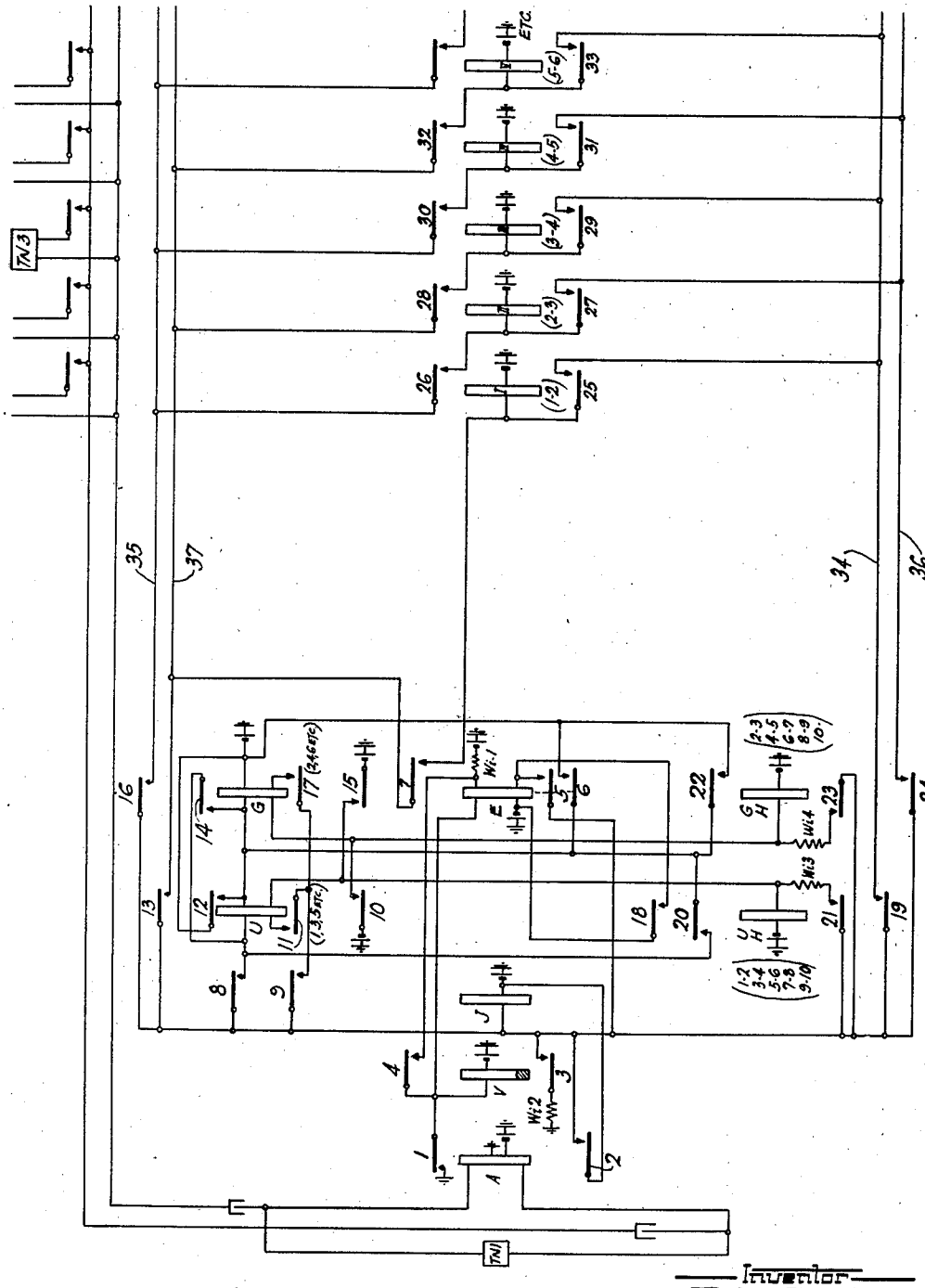
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COUNTING RELAY SWITCH

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COUNTING-RELAY SWITCH

Fritz Appelius, Berlin, Germany, assignor to Siemens & Halske Aktiengesellschaft Wernerwerk Siemensstadt near Berlin, Germany

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The invention relates to counting-relay switches, more particularly for telephone systems, and the object is to produce a simple and reliable circuit for such switches. This is achieved by controlling the selecting relays with the aid of two groups of opposingly controlled auxiliary relays, of which one group serves to energize the corresponding selecting, or counting, relays and the other to maintain said relays energized.

The arrangement, according to the invention, makes it possible to control the auxiliary relays without using contacts of the selecting relays, whereby, the number of contacts for the selecting relays may be reduced or said contacts utilized for other purposes. The number of selecting relays may, therefore, be reduced, or increased, without the necessity of making any change in the relay groups utilized for the control. The arrangement also makes it possible to use relays with make contacts only.

An embodiment is shown in the accompanying drawing, but, the invention is not limited to this embodiment only. The operation of the relay switch in conjunction with the impulse relay is merely shown and it is presumed that, for example, the substation Tn1 wishes to set up a connection with Tn3. The connecting up of the substations over junction lines and the completion of a connection is carried out in known manner and is not described in detail as it does not constitute the subject of the present invention.

The subscriber Tn1 lifts his receiver, whereupon relay A is energized over its two windings in series, and, over contact 1, energizes relays V and E. Relay V is a slow-acting relay and, therefore, remains energized during the impulse output. Relay E remains energized over its lower winding and contacts 5 and 3 due to contact 3 being closed before contact 4, thus preventing relay E from releasing. Relay G is short-circuited by the actuation of contact 6 and the circuit for the selecting relay I is prepared by contact 7. The subscriber Tn1 now dials the digit 3. Relay A releases in accordance with the current interruptions in the subscriber's line loop. The short-circuit for the impulse receiving relay J is removed by contact 2 at the first interruption, causing this relay to be energized over the resistance Wi2 and earth. Relay U is energized over contact 8 and its upper winding and remains energized over contacts 9 and 11, over its lower winding and the winding of relay UH. The last mentioned relay is now energized and remains energized over its contact 21 independently of contact 9. The closing of contact 13 causes the selecting relay I to be energized, which relay remains energized over contact 25, conductor 34, and contacts 19 and 3. Contacts 18 short-circuits the lower winding of relay E with the result that this relay releases and opens its contacts. Relay G, however, cannot be energized as, in the meantime, it has been short-circuited by contact 12 of relay U. Relay A is re-energized at the end of the interruption and short-circuits relay J which opens the locking circuit for the lower winding of relay U at contact 9. Relay U releases and removes the short-circuit for relay G by means of contact 12. Relay A releases afresh at the beginning of the second interruption and relay J is energized, causing relay G to be energized over contacts 8 and 20, said relay short-circuiting relay U by means of contact 14 and remaining energized over its contact 17 and its lower winding. This causes relay GH to be energized in a series circuit with the lower winding of relay G and to remain energized over its contact 23 independently of contact 9. Relay UH is short-circuited over contact 15 and opens its contacts, thereby at 19, opening the holding circuit of selecting relay I. The selecting relay II is energized over 26, 35, 1, 16, and 3, being maintained energized over 27, 36, 24, and 3. Relay J is again short-circuited at the end of this second interruption in the line loop and the lower winding of relay G is disconnected from the battery by the opening of contact 9. This causes relay G to release and to remove the short-circuit from the upper winding of relay U, whereas the upper winding of relay G is short-circuited by means of contact 22. The operation is exactly the same at the third line loop interruption as that performed at the first. Relay U, therefore, energizes on line loop interruptions corresponding to odd digits and connects up the selecting relay which corresponds to an odd number of line loop interruptions and which is disposed in a circuit controlled by the impulse repeating relay, while relay UH repeats its previous function. Relay G energizes at the even numbered line loop interruptions and connects up the even numbered selecting relays II, IV etc., being released by the holding relay GH. The selecting relay corresponding to the dialled number, in the present case relay III, is energized over conductor 37 after completed dialling and the subscriber TN3 is ultimately reached.

When the subscriber replaces his receiver at the end of the conversation, the loop will be opened, thus causing the deenergization of relay A. The opening of contact 1 causes relay V to release, which, by means of contact 3, opens the circuit for the selecting relay locked to either conductor 34 or 36. This restores the switch to normal.

What is claimed is:

1. In a relay switch, a plurality of selecting relays, two groups of alternately operated auxiliary relays associated with said selecting relays, means controlled by the first group of auxiliary

relays for energizing said selecting relays, and means controlled by the other group of auxiliary relays for maintaining the selecting relays energized.

2. In a relay switch, a first group of selecting relays, a second group of selecting relays, a first group of auxiliary relays associated with said first group of selecting relays, a second group of auxiliary relays associated with said second group of selecting relays, means for alternately operating said two groups of auxiliary relays, means controlled by said first group of auxiliary relays for energizing the relays in said first group of selecting relays and for maintaining such selecting relays energized, and means controlled by said second group of auxiliary relays for energizing the relays in said second group of selecting relays and for maintaining such selecting relays energized.

3. In a relay switch, a plurality of selecting relays, two groups of alternately operated auxiliary relays associated with said selecting relays, means controlled by the first group of auxiliary relays for energizing said selecting relays, means controlled by the other group of auxiliary relays for maintaining the selecting relays energized, contacts on said auxiliary relays, an impulse repeating relay operated in response to each impulse transmitted to said relay switch, and circuits controlled over said contacts by said repeating relay for alternately operating the auxiliary relays in said two groups.

4. In a relay switch, a plurality of consecutively operated selecting relays, a first group of auxiliary relays having means for operating successive odd ones of said selecting relays and for maintaining the same operated, a second group of auxiliary relays having means for operating successive even ones of said selecting relays and for maintaining the same operated, and means controlled by either group of auxiliary relays for short-circuiting the relays in one group when a relay in the other group is operated.

5. In a relay switch, a plurality of selecting relays, a first and a second auxiliary relay, means for alternately operating said first and second auxiliary relays in response to impulses transmitted to said relay switch, means controlled by the operation of said first and second auxiliary relays for operating said selecting relays consecutively, a connecting relay operated in response to the seizure of said switch, and means operated by said connecting relay for determining which one of said auxiliary relays is to be operated by the first transmitted impulse.

6. In a relay switch, a plurality of consecutively operated selecting relays divided into even and odd relay groups, a first auxiliary relay having means for operating successive relays in the odd group, a second auxiliary relay having means for operating successive even relays in the even group, an impulse repeating relay for alternately operating said first and second auxiliary relays, a first holding relay for maintaining the relays in the odd group in operated position, a second holding relay for maintaining the relays in the even group in operated position, a holding winding for each of said first and second auxiliary relays, a circuit for operating the first holding relay including the holding winding of the first auxiliary relay completed by said repeating relay, and a circuit for operating the second holding relay including the holding winding of the second auxiliary relay completed by an alternate operation of said repeating relay.

7. In a relay switch, a series of consecutively operated selecting relays, a first and a second group of auxiliary relays associated with said selecting relays, a connecting relay energized responsive to the seizure of the relay switch, means controlled by said connecting relay for preparing the first of said selecting relays for operation, means for alternately operating the said first and second groups of auxiliary relays, means controlled by the first group of auxiliary relays for first operating the prepared selecting relay and thereafter each successive alternate one of said selecting relays in response to successive operations thereof, and means controlled by the second group of auxiliary relays for first operating the second selecting relay and thereafter each successive even one of said selecting relays in response to successive operations thereof.

8. In a relay switch, a series of consecutive selecting relays, said relays divided into even and odd groups, an odd operating relay, an odd holding relay, an even operating relay, an even holding relay, means for operating said odd operating relay, means controlled by said odd operating relay for operating said odd holding relay and one of said selecting relays in the odd group, means controlled by said odd holding relay for maintaining said odd selecting relay operated and for preparing said even operating relay for operation, means for thereafter operating said even operating relay, means controlled by said even operating relay for operating said even holding relay and one of said selecting relays in the even group, and means controlled by said even holding relay for maintaining said even selecting relay operated and for preparing said odd operating relay for reoperation.

9. In a relay switch, a plurality of consecutively operated selecting relays, a first group of auxiliary relays comprising an energizing relay and a holding relay having means for operating and maintaining operated successive odd ones of said selecting relays in response to the odd impulses of a series transmitted to said switch, a second group of auxiliary relays comprising an energizing relay and a holding relay having means for operating and maintaining operated successive even ones of said selecting relays in response to the even impulses of the series transmitted, means for releasing the energizing relay in either group at the end of the impulse series, and means for maintaining the holding relay operated in either group at the end of the impulse series.

10. In a relay switch, a plurality of consecutively operated selecting relays, a first group of auxiliary relays comprising an energizing relay and a holding relay having means for operating and maintaining operated successive odd ones of said selecting relays in response to the odd impulses of a series transmitted to said switch, a second group of auxiliary relays comprising an energizing relay and a holding relay having means for operating and maintaining operated successive even ones of said selecting relays in response to the even impulses of the series transmitted, means controlled by each holding relay upon operating for short-circuiting its associated energizing relay in its group, means for releasing the energizing relay in either group at the end of the impulse series, and means for maintaining the holding relay operated in either group at the end of the impulse series.

FRITZ APPELIUS.