

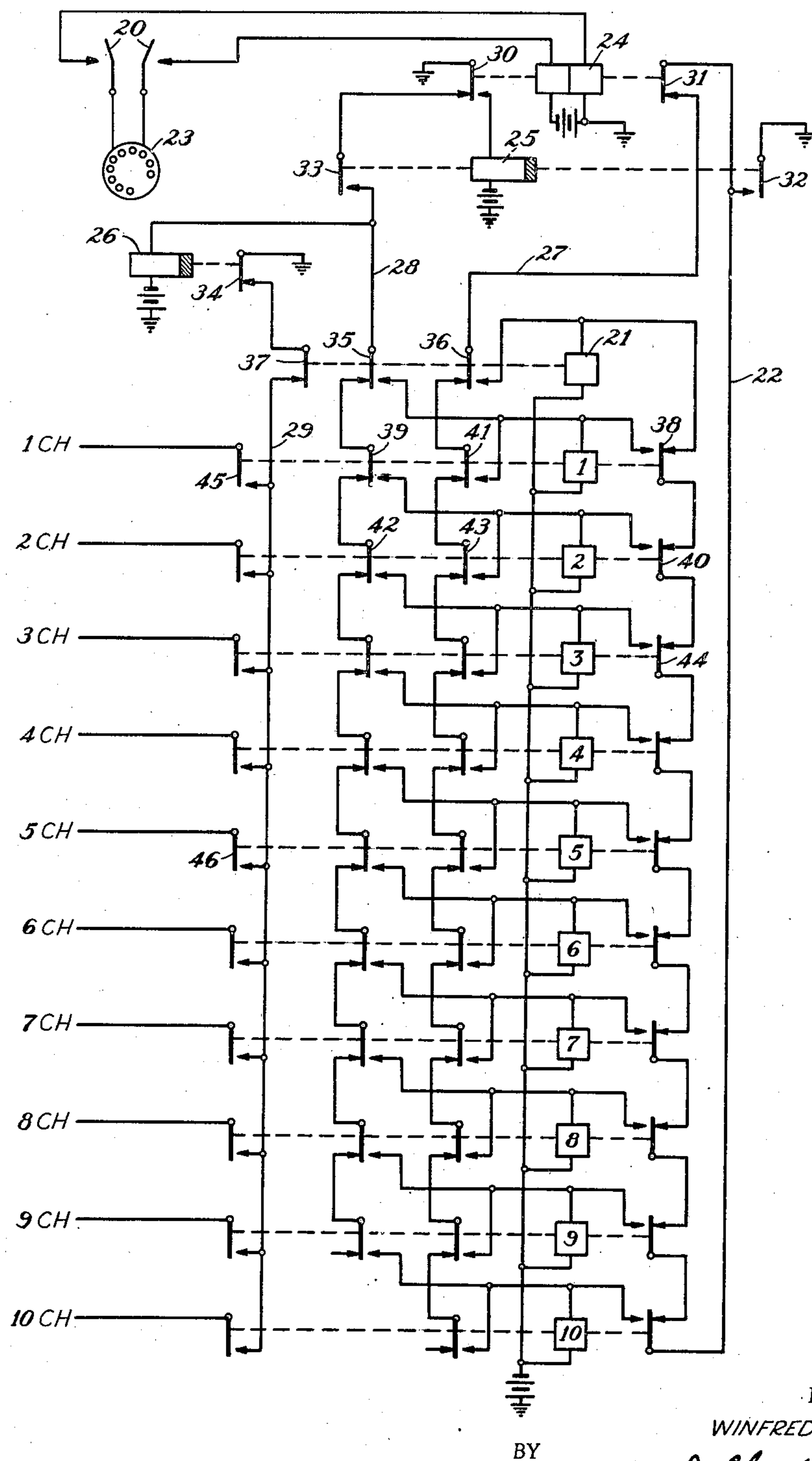
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2,241,156

SELECTING SYSTEM

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SELECTING SYSTEM

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4 Claims. (Cl. 177—353)

This invention relates to a selecting system and more particularly to a counting relay arrangement for use in such a selecting system.

The main feature of the invention relates to an arrangement in which ten counting relays and a minimum number of control relays are used to count and record successive series of impulses of a code designation, such as the selecting impulses corresponding to the various digits in a telephone line designation.

While certain features of the invention are applicable to and useable with any type of communication system, the present arrangement is particularly adapted for use in establishing telephone connections in a dial telephone system of the all-relay type. In the course of establishing such a telephone connection, a link circuit (not shown) is utilized. This link circuit is selected when the calling party removes the receiver, preparatory to dialing the digits of the wanted telephone line. Since it is well-known how the calling telephone line may be associated with the link circuit upon initiation of a call, the usual apparatus for accomplishing this result has not been shown, but merely indicated by a manually operated key or switch 20.

Upon the closure of switch 20, the closed circuit of the calling telephone line, including calling device 23, is completed for operating impulse relay 24. This circuit extends from grounded battery, left-hand winding of relay 24, right-hand make contact of key 20, calling device 23, left-hand make contact of key 20 and right-hand winding of relay 24 to ground. Relay 24 operates over this circuit and closes an obvious circuit at its front contact 30 for energizing slow-release relay 25. Relay 25 closes a circuit from ground, front contact 32 of relay 25, conductor 22, armatures and back contacts in series of all the counting relays from #10 to #1 inclusive and winding of starter relay 21 to grounded battery.

Relay 21 operates and at its front contacts prepares circuits for controlling the operation and release of the first counting relay, as will be presently described. Relay 25 prepares the impulse circuit by way of its front contact 33 for controlling the counting relay operations in response to the dial impulses of the series.

It will be understood that calling device 23 provides a number of interruptions in the above described line circuit in accordance with the number selected by the operation of the calling device or dial. At each interruption relay 24 is released and at each closure of the line circuit following each interruption, relay 24 is energized.

It will also be understood that these interruptions are at such a rate that relay 24 does not remain released long enough to allow relay 25 to release. Furthermore, the periods between interruptions are of such duration that the circuit of slow-releasing relay 26 (to be later described) is not opened for a sufficient time to allow this relay to release.

It will now be assumed that the calling party dials #0 for transmitting a series of ten impulses over the line. This will result in relay 24 being released ten times, followed by an operation of this relay which persists until another digit is dialed or until the connection is released. Upon the first release of relay 24, a pickup circuit is closed for the #1 counting relay which extends from ground, back contact 30 of relay 24, front contact 33 of relay 25, conductor 28, front contact 35 of relay 21 and winding of the #1 counting relay to grounded battery. This effects the operation of the #1 counting relay and before this relay operates to open the above described energizing circuit for relay 21, at back contact 38, a stick circuit is closed for relay 21, which extends from ground, front contact 32 of relay 25, back contact 31 of relay 24, conductor 27, front contact 36 and winding of relay 21 to grounded battery. This prevents the release of relay 21 until the end of the impulse period which effects the energization of the #1 counting relay.

The operation of the #1 counting relay closes a stick circuit for itself including conductor 22, back contacts of counting relays #10 to #2 inclusive, front contact 38 and winding of the #1 counting relay to grounded battery.

When relay 24 is energized, after the transmission of the first impulse, the stick circuit for relay 21 is opened at back contact 31 of relay 24, which effects the release of relay 21. The release of relay 21 prepares the impulse circuit for the #2 counting relay, which is effective when relay 24 releases in response to the second impulse. This circuit for operating the #2 counting relay extends from ground, back contact 30 of relay 24, front contact 33 of relay 25, conductor 28, back contact 35 of relay 21, front contact 39 of the #1 counting relay and winding of the #2 counting relay to grounded battery. A first stick circuit for the #2 counting relay is completed from conductor 22, back contacts of counting relays #10 to #3 inclusive, front contact 40 and winding of the #2 counting relay to grounded battery.

Before the termination of this impulse and the consequent energization of relay 24, the #1 counting relay is stuck up over a circuit extending

from ground, front contact 32 of relay 25, back contact 31 of relay 24, back contact 36 of relay 21, front contact 41 and winding of the #1 counting relay to grounded battery. At the termination of this impulse and the consequent energization of relay 24, this last mentioned stick circuit is opened at contact 31 for effecting the release of the #1 counting relay, which prepares the pickup circuit, at the back contact 39, and front contact 42 of the #2 counting relay, for the #3 counting relay.

When relay 24 releases in response to the third impulse, a stick circuit is completed for the #2 counting relay which extends from ground, front contact 32 of relay 25, back contact 31 of relay 24, conductor 27, back contact 36 of relay 21, back contact 41 of the #1 counting relay, front contact 43 and winding of the #2 counting relay to grounded battery. In response to this third impulse, a pickup circuit is closed for the #3 counting relay which extends from ground, back contact 30 of relay 24, front contact 33 of relay 25, conductor 28, back contact 35 of relay 21, back contact 39 of the #1 counting relay, front contact 42 of the #2 counting relay and the winding of the #3 counting relay to grounded battery. The operation of the #3 counting relay closes a first stick circuit for itself at its front contact 44 before the #2 counting relay is released at the termination of this impulse. The #2 counting relay is released when relay 24 is energized at the termination of the third impulse because its second stick circuit, including its front contact 43, is opened at back contact 31 of relay 24.

From the above operation it will be seen that relay 21 functions as a start relay to prepare the circuits for the first counting relay and that the first counting relay is energized in response to the first impulse transmitted by the dial. At the termination of this impulse the start relay 21 is released to prepare the circuit for the #2 counting relay for response to the second impulse. At the termination of the second impulse, the #1 counting relay is released to prepare the circuit to the #3 counting relay which will be energized in response to the third impulse.

This sequence of operations is provided by the remainder of the relays in the series and it is believed unnecessary to point out in detail the operating, stick and release circuits of these relays, since they may be readily traced and are of the same sequence as specifically described for the first three relays. It will be observed that a counting relay is energized in response to an impulse corresponding to an open condition of the line circuit and that this same counting relay remains energized at the termination of this impulse which corresponds to a closed circuit condition of the line. Then a preceding counting relay releases at the termination of an impulse which energizes a succeeding counting relay. responds to a certain impulse of the series by energizing and after the next succeeding counting relay has been energized by the next impulse of the series, the first counting relay releases to prepare the circuit for the third counting relay of the series.

Slow-releasing relay 26 is connected to conductor 28 and since each impulse transmitted by the release of relay 24 applies ground to conductor 28, relay 26 will be energized by the first impulse and will remain energized until all of the impulses of the series have been transmitted. Relay 26 will then release and energize the channel circuit which was selected by the impulse or

impulses of the series. For example, if one impulse is transmitted, the #1 counting relay will remain energized and relay 26 will release. A circuit is now closed from ground, back contact 34 of relay 26, back contact 37 of relay 21, conductor 29, front contact 45 of the #1 counting relay to the #1 channel conductor 1CH. It will be understood that a separate relay, or the like, may be connected to the channel conductors and selectively energized at the termination of the series of impulses and in accordance with the number of impulses transmitted. In the event that 5 impulses are transmitted before the termination of the series, relay 26 will be released and with the #5 counting relay energized a circuit will be extended from conductor 29 by way of front contact 46 of the #5 counting relay for applying ground to channel conductor 5CH.

When the connection is released, as for example, by restoring key 20 to normal, relay 24 is deenergized and remains deenergized long enough to effect the release of relay 25. The release of relay 25 opens its contact 32 for removing ground from conductor 22, which is effective to release the counting relay which was left energized in response to the previous series of impulses. The release of the counting relays opens the circuit to the selected channel conductor, thus restoring the counting relay selecting arrangement to normal.

Having described a stepping relay bank as particularly adaptable for use in dial telephone systems as one specific embodiment of the present invention, it is desired to be understood that this form is selected to facilitate in the disclosure of the invention, rather than to limit the number of forms which it may assume and it is to be further understood that various modifications, adaptations and alterations may be applied to the specific form shown to meet the requirements of practice, without, in any manner, departing from the spirit or scope of the present invention except as limited by the appended claims.

What I claim is:

1. In a counting relay arrangement, an impulse relay operated in response to impulses, a series of counting relays, circuits for operating said relays in succession in response to the operation of said impulse relay, a locking circuit for each relay when operated, the operation of each relay serving to interrupt the locking circuit of the preceding relay in the series and a secondary circuit for holding each relay energized after its locking circuit is interrupted and until the conclusion of the impulse for operating the succeeding relay in the series, said secondary circuit being completed at said impulse relay and at a preceding relay in the series.

2. In a counting relay arrangement, an impulse relay, a series of counting relays, initial operating circuits for said relays, completed in succession by the operation of said impulse relay and controlled at the next preceding relay in the series, a primary locking circuit for each of said relays when operated, said primary locking circuit being controlled at a back contact and armature of certain of the succeeding relays in the series and a secondary locking circuit for each relay when operated, said secondary locking circuit being controlled at a back contact and armature of certain of the preceding relays in the series and by said impulse relay.

3. In a counting relay arrangement, an impulse relay, a series of counting relays, initial operating

circuits for said relays, completed in succession by the operation of said impulse relay and controlled at the next preceding relay in the series, a primary locking circuit for each of said relays when operated, said primary locking circuit being controlled at a back contact and armature of each succeeding relay in the series and a secondary locking circuit for each relay when operated, said secondary locking circuit being controlled at a back contact and armature of each preceding relay in the series and by said impulse relay.

4. In a counting relay arrangement, an impulse relay, a series of counting relays, an initial op-

erating circuit for each counting relay controlled at an armature and front contact of the next preceding relay and at a back contact and armature of each of the remainder of the preceding relays in the series, a primary locking circuit for each of said relays when operated, said primary locking circuit being controlled at a back contact and armature of each succeeding relay in the series, and a secondary locking circuit being controlled at a back contact and armature of each preceding relay in the series and by said impulse relay.

WINFRED T. POWELL.

CERTIFICATE OF CORRECTION.

Patent No. 2,241,156.

May 6, 1941.

WINFRED T. POWELL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 62, before the word "responds" insert --This means that each counting relay--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of June, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.