This invention relates to an improvement in stopping circuits of the rotary switches having a marking multiple common to several marking devices. It is applicable to distant-communication automatic exchanges provided with finding and selecting members hunting completely over their contact-stud banks in a simple movement and in which means such as registers or similar control circuits are utilized which provide for the orientation of the members through a marking arrangement. The simultaneous calling which must be provided for necessitates the simultaneous positioning of several devices, the orientation of each of them calling for a marking device independent of the others.

Certain marking systems comprise to this effect a splitting of the marking multiples, and each of these multiples is affected to a marking device, either permanently or temporarily through a finder; the operations can therefore only take place successively on these split multiples.

The drawbacks of the split multiples do not only consist in the delay they entail in the achievement of the communication, but chiefly also in the fact that during the operation the marking multiple permanently connected renders unavailable all the non-busy devices which it controls.

In all considered cases the consequence is that the importance of the equipment is increased, in as much as the devices operate in small groups of reduced efficiency; certain systems even require that all members which have become available revert to a rest position, the consequence being an undue wear of the apparatus parts.

When it is desired, however, to enable any register to orient any selector, a connection between these devices must be effectuated through a common marking multiple. The simultaneous operations of several registers can then take place under the condition that the independence of the marking circuit is provided for. This invention enables to utilize one marking multiple only common to all selectors and marking devices and nevertheless to detect and render inoperative any entangling of test and stopping circuits taking place, owing to several only being connected in series, during the simultaneous operation of any registers in the process of marking.

It achieves the independence of the circuits by precluding the operation of a marking circuit when the selector met is not that to which the register has been connected so as to achieve the communication; the circuit entanglements have thus no longer any influence, since each of these circuits can only operate when the marking is normally established between the register and the selector it controls at that moment.

The invention will be described with reference to the accompanying drawings, in which:

Fig. 1 shows a known arrangement, to which the invention has not been applied, of a common marking multiple utilized in the invention.

Fig. 2 shows a protective device according to the invention.

Fig. 3 shows the arrangement of Fig. 1, after it has been provided with the device according to Fig. 2.

In Fig. 1 two selectors only S1 and S2 registers E1 and E2 have been shown; the register E1 is connected to the selector S1 in known manner through its chooser and the circuit of connection. None of these members has been represented. Each selector hunts for the marking multiple designated by the register under whose control it is to operate. The registers E1 and E2 are provided with supply sources U1 and U2 respectively, each of which is specially affected to its marking device and has no point common with the other source.

The line bundles are designated to the selectors by the registers or similar circuits owing to the direction marking devices D1 and D2 which are numerical switches located in the registers and whose homologous contact studs 303 and 403, 305 and 405, etc. are strapped as shown and connected to the different control wires of the common marking multiples ml, m2, etc. The suitable orientation of all selecting members can thus be effected from any register.

The conditions in which the simultaneous hunting of the selecting members can take place show that the independency of the supply sources is not sufficient to prevent the formation of entangled test and stopping circuits. As will be shown hereinafter, errors in the determination of a direction may take place, it being possible that a selector is stopped by the register associated therewith but on a position designated by another register.

Electro-magnets R11 and R21 (Fig. 1) provide for the rotation of selectors S1 and S2, of which only the brushes C81 and C82 have been shown, each of which hunts over the contact studs of one bank, which are distributed in four groups in the example illustrated, one contact stud only of each group being shown at b1 to b14, b21 to b24; these two selectors are controlled by the direction marking devices D1 and D2, which are operated by the register circuits of which they
are part, and each of which is represented by one of its brushes 401, 402 only; each of these marking devices designates a marking wire.

The selectors have no rest position; B is therefore start from any position at the moment of marking. If the wire m1 were not multiplied, the brush CS1 could only stop on the contact stud b23 through the following process: when the brush CS1 reaches b25 it energizes A1 through the circuit: pole+ of U1, A1, brush 401 and contact stud 305 of D1, contact stud b23, brush CS1 and pole- of U1; A1, being excited, opens at a13, B11 of S1, which stops; under similar conditions S2 would stop on B21 designated by the marking device D2.

But the homologous brushes of S1 and S2 are multiplied, also those of D1 and D2, and there may become established: the circuit shown in the figure, namely: pole+ of U1, A1, brush 401 of D1, contact stud b23, brush CS2, pole- of U2, pole+ of U2, A2, brush 402 of D2, contact stud b11, brush CS1, pole- of U1. The selectors S1 and S2 then stop on wrong positions: b11 instead of b13, b23 instead of b21. This mixing of circuits is caused by the two identical sources U1 and U2 and the two identical relays A1 and A2 being arranged symmetrically and therefore at the same voltages.

The invention relates to a system which prevents the formation of such a circuit by destroying this symmetry. According to the invention, each selector comprises the following elements: connected in series, the brush of the marking device, a first relay, a contact of this relay, a contact of a second, two-winding relay, an electrically insulated battery and a connection between said battery and the brush of a selector; shunted on the exit of said first relay and the contact of said second relay a winding of said second relay; shunted on the contacts of said relays, a condenser and a resistance mounted in series; shunted on the entry of the first relay and the exit of the battery, a rectifier and the second winding of said second relay; the resistance of the winding of said first relay and the resistance of the second winding of said second relay being higher than the resistance of the first winding of said second relay.

The parts of the register which have just been enumerated are shown in Fig. 2, in which they are designated as follows:

D: marking device;
400: brush of the marking device;
A: first relay;
a1: contact of relay A;
B: second, two-winding relay;
b1: contact of relay B;
U: electrically insulated battery;
x: condenser;
y: resistance;
R: rectifier.
300 designates a contact stud of the marking device, S the selector, CS the selector brush, b20 a selector contact stud, a2 a second contact of relay A and C the connection relay.

Fig. 2 corresponds to the normal operation, that is, without entangling, of a register. The current flows through the circuit: pole+ of U, b1, a1, A, brush 400 of D, contact stud 300, marking wire m, contact stud b20 and brush CS of the selector S, pole- of U. Relay A is energized and stops at a1 the rotation of the selector as has been mentioned; it causes the short-circuit of the upper winding of B to be cut at a1 and operates C at a2. Relay B can not attract its armature completely because its energizing circuit, which is connected in series with relay A, is opened by B1. B therefore vibrates, and its vibration frequency is chosen sufficiently high that A may be kept energized owing to the charging current of the condenser placed at the terminals of the contact b1.

C, when it operates, brings about the connection through a contact not shown; replacing contact a13 of relay A1 of Fig. 1; it also brings about, through a contact not shown, the disconnection of relays A and B.

To the elements a1, a2, b1, c, z and R of Fig. 2 correspond in Fig. 3 the following elements respectively: a21 and a22, a11 and a21, b11 and b21, z1 and z2, y1 and y2, b1 and b2. In Fig. 3 as in Fig. 1 A1 and A2 are operated in series through the following circuit: pole+ of U1, b11, a12, A1, brush 401 of D1, wire m1, contact stud b23, brush CS2 of S2, pole- of U2, pole+ of U2, a22, A2, brush 402 of D2, wire m2, contact stud b11, brush CS1 of S1, pole- of U1. But this circuit is destroyed through the following process: A1 and A2 open the short circuits of the upper windings of B1 and B2 and insert them into the above circuit instead of a14 and a22; the lower windings of B1 and B2 are withdrawn influence so long as contacts b17 and b27 are closed, since they are connected to points at the same voltage; if one of contacts b17 and b27 opens, the lower winding of the corresponding relay is subjected to the voltage of the insulated battery of the other system and the relay armature and the relay armature completely; b17 being open, the circuit is established as follows: pole+ of U2, contact b27, upper winding of B2, A2, brush 402 of D2, wire m2, contact stud b11, brush CS1 of S1, lower winding of B1, rectifier R1, brush 401 of D1, wire m1: b23, brush CS2 of S2, pole- of U2.

The lower winding of B1 has a resistance sufficiently high to present the energization of B2 in series therewith through its upper winding and to bring about the release of a2; on the other hand, A1, operated by b11, is released, and B1 and B2 are not energized rapidly enough to be energized during the short operation of A1 and A2.

What has just been stated would apply in the event B2 would be energized first, the registers being identical; if B1 and B2, which control each other, would open their contacts exactly at the same time, the first which is released can no more be energized, whereas the other is.

I claim:

55 In an automatic-switching, distant-communication exchange: several registers each of which contains at least one marking device, several selectors each of which has a driving magnet, a marking wire multiplied on the homologous contact studs of the marking devices of the registers and on the homologous contact studs of the selectors, and, in each register, the following parts: connected in series, the brush of the marking device, a first extremity of a winding of a first relay, said winding, the second extremity of said winding, a rest contact of this relay, an armature of a second, two-winding relay, the rest contact of said armature, a first pole of an electrically insulated battery, a battery of said battery and the brush of a selector; shunted on the second extremity of the winding of said first relay and said armature, a winding of said second relay; shunted on said armature and the rest contact of said armature, a condenser and a resistance mounted in series;
shunted in series on said first extremity of said winding of the first relay and said second pole of the battery, a rectifier and the second winding of said second relay; a third relay controlled by the operation of said first relay and whose operation controls the operation of said driving magnet; the resistance of the winding of said first relay and the resistance of the second winding of said second relay being higher than the resistance of the first winding of said second relay, and said third relay being so slow-operating that it only operates when said first relay is permanently energized.

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