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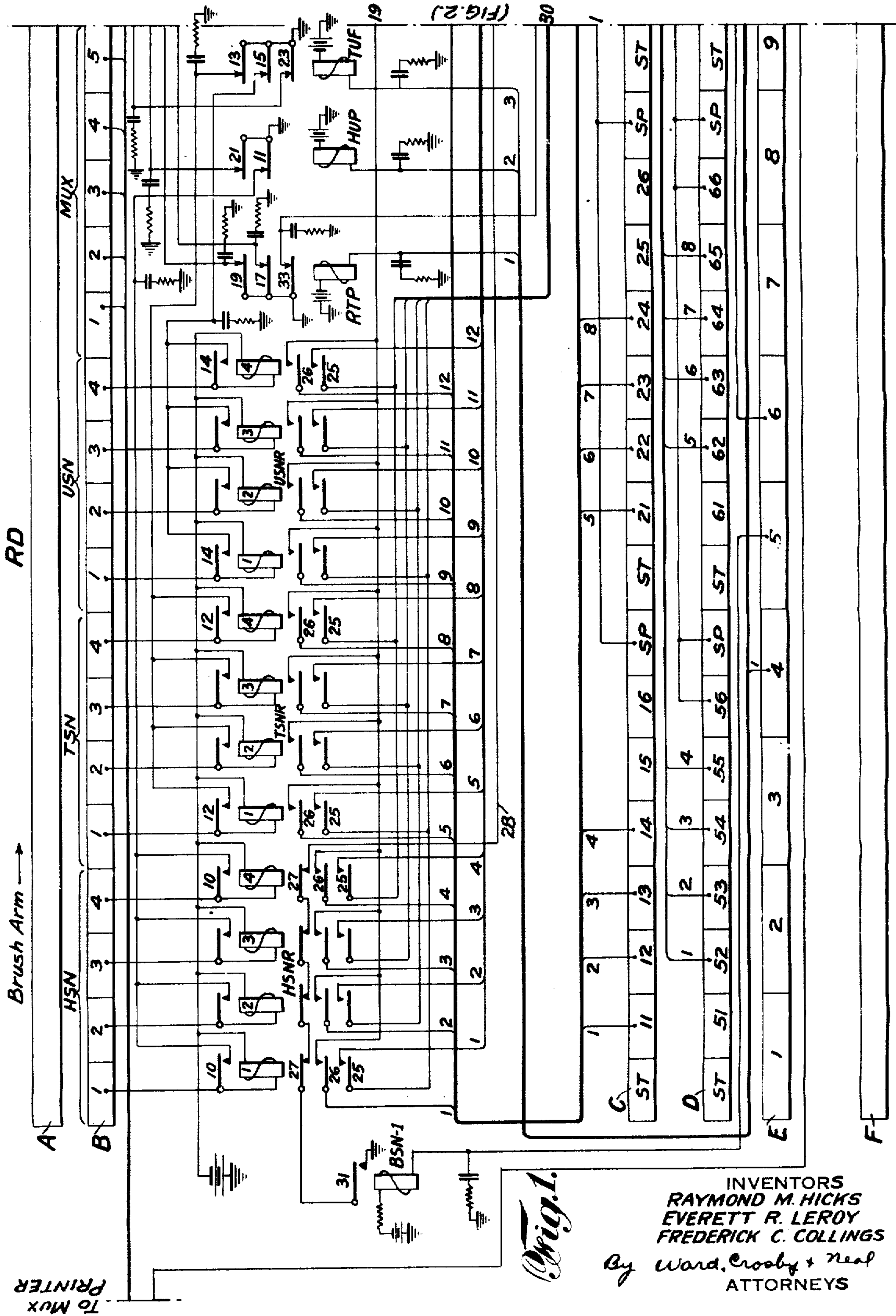
R. M. HICKS ET AL

1,932,665

REGENERATIVE REPEATER

Original Filed Feb. 3, 1932

3 Sheets-Sheet 1



Oct. 31, 1933.

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3 Sheets-Sheet 2

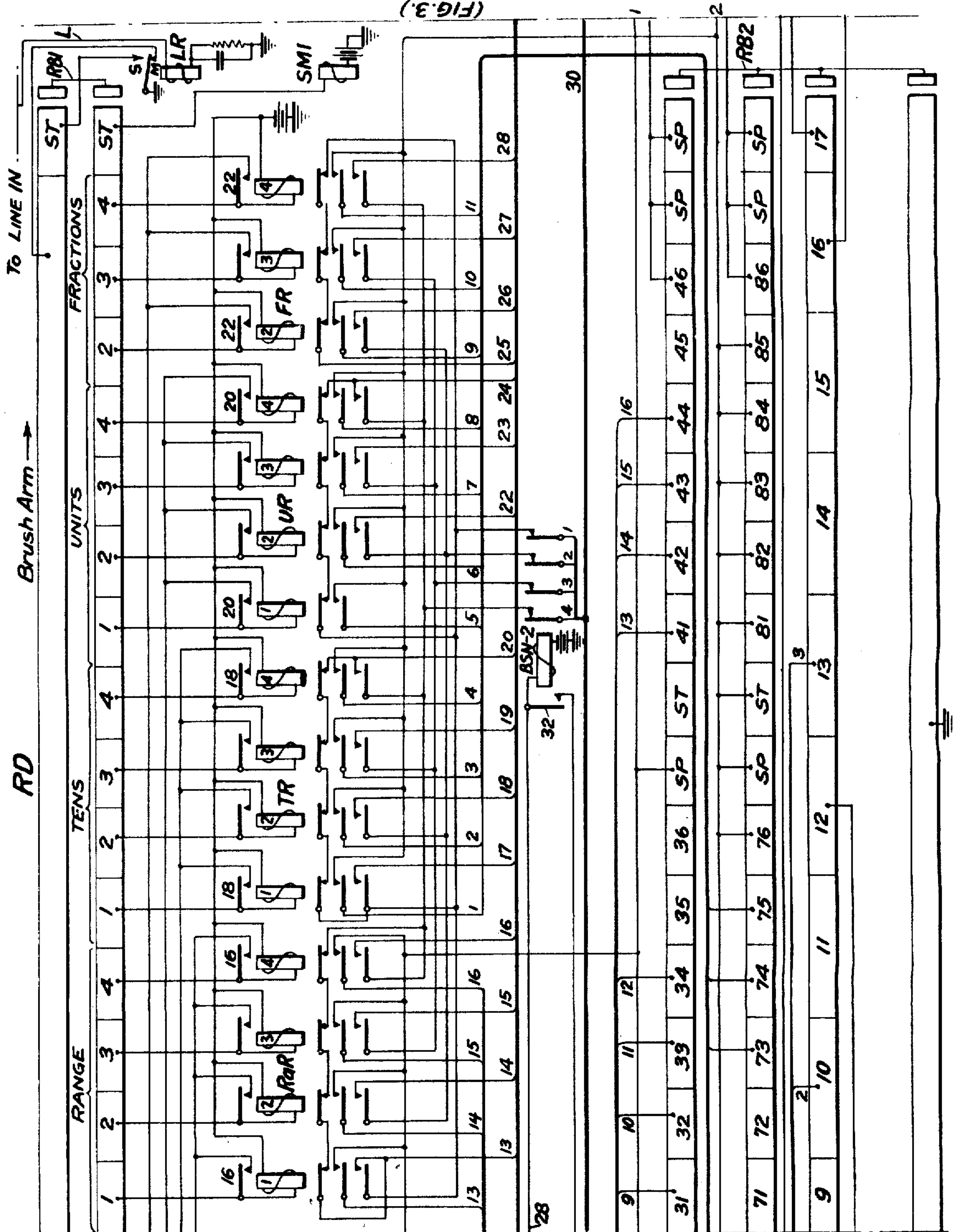


Fig. 2.

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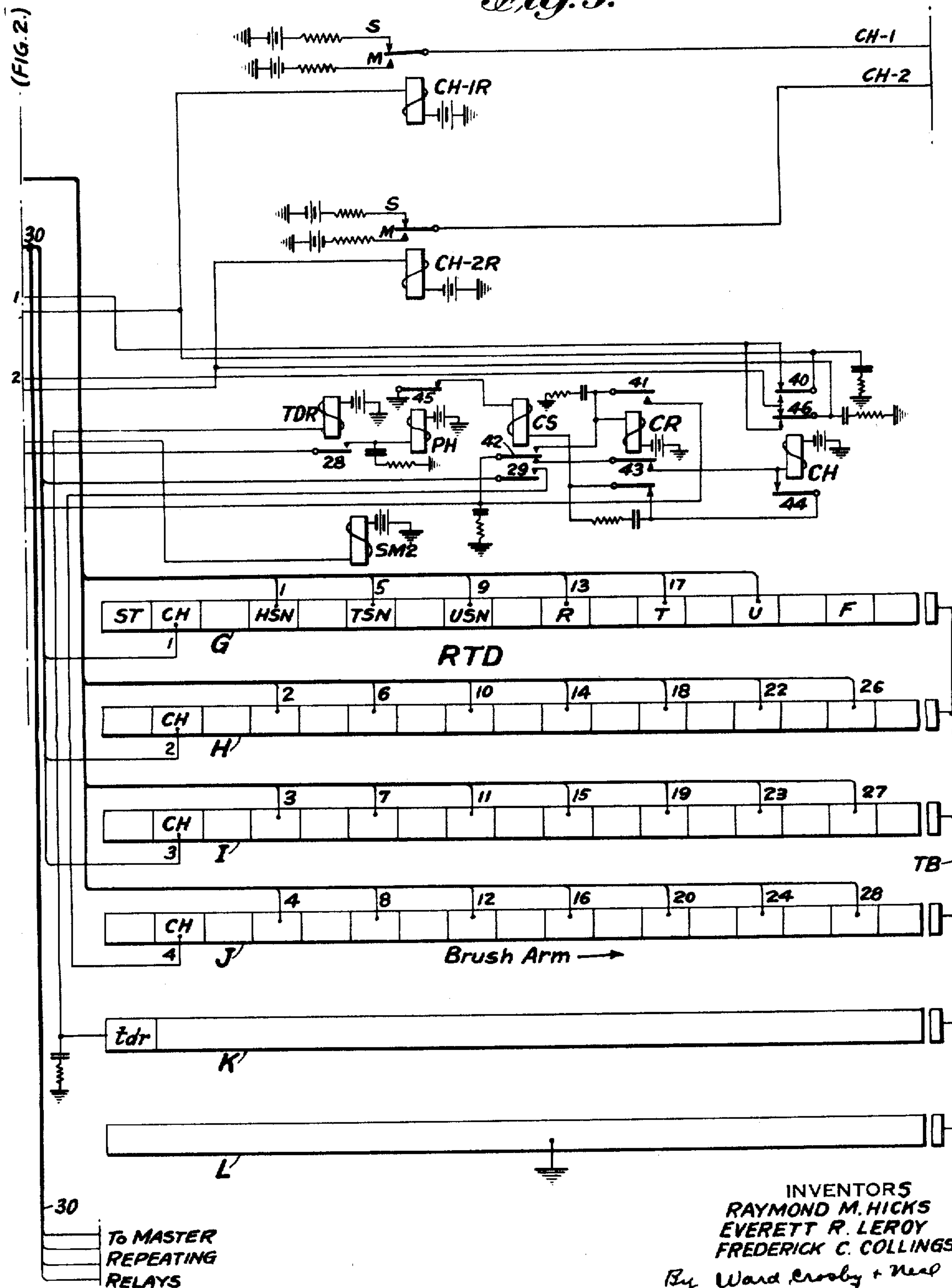
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Fig. 3.



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1,932,665

REGENERATIVE REPEATER

Raymond M. Hicks, Plainfield, N. J., Everett R. Leroy, New York, N. Y., and Frederick C. Collings, Plainfield, N. J.; said Collings assignor to The Western Union Telegraph Company, New York, N. Y., a corporation of New York, and said Hicks and Leroy assignors to The Tele-register Corporation, New York, N. Y., a corporation of Delaware

Application February 3, 1932, Serial No. 590,558
Renewed January 17, 1933

21 Claims. (Cl. 178—52)

This invention relates to regenerative repeaters.

Among the objects of this invention is the provision of mechanism for receiving a four unit numerical code over one wire and redistributing the characters in time phase to retransmit them over four wires; for furnishing suitable means for operating printers of a type similar to the well known stock ticker for monitoring and recording incoming line signals; for receiving at intervals a five unit coded signal for operating a special printer for the purpose of transmitting operating instructions; and for alternately transmitting information received as different channel information as predetermined by code signals received.

Other objects of this invention will be apparent to those skilled in the art after reading the following description taken in connection with the drawings, in which

Figs. 1 and 2 show a development in a plane of the receiving distributor and the storage relays for controlling both the monitor printer functions and the four wire retransmission; and

Fig. 3 shows a development in a plane of a four wire retransmitting distributor, together with various control rings and relays and the relay circuit used for operating the so-called monitor printers.

The mechanism disclosed for purposes of illustration includes a receiving distributor RD, Figs. 1 and 2, and a retransmitting distributor RTD, Fig. 3. The receiving distributor comprises a line receiving ring A having a start segment ST, a segmented ring B having hundreds, tens, units, MUX, range, and tens, units and fractions price segments, and a start segment, and segmented monitor printer controlling rings C and D, and a segmented operation controlling ring E, which will be referred to more specifically later, and a continuous grounded ring F. A brush arm, not disclosed, which carries brushes RB1 and RB2 is adapted to be frictionally driven from a motor, not shown, when released by the start magnet SM1.

The retransmitting distributor RTD, Fig. 3, includes segmented rings G, H, I and J, which include start segment, channeling segment, hundreds, tens and units stock number segments, range segment, and tens, units and fractions price segments. The distributor RTD also includes a ring K having a segment later referred to, and a continuous grounded ring L. A brush arm, not shown, and having brushes indicated at TB, is adapted to rotate over these rings when released by the starting magnet SM2.

Both distributors are normally at rest with the respective brushes resting on the start segments. The incoming line L, controlling the receiving distributor, has a marking potential held on it during the time that the receiving distributor is at rest. When the start pulse is sent over the incoming line the armature of the line relay LR, Fig. 2, is thrown to the spacing contact S operating the receiving distributor start magnet SM1, over the start segment ST of the line receiving ring A, and the segmented ring B connected by the brush RB1. The brush arm is released and is rotated at any suitable speed and, as preferred in practice, at 102 rotations per minute.

In the course of a rotation the marking impulses of a four unit code are transmitted over the ring A and through the brush RB1, in succession over the segments HSN, TSN, USN, MUX, range, tens, units and fractions of the ring B. It will be noted that there are four segments for each item of transmission, except the fractions segments of which there are three, and the MUX segments of which there are five, a five unit code being transmitted over the MUX segments and a four unit code being transmitted over the remaining segments. The impulses transmitted over the MUX segments operate a multiplex (or MUX) printer which may be of any well known type, or other electrical recording device using a five unit code.

As the brush RB1 is rotated, a marking impulse transmitted across the first of the HSN segments, marked 1, operates the relay HSNR, marked 1, which locks across its contact 10 and contact 11 of relay HUP, to ground. If ground is applied when the brush arm is in contact with the hundreds stock number segment, marked 2, the hundreds stock number relay, marked 2, will pull up and lock over its contact 10 and over the contact 11 of relay HUP, to ground. Whether or not the hundreds stock number relays marked 3 and 4 pick up depends upon whether ground is applied to the ring A as the brush passes over the segments 3 and 4.

In a like manner, when the ring A is grounded as the brush passes over the tens stock number segments, certain of the tens number relays TSNR, marked 1, 2, 3 and 4, will pick up and lock over their contacts 12, and across a contact 13 of relay TUF, to ground. In the same manner, certain of the units stock number relays USNR, marked 1, 2, 3 and 4, will pick up and lock over their contacts 14, and contact 15 of relay TUF, to ground. The brush then passes over the MUX segments operating the MUX printer,

or other electrical recording device, after which the brush passes over the range, tens, units and fractions price segments, operating combinations of the range, tens, units and fractions relays designated RaR, TR, UR and FR, and bearing the small numerals 1, 2, 3 and 4. The range relays RaR lock over their contacts 16, and a contact 17 of the relay RTP, to ground. The tens relays TR lock over their contacts 18, and a contact 19 of the relay RTP, to ground. The units relays UR lock over their contacts 20, and a contact 21 of relay HUP, to ground. The fractions relays FR lock over their contacts 22, and a contact 23 of relay TUF, to ground. The four unit coded information as to the stock designation, range, and tens, units and fractions prices, is now stored in the stock number, range and price relays in Figs. 1 and 2, these relays being held up over contacts of the relays RTP, HUP and TUF in combinations to release the range and tens price storage relays when the relay RTP is operated, the hundreds stock number and units price storage relays when the relay HUP is operated, and the tens stock number, units stock number, and fractions price when the relay TUF is operated, as will be described later.

The storage relays in Figs. 1 and 2, in addition to the locking contacts, have two sets of contacts 25 and 26 associated respectively with the four wire distributor shown in Fig. 3, and with the monitor printing rings C and D of the receiving distributor, the latter contact 26 coding the information received to be transmitted to the monitor printing rings. Certain of these storage relays also include a third set of contacts 27, which will be referred to later.

The mechanism includes also a group of channeling and phasing relays, Fig. 3, which insure that a channel-one transmission will be made first when the mechanism starts from a position of rest, and that during a continuous series of operations, the channel-one and channel-two transmissions will be made alternately. This mechanism includes also a relay for channeling the information to a pair of monitor printers, as will be described later.

Four wire retransmitting distributor

As the distributor brush RB2, Figs. 1 and 2, connects the segment 6 of the ring E, Fig. 1, to ground, over the ring F, the starting magnet SM2 for the four wire distributor RTD, Fig. 3, releases the brush TB which moves over the respective distributor rings. The brush normally connects the grounded ring L to the segment *tdr* of the ring K energizing the relay TDR, which closes at its contact 28 the circuit for the phasing relay PH when the distributor brush RB2 of the receiving distributor is in its home position and connects ground on the segment 17 of the ring E to the grounded ring F. However, at the time that the transmitting distributor is released the phasing relay is unoperated and the relay CS is unoperated, so that as the brush TB passes over the channel segment CH of the ring J, ground will not be connected over the contact 29 of the relay CS and, therefore, there will be no ground out for the line 4 going to the master repeating relays. Ground will be transmitted over the channel segments CH of rings G, H and I across lines 1, 2 and 3 and cable 30 to the master repeating relays which transmit impulses controlling receiving mechanism, not shown, to receive the subsequently transmitted stock information as a channel-one information.

As the brush TB continues its movement it grounds the HSN segments of the rings G, H, I and J, applying ground to lines 1, 2, 3 and 4 which, as shown in Fig. 1, continues across the operated contacts 25 of the hundreds stock number relays to four lines which are cabled as at 30, and which are the lines that go to the master repeating relays, as indicated in Fig. 3, causing these relays to operate and transmit a four unit code for the outgoing four wires.

As the brush moves over the tens segments TSN of the distributor rings G, H, I and J, ground is applied across these segments to lines 5, 6, 7 and 8 which, in Fig. 1, are shown as connected across the operated contacts 25 on the relays TSNR which are connected to the four wires which go to the master repeating relays, causing these relays to operate and transmit a four unit code representing the tens stock number.

In a similar manner, as the brush TB moves over the units stock number segment USN, ground is applied to the lines 9, 10, 11 and 12 which are connected across operated contacts 25 of the units stock number storage relays USNR, Fig. 1, to the four lines in cable 30 which extends to the master repeating relays.

In a similar manner, a four unit code is transmitted as to the range, tens, units and fractions prices as the brush TB moves over the segments R, T and U of the rings G, H, I and J, and the segments F of the rings H, I and J. As shown in Fig. 2, the four lines to which ground is applied over the contacts 25 of relays Ra, T, U and F are connected across break contacts of the relay BSN—2 to the four lines which go to the master repeating relays. The BSN—2 relay is normally unoperated, as shown in Fig. 1. When the brush RB2 moves over the segment 5 of the ring E, ground is applied to one side of the winding of the relay BSN—1 which pulls up and at its contact 31 applies ground to a line which is connected across the contacts 27 of the hundreds stock number relays HSNR, when these relays are unoperated, to line 28 which is connected to one side of the winding of the relay BSN—2, causing this relay to pick up if no hundreds stock number has been received. This disconnects the four lines going from the range, tens, units and fractions storage relays from the four lines going to the master repeating relays, so that no information can be transmitted in reference to range, tens, units and fractions prices in the case where no hundreds stock number has been received. BSN—2 relay locks over its own contact 32, across a contact 33 of the relay RTP, Fig. 1, to ground, so that this condition will be maintained until the relay RTP is operated.

The monitor printer controlling rings C and D of the receiving distributor, Figs. 1 and 2, are arranged for overlapping the selection and price information to the two channel printers, the receiving line relays of which are indicated in Fig. 3 at CH—1R and CH—2R, the printers being controlled from these relays in the usual manner. While the hundreds stock number, tens stock number, units stock number, and range, are successively printed on the channel-one monitor printer, the tens, units and fractions prices of the preceding quotation are being printed on the channel-two monitor printer.

The monitor printers are arranged to operate with a start—stop system having a six unit code, the sixth pulse being supplied for the purpose of shifting the printing mechanism from upper

to lower case. The type wheel used with the monitor printers, instead of printing the usual stock abbreviation in the upper case, prints a three digit stock number. Each of the digits to be printed requires a stop pulse to its associated monitor printer, and these stop pulses are supplied from separate segments located after the sixth interval of each character. The start pulses are supplied during the open interval to the monitor printer control relays during which time a spacing impulse is sent to the control magnets of the respective printers.

As the brush RB2, which is carried on the same brush arm as the receiving distributor brush RB1, moves over the rings C, D and E, it connects ground from the ring F to the various segments of the rings C, D and E. It is assumed here that the mechanism has been at rest for some time, and a stock number, range and price being received and transmitted that the channeling relay CH, Fig. 3, is deenergized so that the impulses as to the stock designation will go out over channel CH1 to the channel-one monitor printer.

As the brush RB2 connects ground on the ring F to the first segment of the ring C, ground is extended over the operated contact 26 of the hundreds stock number relay HSNR, marked 1, if this relay has been energized, to a line designated 19 which is connected to a line 1 connected to each of the SP segments of the ring C, and extended across a break contact 40 of the relay CH, Fig. 3, to the channel-one line CH—1 operating the relay CH—1R, Fig. 3.

In a similar manner, ground will be connected across the ring F and the segments 12, 13 and 14 of the ring C, and through lines 2, 3, 4, across contacts 26 of the operated relays HSNR, marked 2, 3 and 4, and across the circuit before described to the monitor printer relay CH—1R.

As the brush RB2 continues its movement it connects ground to the stop segment SP to control the monitor printer controlled by the relay CH—1R.

In a similar manner, as the brush RB2 travels over the segments 21, 22, 23 and 24, impulses are transmitted over the contacts 26 of the operated relays TSNR to the monitor printing relay CH—1R.

In the same manner information as to the units stock number and as to the range, is transmitted from ground on the ring F, over the segments 31, 32, 33 and 34; and 41, 42, 43 and 44, and across the contacts 26 of the relays USNR and RaR to the relay CH—1R controlling the channel-one monitor printer to print the units stock number and the range.

As the brush RB2 passes over the segment 4 of the ring E, after the hundreds stock number has been transmitted, it operates the relay RTP which releases the range relays RaR, the tens price relays TR, and the BSN—2 relay, if this relay was operated. As the brush RB2 moves over the segment 5 of the ring E it operates the BSN—1 relay, which causes the BSN—2 relay to operate in case no stock number was set up. As the brush continues its movement across the segment 6 of ring E, it operates the start magnet SM2 for the four wire distributor, Fig. 3, causing this distributor to operate. As the brush moves on to segment 10, it completes the circuit for the relay HUP, Fig. 1, releasing the hundreds stock number storage relays HSNR, and the units price relays UR. As the brush grounds the segment 12 it sets the MUX printer in operation. As the brush grounds the segment 13 it closes the cir-

cuit for the relay TUF, Fig. 1, which releases the storage relays for the tens and units stock number relays TSNR and USNR, and the storage relays FR for the fractions price.

After transmission of the hundreds, tens and units stock number, and the range, and the release of the holding relays, as described, the brush grounds the segment 46 of the ring C which operates the relay CH—1R for controlling the case shifting mechanism in the channel-one monitor printer. As the brush continues its movement, ground is applied to the two stop segments SP of the ring C, and ground is also applied to the segments 16 and 17 of the ring E, the ground on the segment 16 being extended to the contact 41 of the relay CR, Fig. 3, and the ground on the segment 17 being extended to the contact 28 of the relay TDR, Fig. 3. In a position of rest of both distributors, the relay TDR, Fig. 3, is operated from the segment *tdr* of the ring K, and ground over segment 17 of the ring E of the receiving distributor operates the phasing relay PH, which releases the channeling relays CS and CH if previously operated so that the first information transmitted at the beginning of a series of transmissions will go out over channel-one CH—1, which was the case assumed at the beginning of the operation.

If after the information as to the stock number and the range has been transmitted, and the brush RB2 is resting on the start segments shown in Fig. 2, the brush TB of the transmitting four wire distributor will have moved off the segments *tdr* of the ring K so that the relay TDR will be deenergized at the time that ground is applied to the segment 17 of the ring E and relay PH will not pick up. As the brush passed over the segment 16 of the ring E, with the relays in the condition shown in Fig. 3, the channel relay CH picked up on ground over a contact 42 of the relay CS, and a contact 43 of the relay CR, and after the impulse ceased it locked over its own contact 44, the winding of the relay CS and a contact 45 of the relay PH to ground, the relay CS picking up in series with the relay CH. At its contacts 40 and 46 the relay CH connected the line 1 to the relay CH—2R, and the line 2 to the relay CH—1R, so that in the next operation of the receiving distributor the stock number and range will be transmitted to the channel-two printer, and the tens, units and fractions price of the previous quotation, to the channel-one printer.

As the receiving distributor makes its second operation, receiving a second quotation, and as it transmits in succession the hundreds, tens, units stock number, and the range, it transmits the price of the first quotation over segments of the ring D. As the brush moves over segment 52 of the ring D, it connects ground from the ring F over this segment to the line 1, which is connected across a contact 26 of the tens relay TR, marked 1, if this relay is operated, to the line 2 which is connected to the segments 56, SP, 66, SP, 76, SP, ST and 81 to 85, of the ring D, and which is connected across the operated contact 40 to the relay CH—1R, causing the relay CH—1R to pick up and control the channel-one monitor printer so that the price of the first quotation will be printed by the channel-one monitor printer, which printed the stock number and range of the first quotation.

As the brush continues its movement across segments 53, 54 and 55, it applies ground to the relay CH—1R, over the contacts 26 of the relays TR, marked 2, 3 and 4. In a similar manner,

the tens price is transmitted by ground on the segments 62, 63, 64 and 65, and the fractions price is transmitted by grounding the segments 73, 74 and 75.

5 As the four wire transmitting distributor is released for the transmission of the second quotation, ground over the channel segment CH of the ring J, and the operated contact 29 of the relay CS, will apply ground to the line 4 going out to
10 the master repeating relays in the four wire system, indicating that this is a channel-two transmission. As ground is applied to the segment 16 of the ring E, after the second quotation has been received, the relay CR is operated which locks
15 over its own contact 41 momentarily, to ground over the segment 16. This opens up the circuit for the channel relay CH so that the next stock number will be transmitted over the channel CH—1, and the price of the second quotation over
20 the channel CH—2. The energization of the relay CR also releases the relay CS, and immediately after the brush leaves the segment 16 of the ring E the relay CR releases and the channeling and phasing relays in Fig. 3 will be in the condition shown.

While this invention has been described with reference to the single preferred embodiment disclosed, it is to be understood that other embodiments may be apparent to those skilled in this art
30 after ascertaining the principles of this invention, and that it is intended to cover all embodiments that comes within the principles of this invention.

What we claim is:

1. In an apparatus of the character described,
35 the combination of a one wire receiving distributor, a series of groups of storage relays operated by pulses over said receiving distributor, means for holding said relays operated, a four wire retransmitting distributor for transmitting pulses
40 over contacts of said storage relays when operated, means controlled by said receiving distributor for setting said retransmitting distributor in operation, and means also controlled by said receiving distributor for releasing said storage
45 relays.

2. In an apparatus of the character described, the combination of a one wire receiving distributor, a series of groups of storage relays operated by pulses over said receiving distributor, means
50 for holding said relays operated, a four wire retransmitting distributor for transmitting pulses over contacts of said storage relays when operated, means controlled by said receiving distributor for setting said retransmitting distributor
55 in operation, means also controlled by said receiving distributor for releasing said storage relays, and means for preventing the retransmission of certain of the information stored in said storage relays when no relays of the first group have
60 been operated.

3. In an apparatus of the character described, the combination of a one wire receiving distributor, a series of groups of storage relays operated by pulses over said receiving distributor, means
65 for holding said relays operated, a four wire transmitting distributor for transmitting pulses over contacts of said storage relays when operated, means controlled by said receiving distributor for setting said retransmitting distributor in operation,
70 means also controlled by said receiving distributor for releasing said storage relays, and means under control of a plurality of the last groups of the series of groups of relays when
75 unoperated for causing the retransmitting dis-

tributor to transmit pulses indicative of this condition of the relays.

4. In an apparatus of the character described, the combination of a one wire receiving distributor, a series of groups of storage relays operated by pulses over said receiving distributor, the
80 first of said series of groups of relays storing stock number pulses, the next group of said series storing the range pulses, and the remaining groups of said series storing the price pulses, a retransmitting distributor for retransmitting information
85 received under control of said groups of relays, and means operated when the relays of the first group are unoperated to prevent a retransmission under control of the range and price
90 groups.

5. In an apparatus of the character described, the combination of a one wire receiving distributor, a plurality of storage relays adapted to be energized by impulses received over said distributor, means for holding said relays energized, a
95 four wire transmitting distributor including four segmented rings and a grounded solid ring, a brush cooperating with said rings, and wires connecting the segments of said rings with contacts
100 of the corresponding storage relays, said contacts connecting said wires to four outgoing wires whereby impulses are transmitted over said four outgoing wires from ground over segments of said
105 segmented rings of the retransmitting distributor and the contacts of the corresponding storage relays when energized.

6. In an apparatus of the character described, the combination of a one wire receiving distributor, a plurality of storage relays adapted to be energized by impulses received over said distributor, means for holding said relays energized,
110 a four wire retransmitting distributor including four segmented rings and a grounded solid ring, a brush cooperating with said rings, wires connecting the segments of said rings with contacts of the corresponding storage relays, said contacts
115 connecting said wires to four outgoing wires whereby impulses are transmitted over said four outgoing wires from ground over segments of said segmented rings of the retransmitting distributor and the contacts of the corresponding
120 storage relays when energized, and means operated when the relays of the first group of the series are unoperated for opening the circuits from the contacts of other storage relays to said
125 four outgoing wires.

7. In an apparatus of the character described, the combination of a one wire four unit code receiving distributor, storage relays adapted to be energized over said distributor, holding circuits
130 for said storage relay, a four wire four unit code retransmitting distributor operable to transmit pulses over contacts of said storage relays, means under control of said receiving distributor for setting said retransmitting distributor in operation,
135 means also controlled by said receiving distributor for releasing said storage relays, and a channeling mechanism controlled by said distributors for retransmitting the four unit code received as a channel-one or channel-two transmission.
140

8. In an apparatus of the character described, the combination of a one wire four unit code receiving distributor, storage relays adapted to be energized over said distributor for storing information as to one item upon each operation of the
145 distributor, means for holding said relays energized, a pair of retransmitting mechanisms included in said receiving distributor, a pair of monitor printers, circuits adapted to be made
150

across one of said pairs of retransmitting mechanisms for operating one of said printers to print information stored in certain of said storage relays, and circuits adapted to be made across the other of said retransmitting mechanisms for controlling the other of said printers to print information stored in other of said storage relays, the operation being such that complete information as to each item is printed by one or the other printer during two operations of said receiving distributor.

9. In an apparatus of the character described, the combination of a receiving distributor, a set of storage devices for storing pulses received over said distributor, a pair of retransmitting devices, a pair of printers, circuits adapted to be made across one of said retransmitting mechanisms for operating one of said printers to print information stored in certain of said storage devices, and circuits adapted to be made across the other of said retransmitting mechanisms for controlling the other of said printers to print information stored in the other of said storage devices.

10. In an apparatus of the character described, the combination of a receiving distributor including a segmented distributor ring, a set of storage relays connected to said segments adapted to be operated by pulses over said segments, a pair of segmented distributor rings included in said receiving distributor, a pair of recording devices, and means for separately operating said recording devices simultaneously over said distributor rings under the control of contacts of different ones of said storage relays.

11. In an apparatus of the character described, the combination of a receiving distributor including a segmented distributor ring, storage relays connected to said segments adapted to be operated by pulses over said segments, a pair of segmented distributor rings included in said receiving distributor, a pair of recording devices, and circuits adapted to be made over contacts of said storage devices and segments of said distributor rings to said printers to print information stored in certain of said relays on one printer and information stored in the remaining of said storage relays on the other of said printer, and channeling mechanism operable to cause all of the information relating to one item to be printed by one printer and that of the succeeding item by the other printer.

12. In an apparatus of the character described, the combination of a receiving distributor including a segmented distributor ring, storage relays connected to said segments adapted to be operated by pulses over said segments, a pair of segmented distributor rings included in said receiving distributor, a pair of recording devices, circuits adapted to be made over contacts of said storage devices and segments of said distributor rings to said printers to print information stored in certain of said relays on one of said printers and information stored in the remaining of said storage relays on the other of said printers, channeling mechanism operable to cause all of the information relating to one item to be printed by one printer and that of the succeeding item by the other printer, and means included in said channeling mechanism for causing the first item of a series of items received to be printed by a particular one of said printers.

13. In an apparatus of the character described, the combination of a one wire four unit code receiving distributor, a set of storage relays adapted to be energized over said distributor for storing

information as to an item upon each operation of the distributor, means for holding said relays energized, a pair of retransmitting mechanisms included in said receiving distributor, a pair of monitor printers, circuits adapted to be made across one of said pairs of retransmitting mechanisms for operating one of said printers to print information stored in certain of said storage relays, circuits adapted to be made across the other of said retransmitting mechanisms for controlling the other of said printers to print information stored in other of said storage relays, the operation being such that complete information as to each item is printed by one or the other printer during two successive operations of said receiving distributor, and means controlled by said receiving distributor for opening said holding circuits for said storage relays after transmission across their contacts has been completed.

14. The combination of a receiving distributor including a segmented face plate, a set of storage relays connected to the segments of said face plate, means for energizing said relays over said segments, a pair of retransmitting distributor segmented face plates included in said receiving distributor, wires connecting contacts of certain of said storage relays to the segments of one of said pair of face plates, wires connecting contacts of the other of said storage relays to the segments of the other of said pair of face plates, a grounded solid face plate, and a brush for connecting said solid face plate to the segments of said pairs of face plates to apply ground to circuits made across the contacts of said storage relays, a pair of monitor printers, and lines extending from the contacts of said storage relays to said monitor printers.

15. The combination of a receiving distributor including a segmented face plate, storage relays connected to the segments of said face plate, means for energizing said relays over said segments, a pair of transmitting distributor segmented face plates included in said receiving distributor, wires connecting contacts of certain of said storage relays to the segments of one of said pair of face plates, wires connecting contacts of the other of said storage relays to the segments of the other of said pair of face plates, a grounded solid face plate, a brush for connecting said solid face plate to the segments of said pairs of face plates to apply ground to circuits made across the contacts of said storage relays, a pair of monitor printers, lines extending from the contacts of said storage relays to said monitor printers, channeling mechanism for normally connecting the lines from the contacts of certain of said storage relays to one printer and the lines from the contacts of the other storage relays to the other printer, and means included in said channeling mechanism for causing the lines from the contacts of the first said storage relays to be connected to said other printer and the line from the contacts of the second storage relays to said first printer during the next operation of the receiving distributor.

16. In a signaling system, a source of signals comprising a plurality of series of groups of code signals transmitted in continuous succession, a receiving distributor arranged to receive said series of signals in succession, means associated with said distributor for retransmitting the first series of signals received over a particular one of a plurality of channels and for retransmitting the next series of signals received over another of said channels.

17. In a signaling system, a source of signals comprising a plurality of groups of code signals transmitted in continuous succession, a receiving distributor arranged to receive said signals during a predetermined time interval, a plurality of storage elements for said signals equal in number to the number of impulses transmitted in such continuous succession, and means for repeating said signals from said storage elements over a substantially longer time interval.

18. In a signaling system, a source of signals, a distributor arranged to receive a plurality of groups of character code signals during one cycle of operation thereof, a single set of storage devices equal in number to the number of impulses received by said receiving distributor during one cycle of operation, and means associated with said relays for retransmitting said groups of character code signals during two cycles of operation of the distributor.

19. In a signaling system, a source of signals, a distributor having a receiving ring and a pair of transmitting rings, a plurality of storage relays for storing the impulses as received and repeating a portion of said signals through one transmitting ring during the receiving cycle and a further portion thereof over another of the transmitting rings during a subsequent cycle of the distributor.

20. In a signaling system, a source of signals, a distributor having a receiving ring and a plurality of transmitting rings, and a set of storage relays common to both of said transmitting rings for storing the impulses as received over said receiving ring, certain of said relays and one of said transmitting rings serving to repeat a portion of said signals during the cycle in which the signals are received, and other of said relays and another of said rings serving to repeat another portion of said signals during a subsequent cycle.

21. In a signaling system, a source of signals, a distributor having receiving segments corresponding to a plurality of groups of character code signals, a single set of storage elements associated with said distributor, means for applying signals received on said receiving segments successively to said storage elements during a cycle of operation of the distributor, a plurality of retransmitting means each associated with certain of said storage elements and means for controlling the retransmission of successive series of pluralities of groups of character code signals from said retransmitting means over different channels.

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DISCLAIMER

1,932,665.—*Raymond M. Hicks*, Plainfield, N. J., *Everett R. Leroy*, New York, N. Y., and *Frederick C. Collings*, Plainfield, N. J. REGENERATIVE REPEATER. Patent dated October 3, 1933. Disclaimer filed May 15, 1937, by the assignee, *The Teleregister Corporation*.

Hereby enters this disclaimer to the subject matter in claims 1, 7, 9, 16, 17, and 18.

[Official Gazette June 8, 1937.]

17. In a signaling system, a source of signals comprising a plurality of groups of code signals transmitted in continuous succession, a receiving distributor arranged to receive said signals during a predetermined time interval, a plurality of storage elements for said signals equal in number to the number of impulses transmitted in such continuous succession, and means for repeating said signals from said storage elements over a substantially longer time interval.

18. In a signaling system, a source of signals, a distributor arranged to receive a plurality of groups of character code signals during one cycle of operation thereof, a single set of storage devices equal in number to the number of impulses received by said receiving distributor during one cycle of operation, and means associated with said relays for retransmitting said groups of character code signals during two cycles of operation of the distributor.

19. In a signaling system, a source of signals, a distributor having a receiving ring and a pair of transmitting rings, a plurality of storage relays for storing the impulses as received and repeating a portion of said signals through one transmitting ring during the receiving cycle and a further portion thereof over another of the transmitting rings during a subsequent cycle of the distributor.

20. In a signaling system, a source of signals, a distributor having a receiving ring and a plurality of transmitting rings, and a set of storage relays common to both of said transmitting rings for storing the impulses as received over said receiving ring, certain of said relays and one of said transmitting rings serving to repeat a portion of said signals during the cycle in which the signals are received, and other of said relays and another of said rings serving to repeat another portion of said signals during a subsequent cycle.

21. In a signaling system, a source of signals, a distributor having receiving segments corresponding to a plurality of groups of character code signals, a single set of storage elements associated with said distributor, means for applying signals received on said receiving segments successively to said storage elements during a cycle of operation of the distributor, a plurality of retransmitting means each associated with certain of said storage elements and means for controlling the retransmission of successive series of pluralities of groups of character code signals from said retransmitting means over different channels.

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DISCLAIMER

1,932,665.—*Raymond M. Hicks*, Plainfield, N. J., *Everett R. Leroy*, New York, N. Y., and *Frederick C. Collings*, Plainfield, N. J. REGENERATIVE REPEATER. Patent dated October 3, 1933. Disclaimer filed May 15, 1937, by the assignee, *The Teleregister Corporation*.

Hereby enters this disclaimer to the subject matter in claims 1, 7, 9, 16, 17, and 18.

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