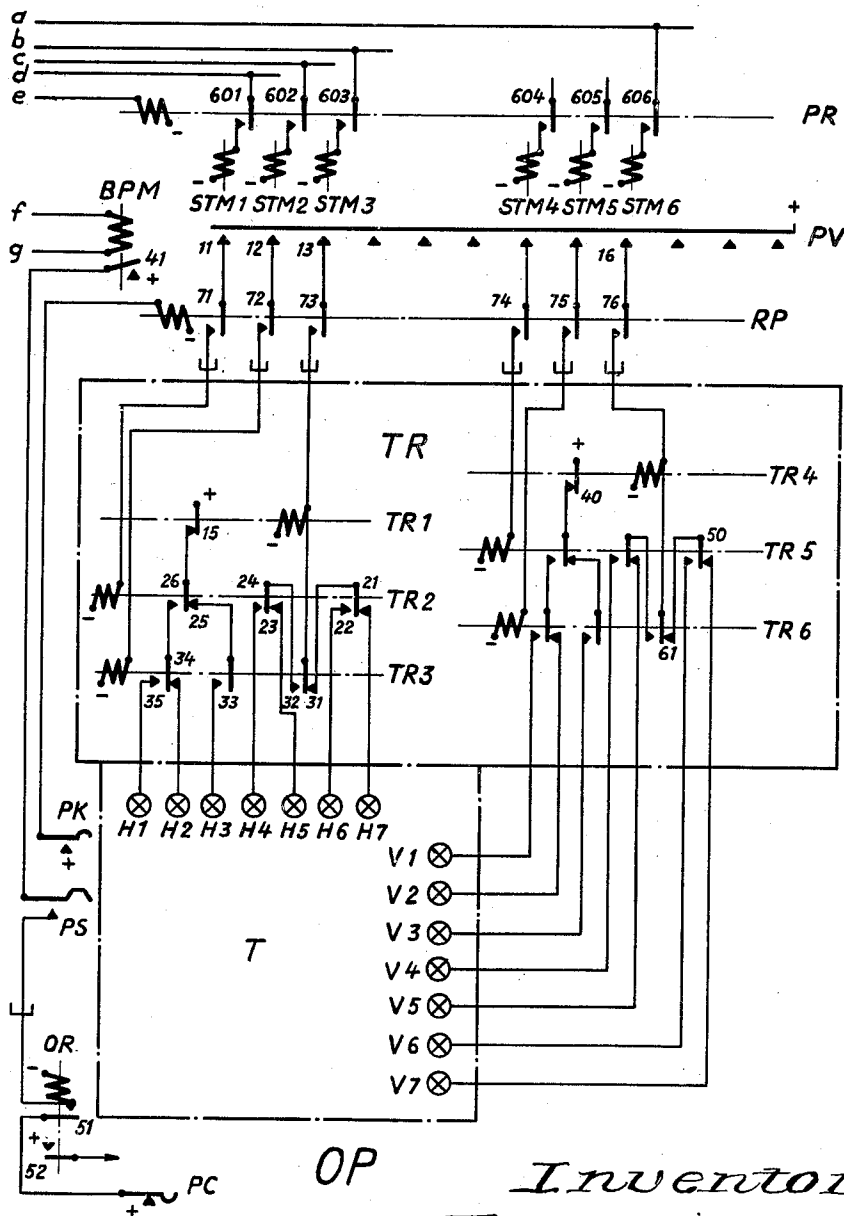
E. A. ERICSSON ET AL
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LOCATIONS OF PERSONNEL

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Fig. 3



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DEVICE FOR REGISTERING THE LOCATIONS
OF PERSONNEL

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The present invention relates to improvements in arrangements for the recording of identification signals in systems arranged for indicating the location place and identity of persons. According to the system a certain number of persons can indicate their presence at any of a number of different places by means of signal transmitters arranged at the said places, which transmitters can be actuated to emit a signal assigned to the person in question.

The signal is carried over a line to a central exchange comprising a number of connecting links of the kind well known in automatic telephony and comprising two selectors each, one of said selectors being a line finder, which by a call from a certain place is connected to the line coming from said place and thus connecting to the line the other selector, which is a final selector. The final selector is set by a signal (for example two impulse trains from a dial) emitted from the signal transmitter at the place in question, a connection thus being established between the line finder and a special selector for place marking, corresponding to the identity signal of the calling person. The selector for place marking, hereinafter called a place marking selector, is then brought into a condition corresponding to the position of the line finder and thus indicates the location from which the signal has been emitted. The person, who has thus indicated his present location on his place marking selector may then have his telephone calls connected to the telephone at the said place. For reading the indications of the place marking selectors, there is provided an operator's position with a lamp field comprising a lamp combination for each location at which there is a signal transmitter, and a key for each person.

In plants according to the above description the place marking selectors, one of which is needed for each person, and each of which must have one position for each location, often represent a considerable part of the total cost of the plant, especially if the number of persons and places is great. The present invention has for an object to reduce the cost in large plants, and achieves this by arranging that the selectors for place marking each consists of an operating bar in a cross bar switch, on which bar the locations are indicated by the simultaneous closing of more than one contact spring set. This is achieved by actuation of the selecting magnets of the cross bar switch in different combinations, followed by actuation of the operating magnet of the operating bar.

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An embodiment of the invention will now be described with reference to Figures 1-3 of the accompanying drawings, in which

Fig. 1 is a schematic drawing of the invention combined with a known telephone system,

Fig. 2 shows additional circuits in the telephone system necessary for applying the system to the invention, and

Fig. 3 shows a place marking selector consisting of an operating bar in a cross bar switch according to the invention.

In Fig. 1, F is a telephone instrument or at least a dial by the operation of which a call is made over the line L to a central exchange which may be a cross bar system for example of the type described in U. S. Patent No. 1,517,331. By a call the line L is extended over contacts in the contact sets 1 and 2 in a line finder to a trunk or link circuit SNR, which over a contact set 5 in a sender selector switch SR is connected to a sender REG. The call is in this case made by a person who wishes to indicate on his place marking selector PV, his presence at the place where the said telephone instrument or dial is located. He sends by means of the dial a number of impulse series which correspond to his place marking selector, which is the operating bar PV. The sender is now connected to a marker N over the contact set 6 in a marker connector NS. The marker N cooperates with the sender REG for setting the connector switch or final switch LV to the operating bar PV belonging to the calling person. The communication is extended from the link circuit SNR over the contact sets 3 and 4 to the operating bar PV. The marker N and the sender REG are released. As soon as the communication is completed the link circuit SNR calls the marker M and, if this marker is idle, SNR is connected over a contact set 7 in a relay chain MR to the marker M.

A circuit is now closed over contacts in the contact sets 1 and 2 to the marker M which by said circuit is set in accordance with the calling location or line L. Another circuit is closed over contacts in the contact sets 3 and 4 to a relay, which connects the selecting magnets of the cross bar switch to which the called operating bar PV belongs, to the marker M. The marker M sets said selecting magnets in a combination corresponding to the calling place or line L. This will be described later.

The operating bar PV is of a special construction in that the bar is normally in its "operated" position. This is achieved in a simple way by the magnetic circuit of the operating magnet con-

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taining at least one part with high magnetic remanence, for example a core of steel, whereby the magnet when energized retains its armature (and bar PV) in "operated" position after the current through its winding has been broken.

When a call is made to an operating bar PV for place marking, the operating magnet is first de-energized at least for a moment and all actuated contact sets of the operating bar are released. When the selecting magnets of the cross bar switch, to which the called operating bar PV belongs, have been energized in a combination representing the calling place, the operating magnet of the called operating bar is again energized, thus registering said combination by actuating the contact sets corresponding to the energized selecting magnets. When this is done the communication between the calling place and the called operating bar can be released, the latter remaining in operated position.

Referring now to Figs. 2 and 3 of the drawings, a communication may be set from a calling place or line L with help of an instrument F to an operating bar PV (Fig. 3) by apparatus shown in Fig. 2. It is presumed that the calling line L has the number 17, which is marked by closure of the contact set 17 in the line finder S. The communication is set over a link circuit SNR which is marked in Fig. 2 by closure of the contact set 10 in the line finder S and of contact set 60 in the final selector LV. The called operating bar PV (Fig. 3) has the number 67 which is marked by closure of the contact set 67 in the final selector LV. The line L is connected to the link circuit SNR over the contact bars A and B in accordance with a normal automatic telephone system. The winding of the operating magnet BPM for the called operating bar PV in Fig. 3 is connected to the link circuit SNR over the contact bars E and F in the final selector LV. The operating magnet BPM is deenergized and reenergized in the opposite direction by the following circuit: positive battery, contact 101, contact bar E, the contact sets 60 and 67, the conductor *f*, winding on BPM (Fig. 3), conductor *g*, contact bar F, contact 103, to negative battery. All contact sets on the operating bar PV are thereby released.

When the communication is completed a contact 100 in the link circuit is closed. This contact can be operated by the same relay which in a normal automatic telephone system releases the register REG. For each link circuit SNR there is a relay R1 in a relay chain MR, in which only one relay at a time can be energized. The following circuit is closed: positive battery, contact 100, the winding of relay R1, the contacts 114, 126—116, to negative. The relay R1 operates. The contacts 111—116 are actuated. The following two circuits are closed: (1) positive battery, contact 111, contact bar D, the contact sets 60 and 67, conductor *e*, winding on relay PR (Fig. 3) to negative battery; (2) positive battery, contact 112, contact bar C, the contact sets 10 and 17, the winding on relay R21 in the marker M, to negative battery. The relays PR and R21 thus both are energized. The contacts 171—173 (Fig. 2) and 601—606 (Fig. 3) are closed.

From the marker M there is a number of common conductors, in this case 6 conductors, of which 4 conductors, *b*, *c* and *d* are shown in the figures. The 6 conductors are connected by the relay PR over the contacts 601—606 to the selecting magnets STM1—STM6 of the cross bar switch to which the called operating bar PV cor-

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responds. The relay R21 that corresponds to the line L closes circuits over the contacts 171—173 for some of said selecting magnets, which together form a combination representing the calling line L or the location of the instrument F. In this case the selecting magnets STM1, STM2 and STM6 are energized in the following circuits: positive battery, winding on relay R12, contacts 113, 171—173, 601—602 and 698, the windings on the selecting magnets STM1—2 and STM6, to negative battery. The relay R12 has low resistance and is energized at the same time as the selecting magnets. The contact 105 is closed and the relay R11 is energized. The contacts 101—104 are actuated thereby reversing the current direction through the winding of the operating magnet BPM. The operating magnet BPM thus releases for a moment, during which the selecting fingers on the selecting bars operated by the selecting magnets STM1, STM2 and STM6 for the operating bar PV are moved under the corresponding contact sets 11, 12 and 16. The operating magnet BPM is then immediately reenergized, thereby actuating the contact sets 11, 12 and 16.

Now the operating bar PV for the calling person has been set in a combination representing the place from which the call was made, and the communication can be released, e. g. by the calling person replacing the receiver on the telephone instrument F.

For reading the combination registered by the place marking selectors PV there is provided a key PK corresponding to each person and a lamp field T common to all the place marking selectors, said key and lamp field being arranged at an operator's position OP.

When a key PK is pushed, a relay RP is actuated, said relay connecting the contact spring sets for the place marking selector to two relay sets TR1—3 and TR4—6 in Fig. 3. In small plants such relay sets may be very simple. As an example the relays TR1—TR3 pertaining to the relay set TR are shown in the Figure 3; by means of these three relays seven combinations of the contact spring sets 11, 12 and 13 are translated to seven circuits, one for each lamp in a horizontal row of lamps H1—H7. If only contact 13 is closed, the lamp H7 glows in the following circuit: Positive battery on bar PV, contact 13, contacts 73 and 31 and 21, lamp H7, to negative battery. If the contacts 11 and 13 are both closed, the relays TR1 and TR2 attract their armatures and a circuit is completed over contacts 31 and 22 to the lamp H6. If only the contact 12 is closed, only relay TR3 attracts its armature and the following circuit is completed: From positive battery, contacts 15, 25 and 33, to the lamp H3 as shown in the figure, and so on.

By means of a further set of three relays it is possible to arrange a relay set TR4—TR6 for reading the setting of three other contact spring sets pertaining to the place marking selector PV, and for this purpose a further row of lamps V1—V7 is provided.

By combination of the lamps H1—H7 and V1—V7, it is therefore possible to obtain 49 different readings in the lamp field T, only 6 selecting magnets STM1—STM6 and contact spring sets being used. 20 different combinations can easily be obtained by means of 6 contact spring sets. The number of relays in the relay sets must be correspondingly increased, so as to obtain 20 outgoing circuits from each relay set. By means of two rows of lamps having 20 lamps

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each it is possible to obtain 400 different readings, that is the plant can deal with 400 places.

It sometimes happens that a person who is sought at the place at which he last indicated his presence, has already left that place. In such a case the sought person usually soon indicates is presence at another location. The operator concerned with such indications can then press a key PS, which is individual for the sought person. As the operating bar PV is normally operated, the contact 41 is normally broken by the operating magnet BPM. Each time the operating bar PV is set by a final selector LV, the contact 41 is however closed simultaneously with the release of the selecting fingers for the contact spring sets. If the key PS is depressed at the time when the contact 41 closes, relay OR, which is common to all the keys PS, receives current and attracts its armature. Relay OR is self held over contact 51 in a circuit through the key PC, and which circuit can be broken by the operator by pressing that key. An acoustic signal, for example a bell connected by contact 52 on relay OR, may thus be sounded to call the operator's attention to the arrival of the sought person at his new location. This signal may be discontinued by the operator, when desired, by depressing key PC.

It will be seen from the above description that we have provided a system accomplishing all of the stated objects of the invention with a minimum cost of installation, but many changes in the details of the proposed system may be made without departing from the spirit of our invention as defined in the appended claims.

We claim:

1. In a system for registering the locations of various persons with reference to a plurality of different stations, signal transmitting means at each of said stations operative to transmit signals corresponding to the identities of said persons, cross bar switch means including a plurality of operating bars corresponding respectively to signal codes assigned to respective persons, said bars being normally in an operated condition, a link circuit including selecting magnet means operative to select a particular bar in accordance with signals received from a respective transmitting means, automatic switching means operable to connect a selected one of said transmitting means to said link circuit, a common marker, means for connecting said link circuit to said marker for setting said marker in accordance with the particular transmitting means being operated, means in said marker for setting the selecting magnets of said cross bar switch corresponding to a selected operating bar in a combination indicative of said transmitting means, means for releasing said operating bar and immediately restoring the same to operated condition, means under the control of the last named means for registering said combination, centralized operating equipment including a key individual to each person and a

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location indicator, and connections controlled by said keys for connecting all the contact sets on the operating bar corresponding to said person with said indicator, whereby to provide an indication of the transmitting means from which said operating bar last was controlled.

2. In a system for registering the locations of various persons with reference to a plurality of different stations, signal transmitting means at each of said stations operative to transmit signals corresponding to the identities of said persons, cross bar switch means including a plurality of operating bars corresponding respectively to signal codes assigned to respective persons, said bars being normally in an operated condition, link circuits including selecting magnet means operative to selecting a particular bar in accordance with signals received from a respective transmitting means, automatic switching means operable to connect a selected one of said transmitting means to said link circuit, marker, means for connecting said link circuit to said marker, for setting said marker in accordance with the particular transmitting means being operated, means in said marker for setting the selecting magnets of said cross bar switch corresponding to a selected operating bar in a combination indicative of said transmitting means, means for releasing said operating bar and immediately restoring the same to operated condition, means under the control of the last named means for registering said combination, and central operating equipment including a key individual to each person, lamp indicator and a relay device, and connections between said keys and said relay device for connecting all the contact sets on the operating bar corresponding to said person with said indicator, whereby to provide an indication of the transmitting means from which said operating bar last was controlled.

3. The invention in accordance with claim 1, including an operating magnet for each of said operating bars, the magnetic circuit of each operating magnet including at least one portion having relatively high remanence, whereby said operating bar remains in its operated position after the cessation of current through said operating magnet.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,963,600	Voss	June 19, 1934
2,199,824	Kinhead	May 7, 1940
2,330,355	Hershey	Sept. 28, 1943
2,330,357	Mote	Sept. 28, 1943
2,335,524	Lomax	Nov. 30, 1943
2,397,881	Nitterauer	Apr. 2, 1946