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TELETYPEWRITER SYSTEM
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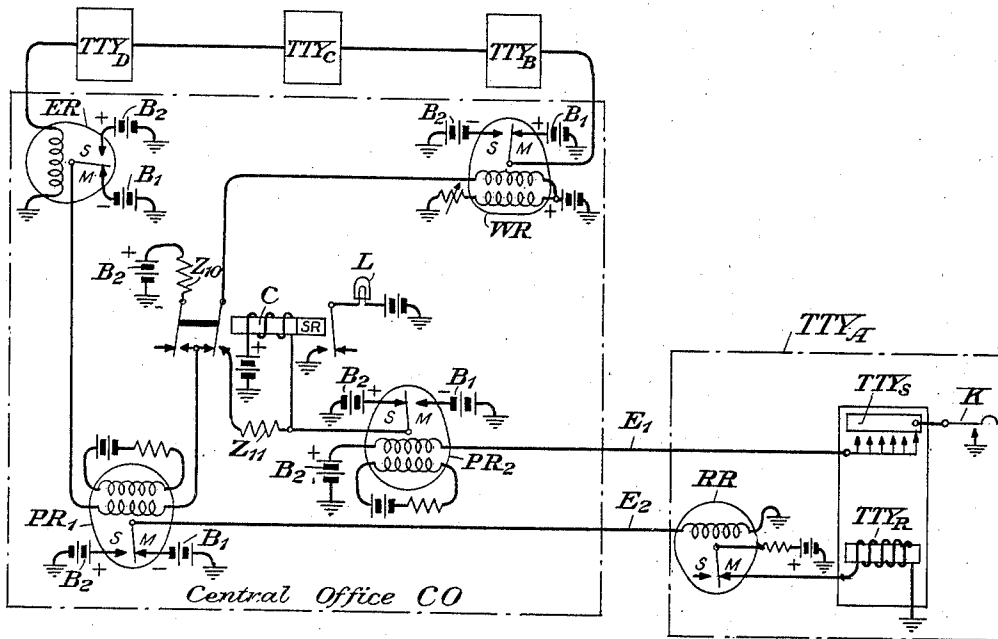


Fig. 1

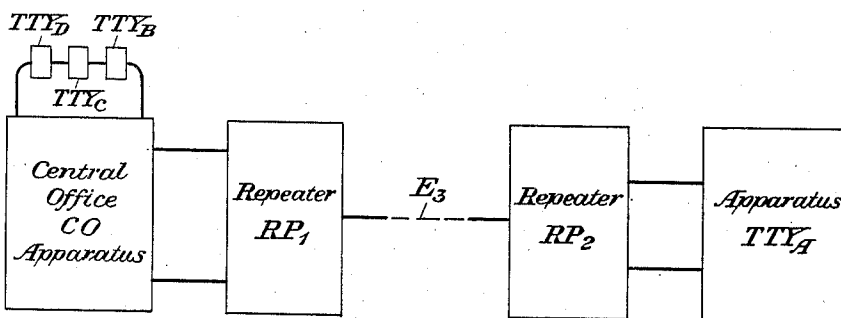


Fig. 2

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TELETYPEWRITER SYSTEM

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2 Claims. (Cl. 178—2)

This invention relates to telegraph and teletypewriter systems, and more particularly to round robin systems for telegraph or teletypewriter circuits and apparatus.

There are at present several types of so-called "round robin systems" in use in which a plurality of teletypewriter stations are interconnected in the form of a ring or loop in such a way that messages may be transmitted from any one of the stations in the system to all of the other stations so that all of the stations including the station transmitting the messages may receive and prepare copies of the messages. Each station is generally connected to the round robin system by three conductors, one being employed for transmitting messages from that station to the other stations of the system, the second for receiving messages from any one of the stations including the home station, and the third is used for control purposes, i. e. for splitting the circuit between the sending and receiving legs at the central office so that the station may transmit whenever desired over the round robin system.

In accordance with the present invention it is proposed to eliminate the third or control conductor and at the same time enable any station to cut or split the round robin circuit, thereby permitting signals to be sent over the round robin system whenever desired. This may be accomplished in accordance with this invention by the use of an arrangement including a slow-release relay located at the central office, the relay being operated under the control of a key located at the station, the key being connected in series with the sending contacts of the sending apparatus.

This invention will be better understood from the detailed description hereinafter following when read in connection with the accompanying drawing in which Figure 1 illustrates one embodiment of the invention applied to a teletypewriter system merely for the purpose of illustration, and Fig. 2 illustrates schematically any form of a repeater system which may be used to connect any teletypewriter station with a central office.

Referring to Fig. 1 of the drawing, there is shown a round robin system for teletypewriter apparatus, the system interconnecting a plurality of stations designated TTY_B, TTY_C and TTY_D, and another station TTY_A which may include a central office CO. The station TTY_A is connected to the central office CO by conductors E₁ and E₂. As is well known, messages

emanating from any one of the stations, such as TTY_B, may be transmitted to all of the other stations, including the central office CO and the station TTY_A, so that copies of the messages may be obtained at each of the various stations including, of course, station TTY_A.

The central office CO includes an east repeating relay ER, a west repeating relay WR and a one-way polar relay PR₁ which interconnects the armature of the relay ER with the upper winding of the relay WR. The interconnecting circuit, however, includes one of the armatures of a control relay C which may be of the dash-pot or mercury type, or of any suitable slow-release type. The central office also includes another one-way polar relay PR₂, the upper winding of which is in series with one of the conductors E₁ extending to the station TTY_A. The upper winding of relay PR₁ and the lower winding of relay PR₂ are the usual biasing windings for such relays.

The station TTY_A includes a receiving relay RR, the winding of which is connected to the other conductor E₂ extending between the station TTY_A and the central office CO. The armature of relay RR and one of its contacts are connected to the receiving equipment TTY_R of a teletypewriter apparatus of well-known type. The station TTY_A also includes, in addition to the sending portion TTY_S of the teletypewriter, a key K which may be used for cutting or splitting the round robin circuit in such a way as to enable the operator at station TTY_A to send messages over the round robin system.

The marking and spacing signals emanating from, for example, station TTY_B will traverse the teletypewriter stations TTY_C and TTY_D and then operate the relay ER at the central office CO. The armature of the relay ER will then move between its M and S contacts in accordance with these signals and connect oppositely poled batteries B₁ and B₂ alternately to the armature of the relay. These oppositely poled voltages are then applied through the main or lower winding of the relay PR₁ and through the back contact of the inner armature of relay C to the upper winding of the relay WR. Hence the armatures of both relays PR₁ and WR will be moved between their M and S contacts in accordance with the signals. As the armature of relay PR₁ moves between its M and S contacts it connects oppositely poled batteries B₁ and B₂ over conductor E₂ to the winding of relay RR at station TTY_A, thereby operating relay RR at station TTY_A in accordance with the signals.

The armature of the relay RR will then move between its M and S contacts and hence operate the receiving portion TTY_R of the teletypewriter apparatus at station TTY_A. This provides copy at station TTY_A of the signals emanating from, for example, station TTY_B. At the same time the armature of relay WR moves between its M and S contacts, connecting oppositely poled batteries B₁ and B₂ to the line extending to station TTY_B to supply home copy to the latter station. It will be observed, therefore, that with key K open the messages are transmitted over the round robin system and also received at station TTY_A.

The key K at station TTY_A may then be operated to break the transmission over the round robin system. Upon the closure of key K the upper winding of relay PR₂ will be supplied with current from the battery B₂ connected to this winding. The armature of relay PR₂ will then move from its spacing position at contact S to its marking position at contact M. When this happens, oppositely poled batteries will be connected to the terminals of the winding of relay C, thereby operating relay C. Upon the closure of the left inner make contact of relay C, the marking battery B₁ connected to the armature of relay PR₂ will then be connected to the upper winding of relay WR and, therefore, hold the armature of relay WR on its marking contact M as long as key K is operated.

It will be observed that upon the operation of relay C the opening of the back contact of its left inner armature will open the circuit between the lower or main winding of relay PR₁ and the upper winding of relay WR so that relay ER cannot repeat the signals to relay WR as heretofore. The closure of the inner make contact of the left outer armature of relay C will connect an impedance Z₁₀ to the lower winding of relay PR₁. This impedance will properly terminate the main or lower winding of relay PR₁. By preventing relay ER from operating relay WR, the break signal is communicated to the other stations, such as TTY_B, of the round robin system, and the operator of any such station will stop sending when he fails to receive his home copy. The closure of the make contact of the right armature of relay C will also light a lamp L to indicate to the central office operator that the circuit has been "cut" by the operator at station TTY_A.

The operator at station TTY_A may then send signals into the round robin system while key K remains closed by operating the sending teletypewriter apparatus TTY_S. The marking and spacing signals produced by the transmitting apparatus TTY_S will operate the relay PR₂, thereby moving its armature between its M and S contacts in accordance with these signals. But as the armature of relay PR₂ moves between its two contacts, the relay C, which is very slow to release, will fail to release while such signals are transmitted.

The operation of relay PR₂ in accordance with the transmitted signals will correspondingly operate the relay WR, the armature of relay PR₂ being connected to the upper winding of relay WR through the circuit of an impedance Z₁₁ and the left inner armature and make contact of relay C. The relay WR will then repeat the signals into the round robin system of stations TTY_B, TTY_C and TTY_D. As these signals reach the relay ER at the central office CO, they will operate the relay ER and thereby move its armature between its M and S contacts in accord-

ance with the signals. The armature of relay ER will, therefore, alternately connect oppositely poled batteries E₁ and E₂ to the winding of relay PR₁, which is now terminated by impedance Z₁₀, and relay PR₁ will then respond to these signals. As the armature of relay PR₁ moves between its M and S contacts, oppositely poled batteries B₁ and B₂ will be connected to the winding of relay RR at station TTY_A over the conductor E₂. The relay RR will then repeat the signals to the receiving teletypewriter apparatus TTY_R to provide the home copy.

The relay C is of the slow-release type, as already explained, and may be designed so as not to release on the receipt of a break signal. As will be understood, a break signal is ordinarily sent to break or stop the transmission from a distant station of the system. Such slow-acting relays are well known to those skilled in the art. However, a relay circuit including condensers and resistances, and including also, if desired, a vacuum tube system may be employed to introduce the necessary slow-release feature.

The addition of the relay C and the apparatus associated therewith at the central office CO enables sending and receiving service to be extended from the central office to the operator at station TTY_A without the usual third or control conductor. The apparatus at the central office is so connected as to respond to the manipulation of the key K at the station TTY_A and split the round robin loop at the central office so as to enable the operator at the station TTY_A to send signals into the round robin system. The circuit arrangement is very simple and employs a minimum of equipment. The cost of the initial equipment and circuits and their maintenance will be low.

Fig. 2 shows a schematical representation of the apparatus in Fig. 1, with the addition of repeaters RP₁ and RP₂, which may be at widely distant points from each other. The repeaters RP₁ and RP₂ may be, for example, at two different cities, and they are interconnected by a line E₃. The repeater RP₁ may, however, be located at the central office CO. Repeaters RP₁ and RP₂ may be of any well-known form, and they may repeat signals from one point to another over the line E₃ on a full duplex basis.

After sending from station TTY_A has been completed, the key K may be released. The relay C will be released, thereby extinguishing lamp L, but station TTY_A will nevertheless receive signals from the round robin system.

It will be understood that while but one central office and but one station such as TTY_A have been shown for illustrative purposes, each of the other round robin stations, such as TTY_B, may include a central office and an additional station connected to the central office by two conductors, as already explained. Moreover, each central office may be connected by similar equipment through separate two-conductor circuits to a plurality of stations.

While this invention has been shown and described in certain particular embodiments merely for the purpose of illustration, it will be understood that the general principles of this invention may be applied to other and widely varied organizations without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. In a telegraph system, the combination of a central office which is part of a round robin

system, a station connected to the central office by a first line for the transmission of signals and by a second line for the reception of signals, the central office having a receiving relay, a sending relay, a control relay and a polar relay, the polar relay interconnecting the receiving relay and the sending relay through the armature and contacts of the control relay, said station having receiving apparatus responsive to all signals received over said second line, a cutting key, and sending apparatus which may send signals over said first line after said key is operated, and means responsive to the operation of said key to operate the control relay for breaking the connection between the sending and receiving relays at the central office, so that signals may be transmitted from said station over said first line and over the round robin system and then be received over said second line by said receiving apparatus.

2. In a telegraph system, the combination of a central office which is connected to a plurality of stations to form a round robin system, an ad-

ditional station connected to the central office by a first line for the transmission of signals and by a second line for the reception of signals, the central office having a receiving relay, a sending relay, a polar relay, a control relay, the armature of which connects the armature of the receiving relay to the winding of the sending relay through the winding of said polar relay, said additional station having sending apparatus, a cutting key connected to said first line through said sending apparatus, and receiving apparatus connected to said second line and to the armature of said polar relay, and means responsive to the operation of said key to operate said control relay and thereby break the transmission over said round robin system, signals being transmitted from said additional station over said first line after said key is operated, said transmitted signals being returned over said round robin system and to said receiving apparatus over said second line.

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