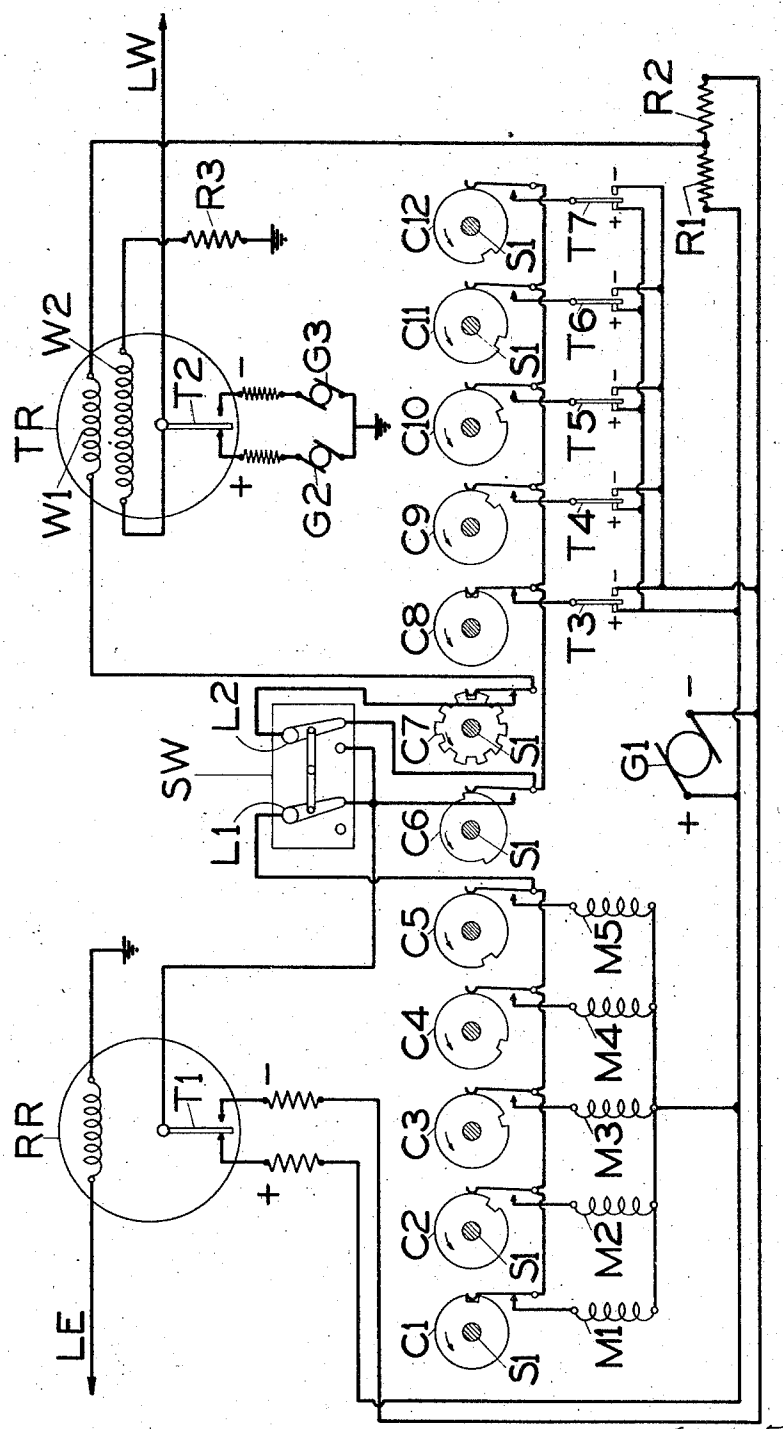
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TELEGRAPH DISTRIBUTION SYSTEM

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TELEGRAPH DISTRIBUTION SYSTEM.

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This invention relates to improvements in systems of telegraph distribution and pertains particularly to multi-channel printing telegraph systems in which the multiplexing is attained by division of line time among the several channels and more particularly to systems which permit certain channels to be terminated at an intermediate point and other channels to be repeated. Such systems are often referred to as "series" circuits.

In vol. 54, No. 256 of The Journal of The Institution of Electrical Engineers, London, England, such "series" circuits have been described by H. H. Harrison. In the system therein described the repeating of certain channels is accomplished by storing up, during one portion of the cycle of operation of the distributor, the signal in a plurality of relays, known as a retransmitter and during another part of the cycle transmitting the stored signal and then, when transmission has been completed, restoring the storage relays to normal.

Other "series" circuits use a plurality of polarized relays for signal storage. The use of polarized storage relays eliminates the necessity of resetting the relays after the transmission of the stored signals.

My invention is an improvement over the systems just described in that it does not store up the several impulses of each channel and therefore does not require a plurality of storage relays, thus accomplishing a reduction in relays and a consequent simplification of apparatus.

My invention also makes it possible to "cut through", by means of a simple switch, the channels which are ordinarily terminated at the intermediate station, the value of this novel feature in meeting changing telegraph traffic conditions is obviously very great.

The particular embodiment of the invention here described contemplates the use of the five-unit Baudot code, the employment of automatic transmission by perforated tape and the use of rotary distributors of the cam type. This invention, however, may be used to advantage in connection with any equal-letter code and with means of transmission other than by tape and is also suitable for use in connection with rotary distributors of the brush and segment type.

In order to more fully describe my invention reference will be had to the drawing, which accompanies and forms a part of this specification, and which shows diagrammatically the circuits of the intermediate station of a series circuit wherein one channel is dropped at the intermediate station and the other channel is repeated. It should be understood that the invention will give many circuit combinations in addition to the "drop 1, repeat 1," circuit described herein, when suitable distributors are used.

There is shown in the drawing the essential apparatus at an intermediate station on a "series" circuit. Only the apparatus necessary for one operation in one direction, east to west for example, is shown. When the lines are duplexed, as is usual, additional similar apparatus and balancing equipment will be required for the west to east operation, as is obvious.

Referring now to the drawing the distributor comprises a plurality of cams; C^1, C^2 to C^{12}, which with regard to their angular relation to each other are fixed and rotate upon a common shaft S^1. The depressions shown upon these cams cause certain contacts to close during definite portions of the cycle of the cams' revolution. The cam shaft is driven by a phonic or other type of motor and is kept in synchronism and proper phase relation with the transmitter at the distant station by a synchronizing apparatus not shown. Syncronizing systems for continuously rotating distributors as used in printing telegraphy are well shown in the art and need not be described here. RR represents the receiving relay which is controlled by impulses transmitted over line LE from a distant station. TR represents the transmitting relay adapted to send impulses over line LW to another distant station. M^1 to M^5 represent the operating magnets in the local receiver printer or recorder. T^3 to T^7 represent the contacts on the local transmitter. The positions of these contacts are controlled by a perforated tape which is not shown as such control is obvious. W^1 is the operating winding of the transmitting relay TR. The cam C^7 has 10 short depressions and determines the time and duration of impulses sent to the winding W^1 of relay TR. The cams C^1 to C^5 each have one short depression and close their contacts successively and pass a small part of the signal, which is

received by relay RR, to the magnets M^1, M^2, M^3, M^4 and M^5.

In the drawing the cams are shown in the position where the local channel is being received, and cam C^1 has just closed its contacts and completed the circuit to printer magnet M^1. The common return of the magnets M^1 to M^5 is shown as connected to positive battery G^1 and the tongue T^1 of relay RR is on the positive contact and therefore magnet M^1 is not at this time operated. If, however, T^1 of relay RR had been on the negative contact current would flow from G^1 through magnet M^1 and operate it. As the cams rotate, T^1 is successively connected from M^1 to M^5 through the medium of cams C^1 to C^5 and the magnets are operated or not operated according to the position of T^1 as the successive cam contacts close. In this manner the signals received on relay RR will set up the proper combination on the printer magnets and the recording of the received message is then effected, an operation common in the art.

It should be noted that cams C^1 and C^8, C^2 and C^9, C^3 and C^{10}, C^4 and C^{11}, and C^5 and C^{12} close simultaneously. The contacts in connection with cams C^8 to C^{12} close the circuits from the tongues of the tape transmitter T^3 to T^7 through switch SW and master transmitting cam C^7 to the winding W^1 of relay TR and thence to the junction points of resistances R^1 and R^2, to cause the operation of tongue T^2 to connect either generator G^2 or G^3 to the outgoing line LW to send impulses of desired polarity to the distant station. It should be noted that the length of depressions in cams C^8 to C^{12} are longer and overlap depressions on cam C^7, and therefore cam C^7 determines the exact instant when winding W^1 is energized, and also the duration of such energization it may be said therefor to be a regenerator of impulses. The direction of the current through winding W^1 will naturally be dependent upon the positions of the tape transmitter tongues T^3 and T^7, as determined by the perforations in the message tape. It will be seen that during one half of the revolution of the distributors the reception of impulses on printer magnets M^1 to M^5 is simultaneous with the potential transmission of impulses from the local transmitter to winding W^1, thus the local transmitter may be used to transmit messages through relay TR to LW during this time interval.

During the other half of the revolution, cams C^1 to C^5 and C^8 to C^{12} do not close their contacts and the local printer and tape transmitter is not during this time interval operated but it will be seen that cam C^6 will be closed during this half cycle and the winding W^1 of relay TR will be connected to the tongue T^1 of relay RR through the contacts in connection with C^7 and therefore any signals received on receiving relay RR will be repeated to winding W^1 of transmitting relay TR and the cam C^7 will pick out but a small portion of the received signal to operate relay TR and the repeated signal will therefore be regenerated and repeated perfectly even though there is a slight distortion in the received signal.

When the levers L^1 and L^2 of switch SW are thrown to the left no local transmission or printing can take place and all signals received on relay RR will be repeated to transmitting relay TR but will be regenerated in form through the medium of cam C^7. It is evident that when lever L^1 is thrown to the left the circuit to the magnets M^1 to M^5 is opened and that no printing can take place. When lever L^2 is thrown to the left the circuit to relay TR through cam C^7 is connected directly to tongue T^1 of the receiving relay RR and all signals will be repeated.

It is an advantage to have the depressions of cam C^7 as short as posible so that a minimum amount of the received signal will be utilized and thereby permit of regenerating very badly distorted received signals.

To insure that the tongue of the transmitting relay TR is held firmly against one or the other of its contacts during the period of no current in the winding W^1, a leak from T^2 through winding W^2 and then through resistance R^3 to ground has been provided. The direction of flow of the current in this winding W^2 always tends to hold the tongue T^2 against whichever contact it may be resting. The steady current flowing through W^2 will be much less than the momentary current through W^1 and it therefore will not interfere with the proper operating of the relay by the winding W^1.

While I have shown my invention as applied to wire telegraph systems, it is obvious that it is not limited to such use, but may be applied to carrier current, or radio telegraph systems.

What is claimed is:

1. In a telegraph distribution system, a receiving relay, a transmitting relay, a local receiver, a local transmitter, means whereby impulses from said receiving relay are for one interval of time distributed directly to said receiver, and means whereby during the same time interval said local transmitter is co-functionally associated with said transmitting relay, and whereby during the next successive time interval impulses are transmitted directly from said receiving relay to said transmitting relay.

2. In a telegraph distribution system, a receiving relay, a transmitting relay, a local receiver, a local transmitter, an impulse regenerating means, means whereby im-

pulses from said receiving relay are for one time interval distributed directly to said receiver, means whereby said local transmitter is during the same time interval co-functionally associated with said transmitting relay, and whereby impulses are during a subsequent time interval distributed after passage through said regenerating means directly to said transmitting relay.

3. In a telegraph distribution system, a receiving relay, a transmitting relay, a local receiver, a local transmitter, an impulse regenerating means, means whereby during one time interval impulses from said receiving relay may be distributed directly to said local receiver, means whereby during the same time interval said local transmitter is co-functionally associated with said transmitting relay, and whereby impulses from said receiving relay are distributed after passage through said regenerating means directly to said transmitting relay during a subsequent time interval.

4. In a telegraph distribution system, a receiving relay, a transmitting relay, a local recorder, a local transmitter, an impulse regenerator, means whereby impulses from said receiving relay are for one time interval distributed directly to said recorder, means whereby during the same interval of time said local transmitter is co-functionally associated with said transmitting relay and whereby during the next successive time interval, impulses are, after traversing said regenerator, distributed directly from said receiving relay to said transmitting relay.

5. In a telegraph distribution system, a receiving relay, a transmitting relay, a local receiver, a local transmitter, an impulse regenerator, means whereby impulses from said receiving relay are for one time interval distributed directly to said receiver, means whereby said local transmitter is during the same time interval co-functionally related through said regenerator with said transmitting relay and whereby impulses are during a subsequent time interval distributed after passing through said regenerator directly to said transmitting relay.

6. In a telegraph distribution system, a receiving relay, a transmitting relay, a local printer, a local transmitter, an impulse regenerator, means whereby impulses from said receiving relay are for one time interval distributed directly to said printer, means whereby said local transmitter is co-functionally related to said transmitting relay during the same time interval, and whereby impulses are during a subsequent time interval distributed through said regenerator directly from said receiving relay to said transmitting relay, and switching means for rendering said local printer and transmitter inoperative to permit impulses to be transmitted directly from said receiving relay through said regenerator to said transmitting relay during both of said time intervals.

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