Jan. 6, 1942. O. McD. PATTON 2,269,379

TELETYPEWRITER SWITCHING SYSTEM

Filed June 9, 1939 6 Sheets-Sheet 1

FIG. 1

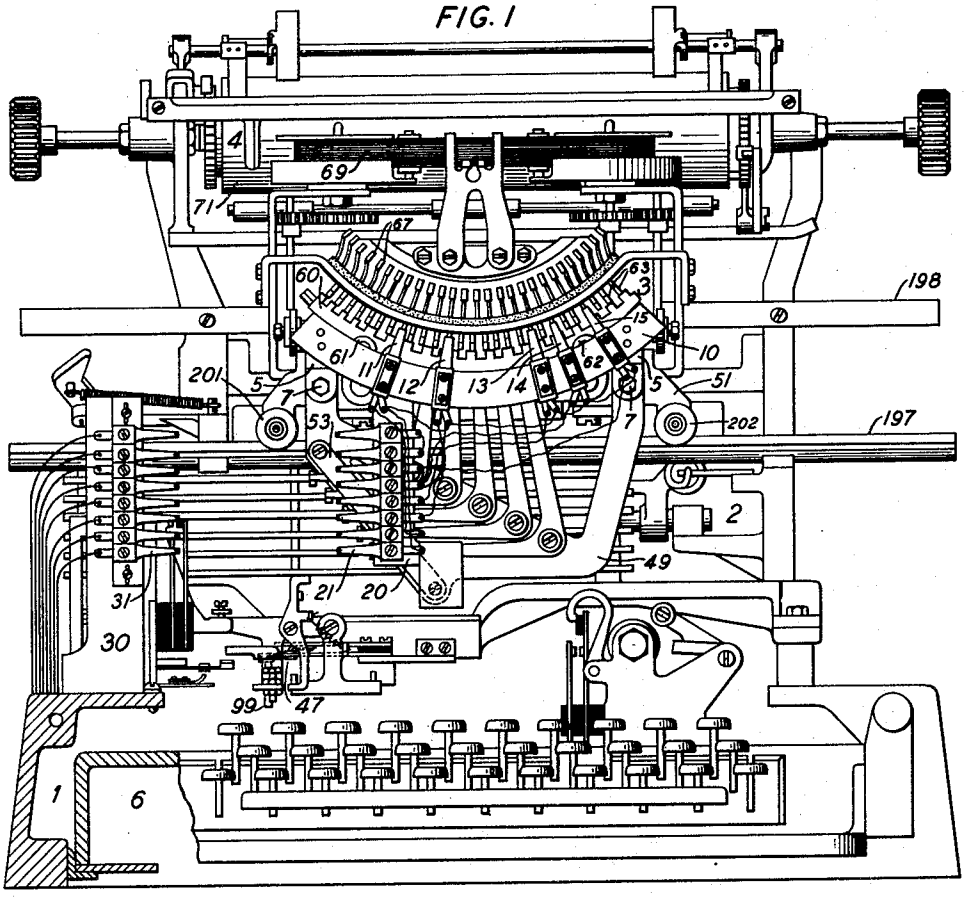


FIG. 2

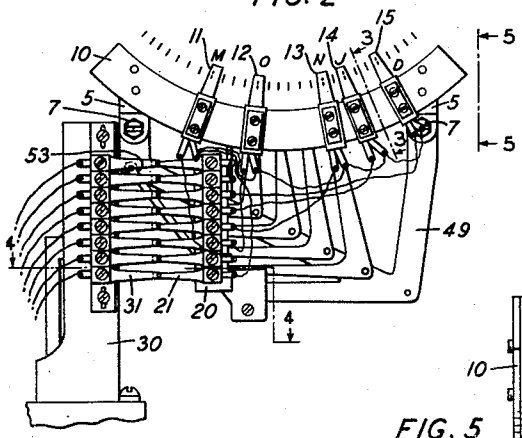


FIG. 3

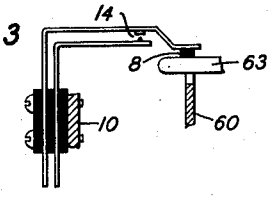


FIG. 4

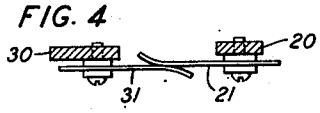
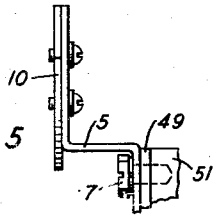


FIG. 5



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TELETYPEWRITER SWITCHING SYSTEM

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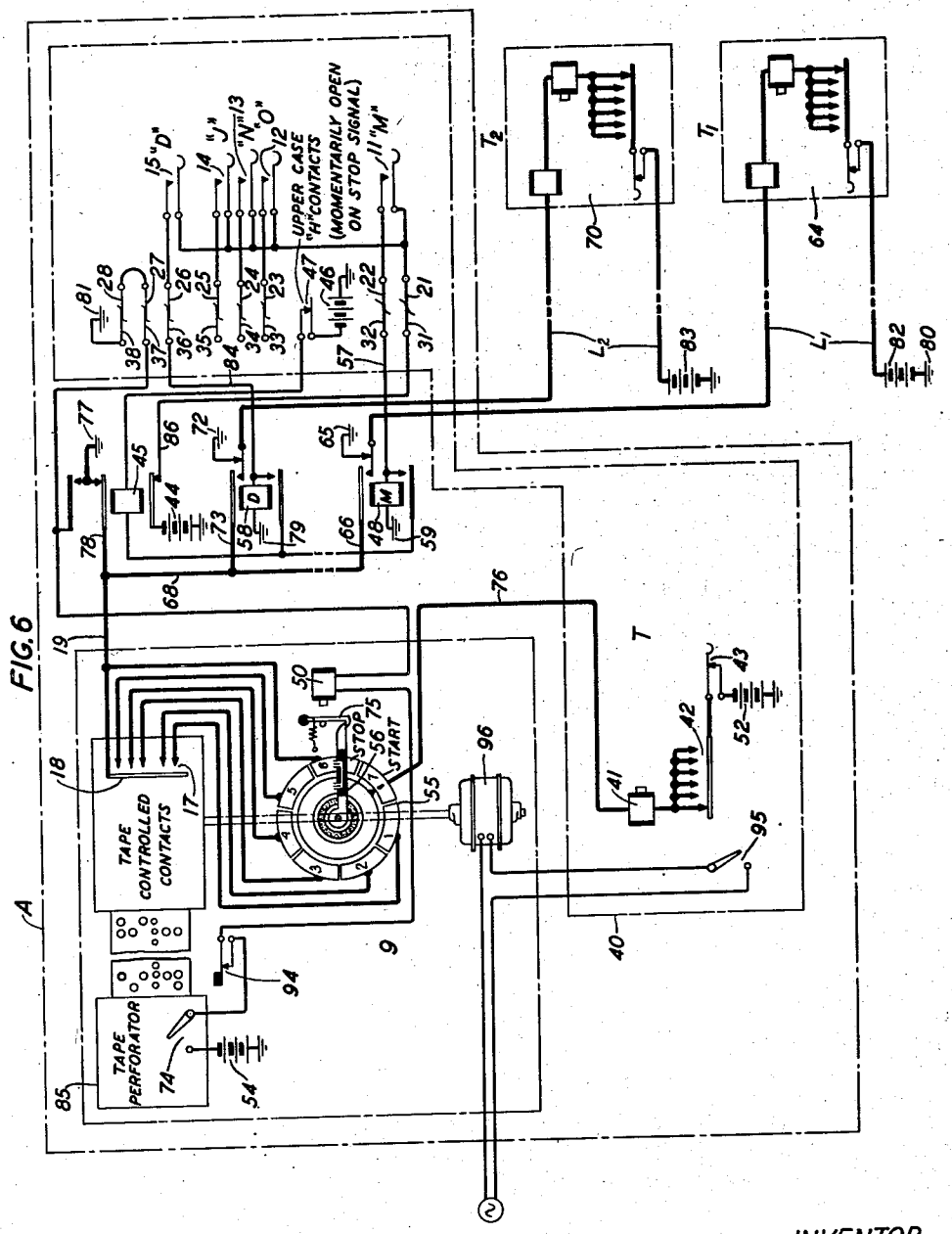


FIG. 6

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TELETYPEWRITER SWITCHING SYSTEM

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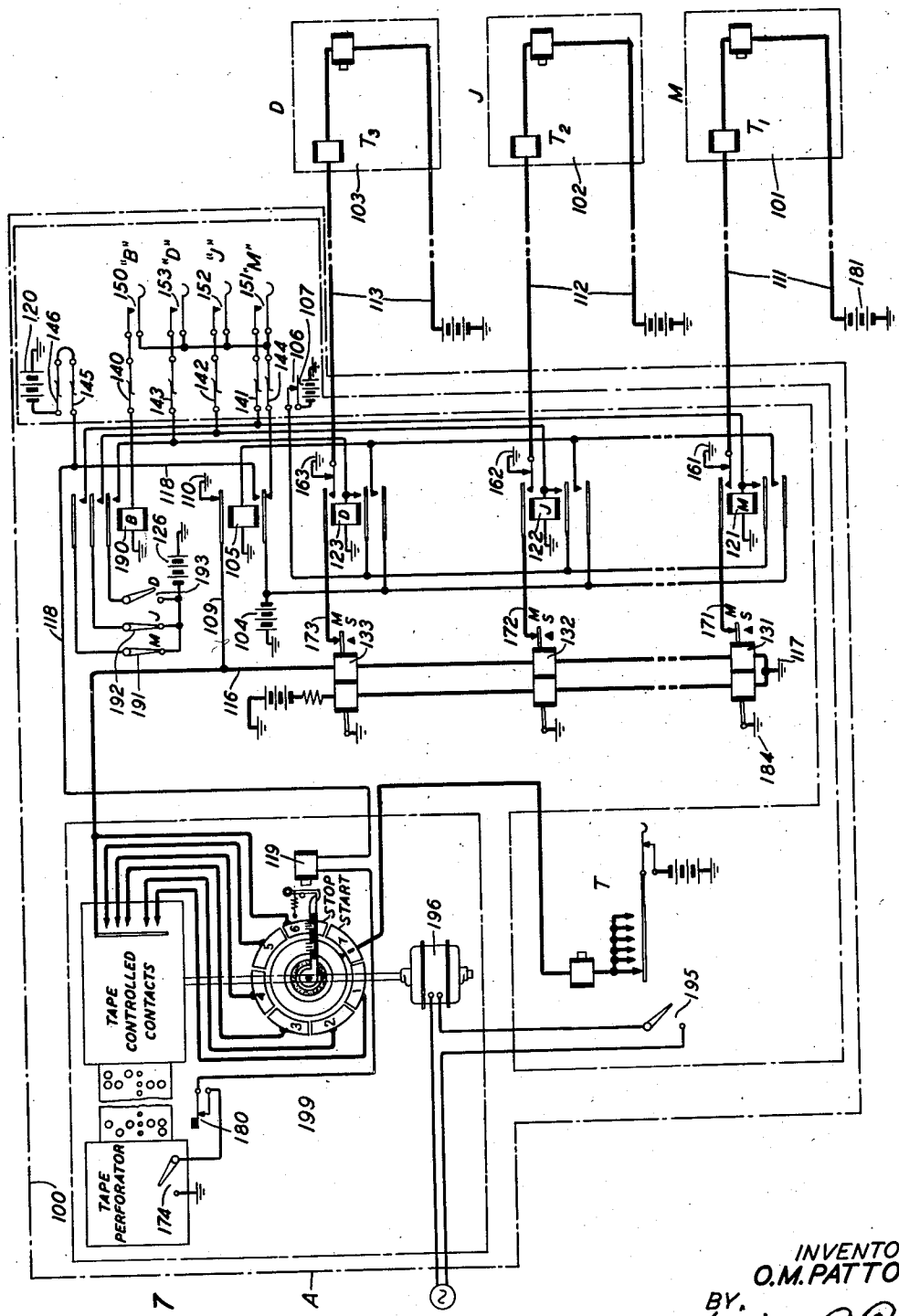


FIG. 7

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TELETYPEWRITER SWITCHING SYSTEM

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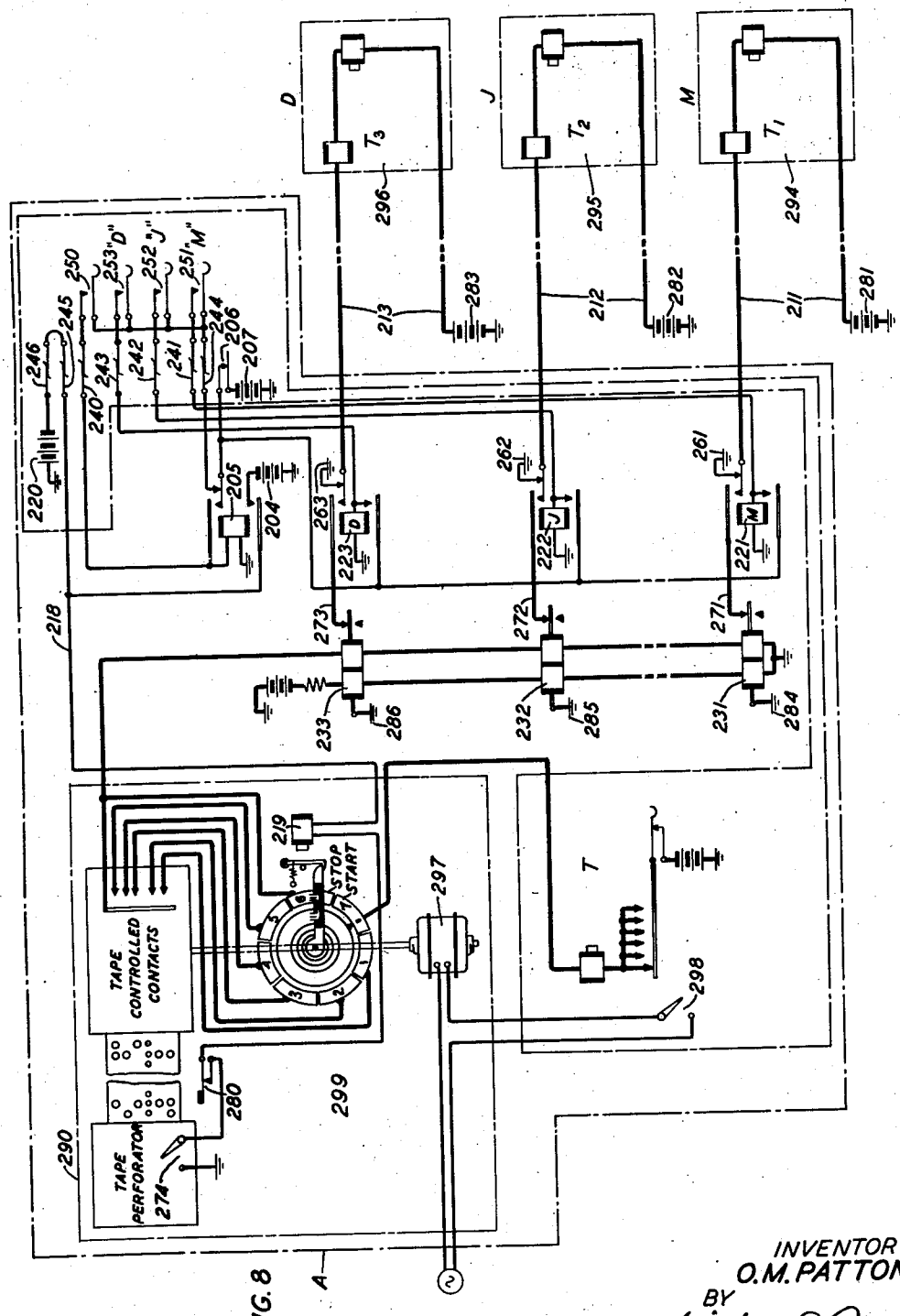


FIG. 8

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TELETYPEWRITER SWITCHING SYSTEM

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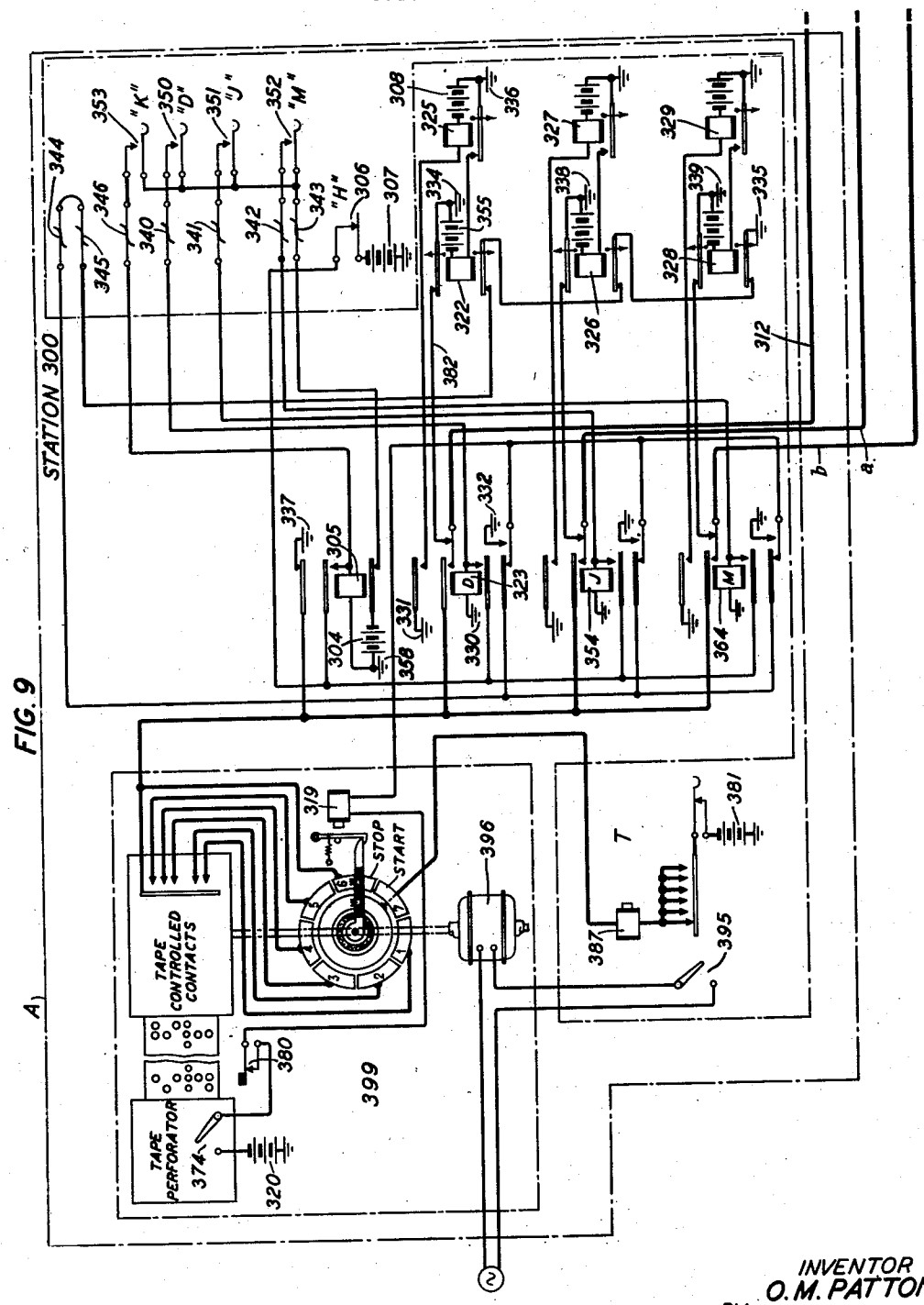


FIG. 9

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TELETYPEWRITER SWITCHING SYSTEM

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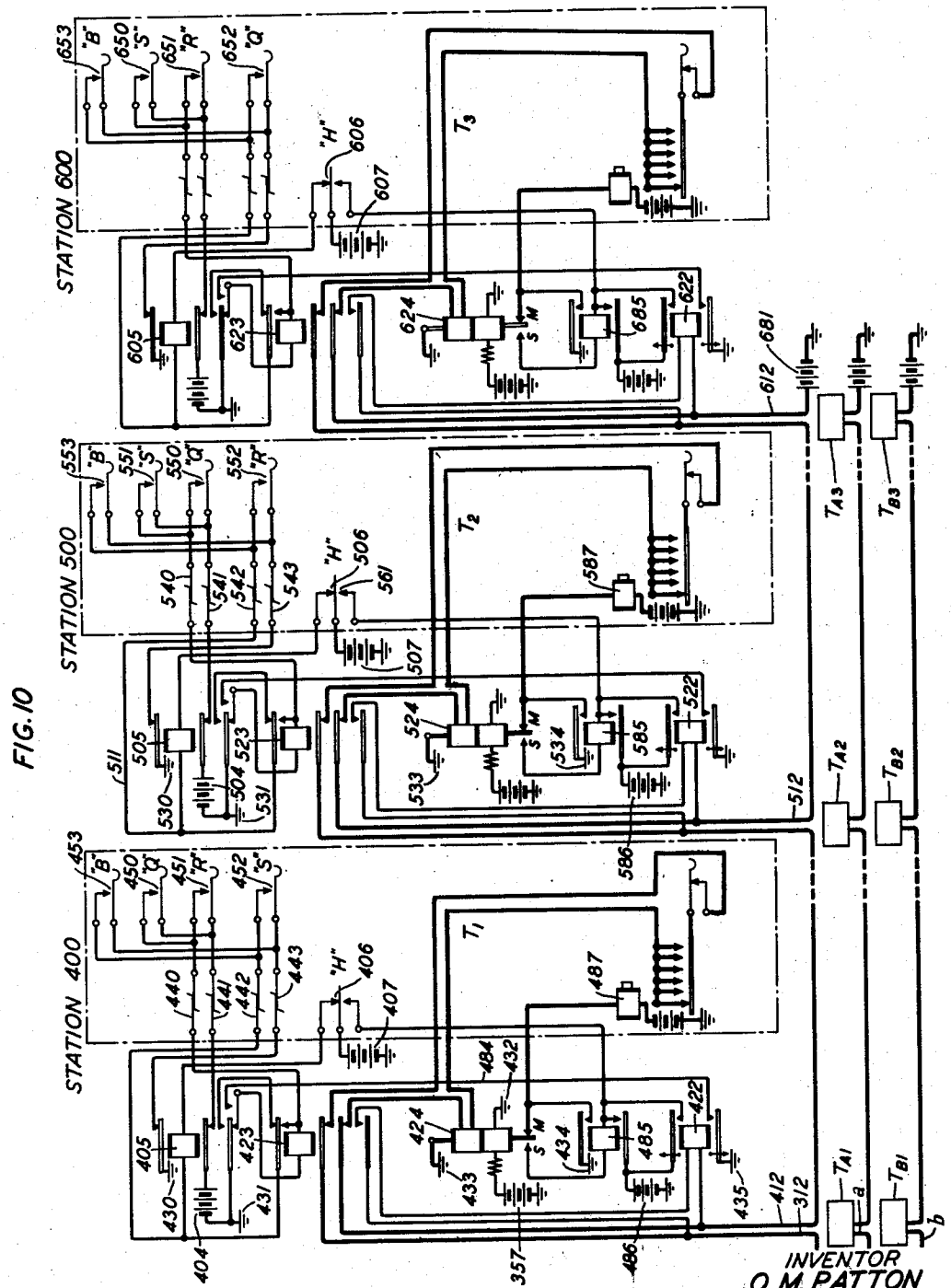


FIG. 10

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UNITED STATES PATENT OFFICE

2,269,379

TELETYPEWRITER SWITCHING SYSTEM

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Application June 9, 1939, Serial No. 278,348

41 Claims. (Cl. 178—4)

This invention relates to a teletypewriter switching system and, more particularly, to a teletypewriter switching system employing instrumentalities mounted upon the movable type basket carriage of a page printing telegraph machine for controlling the switching of communication lines in a printing telegraph system.

Heretofore, the mechanical or automatic switching of lines in a printing telegraph system has been controlled chiefly by contacts mounted upon stationary parts in a tape printing telegraph machine, such as the contacts shown in Patent 2,120,235, granted June 14, 1938, to J. F. Beattie et al. The switching apparatus shown in this Beattie et al. patent is shown to be mounted principally upon a stationary type basket.

Accordingly, it is an object of this invention to employ a page printing telegraph machine for operating control contacts.

Another object of this invention is to provide a teletypewriter having a movable type basket carriage with improved means for mechanically, or automatically, controlling the switching of telegraph lines.

It is also an object of the invention to provide a teletypewriter having a movable type basket carriage with switching contacts for controlling the switching of telegraph lines and improved means for causing a switching operation to be effective only when the type basket is in a preassigned position.

A further object of the invention is to mount switching contacts upon the movable type basket carriage of a teletypewriter and to connect them to their switching circuits by means of slip connector fingers.

These objects of the invention are attained by mounting a plurality of pullbar contacts, of the type shown in the Beattie et al. patent, the disclosure of which is incorporated herein by reference as a part of this specification, upon a contact yoke in a teletypewriter having a movable type basket carriage. These contacts are connected by conductors to a set of slip connector fingers affixed to the movable type basket. Another set of slip connector fingers is mounted on a stationary bracket in the teletypewriter and is designed to engage with the other set of fingers only when the type basket is in its return position. When the type basket moves away from its return position, it carries with it one set of fingers thereby opening the circuits through the fingers. Consequently, the operation of the pullbar contacts is effective to accomplish the switching functions only when the type basket is in its return position.

Switching operations are performed by preceding each message with a carriage return signal and a particular preassigned permutation code signal which effects the closing of a selected pullbar contact thereby closing a switching circuit through the slip fingers to energize a switching relay which operates and locks-up to connect the desired station to the calling station. When the switching operation has been performed, it remains in effect until a preassigned signal is transmitted over the system to unlock the selected switching relay which, in releasing its armatures, restores the system to its normally unoperated condition.

A modification of the invention is designed to enable an operator at a main transmitting teletypewriter station to either transmit a message to a selected teletypewriter station or else broadcast a message simultaneously to a selected plurality of the teletypewriter stations in the system by effecting operation of switching apparatus under the control of slip connector fingers in the teletypewriter at the main office.

Another modification of the invention permits an operator at a main transmitting station to select, by means of slip connector fingers and their associated apparatus, any one of a plurality of communication channels. Each channel has several subscribers' stations connected therein and means are provided for enabling an operator at the main station to effect the operation of slip connector fingers and pullbar contacts in the teletypewriters at the subscribers' stations to condition these stations in such a manner that the message signals transmitted over the selected line will be recorded by only one subscriber's station to the exclusion of the other subscribers' stations in the selected channel. Further broadcasting means allow the operator at the main station to select more than one of the communication channels for the simultaneous transmission of message signals thereover which will be recorded practically simultaneously by either a selected station on each of the selected channels or by all of the stations on the selected channels.

These and other features of the invention will be more fully described in detail in connection with the following detailed description of the drawings, in which:

Figure 1 is a front view of a teletypewriter having a movable type basket carriage on which is mounted a contact yoke carrying a plurality of pullbar contacts connected to a set of slip con-

nector fingers which, due to the type basket being approximately in the middle of its path of travel, are disengaged from the corresponding set of slip fingers mounted at the left of the type basket;

Fig. 2 is a front view of a portion of the type basket showing it to be in its return position and showing the sets of slip connector fingers to be in mutual engagement;

Fig. 3 is a simplified view taken along the line 3—3 in Fig. 2 and illustrates the manner in which a pullbar contact is mounted for operation by a pullbar;

Fig. 4 represents the manner in which a pair of slip connector fingers are held in mutual engagement;

Fig. 5 is taken along the line 5—5 in Fig. 2, omitting the pullbar contacts for the sake of simplicity, and shows the manner in which the contact yoke is mounted upon the frame of the type basket;

Fig. 6 is a circuit diagram of the selective switching system as a whole showing the pullbar contacts and slip fingers schematically;

Fig. 7 is a modification of the selective switching system in which instrumentalities have been provided to enable a control printer to either transmit a message to a selected printer or else broadcast a message simultaneously to a selected plurality of the outlying teletypewriters;

Fig. 8 illustrates a circuit which is somewhat similar to the system shown in Fig. 7 except that it employs electrically operated means instead of manually operated instrumentalities for assisting in selecting a plurality of the subscribers' stations for connection into a broadcasting circuit;

Fig. 9 represents the main teletypewriter transmitting station in a selective switching system having a plurality of communication channels extending therefrom with apparatus at the main station for enabling the operator to select any channel and any outlying teletypewriter station on the channel for communicative purposes or to broadcast over a plurality of the channels to a plurality of the subscribers' stations; and

Fig. 10 illustrates the selective conditioning apparatus at several of the subscribers' teletypewriter stations connected into a communication channel extending to the main station shown in Fig. 9.

The printer type of mechanism shown in Fig. 1 is a page printing telegraph machine of the type described in Patent 1,904,164 granted April 18, 1933, to S. Morton et al. The disclosure of this Morton et al. patent is incorporated herein by reference as a part of this specification. As is described in the Morton et al. patent, the teletypewriter includes a base unit 1, a printing unit 2, a type bar carriage unit 3, a stationary platen unit 4, and a manually-operated keyboard unit 6. The type bar carriage unit 3 is provided with rollers 201 and 202 slidably mounted on rail 197 and has another roller (not shown) slidably mounted on rail 198. During the printing of a line, operating means cause the type basket 3 to be moved, step by step, along rails 197 and 198 in a fixed path of travel from left to right. When a full line has been printed or when it is desired to return the type carriage 3 to the left to commence a new line, means are provided whereby the type carriage 3 can be moved to its return position either in response to the transmission of a preassigned permutation code combination or by the manual operation of the carriage release lever as is explained in the Morton et al. patent.

To perform a printing operation, the selected code bars 60 are operated to allow the proper pullbar 63 to fall into the aligned notches of code bars 60 where it is urged outwardly by the pullbar bail with the result that its associated type bar 67 is driven upward to strike against the inking ribbon 69 and the platen 71.

Mounted just in front of studs 61 and 62 is a contact yoke 10 on which are mounted a plurality of spring contacts 11, 12, 13, 14 and 15. As is shown in Figs. 1, 2 and 5, contact yoke 10 is bolted to a pair of brackets 5—5 which are secured to the type bar carriage frame 51 by the same bolts 7—7 which fasten the bell crank mounting plate 49 to frame 51. The manner in which the spring contacts 11, 12, 13, 14 and 15 are mounted for operation by the pullbars 63 is illustrated in Figs. 1, 2, and 3, but more particularly in Fig. 3 which shows a contact 14 with its component parts appropriately spaced apart and bolted to the contact yoke 10. As is shown in Fig. 3, the set of spring contact points of contact 14 are normally held open, as are contacts 11, 12, 13 and 15, by the insulated tip 8 of its extension arm which is in engagement with, or which rests upon, the top edge of a pullbar 63 at a point near the end of the pullbar 63.

When this particular pullbar 63 is selected by the aligned notches in code bars 60, it drops down to its selected position in the bottom of the notches. Tip 8 follows pullbar 63 in a downward movement which is of sufficient extent to allow the set of spring contact points of contact 14 to close since the force of the spring tends to close them. Contact 14 remains closed until the pullbar operating bail has completed its cycle of operations at which time it lifts the pullbar 63 up off the code bars 60 to its unselected position thereby opening the contact points of contact 14. The other pullbar contacts 11, 12, 13 and 15, are operated in a similar manner and constitute what may be termed a mechanically operated switchboard.

A movable contact mounting bracket 20 is suitably secured to the bell crank retaining bar 53, the bell crank mounting plate 49, and to the type bar carriage frame 51. Attached to bracket 20 are a plurality of slip connector fingers 21 to 28, inclusive (shown schematically in Fig. 6). Fixedly secured to the left portion of base 1 is a stationary contact mounting bracket 30 on which another set of slip connector fingers 31 to 38, inclusive (also shown schematically in Fig. 6) is mounted for engagement with the other set of slip fingers 21 to 28.

The manner in which these slip fingers engage is illustrated in Fig. 4 which shows that the end of one finger 21 in the set of fingers mounted on bracket 20 is bent in one direction whereas the end of a finger 31 in the set mounted on bracket 30 is bent in the opposite direction. Thus, when the type carriage 3 is moved to the left to its return position, the two sets of slip fingers will engage with each other, as is shown in Fig. 2; but, when the type basket 3 is moved to the right, as is shown in Fig. 1, the slip fingers mounted on bracket 20 will be carried with it and will be taken out of engagement with the fingers mounted on the stationary bracket 30.

The slip fingers on the movable bracket 20 are wired to the pullbar contacts 11, 12, 13, 14, and 15 and the fingers on the stationary bracket 30 are wired to a plurality of switching relays as shown in Fig. 6. Consequently, when the type carriage 3 is in its return position, the two

sets of fingers prepare circuits for controlling the switching relays. When one of the pullbar contacts 11, 12, 13, 14, and 15 is now closed, it completes a circuit to one of the switching relays. Then, when the type carriage 3 is moved to the right in response to a letter spacing operation, the slip fingers on the bracket 20 are also carried to the right and are taken out of engagement with the fingers on the bracket 30 thereby opening the circuits to the switching relays.

Since the closure of the pullbar contacts 11 to 15 is effective to operate the switching relays only when the slip connector fingers are in engagement, the pullbar contacts 11 to 15 can be employed in a telegraph system to effect the automatic and selective connection and disconnection of telegraph lines leading to various subscribers' stations in the manner illustrated in Fig. 6. Fig. 6 shows a telegraph system comprising a main transmitting station A provided with a signal sending device including a transmitter-distributor 9 having a segmented distributor face-plate 55 with the usual rotating brush 56. Normally, brush 56 is prevented from rotating by latch 75 which is controlled by a release magnet 50 connectable through the usual tape control switch 94 and the normally open, manually operable, locking switch 74 to a battery 54. Before beginning the selection of lines for communication, the operator at station A will manually close switch 74. The stop segment of the face-plate 55 is connected directly to conductor 19 but the permutation code selecting segments of face-plate 55 are individually connected to the tape controlled contacts 17 which are designed to coact with a contact bar 18 connected to conductor 19.

The solid ring of face-plate 55 is connected by conductor 76 to a teletypewriter T having a printer magnet 41, transmitting contacts 42, a break key 43, and a grounded battery 52. Teletypewriter T represents schematically the teletypewriter shown in Fig. 1 and is equipped with a set of stationary slip connector fingers 31 to 38, inclusive, adapted to engage with a movable set of slip fingers 21 to 28, inclusive, in the manner described above. As is shown in Figs. 1 and 6, the movable fingers 21 to 26 are connected to the pullbar contacts 11 to 15.

Current from battery 44 is normally applied to a contact point of each of the pullbar contacts 11 to 15 over a path that includes the normally unoperated armature of relay 45, conductor 86, and the pair of slip fingers 21 and 31. Although current from battery 46 is normally applied to relay 45 over a path including the stop contact 47, which is normally closed but which opens in response to a preassigned code signal called a stop signal, such as upper case "H," relay 45 remains unenergized as long as this energizing path is open at the armatures and contacts of relays 48 and 58. Relays 48 and 58 remain unenergized until the closure of either pullbar contact 11 or 15 closes a path for current from battery 44 to pass along either conductor 57 or 84 to ground 59 or 79.

Stop contact 47 is operated by a lever, indicated at 99 in Fig. 1, which is not mounted upon the movable carriage. As is described in Morton et al. Patent 1,904,164, this stop contact 47 is operated by means which are independent of the operation of the pullbars and which are also independent of the location of the carriage along its path of travel. In this Morton et al. Patent 1,904,164, it is stated that the stop contact is operated in response to two successive "figures-shift" signals, the first conditioning a function lever for operation and the second effecting the operation of the function lever which, in turn, effects the operation of the stop contact. Various other signals have been preassigned for operating the stop contact, such as "figures-shift" and "M." In the preferred embodiment of the invention, "figures-shift" followed immediately by the operation of the "H" key on the keyboard is preassigned to effect the operation of contact 47. Other combinations of signals may be used to effect the operation of the stop contact 47 but, for the purpose of this description, it will be "figures-shift" plus "H." Contact 47 remains open until closed in the manner described in Morton et al. Patent 1,904,164.

When relay 48 is energized, it operates its armatures and locks-up over its bottom armature through relay 45 and stop contact 47 to grounded battery 46. At the same time, the operation of the top armature of relay 48 switches the line L_1, extending from the subscriber's teletypewriter station 64, from ground 65 to conductors 66 and 68 leading to conductor 19 and transmitter-distributor 9 for the transmission and reception of permutation code signals.

Likewise, when relay 58 becomes energized, it operates its armatures and locks up over its bottom armature to battery 46. The operation of the top armature of relay 58 switches the subscriber's teletypewriter station 70 into communicative relation with the transmitter-distributor 9 by disconnecting line L_2 from ground 72 and connecting it to conductors 73, 68 and 19 leading to transmitter-distributor 9. Either of these connections remains in effect until the preassigned code combination is transmitted to cause contact 47 to open thereby opening the locking-up circuits of relays 48 and 58 which will consequently release their armatures to switch lines L_1 and L_2 back to grounds 65 and 72, respectively.

In operating the system, the operator at station A closes the normally open, manually operable, locking switch 95 to start his motor 96 and presses the carriage return key on the keyboard of the teletypewriter T at station A to effect the closure of the slip fingers 21 to 28 and 31 to 38. The operator then closes the normally open, manually operable, locking switch 74 to close a path for current to pass from grounded battery 54, over switch 74, the usual tape control switch 94, through the winding of release magnet 50, and then over slip fingers 37, 27, 28, and 38, to ground 81. Magnet 50 thus becomes energized and operates its armature 75 thereby releasing the brush 56 for rotation over face-plate 55.

Messages that have either been previously perforated in transmitting tape by one or several tape perforators, such as perforator 85, or are now perforated in the tape, are transmitted by feeding the perforated tape through the transmitter-distributor 9. The perforations in the tape selectively operate the tape controlled contacts 17 to control the transmitter-distributor 9 and cause it to transmit the permutation code signals, perforated in the tape, over conductor 19 to conductors 68, 66, and 73. These signals are also transmitted over conductor 76 to operate the teletypewriter T which actuates its code bars 60 and pullbars 63 in accordance with the code signals.

A message perforated in the tape is preceded

by a preassigned code signal, known as a carriage return signal, and is followed by a particular routing signal such as the code signal for "M" or "D." The conditioning signal, or carriage return signal, causes the type basket carriage 3 to move to a preassigned point on its path of travel, its return position at the left, as was explained above, to bring the two sets of slip connector fingers into mutual engagement. The routing signal causes the teletypewriter 40 to select and operate the corresponding pullbar 63 which, in operating, closes its associated contact.

For example, if it is desired that a message be sent to the subscriber at station 64, then the routing signal, which may be the permutation code combination for some letter, such as "M", will cause the operation of the proper pullbar 63 to close contact 11. This closes a path for current from battery 44 to pass over the bottom armature of relay 45, along conductor 86, over slip fingers 31 and 21, pullbar contact 11, slip fingers 22 and 32, along conductor 57, and then through the winding of relay 48 to ground 59. This energizes relay 48 which operates its armatures to lock-up over its bottom armature through the winding of relay 45 and stop contact 47 to grounded battery 46. The top armature of relay 48 switches line L_1 from ground 65 to conductors 66, 68 and 19 leading to transmitter-distributor 9. Station 64 is thus connected into communicative relation with transmitter-distributor 9 and a message now transmitted from transmitter-distributor 9 will be recorded by the teletypewriter T_1 at station 64 for a particular period of time or until this switching connection is wiped out.

The operation of the bottom armature of relay 48 also permits battery 46 to energize relay 45 which, accordingly, operates its armatures. The operation of the bottom armature of relay 45 removes battery 44 from the pullbar contacts 11 to 15 to deactivate them so that no further switching operations will be made at this time. The inner top armature of relay 45 removes ground 77 from conductor 78. Ground 77 is replaced by ground 80 to complete the circuit from battery 52 through transmitter-distributor 9 and line L_1. The outer top armature of relay 45 connects ground 77 to magnet 50 to maintain it energized by battery 54. This is necessary because ground 81 is disconnected from battery 54 when the movement of the type basket carriage 3 disengages the slip fingers.

This also serves as a safety telltale because, if an intended line selection has not been made either through error or failure of the selecting equipment, neither relay 48 nor 58 will be operated and, under these conditions, relay 45 cannot operate. Then, when the slip fingers are disengaged by the movement of carriage 3, neither ground 81 nor ground 77 will be connected to battery 54. Consequently, magnet 50 would then release its armature 75 to stop the brush 56 of the transmitter-distributor 9 from rotating thereby prohibiting it from transmitting signals at this time and indicating to the operator that the line selection has not been accomplished.

Another safety telltale is provided by the fact that the batteries 82 and 83 in lines L_1 and L_2 are of a polarity opposite to that of battery 52. Thus, if a subscriber's station is selected when its teletypewriter T_1 or T_2 is not turned on, or if for any other reason line current is not fed back from the selected station, the transmitting machine T will run open thereby serving to notify the operator that something is amiss.

When it is desired to discontinue, or wipe out, this connection, a preassigned permutation code signal is transmitted to effect the momentary opening of stop contact 47. This contact 47 is operated by lever 99, as was described above, only in response to a preassigned upper case signal, such as upper case "H." The opening of contact 47 serves to open the locking-up circuit of relay 48 which consequently releases its armatures. The release of the top armature of relay 48 switches line L_1 from conductor 66 to ground 65. The release of the bottom armature of relay 48 opens the energizing path for relay 45 which releases its armatures; the outer top armature disconnects ground 77 from magnet 50, the inner top armature applies ground 77 to conductor 78 leading to conductor 19 and thereby grounding transmitter-distributor 9, and the bottom armature applies current from battery 44 to the pullbar contacts 11 to 15 to activate them.

To communicate with the subscriber at station 70, transmitter-distributor 9 is caused to transmit a carriage return signal followed by the particular permutation code signal that has been previously assigned to station 70 as its routing signal, such as the code signal for "D." This routing signal is transmitted from contacts 17 in transmitter-distributor 9 and is the code signal which will effect the operation of the pullbar contact 15. Closure of contact 15 closes a path from battery 44 over conductor 86, slip fingers 31 and 21, through contact 15, slip fingers 26 and 36, along conductor 84, and then through the winding of relay 58 to ground 79. Relay 58 operates its armatures and locks-up through its bottom armature, the top armature switching line L_2 from ground 72 to conductors 73, 68, and 19 leading to transmitter-distributor 9. Relay 45 also operates at this time and functions in the manner described above. This establishes a communication circuit between the transmitter-distributor 9 and the teletypewriter T_2 at station 70 so that messages can be sent over this circuit as desired.

This communicative connection can be discontinued by transmitting the preassigned permutation code signal to open the stop contact 47 which opens the locking-up circuit for relay 58. Accordingly, relay 58 releases its armatures, the top armature switching line L_2 from conductor 73 to ground 72 and the bottom armature opening the energizing circuit for relay 45. This causes relay 45 to release its armatures to perform the functions mentioned above.

If it is desired to expand the system to include other subscribers' teletypewriter stations, they can be added to the system by providing them with lines similar to lines L_1 and L_2 and relays similar to relays 48 and 58. The relays added should be connected to the slip fingers 33, 34, and 35 in a manner similar to that in which relays 48 and 58 are connected to slip fingers 32 and 36.

Although the selecting, or switching, relays 48 and 58 are under the control of the main transmitting station A at which the transmitter-distributor 9 is located, once a communication connection has been established, two-way communication may be carried on.

The system shown in Fig. 6 is designed to connect in communicative relation only one outlying station at a time to the transmitter-distributor 9 at the main station A. This is due to the fact

that, as soon as a selecting relay 48 or 58 has been energized, relay 45 is energized to disconnect battery 44 from pullbar contacts 11 to 15 thereby deactivating them to render their operation at this time ineffective to perform any switching function.

Fig. 7 illustrates a communication system in which a main transmitting station 100 is shown to have transmission channels 111, 112, and 113 extending to a plurality of outlying teletypewriter stations 101, 102, and 103 and is provided with apparatus for automatically and selectively connecting the station 100 to any one of the outlying stations 101, 102, and 103 for the transmission of significant current variations. Means are also provided for enabling messages to be broadcast from station 100 to either all or to a selected plurality of stations 101, 102, and 103. Station 100 is provided with switching relays 121, 122, and 123 and repeating relays 131, 132, 133. As is similar to the system shown in Fig. 6, the transmitting station 100 has a teletypewriter, comparable to that shown in Fig. 1, equipped with seven pairs of slip connector fingers 140 to 146 and pullbar contacts 150 to 153. A relay 190 is provided for establishing broadcasting connections.

To transmit a message to the outlying station 101, the operator follows the same procedure described above in connection with the description of the operation of the system shown in Fig. 6; that is, the operator first closes the normally open, manually operable, locking switch 195 to start his motor 196 and presses the carriage return key in the teletypewriter T at station 100 to effect the closure of the slip fingers 140 to 146, inclusive. The operator then closes the normally open, manually operable, locking switch 174 to close a path for current from grounded battery 120 to pass over slip fingers 146 and 145, along conductor 118, through the winding of release magnet 119, the usual tape control switch 180, and then over switch 174 to ground.

The operator then transmits the permutation code signal, such as "M," that has been preassigned to select the pullbar that will operate the pullbar contact 151 to close a path from battery 104, over the bottom armature of relay 105, over the slip fingers 144, contact 151, slip fingers 141, and then through the winding of the switching relay 121 to ground. This energizes relay 121 which operates its armatures and locks up over its inner bottom armature through the stop contact 106 to grounded battery 107. The outer bottom armature of relay 121 closes an energizing path for relay 105 from battery 104.

The operation of the top armature of relay 105 disconnects ground 110 from conductor 109 thereby opening the short-circuit path across the repeating relays 131, 132, and 133 and rendering effective the path from the transmitter-distributor 199 to conductor 116 leading to ground 117. The operation of the bottom armature of relay 105 deactivates the pullbar contacts 150 to 153 by switching battery 104 from them to conductor 118. This maintains release magnet 119 energized after the movement of the type basket carriage has opened the slip fingers 145 and 146 to disconnect battery 120 from conductor 118.

The operation of the top armature of relay 121 removes ground 161 from the subscriber's loop 111 and closes a path for current from battery 181 to pass through the subscriber's teletypewriter T_1, station 101, over line 111, top armature of relay 121, along conductor 171 leading over the marking contact and armature of the repeating relay 131, to ground 184. Messages composed of significant current variations originating in the transmitter-distributor 199 at station 100 will pass through the windings of the repeating relays 131, 132, and 133 to ground 117 and will be repeated by the armature of relay 131 for transmission over conductor 171 and line 111 to station 101 where they will be recorded by the teletypewriter T_1 thereat.

This communication connection can be discontinued at the will of the operator at station 100 by transmitting the preassigned permutation code signal for effecting the opening of stop contact 106. This opens the locking-up circuit of relay 121 which, consequently, releases its armatures to switch line 111 back to ground 161 and restores the system to its normal condition by deenergizing relay 105 to activate the pullbar contacts 150 to 153 by applying to them current from battery 104.

The operator at station 100 can selectively connect the transmitter-distributor 199 at station 100 to the teletypewriter T_2 at station 102 for communicative purposes by transmitting a carriage return signal followed by the preassigned permutation code signal, such as "J," to select the proper pullbar for operating pullbar contact 152. Closure of contact 152 completes an energizing path for relay 122 from battery 104. Relay 122 operates its armatures and locks up over its inner bottom armature. The operation of the top armature of relay 122 switches line 112 from ground 162 to conductor 172 leading to the marking contact of repeating relay 132. Operation of the outer bottom armature of relay 122 closes a path for current from battery 104 to energize relay 105 thereby opening the short circuit across the repeating relays 131, 132, and 133.

Messages originating in the transmitter-distributor 199 will now be recorded by the teletypewriter T_2 at station 102. This connection can be discontinued by transmitting the code signal for effecting the opening of stop contact 106 which forces relay 122 to release its armatures to cause line 112 to be switched from the armature of relay 132 to ground 162 in the manner described above for line 111.

Line 113 extending from station 103 can be switched from ground 163 to conductor 173 leading to the marking contact of repeating relay 133 for the transmission of significant current variations in the manner described above for lines 111 and 112. Line 113 can be switched back to ground 163 in a manner corresponding to that described for lines 111 and 112.

If the operator at station 100 wishes to broadcast a message to be recorded simultaneously by the teletypewriters at a selected plurality of the outlying stations 101, 102, and 103, he closes the particular switches 191, 192, and 193 leading to the windings of the switching relays 121, 122, 123. For example, if he wishes to broadcast to stations 101 and 102, he operates the normally open, manually operable, locking switches 191 and 192 to their closed positions as shown in Fig. 7. He then transmits a carriage return signal followed by the code signal for selecting the proper pullbar for operating the pullbar contact 150 to close a path for current from battery 104 to energize relay 190. Accordingly, relay 190 operates its armatures to close paths for current from battery 126 to pass over switches

191 and 192, the outer and middle top armatures of relay 190, and then through the windings of each of the switching relays 121 and 122.

Relays 121 and 122 thus become energized and operate their armatures to lock-up and switch lines 111 and 112 to the marking contacts of repeating relays 131 and 132, respectively, in the manner described above. Relay 105 also operates its armatures at this time to deactivate the pullbar contacts 150 to 153 and to remove the short-circuit across the repeating relays 131, 132, and 133. This causes relay 190 to release its armatures. Messages now originating in the transmitter-distributor at station 100 will be simultaneously repeated by relays 131 and 132 over lines 111 and 112 and will be recorded practically simultaneously by the teletypewriters at the selected stations 101 and 102. To broadcast to all three stations, the operator would close all three switches 191, 192, and 193.

This broadcast connection can be discontinued and the system restored to its normal condition by transmitting the preassigned signal to effect the opening of stop contact 106 which opens the locking-up circuits of each of relays 121 and 122 thereby switching lines 111 and 112 to grounds 161 and 162, respectively. At the same time, relay 105 is deenergized and releases its armatures to short-circuit the repeating relays 131, 132, and 133.

It is to be understood that the system shown in Fig. 7 is not limited to only three outlying stations. More subscribers' stations can be added. if desired, by adding relays corresponding to the switching relays 121, 122, and 123 and by inserting corresponding additional repeating relays between relays 132 and 131. This would require the addition to the system of additional pullbar contacts, slip fingers, conductors, et cetera.

The system shown in Fig. 7 can be modified to permit the operator at the main transmitting station to selectively connect his transmitter, by means of permutation code signals which effect the operation of electrically operated means, to any one of the outlying stations or to any desired combination of the outlying stations for simultaneous communication thereto. This modification is shown in Fig. 8 which is designed to establish a broadcasting circuit through the use of a multi-signal permutation code and includes the main transmitting station 290 having transmission channels 211, 212, and 213 extending to the outlying teletypewriter stations 294, 295, and 296. Station 290 is also provided with switching relays 221, 222, and 223 and repeating relays 231, 232, and 233 in addition to a teletypewriter T similar to that shown in Fig. 1. As is indicated by the dot-dash lines, the equipment comprising the slip connector fingers 240 to 246 and pullbar contacts 250 to 253 is a part of the teletypewriter T. Station 290 is further provided with a relay 205 for controlling the activation of the pullbar contacts.

The sets of slip connector fingers 240 to 246 are so constructed as to remain in mutual engagement while the movable type basket travels during its first few letter space movements. The particular number of letter space movements that the slip connector fingers must remain in engagement is equal to one plus the maximum number of outlying stations to be connected into a broadcasting circuit. Thus. in the circuit shown in Fig. 8, the slip fingers must remain in engagement while the type basket is traveling its first four letter space movements. In other words, the selecting means is effective only when the carriage is at certain preassigned points on its path of travel.

To transmit a message to the outlying station 294, the operator at station 290 first closes the manually operable, locking switch 298 to start his motor 297 and then presses the carriage return key on his teletypewriter keyboard to bring the sets of slip fingers 240 to 246 into mutual engagement. The operator next closes the normally open, manually operable, locking switch 274 to close a path for current from battery 220 to pass over slip fingers 246 and 245, over conductor 218, through the winding of the release magnet 219, the usual type of tape control switch 280, and then over switch 274 to ground thereby energizing magnet 219 and conditioning the transmitter-distributor 299 for operation.

The operator follows this with the permutation code signal, such as "M" that has been assigned to effect a selection of the proper pullbar to operate contact 251 thereby closing a path for current from battery 207 to pass over the stop contact 206, contact of the non-operated relay 205, slip finger 244, pullbar contact 251, slip finger 241, and then through the winding of relay 221 to ground. This serves to energize the switching relay 221 which operates its armatures and locks up over its bottom armature and then over stop contact 206 to grounded battery 207. The operation of the top armature of relay 221 removes ground 261 from the subscriber's loop 211 and closes a path for current from battery 281 to pass through the outlying subscriber's teletypewriter set T_1 at station 294, over line 211, top armature of relay 221, along conductor 271 leading to the marking contact and armature of repeating relay 231 and then to ground 284.

The operator at station 290 then transmits the permutation code signal, such as "C," that has been assigned to effect the selection of the proper pullbar to operate contact 250 thereby closing a path for current from battery 207 to pass over the stop contact 206, contact of the non-operated relay 205, slip finger 244, pullbar contact 250, slip finger 240, and then through the winding of relay 205 to ground. This serves to energize the control relay 205 which operates its armatures and locks up over its upper armature and then over stop contact 206 to grounded battery 207.

The lower armature of relay 205 applies battery 204 to conductor 218 so as to hold magnet 219 energized after the type basket has moved along its path of travel a distance sufficient to disengage the slip connector fingers 240 to 246 thereby disconnecting battery 220 from magnet 219. This also serves as a safety telltale in the event no line selection was made either through error or failure of the selecting equipment as, under such conditions, no current would be supplied to the release magnet 219 which would then release its armature to stop the transmitter-distributor 299 thereby indicating to the operator at station 290 that the line selection has not been accomplished.

At the same time the operation of the upper armature of relay 205 opens the path from battery 207 to the slip fingers 240 to 246 thereby deactivating the pullbar contacts 250 to 253 so that their subsequent operation will be ineffective to accomplish any useful function. The system is now placed in condition for communication thereover.

This communicative connection can be wiped out by transmitting the preassigned permutation code signal for effecting the opening of the

stop contacts 206. This opens the locking-up circuits of relays 205 and 221 which release their armatures, the top armature of relay 221 switching the subscriber's line 211 from conductor 271 to ground 261. The lower armature of relay 205 disconnects battery 204 from conductor 218 while the upper armature allows the top contact of relay 205 to connect battery 207 to the pullbar contacts 250 to 253. The pullbar contacts 250 to 253 are thus activated once more and the system restorted to its normal condition.

The operator at station 290 can cause messages transmitted from the transmitter-distributor 299 at station 290 to be automatically routed to the teletypewriter station 295 by preceding the messages with the carriage return signal followed by the preassigned code signal, such as "J," for effecting the energization of relay 222 and then the preassigned code signal, such as "C," for effecting the operation of relay 205. After the desired number of messages have been sent to station 295, this automatic routing of messages can be discontinued by transmitting the preassigned code signal, such as "H," to effect the opening of the stop contact 206.

The destination of messages transmitted from the transmitter-distributor 299 at station 290 can also be automatically assigned to the teletypewriter station 296 by following the same procedure as described above except that this time the operator uses the preassigned code signal, such as "D," for effecting the energization of relay 223. This routing of messages can be terminated in the manner described above.

Messages originating at station 290 can be broadcast for simultaneous reception by any desired combination of two or more of the outlying stations 294, 295, and 296. To effect broadcast routing of messages, the operator at station 290 follows somewhat the same procedure described above by first transmitting a carriage return signal. This is followed by the preassigned code signals assigned to the particular stations that are desired to be connected into a broadcasting circuit. For example, if it is desired to broadcast to stations 294 and 296 simultaneously, the operator sends the particular signals, such as "M" and "D," designed to effect first the energization of relay 221 and then the energization of relay 223. These relays 221 and 223 operate their armatures to switch current from batteries 281 and 283 from grounds 261 and 263 to conductors 271 and 273 leading to the armatures of the repeating relays 231 and 233 and then to grounds 284 and 286.

The operator then transmits the code signal to effect the energization of relay 205 which operates its armatures to deactivate the pullbar contacts 250 to 251 by disconnecting battery 207 therefrom. Messages originating in the transmitter-distributor 299 at station 290 will now be repeated simultaneously over the communication channels 211 and 213 for reception by the teletypewriters at stations 294 and 296. This broadcasting connection can be discontinued in the manner described above by transmitting the particular signal that has been assigned to operate the stop contact 206.

If it should be desired to include the outlying station 295 in the broadcasting circuit, the operator would first send a carriage return signal and would then include with the other routing signals the preassigned signal, such as "J," for effecting the energization of relay 222. This would be followed by the signal to energize relay 205 for deactivating the pullbar contacts 250 to 253. Current from battery 282 would thus be switched from ground 262 to conductor 272 leading over the armature of relay 232 to ground 285.

The operator at station 290 can selectively connect transmitter-distributor 299 to any of the outlying stations 294, 295 and 296 in any combination that may be desired for the broadcasting of messages. The system is not limited to only three outlying stations as more subscribers' stations may be added to the system by inserting additional repeating relays between relays 232 and 231 and by adding additional pullbar contacts, slip connector fingers, switching relays, and other equipment similar to that described above for stations 294, 295, and 296.

Figs. 9 and 10 show a communication system having a main transmitting teletypewriter station 300 with a plurality of outlying teletypewriter subscribers' stations 400, 500, and 600 connected thereto in series by communication lines 312, 412, and 512. Lines 312, 412, and 512 are really all part of the same communication channel but, for the purpose of improving the clarity of the description, these component parts of the main communication line are separately numbered. A plurality of other communication channels *a* and *b* also extend from station 300 and each of these channels *a* and *b* has connected therein one or more subscribers' teletypewriter stations, such as those indicated at T_{A1}, T_{A2}, T_{A3}, T_{B1}, T_{B2}, and T_{B3}, similar to stations 300, 400, and 500. Selecting means are provided for enabling the operator at the main station 300 to select for communicative purposes any single station on any of the channels and to exclude from communication at that time all of the other stations. During idle periods, each of the channels 312, *a*, and *b* are connected to a ground 334, 338, and 339, respectively. The system also includes broadcasting means for broadcasting a message for nearly simultaneous reception by the teletypewriters at a plurality of the subscribers' stations on one or more of the channels.

For example, if the operator at the main transmitting station 300 wished to effect a communicative connection between his station and station 500 to the exclusion of stations 400 and 600, the operator would first close his manually operable, locking switch 395 to start his motor 396. The operator would then press his carriage return key on his teletypewriter keyboard to bring the slip fingers 340 to 346, inclusive, into mutual engagement. Next the operator would close the manually operable, locking switch 374 to close a path for current from battery 320 to pass over switch 374, the usual tape control switch 380, through the winding of release magnet 319, outer bottom contact and armature of relay 323 and relay 354 and relay 364 in parallel, slip fingers 344 and 345, and then over the bottom armatures of slow-release relays 322 and 326 and 328 to ground 335. This releases the brush arm of the transmitter-distributor 399 for rotation for the transmission of permutation code signals but, at this time, the path from transmitter-distributor 399 terminates in ground 337.

The operator follows this with a channel selecting permutation code signal, such as "D," that has been preassigned to effect the momentary closure of the pullbar contact 350 thereby closing a path for current from battery 304 to pass over the bottom armature of relay 305, slip

connector finger 343, contact 350, slip finger 340, and then through the winding of relay 323 to ground 330, thereby energizing relay 323. Relay 323 operates its armatures and locks-up from ground 330, through its winding, over its inner bottom armature, stop contact 306, and then to grounded battery 307.

The operator then sends the preassigned code signal, such as "K," to effect the closure of pullbar contact 353 resulting in the energization of relay 305 which operates its armatures and locks-up from battery 307 over its inner top armature to ground 358. The operation of the bottom armature of relay 305 disconnects battery 304 from the pullbar contacts 350 to 353 to deactivate them, thereby rendering them ineffective to perform any switching functions during the subsequent transmission of permutation code signals. The operation of the outer top armature of relay 305 removes ground 337 from the path leading from transmitter-distributor 399. Relay 305 remains energized along with relay 323 until a stop signal, such as upper case "H," is sent to effect the opening of stop contact 306.

The operation of the inner top armature of relay 323 removes ground 334 from the line conductor 312 and connects line 312 over the inner top armature of relay 323, over the face-plate of the transmitter-distributor 399, and then through the winding of the teletypewriter line magnet 387 to grounded battery 381. The outer bottom armature of relay 323 substitutes ground 332 in place of ground 335 at the end of the path from grounded battery 320 through the release magnet 319. This serves as a safety telltale to guard against a selection failure as explained above and also serves to maintain release magnet 319 energized after the movement of the type-basket carriage has opened the slip fingers 344 and 345 to disconnect ground 335 from slip finger 344. The operation of the outer top armature of relay 323 applies ground 331 to complete a circuit for current from battery 308 to energize slow-release relay 325.

Relay 325 operates its armature to close a path from grounded battery 355, through the winding of slow-release relay 322, and then over the armature of relay 325 to ground 336. This energizes relay 322 which operates its armatures, the bottom armature removing ground 335 from the slip finger 345 while the top armature removes ground 334 from the conductor 382 leading to a contact of relay 323. This completes the selection of the line 312 for communicative purposes while channels *a* and *b* remain connected to grounds 338 and 339, respectively.

The preassigned code signal, such as "D," having effected the selection of the communication channel 312 at station 300, the operator at station 300 now has a choice of either broadcasting a message for reception by all of the stations 400, 500, and 600 that are connected in series on the line or else selecting one of the stations 400, 500, or 600 to receive a message to the exclusion of the other stations. If the operator wishes to send a message for reception by only one outlying teletypewriter station, such as station 500, a carriage return signal is first transmitted to bring the slip fingers mounted in the teletypewriters T_1, T_2 and T_3 at stations 400, 500, and 600, into mutual engagement. If the carriages of the teletypewriters at these stations were already in the return position, it would not be necessary to send a carriage return signal at this time. However, as a safety precaution, it is advisable to send such a signal in all cases.

This is followed by the station selecting permutation code signal, such as "R", that has been preassigned to effect the operation of the "R" pullbar in each of the connected outlying teletypewriters T_1, T_2 and T_3 thereby closing the "R" pullbar contacts 451, 552, and 651. At station 500, the closure of contact 552 completes an energizing circuit for relay 505 from grounded battery 507, through the stop contact 506, winding of relay 505, conductor 511, slip finger 542, pullbar contact 552, slip finger 543, and then over the top armature of relay 505 to ground 530.

Consequently, relay 505 operates its armatures and locks-up from battery 507, stop contact 506, winding of relay 505, top armature and contact of relay 523, and then over the outer bottom armature of relay 505 to ground 531. The operation of the inner bottom armature of relay 505 disconnects battery 504 from the pullbar contacts 550 and 551 and the operation of the top armature of relay 505 disconnects ground 530 from pullbar contacts 552 and 553. This deactivates the pullbar contacts 550 to 553 so that the operation of these contacts during the subsequent printing of a message will not be effective to perform any switching functions. The apparatus at station 500 is thus placed in condition for the printing of a message transmitted from station 300.

As was stated above, all of the "R" pullbar contacts in the connected teletypewriters T_1, T_2 and T_3 are operated in response to the transmission of the "R" code signal. At station 400, the closure of the "R" pullbar contact 451 closes a path for current from battery 404 to pass over the inner bottom armature of relay 405, slip finger 441, contact 451, slip finger 440, through the winding of relay 423, and then over the outer bottom armature of relay 405 to ground 431. This serves to energize relay 423 which operates its armatures and locks-up over a path traced from grounded battery 407, stop contact 406, winding of relay 405, top armature and winding of relay 423, and then over the outer bottom armature of relay 405 to ground 431 thereby energizing relay 405 which operates its armatures.

The operation of the inner and middle bottom armatures of relay 423 disconnects the polarized line relay 424 from line conductors 312 and 412. Accordingly, line relay 424 moves its armature to its spacing contact under the influence of the biasing current which passes from battery 357 through the biasing winding of relay 424 to ground 432. At the same time, the operation of the outer bottom armature of relay 423 switches slow-release relay 422 into the line circuit by closing a path for line current to pass from line conductor 312, over the outer bottom armature and contact of relay 423, winding of relay 422, and then to line conductor 412 thereby energizing relay 422. Relay 422 operates its armatures, the bottom armature applying ground 435 to conductor 484.

Also at this time, as was stated above, relay 405 becomes energized and operates its armatures. The operation of the inner bottom armature of relay 405 removes battery 404 from pullbar contacts 450 and 451 and the operation of the top armature removes ground 430 from pullbar contacts 452 and 453 thereby deactivating the pullbar contacts 450 to 453. The operation of the outer bottom armature of relay 405 removes ground 431 from the locking-up circuit through

relay 423 and effects the substitution of ground 435 over conductor 484. This holds both relays 405 and 423 operated under the control of the stop contacts 406 and relay 422. Since relay 422 is of the slow-to-release type, its armatures will not be released during the momentary interruptions of the line current when signals are sent over the line.

The operation of the top armature of slow-release relay 422 closes a path for current to pass from grounded battery 486, over the top armature of relay 422, through the winding of relay 485, and then over the spacing contact and armature of line relay 424 to ground 433 thereby energizing relay 485. Relay 485 operates its armatures and locks-up from grounded battery 486, bottom armature and winding of relay 485, and then over the armature of line relay 424 to ground 433. The operation of the top armature of relay 485 closes a path for current to pass from battery 481, through the winding of the teletypewriter magnet 487, and then over the top armature of relay 485 to ground 434. This serves to keep the teletypewriter at station 400 running closed during the time that it remains switched out of the communication channel.

The operation of the "R" pullbar contact 651 at station 600 will perform the same functions at station 600 that the operation of contact 451 performed at station 400. The line relay 624 will be switched out of the communication circuit and the line circuit will be switched to pass through the winding of relay 622 and then over conductor 612 to grounded battery 681.

This completes the preparation of the circuit for the transmission of significant current variations from grounded battery 381 at station 300, through the teletypewriter line magnet 387 and the transmitter-distributor 399, inner top armature of relay 323, line conductor 312, outer bottom armature of relay 423 at station 400, winding of relay 422, out over line conductor 412 to station 500, inner bottom armature of relay 523, line winding of the polarized line relay 524, middle bottom armature of relay 523, out over line 512 to station 600, outer bottom armature of relay 623, winding of slow-release relay 622, and then over conductor 612 to grounded battery 681. Messages comprising significant current variations can now be transmitted from the transmitter-distributor 399 at station 300 over the line circuit just traced and will be received and printed by the teletypewriter T_2 at station 500 but will not be printed by the teletypewriters T_1 and T_3 at stations 400 and 600.

At the conclusion of the transmission of messages between stations 300 and 500, a disconnect, or stop, signal, such as upper case "H" is transmitted to wipe out the selection by effecting the opening of the stop contacts 306 and 506. At station 300, the opening of stop contact 306 opens the locking-up circuit of relays 305 and 323 and causes them to release their armatures. The release of the bottom armature of relay 305 applies current from battery 304 to the slip finger 343 so that, when a carriage return signal is transmitted, the pullbar contacts 350 to 353 will again be activated. The release of the outer bottom armature of relay 323 removes ground 332 from the circuit through the release magnet 319.

Since the path from ground 335 is open at the bottom armature of slow-release relay 322, release magnet 319 will release its armature which will catch the brush of the transmitter-distributor 399 to prevent it from further rotation at this time. The release of the inner top armature of relay 323 opens the path from the transmitter-distributor 399 to line conductor 312. At the same time, the release of the outer top armature of relay 305 connects ground 337 to the path leading through the transmitter-distributor 399. This serves to keep the teletypewriter T at station 300 running closed. The release of the inner top armature of relay 323 also switches the line conductor 312 to conductor 382 leading to the top contact of slow-release relay 322, but, since the armatures of relay 322 are now operated, the line circuit is left open until such time as relay 322 releases its armatures to supply ground 334 to line conductor 312.

At the same time, the release of the outer top armature of relay 323 removes ground 331 from the energizing circuit through slow-release relay 325 which releases its armature after a time delay in accordance with its slow-release characteristics. This removes ground 336 from the energizing circuit through slow-release relay 322 which, after its inherent time delay, releases its armatures. The bottom armature of relay 322 applies ground 335 to slip finger 345 thereby preparing a circuit for applying ground 335 to the release magnet 319 when the slip fingers 344 and 345 are closed by the return of the carriage. The release of the top armature of relay 322 applies ground 334 to conductor 382 and line conductor 312 thereby closing a path for current from grounded battery 681 to flow over the line to ground 334. Due to the two periods of delay in effecting the release of the armatures of relays 325 and 322, the line was left open for an appreciable period.

This relatively long open period is necessary in order to effectuate the release of the armatures of slow-release relays 422 and 622. At station 400, slow-release relay 422 releases its armatures in response to the long opening of the line. The release of the bottom armature disconnects ground 435 from the energizing circuit through relays 405 and 423 which release their armatures. The release of the top and inner bottom armatures of relay 405 applies battery 404 to slip finger 441 and ground 430 to slip finger 443 so that the pullbar contacts will be activated again when the type-basket carriage moves to its return position. Ground 431 is applied to relay 423 by the release of the outer bottom armature of relay 405 but this accomplishes no useful function at this time.

As was just stated, relay 423 also releases its armatures, its outer bottom armature switching relay 422 out of the line circuit so that it is not energized by the subsequent closure of the line. The release of the inner and middle bottom armatures of relay 423 switches the line winding of the polarized line relay 424 into the line circuit.

Relay 485 remains locked-up until the communication line is closed. When the line is closed, the line current will cause the polarized line relay 424 to move its armature to its marking contact. This switches the circuit through the teletypewriter magnet 487 to ground 433 and also opens the locking-up circuit of relay 485 which will then release its armatures to complete the restoration of the equipment at station 400 to its normal condition.

The long opening of the line accomplishes the same results at station 600 as was just described for station 400. It can thus be understood that this long opening of the line must be of such duration that all the relays, except relays 485

and 685, at stations 400 and 600 will have time to release their armatures. The circuit is designed to allow the holding relays 485 and 685 to remain energized during the interval that the line is open as this holds the teletypewriter circuits at stations 400 and 600 closed and prevents the teletypewriters T_1 and T_3 from running open for a short time which might cause them to print a false character when the line current is restored.

During this time, the stop signal such as upper case "H," is received at station 500 and effects the operation of the stop contact 506 to open its upper contact while closing its lower contact. The opening of the top part of stop contact 506 opens the energizing circuit of relay 505 which, accordingly, releases its armatures. The release of the top and inner bottom armatures of relay 505 applies battery 504 to slip finger 541 and ground 530 to slip finger 543 so that the pullbar contacts 550 and 553 will be activated again when the type-basket carriage moves to its return position. Ground 531 is applied to relay 523 by the release of the outer bottom armature of relay 505 but this performs no useful function at this time.

The closure of the lower part of stop contact 506 completes a circuit for current from battery 507 to pass over this lower portion of stop contact 506, through the winding of relay 585, and then over the spacing contact and armature of relay 524 (relay 524 moves its armature to its spacing contact when relay 323 at station 300 releases its armatures) to ground 533. Relay 585 locks-up over a path traced from grounded battery 586, bottom armature of relay 585, winding of relay 585, and then over the spacing contact and armature of relay 524 to ground 533.

The operation of the top armature of relay 585 closes a path for current to pass from grounded battery 581, through the winding of the line magnet 587, and then over the top armature of relay 585 to ground 534. This serves to keep the teletypewriter T_2 at station 500 running closed while the line is open at this time. This local teletypewriter circuit is held closed until relay 322 at station 300 releases its armatures to apply ground 334 to the line conductor 312 to cause the polarized line relay 524 to move its armature to its marking contact to apply ground 533 to the local teletypewriter circuit while, at the same time, opening the locking-up circuit of relay 585. Consequently, relay 585 will now release its armatures but the local teletypewriter circuit will be held closed by the application of ground 533.

If the operator at station 300 wishes to communicate with a subscriber at the outlying station 400 to the exclusion of stations 500 and 600, the same procedure is followed except that, instead of sending the "R" code signal, the operator transmits a different station selecting signal, such as "S," that has been preassigned to effect the operation of the "S" pullbar contact 452 at station 400 and contacts 551 and 650 at stations 500 and 600. Operation of the "S" contact 452 will prepare the equipment at station 400 for communicative purposes in the manner described above for station 500. At the same time, operation of contacts 551 and 650 will cause the line windings of the polarized line relays 524 and 624 to be switched out of the line circuit and will also cause the line circuit to pass through the windings of relays 522 and 622 in the manner described above in connection with station 400. This communication connection can be discontinued in the manner described above for station 500 by transmitting the preassigned stop signal, such as upper case "H."

In a similar manner, the apparatus at station 600 may be conditioned for exclusive connection with that at station 300 by transmitting another station selecting signal, such as "Q," that has been preassigned to effect the operation of the "Q" pullbar contact 652 at station 600 and contacts 450 and 550 at stations 400 and 500. The operation of these contacts 652, 450 and 550 performs functions similar to those described above to place station 600 in condition for communication to the exclusion of stations 400 and 500. This connection can likewise be discontinued by transmission of the preassigned stop signal.

Whenever a message is of interest to the subscribers at all of the outlying stations 400, 500 and 600, the operator at station 300 can connect them all into a broadcasting connection to enable each of them to receive the message practically simultaneously. This broadcasting connection is effected by transmitting a code signal, such as "B," that has been preassigned to effect the operation of each of the "B" pullbar contacts 453, 553 and 653.

At station 400, operation of contact 453 closes a path for current from grounded battery 407 to pass over stop contacts 406, through the winding of relay 405, slip finger 442, contact 453, slip finger 443, and then over the top armature of relay 405 to ground 430. This energizes relay 405 which operates its armatures and locks-up over the top armature of relay 423 and outer bottom armature of relay 405 to ground 431. The operation of the top armature of relay 405 removes ground 430 from slip finger 443 and the operation of the inner bottom armature disconnects battery 404 from slip finger 441 thereby deactivating the pullbar contacts 450 to 453, inclusive. This places the apparatus at station 400 in condition for the printing of a message. Similarly, the operation of the pullbar contact 553 closes an energizing path for relay 505 which operates and locks-up. This places the equipment at station 500 in readiness for communication. Likewise, operation of pullbar contact 653 effects the energization of relay 605 and conditions the apparatus at station 600 for communication purposes.

Each of the three stations 400, 500, and 600 is thus conditioned for communication over the communication channel extending to station 300. Consequently, any message now transmitted by the transmitter-distributor 399 at station 300 over line conductors 312, 412, 512 and 612 will be recorded practically simultaneously at each of the stations 300, 400, and 500 by the teletypewriters T_1, T_2, and T_3 thereat.

This broadcast connection can be discontinued by transmitting the stop signal, upper case "H," which will perform at stations 300 and 500 the functions previously described above and will accomplish the same functions at stations 400 and 600 as were described above in connection with station 500. The system is thus restored to its normal condition.

Other communication channels, such as *a* and *b* which are similar to the channel comprising line conductors 312, 412, 512 and 612, each having connected therein a plurality of other outlying teletypewriter subscribers' stations, represented at T_{A1}, T_{A2}, T_{A3}, T_{B1}, T_{B2} and T_{B3} and which are similar to stations 400, 500 and 600, may be selected by the operator at station 300. Channel *a* passes to ground 338 over the inner top contact of relay 354 which is similar to relay

323 and has its winding connected to slip finger 341 leading to the pullbar contact 351. Similarly, channel *b* passes to ground 339 at the inner top contact of relay 364 which is like relay 323 and has its winding connected to slip finger 342 leading to the pullbar contact 352.

Channels *a* and *b* can be separately selected by causing either the pullbar contact 351 or the pullbar contact 352 to be operated by sending the proper preassigned channel selecting permutation code signal which may be "J" or "M," respectively, followed by the signal "K" for effecting the energization of relay 305. Closure of contact 351 effects the energization of relay 354 which operates its armatures to switch channel *a* from ground 338 to the transmitter-distributor 399 in the manner similar to that described above in connection with the operation of the armatures of relay 323. Communication can now take place over channel *a* in a manner similar to that described previously after which the communication connection may be terminated by transmitting the stop signal, upper case "H." Likewise, closure of contact 352 causes relay 364 to operate its armatures to switch channel *b* from ground 339 to the transmitter-distributor 399. After transmitting messages for reception by either one teletypewriter or all of the teletypewriters on the channel *b*, this communication connection can be discontinued by transmitting the stop signal.

If it is desired to broadcast over more than one channel at a time, the operator can connect a selected plurality of the channels to the transmitter-distributor 399 at one time. To accomplish this, the operator presses, for example, the "D," "M" and "K" keys on the teletypewriter keyboard in the teletypewriter T at station 300. The operation of the "D" and "M" keys effects the closure of contacts 350 and 352 which, in turn, effects the energization of switching relays 323 and 364 to connect channels 312 and *b* to transmitter-distributor 399. Operation of the "K" contact 353 causes relay 305 to operate and lock-up to remove ground 337 from the transmitter-distributor 399 and to deactivate the pullbar contacts 350 to 353. Selections of one or more stations on each of channels 312 and *b* may be made in the manner described above. These connections can be discontinued by transmitting the stop signal.

Other channels and stations can be added to the system in a similar manner if desired. Various other modifications may be made without exceeding the scope of the invention. Consequently, the invention is to be limited only by the claims appended hereto.

What is claimed is:

1. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a plurality of control means mounted on said movable carriage for determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time.

2. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a plurality of control means mounted on said movable carriage for effecting a selection as to which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular interval of time, means for wiping out said selection said wiping out means comprising only one mechanically operated contact, and means for mounting said contact in the teletypewriter at the first station in a location other than on the movable carriage.

3. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, control means mounted on said movable carriage for determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, operating means for effecting the operation of said control means, and means for permitting the operation of said control means to be effective to accomplish its switching function only when the carriage is at a preassigned point on its path of travel.

4. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a plurality of control means mounted on said movable carriage for determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, operating means for effecting the operation of said control means, and means for permitting the operation of said control means to be effective to accomplish its switching function only when the carriage is at certain preassigned points on its path of travel.

5. A communication system including in commination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, control means mounted on said movable carriage for effecting a selection as to which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, operating means for effecting the operation of said control means, means for permitting the operation of said control means to be effective to accomplish its switching function only when the carriage is at a preassigned point on its path of travel, means for wiping out said selection, and operating means for effecting the operation of said last-mentioned means independently of the location of the carriage along its path of travel.

6. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each

provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a control contact mounted on said movable carriage for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time, and means for operating said control contact.

7. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a control contact mounted on said movable carriage for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time, means for operating said control contact, and means for discontinuing the effect of the operation of said control contact.

8. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars and a movable carriage for carrying the pullbars, means for operating the pullbars, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a control contact mounted on the movable carriage for determining whether a teletypewriter at one of the other stations shall record the signals transmitted from the first station, and means for operating the control contact in response to the operation of a preassigned pullbar.

9. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars and a movable carriage for carrying the pullbars, means for operating the pullbars, means for moving said carriage along a fixed path of travel, a lever mounted in said teletypewriter in a location other than on the movable carriage, means for operating said lever independently of the operation of the pullbars, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a control contact mounted on the movable carriage for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time, means for operating the control contact in response to the operation of a preassigned pullbar, means for terminating the effect of the operation of said control contact, and means for operating said last-mentioned means in response to the operation of said lever.

10. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars and a movable carriage for carrying the pullbars, means for selectively operating the pullbars, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a plurality of control contacts mounted on the movable carriage for selectively determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, and means for selectively operating the control contacts in response to the selective operation of certain preassigned pullbars.

11. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars and a movable carriage for carrying the pullbars, means for selectively operating the pullbars, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a plurality of control contacts mounted on the movable carriage for effecting a selection as to which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, means for selectively operating the control contacts in response to the selective operation of certain of the pullbars, means for wiping out said selection, and operating means for operating said last-mentioned means independently of the operation of the pullbars.

12. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a control contact mounted on said movable carriage, governing means at the first station mounted other than on said movable carriage, a plurality of other teletpyewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, means for completing an electrical connection between said control contact and said governing means under certain conditions, and means for operating said control contact to effect the operation of said governing means when said electrical connection has been completed for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time.

13. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a control contact mounted on said movable carriage, governing means at the first station mounted other than on said movable carriage, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a slip connector finger mounted on a fixedly located portion of the teletypewriter at the first station, another slip connector finger mounted on said movable carriage, means for bringing said slip connector fingers into mutual engagement for completing an electrical connection between said control contact and said governing means under certain conditions, and means for operating said control contact to effect the operation of said governing means when said electrical connection has been completed for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time.

14. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of

travel, a control contact mounted on said movable carriage, governing means at the first station mounted other than on said movable carriage, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a slip connector finger mounted on a fixedly located portion of the teletypewriter at the first station, another slip connector finger mounted on said movable carriage, means for bringing said slip connector fingers into mutual engagement for completing an electrical connection between said control contact and said governing means only when the carriage is at a preassigned point on its path of travel, and means for operating said control contact to effect the operation of said governing means when said electrical connection has been completed for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time.

15. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of control contacts mounted on the movable carriage, governing means at the first station mounted other than on said movable carriage, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a plurality of slip connector fingers mounted on a fixedly located portion of the teletypewriter at the first station, a plurality of slip connector fingers mounted on said movable carriage, means for bringing said slip connector fingers into mutual engagement for completing electrical connections between said control contacts and said governing means only when the carriage is at certain preassigned points on its path of travel, and means for selectively operating any of said control contacts to effect the operation of said governing means when said electrical connections have been completed for selectively determining which of the teletypwriters at the other stations shall record signals transmitted from the first station during a particular period of time.

16. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, said teletypewriter at the first station having a plurality of pullbars, each of said pullbars having an unoperated position and an operated position, a set of spring contact points, an extension arm secured to one of the contact points and normally placed in engagement with a certain one of said pullbars in its unoperated position, and means for moving said certain pullbar to its operated position to allow the extension arm to move the contact point to which it is secured for effecting a selection as to which of the teletypewriters at these other stations to record signals transmitted from the first station during a particular period of time.

17. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, said teletypewriter at the first station having a plurality of pullbars, each of said pullbars having a first position and a second position, a set of spring contact points having the force of the spring tending to close the contact points, an extension arm placed in engagement with a certain one of said pullbars in its first position and secured to one of the contact points, means for moving said certain pullbar to its second position to allow the extension arm to move to close the contact points for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time, and restoring means for effecting the return of said certain pullbar to its position for moving the extension arm to force the contact points open.

18. A communication system including in combination a first teletypewriter station having signal transmitting means and a teletypewriter with a manually operated keyboard, a second teletypewriter station having a communication channel extending to the first station, said second station also having transmitting means for transmitting signals over said communication channel, means for closing a path to shunt signaling current in the signal transmitting means at the first station away from said communication channel, control means at the first station for opening said shunting path, and operating means controlled by the teletypewriter at said first station in response to signals generated by the transmitting means thereat for operating said control means.

19. A communication system including in combination a first teletypewriter station, a plurality of other teletypewriter stations, said first station having transmitting means for transmitting signals from said first station to these other stations, operating means for operating the transmitting means, selective switching means at the first station for effecting a selection as to which of the teletypewriters at these other stations shall record the signals transmitted by the first station during a particular period of time, and safety means for prohibiting the transmission of signals by said transmitting means in the event of a failure of an intended switching operation.

20. A communication system including in combination a first teletypewriter station, a communication channel extending from the first station, a plurality of other teletypewriter stations connected into said channel, each of these other stations having a teletypewriter with a movable carriage, means for moving each carriage along a fixed path of travel, each carriage having a return position, means for transmitting signals from the first station over said communication channel to these other stations, each of the other stations having control means located thereat for determining whether the teletypewriter at that station shall record signals transmitted from the first station during a particular period of time, and operating means for operating each of the control means independently of all the other control means in response to a carriage return signal transmitted from the first station and followed by a signal that is individual to each control means.

21. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel,

said carriage having a return position, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, control means mounted on said movable carriage for determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, operating means for effecting the operation of said control means, and conditioning means for rendering the operation of said control means effective to accomplish its control function only when the carriage is in its return position.

22. A communication system including in combination, a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars, means for selectively operating the pullbars individually, means for moving said carriage along a fixed path of travel, said carriage having a return position, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, a control contact mounted on said movable carriage for determining whether a teletypewriter located at one of the other stations shall record the signals transmitted from the first station during a particular period of time, operating means for operating the control contact in response to the operation of a preassigned pullbar, and conditioning means for rendering the operation of said control contact effective to accomplish its control function only when the carriage is in its return position.

23. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to the other stations, switching means at the first station mounted other than on said movable carriage for determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, control means mounted on said movable carriage, connecting means for establishing an electrical connection between said control means and said switching means for enabling said control means to control the operation of said switching means, and operating means for operating said control means to effect the operation of said switching means after said electrical connection has been established.

24. A communication system including in combination a first teletypewriter station having a teletypewriter with a movable carriage, means for moving said carriage along a fixed path of travel, said carriage having a return position, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to these other stations, switching means at the first station mounted other than on said movable carriage for determining which of the teletypewriters at these other stations shall record the signals transmitted from the first station during a particular period of time, control means mounted on said movable carriage for effecting the operation of said switching means, connecting means for establishing an electrical connection between said control means and said switching means only when the carriage is in its return position, and operating means for operating said control means to effect the operation of said switching means when said electrical connection has been established.

25. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars and a movable carriage for carrying the pullbars, means for selectively operating the pullbars individually, means for moving said carriage along a fixed path of travel, a control contact mounted on said movable carriage, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to the other stations, switching means at the first station mounted other than on said movable carriage for determining whether a teletypewriter located at one of the other stations shall record signals transmitted from the first station during a particular period of time, a slip connector finger mounted on a fixedly located portion of the teletypewriter at the first station, another slip connector finger mounted on said movable carriage, means for bringing said slip connector fingers into mutual engagement for completing an electrical connection between said control contact and said switching means, and operating means for operating the control contact in response to the operation of a preassigned pullbar for effecting the operation of said switching means after said electrical connection has been completed.

26. A communication system including in combination a first teletypewriter station having a teletypewriter equipped with a plurality of pullbars and a movable carriage for carrying the pullbars, means for selectively operating the pullbars individually, means for moving said carriage along a fixed path of travel, said carriage having a return position, a control contact mounted on said movable carriage, a plurality of other teletypewriter stations each provided with a teletypewriter, means for transmitting signals from the first station to the other stations, switching means at the first station mounted other than on said movable carriage for determining whether a teletypewriter at one of the other stations shall record signals transmitted from the first station during a particular period of time, a slip connector finger mounted on a fixedly located portion of the teletypewriter at the first station, another slip connector finger mounted on said movable carriage, means for bringing said slip connector fingers into mutual engagement for completing an electrical connection between said control contact and said switching means only when said carriage is in its return position, and operating means for operating the control contact in response to the operation of a preassigned pullbar for effecting the operation of said switching means when said electrical connection has been completed.

27. A communication system comprising in combination a transmitting station provided with a teletypewriter and a transmitter-distributor, operating means for operating the transmitter-distributor, said teletypewriter having a movable carriage, means for moving said carriage along a fixed path of travel, said carriage having a return position, a plurality of other teletypewriter stations each provided with a teletypewriter, means for enabling said transmitter-distributor to transmit signals to the other teletypewriter stations, control means mounted on said movable carriage for effecting a selection as

to which of the teletypewriters at the other stations shall record the signals transmitted by said transmitter-distributor, conditioning means for rendering the operation of the control means effective to accomplish its selection only when the carriage is in its return position, and safety means for terminating the operation of the transmitter-distributor in the event an attempted selection fails to be completed.

28. A communication system including in combination a first teletypewriter station having a teletypewriter, a plurality of other teletypewriter stations each having a communication channel extending to the first station, said first station also having signal transmitting means for transmitting signals over said communication channels and selective switching means for effecting a selection as to which of the teletypewriters at the other stations shall record signals transmitted by the first station during a particular period of time, means for operating said selective switching means, means for closing a path to shunt signaling current in the signal transmitting means at the first station away from said communication channel, control means at the first station for effecting the opening of said shunting path, and operating means for operating said control means in response to the operation of the selective switching means.

29. A communication system including in combination a first teletypewriter station having transmitting means and a plurality of repeating relays, a plurality of other teletypewriter stations, a communication channel extending from each of said other stations to the first station, connecting means for connecting each of said communication channels individually to a different repeating relay, control means mounted in the teletypewriter at the first station for effecting the selective operation of said connecting means to connect selected communication channels to their respective repeating relays for conditioning said transmitting means for the transmission of signals over the selected communication channels, and selecting means for selectively operating said control means.

30. A communication system including in combination a first teletypewriter station having transmitting means and a plurality of repeating relays, a plurality of other teletypewriter stations, a communication channel extending from each of said other stations to the first station, connecting means for connecting each of said communication channels individually to a different repeating relay, control means mounted in the teletypewriter at the first station for effecting the selective operation of said connecting means to connect selected communication channels to their respective repeating relays for conditioning said transmitting means for the transmission of signals over the selected communication channels, selecting means for selectively operating said control means, and broadcasting means for conditioning the control means to selectively operate the connecting means to connect more than one of the communication channels to the repeating relays at one time for conditioning the system for the transmission of signals by said transmitting means simultaneously over a selected plurality of the communication channels.

31. A communication system including in combination a first teletypewriter station having transmitting means and a plurality of repeating relays, a plurality of other teletypewriter stations, a communication channel extending from each of said other stations to the first station, connecting means for connecting each of said communication channels individually to a different repeating relay, control means mounted in the teletypewriter at the first station for effecting the selective operation of said connecting means to connect selected communication channels to their respective repeating relays for conditioning said transmitting means for the transmission of signals over the selected communication channels, selecting means for selectively operating said control means, and broadcasting means for conditioning the control means to selectively operate the connecting means to connect more than one of the communication channels to the repeating relays at one time for conditioning the system for the transmission of signals by said transmitting means simultaneously over a selected plurality of the communication channels, said broadcasting means including manually operable conditioning means for selectively conditioning the connecting means for operation by the control means.

32. A communication system including in combination a first station having a teletypewriter equipped with a movable carriage, means for moving said carriage along a fixed path of travel, said first station also having transmitting means and a plurality of repeating relays, a plurality of other teletypewriter stations, a communication channel extending from each of said other stations to the first station, connecting means for connecting each of said communication channels individually to a different repeating relay, a plurality of control contacts mounted on said movable carriage for effecting selective operation of said connecting means to connect a selected plurality of said communication channels to their respective repeating relays for conditioning said transmitting means for the broadcasting of signals simultaneously over the selected communication channels, selecting means for selectively operating said control contacts, activating means for activating the control contacts to render their operation effective, and deactivating means for deactivating the control contacts after the selected plurality of communication channels has been connected to render further operation of the control means ineffective.

33. A communication system including in combination a first station having a teletypewriter equipped with a movable carriage, means for moving said carriage along a fixed path of travel, said first station also having transmitting means and a plurality of repeating relays, a plurality of other teletypewriter stations, a communication channel extending from each of said other stations to the first station, connecting means for connecting each of said communication channels individually to a different repeating relay, a plurality of control contacts mounted on said movable carriage for effecting selective operation of said connecting means to connect a selected plurality of said communication channels to their respective repeating relays for conditioning said transmitting means for the broadcasting of signals simultaneously over the selected communication channels, selecting means for selectively operating said control contacts, activating means for activating the control contacts to render their operation effective, and deactivating means for deactivating the control contacts after the selected plurality of communication channels has been connected to render further operation of the control means ineffective, said deactivating means including

electro-responsive means and means for operating said electroresponsive means in response to the operation of a preassigned control contact.

34. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of communication channels extending from said station, each of said communication channels having a plurality of other teletypewriter stations connected therein, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, and selecting means for effecting the selective operation of said control contacts.

35. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of communication channels extending from said station, each of said communication channels having a plurality of other teletypewriter stations connected therein, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, and means for selectively determining which of the other teletypewriter stations connected into a selected communication channel shall record the permutation code signals transmitted over said selected communication channel during a particular period of time.

36. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of communication channels extending from said station, each of said communication channels having a plurality of other teletypewriter stations connected therein, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection of a plurality of said communication channels for the simultaneous broadcasting of permutation code signals thereover by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, and means for conditioning the teletypewriters at all of the stations in each selected channel for recording the permutation code signals simultaneously transmitted over the selected plurality of communication channels during a particular period of time.

37. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of communication channels extending from said station, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, each of said communication channels having a plurality of other teletypewriter stations connected therein, each of said other stations having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, control means mounted on the movable carriage in the teletypewriter at each of these other stations for selectively determining which of the teletypewriters in a selected communication channel shall be employed for recording the permutation code signals transmitted by said transmitting means, and means for selectively operating said control means.

38. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of communication channels extending from said station, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, each of said communication channels having a plurality of other teletypewriter stations connected therein, each of said other stations having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of control contacts mounted on the movable carriage in the teletypewriter at each of these other stations for selectively determining which of the teletypewriters in a selected communication channel shall be employed for recording the permutation code signals transmitted by said transmitting means, means for selectively operating one of the control contacts in the teletypewriter at each station in a selected channel in response to a preassigned permutation code signal transmitted by said transmitting means, conditioning means at each of the stations in said selected channel for prohibiting all but one of the teletypewriters in said channel from recording during a particular period of time, and operating means for operating said conditioning means in response to said operation of one of the control contacts in each teletypewriter in said selected channel.

39. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of communication channels extending from said station, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication

channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, each of said communication channels having a plurality of other teletypewriter stations connected therein, each of said other stations having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, a plurality of control contacts mounted on the movable carriage in the teletypewriter at each of these other stations, broadcasting means for conditioning the teletypewriter at each station in said selected channel for recording signals transmitted by said transmitting means during a particular period of time, means for operating said broadcasting means in response to the operation of a preassigned control contact in each teletypewriter in said selected channel, and means for operating each of said preassigned control contacts in response to the same preassigned permutation code signal transmitted by said transmitting means.

40. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, said carriage having a return position, a plurality of communication channels extending from said first station, each of said communication channels having a plurality of other teletypewriter stations connected therein, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, and conditioning means for rendering the operation of said control contacts effective to accomplish selections only when the carriage is near its return position.

41. A communication system including in combination a first teletypewriter station having transmitting means for transmitting permutation code signals and having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, said carriage having a return position, a plurality of communication channels extending from said first station, each of said communication channels having a plurality of other teletypewriter stations connected therein, a plurality of control contacts mounted on the movable carriage in the teletypewriter at the first station for effecting a selection as to which of said communication channels shall be employed for the transmission of permutation code signals by said transmitting means during a particular period of time, selecting means for effecting the selective operation of said control contacts, conditioning means for rendering the operation of said control contacts effective to accomplish selections only when the carriage is near its return position, each of said other stations having a teletypewriter equipped with a movable carriage and means for moving said carriage along a fixed path of travel, each of said movable carriages having a return position, a plurality of control contacts mounted on each of said movable carriages for effecting a selection as to which of the teletypewriters in a selected channel shall record permutation code signals transmitted by said transmitting means, means for selectively operating said control contacts in response to certain permutation code signals transmitted by said transmitting means, and means for rendering the operation of said control contacts effective only when said movable carriages are near their return positions.

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