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SENDING CHANNEL ASSIGNER

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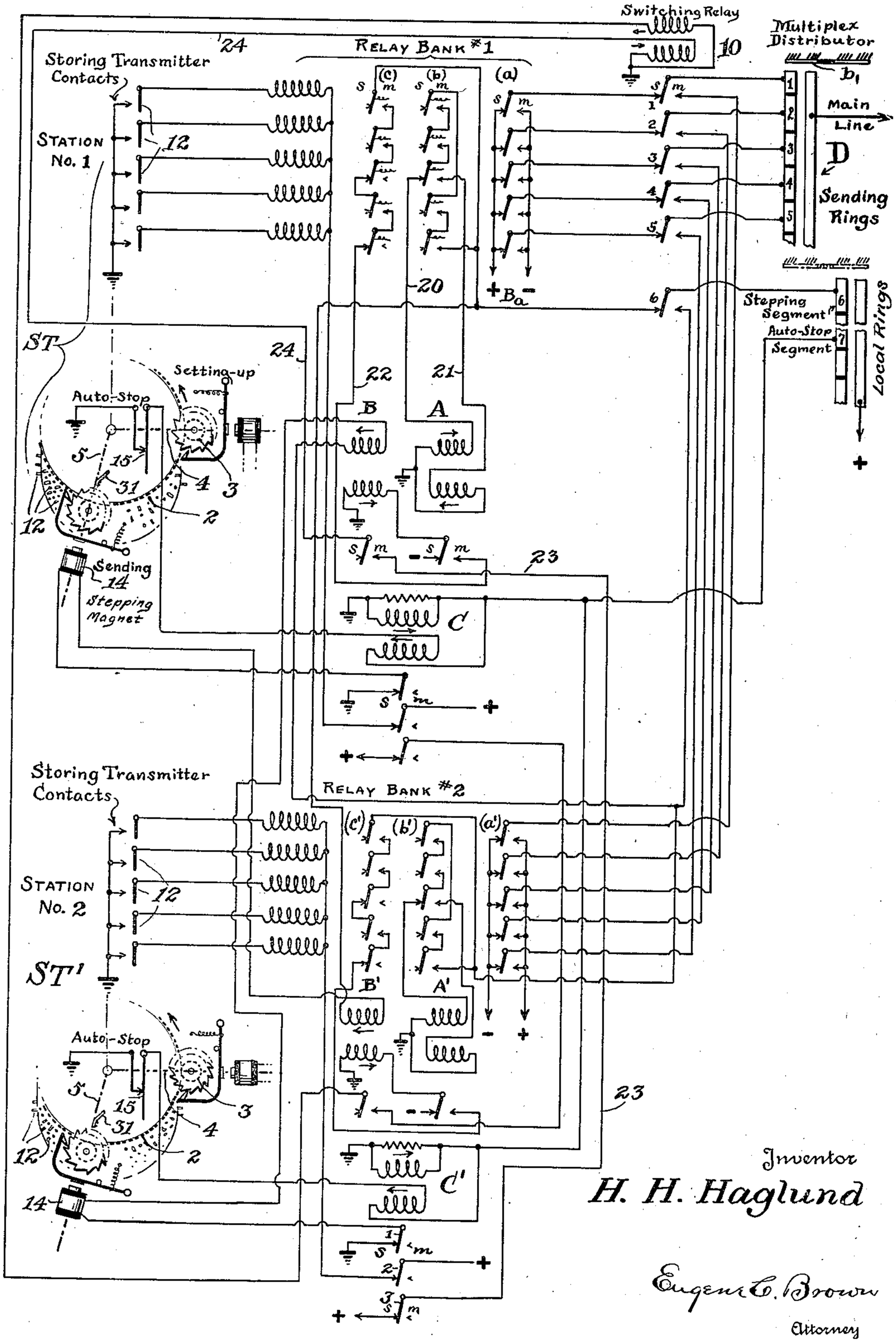

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SENDING CHANNEL ASSIGNER

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This invention relates in general to a method of assigning a printer channel of a telegraph system to a plurality of transmitting operators, none of whom require the entire time of a channel.

There are many branch offices which normally have considerably less business than is required to fill the entire capacity of a channel and yet frequently have messages which require urgent handling.

The object of my invention is to provide means for assigning a printer channel of a telegraph system between two or more branch offices, and transferring the channel automatically from one sender to the other in accordance with the traffic conditions.

My invention enables an operator at a branch office to transmit directly into the main channel, thereby avoiding the delay incident to the operation of a manual relay and without taking away from the main office the total capacity of the channel. Thus if the speed of the channel is, for example, 300 letters per minute and each of two branch offices has a message load of exactly 150 letters per minute, the assigner will transmit one message from each sender alternately, thereby keeping the channel filled to its capacity. Again if the sender at one station becomes idle, the other sender may continue to use the entire capacity of the channel until the first sender again has messages to transmit, when the assigner immediately begins to alternate the channel between the two senders. If both senders become idle, the channel assigner leaves the circuit in such condition that the first one to start immediately takes possession of the channel.

In the following description I shall refer to the accompanying drawing which is a diagram of an arrangement embodying the features of my invention.

For purposes of illustration I have shown the code signals at station No. 1 and station No. 2 as originating on the transmitting shoe contacts of storing transmitters ST and ST'. It should be understood, however, that other storing and transmitting devices may be employed in lieu of the transmitting shoe contacts, such as the contacts of an ordinary tape transmitter or the tongues of a relay bank into which signals are transmitted by means of another multiplex system or a start-stop Simplex printer system.

The storing transmitter referred to is fully described in Wheeler and Dirkes U. S. Patent No. 1,576,167 and consists essentially of a hollow cylinder or drum **1** placed vertically on a base, around which by means of a circular rack **2** and pinion drive **3**, two arms **4** and **5** rotate, one carrying a mechanism for "setting-up" or preparing a character selection and the other carrying a mechanism for converting into electrical selections the mechanical selections which have been previously prepared and stored. The elements used for mechanically storing the selections are small metal pins **12** set into holes in the hollow cylinder or drum. The setting-up mechanism is arranged inside of the pin-drum and acts to push the pins outward so that they extend from the outer surface of the drum. After the setting-up of a character, the transmitting arm **5** causes collector shoes to ride up over the top of the pins which have been selected and close contacts. Following the transmission of any one character the transmitting arm **5** is advanced so that its collector shoes move onto the next row of pins.

If the operator should send slower than the speed of transmission, a device is provided for stopping the operation of the transmitting stepping magnet, known as the "auto-stop" device. This consists of a pair of contacts **15**, carried by the setting-up arm **4**, and which, in conjunction with the auto-stop segment **7** on the distributor, controls a polar relay C, the tongue and contact of which are in series with the stepping magnet **14** of the transmitting arm. If the transmitting arm **5** overtakes the setting-up arm **4**, so that there are only one or two characters remaining thereon, a lug or projection **31** on the transmitting arm engages and opens the auto-stop contacts thereby opening the circuit of stepping-magnet **14**.

At the upper right hand side of the drawing I have indicated the five sending segments of a channel of a multiplex distributor D, and two segments of the local rings of the distributor. Segments **1—5** of a channel of the multiplex distributor D and segment No. 6 of the local rings are connected to the tongues of a switching relay **10** of the polar type. The contacts of the five sending tongues of the relay **10** are connected to the right hand sets of tongues of the relay bank #1 and relay bank #2 associated with the respective sending stations.

The operation will be clearly understood by the following example: Assume that station No. 1 is transmitting. The tongues of switching relay **10** are then in the position shown and the code signal impulses set up on the transmitting shoe contacts **12** of the storing transmitter ST are likewise set up on the right hand set of tongues (*a*) of relay bank #1 from which the proper po-

larity of battery Ba is transmitted into the segments of the multiplex transmitter. While transmitting in the normal manner, the left hand row (c) and middle row (b) of contacts of the relay bank perform no specific function and simply follow along as the relay bank is operated.

Segment 6 of the local rings of the distributor controls the operation of the stepping magnet 14 of the transmitting arm 5 of the storing transmitter after each code letter character has been transmitted to the line by the passage of the brushes b_1 over the five sending segments. It also controls the switching function hereinafter described.

Segment 7 of the local distributor rings controls the operation of polar relay C, in accordance with the position of the auto-stop contacts 15 carried by the setting-up arm 4 of the storing transmitter.

If, during the course of transmitting a message, the operator transmits a "figure shift" combination (i. e. impulses 1, 2, 4 and 5 marking and 3 spacing) the middle set of contacts (b) on the relay bank will be set up in such a manner that a circuit is established from plus battery through solid local ring, segment 6, tongue and contact 6 of switching relay 10, contact and tongue 5 of the middle (b) group of contacts of the relay bank, contact and tongue 4, contact and tongue 1, contact and tongue 2, tongue 3 and left hand contact, conductor 20, through the upper coil of polar relay A to ground. This actuates the relay but normally nothing further happens and when the operator has finished sending a group of figures which required the shift into the upper case position, he sends the letters signal (i. e. all five impulses marking) to restore the printer at the distant station to the lower case position, this also restores relay A to its normal position (i. e. tongue on spacing side) by setting up another circuit through the tongues and contacts of group (b) of the relay bank that emerges through tongue 3 and its right hand contact, then through conduction 21 and the lower coil of relay A to ground which shifts its tongue to the left.

It has been the routine practice in cable operation to indicate the end of each message by transmitting a "bell signal", which is upper case letter J. Accordingly when the operator has reached the end of a mesage, he first transmits the "figure shift" character, thereby energizing the upper coil of relay A, which moves its tongue to the right or marking position as above described. Then he sends the letter J (i. e. impulses 1, 2 and 4, marking, 3 and 5 spacing). It will be observed that this sets up the left hand row (c) of contacts on the relay bank in such a manner that an impulse from the stepping segment 6, follows through this path and through conductor 22, marking contact and tongue of polar relay A, and through the lower coil of polar relay B to ground, thereby causing relay B to move its tongue to the right. Unless station No. 2 was idle (a condition which will be described later) polar relay C′ will be in spacing position with its tongues on the left hand contacts. Hence, upon the operation of relay B, a circuit is established from plus battery, through bottom contact and tongue 3 of polar relay C′, conductor 23, marking contact and tongue of relay B, conductor 24, and the lower coil of switching relay 10 to ground. This operates the switching relay, moving its tongues to the right hand or marking contacts, thereby disconnecting relay bank #1 and connecting the switching relay tongues to the right hand group (a') of tongues of relay bank #2. Signals which have been set up in storing transmitter ST′ are now transmitted by the group of tongues (a') to the line through the channel of the multiplex distributor D in the same manner as previously described for station No. 1. At the end of a message, the operator sends the switching combination previously described, which now operates the switching relay 10 to move its tongue to the left hand or spacing contact, thereby again assigning the multiplex channel to station No. 1.

The description thus far has been based upon the assumption that both stations are transmitting. Under this condition both auto-stop contacts are closed as shown and hence polar relays C and C′ are held continuously on their left hand or spacing contacts by the current in their lower coils. One circuit from the local auto-stop segment 7 goes directly to the polar relays C and C′, one branch going through the upper coil in a direction to move the tongue to the right hand the other branch going through the lower coil in the reverse direction to move the tongue to the left hand or spacing side. The upper coil is shunted by a resistance and hence the lower coil prevails normally to hold the tongue toward the spacing position. If, however, during the course of transmission, the operator does not set up the code signals on the storing transmitter as fast as the transmitting arm 5 is sending the outgoing signals, then the auto-stop contacts are separated mechanically as the transmitting arm overtakes the setting-up arm 4. When this occurs, the circuit through the lower coil of polar relay C is open and the current in the upper coil prevails to shift the tongue to the right hand or marking side. This opens the circuit to the coils of the relay bank so that only spacing signals can be sent to line and it also opens the circuit to the stepping magnet of the transmitting arm 5.

If, after the transmission of a message is finished, either station is clear, having no messages awaiting transmission, the operator sends the switching signals as previously described and stops sending in such a manner that the auto-stop contacts 15 open immediately after the letter J combination has been transmitted. This leaves relays A and B in position for switching. If at this time there are messages awaiting transmission at the other station, the switching relay is thrown in a direction to connect said station to the multiplex distributor, but when the operator at that station sends his next switch-combination the switching relay 10 does not respond, since the battery circuit is open at relay C corresponding to the other station. It will be remembered that we have assumed this station was auto-stopped with relays A and B in the switching position and relay C in the right hand or marking position.

If both stations become clear, with no messages ready, both relays C and C′ are left in the open position and the switching relay 10 is left in position for the sender who last used the channel. If the other station were to start, however, the switching relay is operated to his position as soon as he begins to send, which closes his auto-stop contacts 15 and thereby initiates the flow of current from his relay C or C′ through the switching relay, thus switching it in his favor.

It should be noted that the circuit from the local segment 6, when connected to station No. 1, also passes through relay B′ and the stepping circuit for station No. 2 passes through relay B.

The direction of current is such as to position the tongues of relay B or B' to the left hand or spacing side. This is done in order that if both stations are sending, the circuit of the switching relay coils will be opened immediately after the switching operation has taken place in the desired direction; otherwise it might be possible for both circuits to the switching relays to be closed at the same time, thereby making the operation indefinite.

I have described in detail the arrangement shown in the drawing for assigning a channel between two stations but it will be evident to engineers that the equipment may be readily adapted to assign the same channel of the multiplex to additional stations if the traffic of two stations is not sufficient to occupy the entire line time of a channel.

What I claim is:

1. The method of assigning a transmitting channel of a telegraph system jointly to two branch transmitting stations which comprises setting up and storing telegraphic code messages by the respective stations, automatically shifting said channel alternately from one station to the other at the end of each message and suspending the shifting operation whenever the supply of messages is exhausted at one station, while continuing the transmission into said channel from the other station.

2. In a telegraph system, a multiplex distributor for transmitting to a main line over a plurality of channels, means for distributing the facilities of one channel between a plurality of operators, comprising a plurality of storing transmitters, means for setting up on said transmitters intelligence messages consisting of character selections of impulses followed by a switching combination of impulses, channel assigning means which responds to said switching combination to switch said channel of the multiplex to another transmitter and means for maintaining said channel assigning means unresponsive to the switching combination when no messages are stored on one of said devices.

3. In a telegraph system, a multiplex distributor for transmitting to a main line over a plurality of channels, means for distributing the facilities of one channel between a plurality of operators, comprising a plurality of storing transmitters, means for setting up on said transmitters intelligence messages consisting of character selections of impulses followed by a switching combination of impulses, channel assigning means which responds to said switching combination to switch said channel of the multiplex successively from one transmitter to another and means for maintaining said channel assigning means unresponsive to the switching combination when no messages are stored on one of said devices.

4. In a telegraph system, a multiplex distributor for transmitting to a main line over a plurality of channels, means for distributing the facilities of one channel between a plurality of operators, comprising a plurality of storing transmitters, means for setting up on said transmitters intelligence messages consisting of character selections of impulses followed by a switching combination of impulses, channel assigning means which responds to said switching combination to switch said channel of the multiplex successively from one transmitter to another and means for maintaining said channel assigning means unresponsive to the switching combination when no messages are stored on one of said devices, whereby the device at the other station may transmit successive messages without interruption into said channel.

5. In a telegraph system as set forth in claim 3, said switching combination comprising a case shift selection followed by a predetermined letter selection.

6. In a telegraph system, a multiplex distributor for transmitting telegraph code messages to a main line over a plurality of channels, means for assigning one of said channels to two branch stations, comprising a storing and transmitting device at each station, means for setting up on said devices intelligence messages consisting of code character selections and a switching combination at the end of each message, channel assigning means associated with said devices responsive to said switching combination for disconnecting one device from said channel and connecting the other device thereto and means for maintaining said channel assigning means unresponsive to the switching combination when no messages are stored on one of said devices, whereby the device at the other station may transmit successive messages without interruption into said channel.

7. A telegraph system as set forth in claim 6, and means for automatically stopping the transmission at either station when the transmitting means overtakes the setting-up means of the device thereat.

8. In a telegraph system, a multiplex distributor for transmitting telegraph messages to a main line over a plurality of channels, means for assigning one of said channels to two branch stations, comprising a storing and transmitting device at each station, means for setting up in said devices intelligence messages consisting of code character selections and a switching combination of selections at the end of each message, means for transmitting the selections stored in said devices, auto-stop contacts carried by said setting up means adapted to control the operation of said transmitting means, said contacts being automatically separated when the transmitting means overtakes the setting up means, and channel assigning means associated with said devices responsive to said switching combination for disconnecting the transmitting means at one station and connecting the transmitting means at the other station dependent upon the condition of said auto-stop contacts.

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