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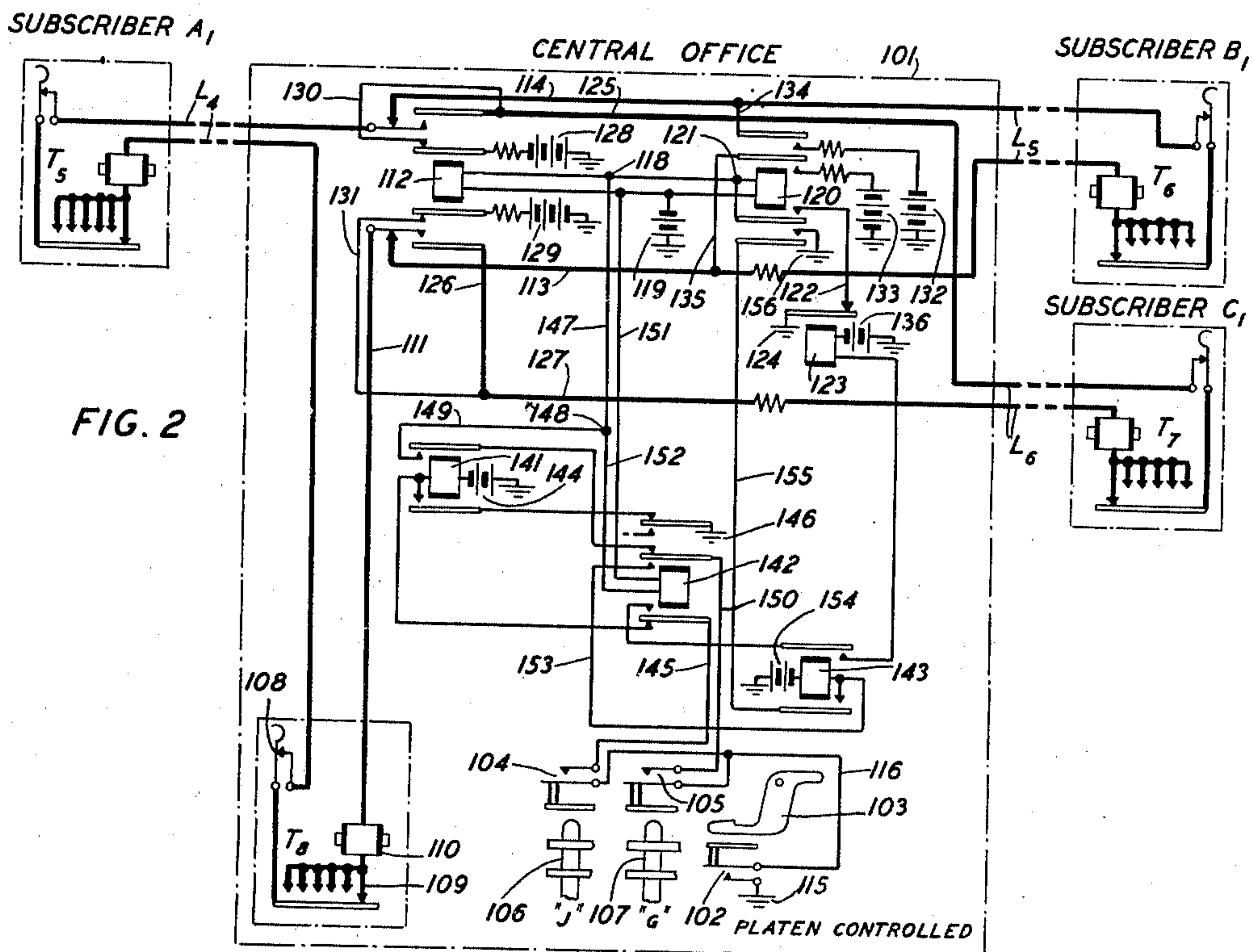
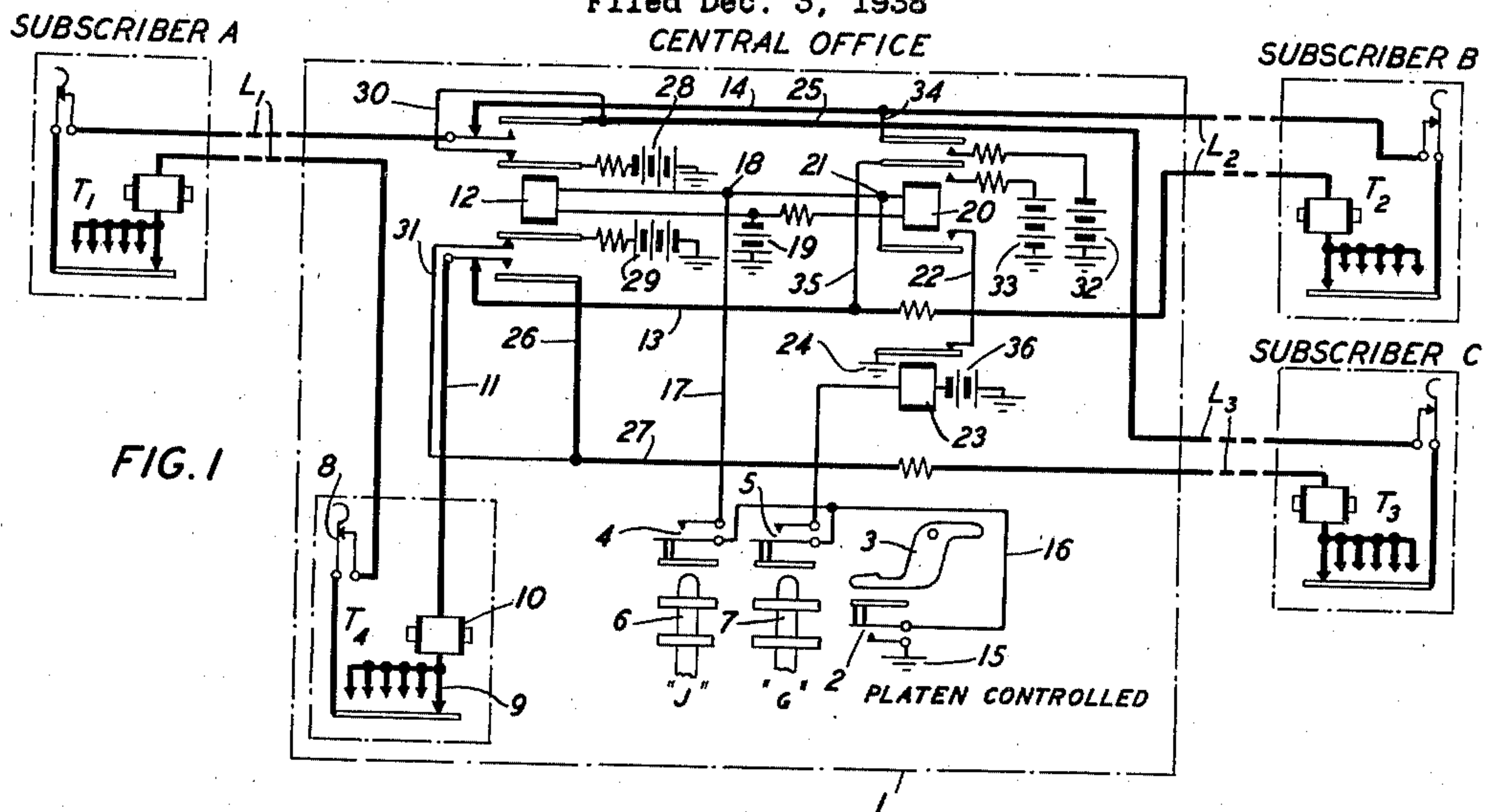
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TELETYPEWRITER SWITCHING SYSTEM

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TELETYPEWRITER SWITCHING SYSTEM

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This invention relates to a printing telegraph selective switching system and, more particularly, to a teletypewriter switching system having means for permitting messages from a transmitting teletypewriter station to be automatically routed to one or the other of two receiving teletypewriter stations.

Certain types of teletypewriter service, such as a dispatching system for the transmission of orders or accounting information, involve the transmission of a large number of short messages from a central teletypewriter station to one or the other of two receiving teletypewriter stations. If manual switching systems were employed for this service, the lines would need to be multiplied to several operators and the messages would have to be sorted and grouped in order to avoid more than one operator attempting to use a particular transmission line. This would result in an uneven distribution of the work unless there were the same number of messages for each receiving station.

Accordingly, it is an object of this invention to provide a teletypewriter switching system with means for automatically routing messages to one or the other of two receiving teletypewriter stations.

It is also an object of the invention to disconnect a connected receiving teletypewriter station without the use of a special, or extra, disconnect signal.

It is a further object of the invention to provide means under the control of a transmitting teletypewriter for connecting it to a receiving teletypewriter station while disconnecting it from another receiving teletypewriter station.

A modification of the invention permits a teletypewriter subscriber to disconnect his teletypewriter from one receiving teletypewriter station and connect it to another receiving teletypewriter station by transmitting from his teletypewriter a plurality of preassigned permutation code signals and enables him to switch his teletypewriter back to the first receiving station by transmitting the same permutation code signals but in reverse order.

These and other objects of the invention are accomplished by providing a central, or switching, teletypewriter with a platen contact and two pull bar contacts of the type described in Patent 2,120,235 granted June 14, 1938 to J. F. Beattie et al. The disclosure of this Beattie et al. patent is incorporated herein by reference as a part of this specification. To accomplish the objects of this invention, the platen contact and the two

pull bar contacts are employed for controlling the energization of switching relays. Operation of the platen contact and one pull bar contact causes the switching relays to operate their armatures to contact the transmitting teletypewriter station to one of the receiving stations, the switching relays locking-up over a path controlled by another relay. Operation of the platen contact and the other pull bar contact causes this last-mentioned relay to open the locking-up circuit of the switching relays which release their armatures to disconnect the previously connected receiving station and to then connect the transmitting station to the other receiving station.

To prevent switching operations from being unintentionally performed by line hits or unintentional sending of the switching signals, a modification of the invention comprises the use of additional relays whereby one station is switched to the transmitting station in response to the operation of the platen contact and both of the pull bar contacts. This station is disconnected and the other station is connected to the transmitting station in response to the operation of the platen contact followed by the operation of both of the pull bar contacts in an order which is the reverse of that in which they were first operated.

These and other features of the invention are fully described and explained in connection with the following detailed description of the drawing in which:

Figure 1 is a schematic circuit diagram of the selective teletypewriter switching system; and

Fig. 2 is a similar circuit diagram of the modified switching system.

In Fig. 1, a subscriber's transmitting teletypewriter station A is shown to be connected by a transmission line L₁ to a teletypewriter central office 1 to which two other subscriber's teletypewriter stations, stations B and C, are connected by transmission lines L₂ and L₃, respectively. The central office 1 is provided with a teletypewriter T₄ which may be of the type disclosed in Patent 1,745,633 granted February 4, 1930 to S. Morton et al. The disclosure of this Morton et al. patent is incorporated herein by reference as a part of this specification. Teletypewriter T₄ is provided with a platen contact 2 which is opened and closed under the control of a lever 3 which is also used for shifting the platen (not shown) of teletypewriter T₄ in the manner described in the above-mentioned Morton et al. patent. Teletypewriter T₄ is further provided with two contacts 4 and 5 operated respectively by pull bars 6 and 7. These pull bars 6 and 7 are preferably

those which have little used upper case symbols, such "'' and "&" which are the upper case symbols for the "J" pull bar 6 and the "G" pull bar 7, respectively. Teletypewriter T₄ is permanently connected in series with the teletypewriter T₁ at station A so that it will always be readily available to perform the desired switching functions.

With the circuit in the condition shown in Fig. 1, the subscriber A is shown to have his teletypewriter T₁ connected in series over line L₁ to the teletypewriter T₄ at the central office 1 and also to the teletypewriter T₂ at station B. This communication path leads from station A over the bottom part of line L₁ to teletypewriter T₄ at the central office 1, over break key 8, sending contacts 9, printer magnet 10, and then along conductor 11 to the lower bottom contact of switching relay 12. From this point, the path extends over conductor 13 to the bottom part of line L₂ and then to station B where it passes through the subscriber's teletypewriter T₂ and then goes back to the central office 1 over the top part of line L₂. At the central office 1, the communication path follows conductor 14 to the upper top contact of relay 12 and then goes out over the top part of line L₁ to station A, thus completing the communication circuit. During this time, station C has its teletypewriter T₃ connected over line L₃ and conductors 25, 30, 27, and 31 to batteries 28 and 29 at central office 1. At this time, all the relays are unenergized.

When the subscriber at station A has a message for the subscriber at station C, he precedes the message with a conditioning, or activating, signal and a routing signal. The conditioning signal is preferably a certain preassigned permutation code signal, such as a shift signal, the transmission and reception of which cause the platen lever 3 to be operated counter-clockwise to place the platen in its upper case position in the manner described in the above-mentioned Morton et al. and Beattie et al. patents. If the platen should already be in its upper case position, it would not be necessary to send a shift signal at this time. Whenever the platen lever 3 is operated to place the platen in its upper case position, it closes the platen contact 2 which remains closed until an unshift signal is transmitted for moving lever 3 clockwise to the position shown in Fig. 1, thereby restoring the platen to its lower case position and opening contact 2 in the manner described in the Beattie et al. patent.

With contact 2 now closed, the subscriber at station A transmits the routing signal which in the preferred embodiment of the invention is the preassigned permutation code signal for effecting the operation of the "J" pull bar 6 which momentarily closes contact 4. This completes a path from ground 15, contact 2, conductor 16, contact 4, and then along conductor 17 to junction 18. Here the path divides, one-half going through relay 12 to battery 19 and the other through relay 20 to battery 19. This energizes the switching relays 12 and 20 which operate their armatures and lock-up over a path from battery 19, through the windings of relays 12 and 20 to junction 21, over the bottom operated armature of relay 20, conductor 22, and then over the non-operated armature of relay 23 to ground 24. Relays 12 and 20 are designed to be quick-acting so that they will operate and lock-up before the pull bar contact 4 opens.

The operation of the armatures of the switching relays 12 and 20 switches station B out of the transmission circuit and switches station C into the transmission circuit in the following manner.

The operation of the outer top armature of relay 12 opens the path from the upper part of line L₁ to conductor 14 and closes the path from line L₁ to conductor 25 leading over line L₃ to station C. The operation of the outer bottom armature of relay 12 opens the path from the lower part of line L₁ to conductor 13 and transfers it to conductor 26 leading over conductor 27 and the lower part of line L₃ to station C. At the same time, the inner top and bottom armatures of relay 12 operate to disconnect batteries 28 and 29 from conductors 30 and 31, respectively, both of which lead to station C. Station C is thus switched from batteries 28 and 29 to communicative relation with station A. The outer top and inner top armatures of relay 20 operate to connect batteries 32 and 33 over conductors 34 and 35, respectively, to conductors 14 and 13 leading over line L₂ to station B. This switches station B out of the transmission circuit and leaves it in an idle condition connected to batteries 32 and 33.

The entire circuit is now in condition for messages to be transmitted between the subscribers at stations A and C, the communication path being traced from the teletypewriter T₁ at station A, over the lower part of line L₁, through the central office switching teletypewriter T₄, over conductor 11, operated outer bottom armature of relay 12, conductors 26 and 27, over the lower part of line L₃, through the teletypewriter T₃ at station C, back over the upper part of line L₃, along conductor 25, over the outer top operated armature of relay 12, and then over the upper part of line L₁ to station A. If the first message begins with an upper case character, no unshift signal is sent. However, if the first message is to begin with a lower case character, the subscriber at station A must transmit an unshift permutation code signal which will cause lever 3 to rotate clockwise and thereby allow contact 2 to open.

Later, when the subscriber at station A has finished his communication with the subscriber at station C and wishes to resume communication with the subscriber at station B, he transmits a shift signal to operate the platen lever 3 which not only places the platen in its upper case position but also closes the platen contact 2 to condition the switching apparatus for operation. If the platen of the teletypewriter T₄ should already be in its upper case position, it would not be necessary for subscriber A to send a shift signal at this time. However, as a safety precaution, he would usually adopt the routine of preceding a routing signal with a shift signal to insure that contact 2 will be closed to condition the switching circuit for effective operation when a routing signal is transmitted.

The subscriber at station A next transmits the preassigned permutation code signal for operating the "G" pull bar 7 which closes its contact 5 momentarily in the manner described in the above-mentioned Beattie et al. Patent 2,120,235. This completes a path for current to pass from grounded battery 36, through the winding of relay 23, contact 5, conductor 16, contact 2 and then to ground 15, thereby energizing relay 23. Relay 23 operates its armature to remove ground 24 from the locking-up circuit of relays 12 and 20, which consequently, release their armatures.

The release of the outer top and outer bottom armatures of relay 12 disconnects station C from communicative relation with station A while the inner top and inner bottom armatures of relay 12 connect station C over conductors 30 and 31

to batteries 28 and 29, respectively. At the same time, the two top armatures of relay 20 disconnect batteries 32 and 33 from station B while the outer top and outer bottom contacts of relay 12 connect conductors 13 and 14 to line L₁ leading to station A. Thus, station C is placed in an idle condition connected to batteries 28 and 29 while station B is again connected into communicative relation with station A. This switching procedure may be repeated as often as desired. It is to be understood that, although stations B and C have been shown to be provided with sending-receiving teletypewriters T₂ and T₃, they may, if desired, be provided with receiving-only teletypewriters. Likewise, although Fig. 1 shows the switching teletypewriter T₄ to be located at a teletypewriter central office 1, it is to be understood that this is the preferred embodiment of the invention and that it is within the scope of the invention to dispense with a teletypewriter exchange central office and to employ instead a private wire system in which the switching teletypewriter T₄ and relays 12, 20, and 23 would be located at station A which would be connected directly to stations B and C by two private wire channels which would be switched into and out of communicative relation by relays 12 and 20.

As was stated above, Fig. 2 shows a modified form of the invention which is designed to reduce the possibility of unintentional operation of the switching apparatus. The circuit shown in Fig. 2 is somewhat similar to that shown in Fig. 1 except that three control relays 141, 142, and 143 and their related circuit connections have been added. The circuit illustrated in Fig. 2 is represented as being in a condition analogous to that of the circuit shown in Fig. 1 in that the subscriber at station A₁ has his teletypewriter T₅ connected to the central office 101 by line L₄ and then over conductors 114, 111, and 113 to line L₅ leading to the teletypewriter T₆ at station B₁. Thus, stations A₁ and B₁ are shown to be connected into communicative relation while station C₁ has its teletypewriter T₇ connected over line L₆ and conductors 125, 130, 127, and 131 to batteries 128 and 129 at central office 101. All the relays are unenergized at this time.

To reverse this connection, the subscriber at station A₁ transmits the preassigned permutation code signal for effecting the operation of the platen lever 103 for shifting the platen and also for closing the platen contact 102 thereby applying ground 115 to the open contacts 104 and 105. Subscriber A₁ next transmits the preassigned code signal for operating the "J" pull bar 106 which momentarily closes its contact 104 to complete a path for energizing relay 141. This path is traced from grounded battery 144, through the winding of relay 141, outer bottom contact and bottom armature of relay 142, conductor 145, contact 104, conductor 116, contact 102, and then to ground 115. Accordingly, relay 141 operates its armatures and locks-up over a path from grounded battery 144, winding of relay 141, bottom armature of relay 141, and then over the non-operated outer top armature of relay 142 to ground 146. At the same time, the top armature of relay 141 prepares a circuit leading from grounded battery 119, through the windings of relays 112 and 120 to junction 118, and then down conductor 147 to junction 148, conductor 149, operated top armature of relay 141, inner top armature of relay 142, and then along conductor 150 to the open contact 105.

The subscriber at station A₁ next transmits the

preassigned permutation code signal for operating the "G" pull bar 107 which momentarily closes its contact 105 to complete the circuit just traced for applying ground 115 to battery 119. Closure of contact 105 also momentarily closes a path from battery 119, conductor 151, winding of relay 142, along conductor 152 to junction 148, conductor 149, top armature of relay 141, inner top armature of relay 142, conductor 150, contact 105, conductor 116, and then to ground 115, thereby operating relay 142.

Before contact 105 opens, relays 112, 120 and 142 operate and lock-up over a circuit extending from junction 118 to junction 121, over the inner bottom armature of relay 120, conductor 122, and then over the armature of relay 123 to ground 124. When relay 142 operated its outer top armature, it disconnected ground 146 from relay 141, thereby opening the locking-up circuit of relay 141 and causing it to release its armatures. At the same time, the inner top armature of relay 142 opens the path from contact 105 to the top armature of relay 141 and prepares a circuit leading from contact 105 over this armature of relay 142, conductor 153, winding of relay 143, and then to grounded battery 154 but contact 105 opens before relay 143 can operate at this time. The bottom armature of relay 142 operates to prepare a circuit leading from contact 104 to the top armature of relay 143.

The operation of the two top armatures of relay 120 switches station B₁ to batteries 132 and 133 via conductors 134 and 135. At the same time, station C₁ is connected into the transmission circuit via conductors 125 and 126 and the outer top and outer bottom operated armatures of relay 112. The circuit is thus placed in condition for the subscriber at station A₁ to communicate with the subscriber at station C₁.

When subscriber A₁ wishes to again communicate with subscriber B₁, he transmits the activating signal to cause platen lever 103 to close contact 102. The subscriber A₁ then transmits the preassigned permutation code signal for operating the "G" pull bar 107 to close momentarily contact 105 thereby completing the energizing circuit for relay 143. This energizing circuit extends from ground 115, through contact 102, conductor 116, contact 105, conductor 150, inner top operated armature of relay 142, conductor 153, winding of relay 143, and then to grounded battery 154. Relay 143 locks-up over its bottom armature, conductor 155, the outer bottom operated armature of relay 120, and then to ground 156. The top armature of relay 143 prepares an energizing path for relay 123 from battery 136 over the bottom armature of relay 142 and conductor 145 to contact 104.

Subscriber A₁ next transmits the preassigned code signal to effect the operation of the "J" pull bar 106 which closes its contact 104 momentarily and thereby completes the energizing path for relay 123 from battery 136, winding of relay 123, top armature of relay 143, bottom armature of relay 142, conductor 145, contact 104, conductor 116, contact 102, and then to ground 115. Accordingly, before contact 104 opens, relay 123 operates its armature which opens the locking-up circuit of relays 112, 120, and 142 and causes these relays to release their armatures. The release of the two top armatures of relay 120 disconnects station B₁ from batteries 132 and 133. The release of the inner bottom armature of relay 120 further opens the locking-up circuit of these relays while the release of its outer bottom

armature opens the locking-up circuit of relay 143, which accordingly, releases its armatures. The release of the armatures of relay 112 connects station B₁ into the transmission circuit by closing the paths from conductors 113 and 114 to line L₄ and, at the same time, these armatures disconnect conductors 125 and 126 from line L₄ and switch station C₁ over conductors 130 and 131 to batteries 128 and 129. Relay 142 releases its armatures thus restoring the entire circuit to the condition shown in Fig. 2.

This procedure can be repeated by the subscriber at station A₁ as often as desired. All that he need do to disconnect his station from communicative relation with the subscriber at station B₁ and to connect it to station C₁ is to transmit a shift signal followed by the preassigned code signals for "J" and "G". To disconnect his teletypewriter T₅ from communicative relation with the teletypewriter T₇ at station C₁ and to connect it to the teletypewriter T₆ at station B₁, he simply transmits a shift signal followed by the permutation code signals for "G" and "J". In other words, by preceding messages with the proper combination of preassigned permutation code signals, they will be automatically routed to one or the other of the two receiving stations B₁ and C₁.

The invention has been described with reference to its preferred embodiment and its preferred application. It is to be understood that the invention is capable of other applications and may be embodied in other forms and apparatus than that specifically shown in the drawing. Consequently, the invention is not to be limited to the particular form and use shown and described, but is to be limited only by the claims appended hereto.

What is claimed is:

1. A printing telegraph system including in combination a plurality of subscribers' printing telegraph stations each provided with a teletypewriter, a plurality of communication channels extending therebetween, electro-responsive means for switching the communication channels, means for energizing the electroresponsive means for establishing a communication connection between the teletypewriters at two of the stations for the transmission of permutation code signals, and means for deenergizing said electroresponsive means for discontinuing the communication connection and for establishing at the same time another communication connection between teletypewriter at one of the two stations and a teletypewriter at another of said stations.

2. A printing telegraph system including in combination a plurality of subscribers' printing telegraph stations each provided with a teletypewriter having a plurality of instrumentalities with means for operating said instrumentalities, a plurality of communication channels extending therebetween, electroresponsive means for switching the communication channels, a circuit for energizing said electroresponsive means for establishing a communication connection between the teletypewriters at two of the stations for the transmission of permutation code signals, and control means for deenergizing the electroresponsive means for discontinuing the communication connection and for establishing at the same time another communication connection between a teletypewriter at one of the two stations and a teletypewriter at another of said stations, said control means including a contact connected into said energizing circuit and means for operating

the contact in response to the operation of a pre-assigned instrumentality in one of the teletypewriters.

3. A printing telegraph system including in combination a plurality of subscribers' teletypewriter stations, a plurality of communication channels extending therebetween, means for connecting two of said stations together in communicative relation, normally unenergized switching means for disconnecting these two stations and for connecting one of the two stations to another of said stations for communication therebetween, a normally open circuit for energizing the switching means, a printing telegraph machine having a plurality of pull bars, and a contact mounted in said printing telegraph machine for operation by one of the pull bars for closing said energizing circuit.

4. A printing telegraph system including in combination a plurality of subscribers' teletypewriter stations, a plurality of communication channels extending therebetween, means for connecting two of said stations together in communicative relation, switching means for disconnecting these two stations and for connecting one of the two stations to another of said stations for communication therebetween, a normally open circuit for energizing the switching means, a printing telegraph machine having a plurality of pull bars, a contact mounted in said printing telegraph machine for operation by one of the pull bars for controlling the operation of the switching means, a normally open activating contact mounted in said printing telegraph machine for closing part of the energizing circuit, and means for closing said activating contact.

5. A printing telegraph system including in combination a plurality of subscribers' teletypewriter stations, a plurality of communication channels extending therebetween, means for connecting two of said stations together in communicative relation, switching means for disconnecting these two stations and for connecting one of the two stations to another of said stations for communication therebetween, a normally open energizing circuit for energizing the switching means, a printing telegraph machine having a normally open first contact for closing part of the energizing circuit and a normally open second contact for completing the energizing circuit, and operating means for closing both of the contacts for effecting the energization of the switching means.

6. A teletypewriter communication system including in combination at least three different subscribers' teletypewriter stations, a plurality of communication channels extending therebetween, switching means for connecting the first and second of the stations together in communicative relation, a printing telegraph machine having a first contact and a second contact mounted therein, operating means for operating firstly the first contact and secondly the second contact for causing the switching means to disconnect these two stations and to connect the first of the two stations to the third station, and means for operating firstly the second contact and secondly the first contact for causing the switching means to disconnect the first and third stations and to connect the first station back to the second station.

7. A teletypewriter communication system including in combination a teletypewriter central office and at least three different subscribers' teletypewriter stations, a plurality of communication channels extending from the central office

to the three subscribers' stations, switching means for connecting and disconnecting one of said subscribers' stations to and from the second and third subscribers' stations alternately, a normally open energizing circuit for energizing the switching means, a normally open activating contact for closing part of the energizing circuit, means for closing said activating contact in response to the transmission over the system of a preassigned permutation code signal, operating means, means for operating the operating means in response to a second preassigned permutation code signal transmitted over the system after the switching means has been conditioned for operation for causing the switching means to disconnect the first of the subscribers' stations from the second of the subscribers' stations and connect it to the third of the subscribers' stations, and means for operating the operating means in response to a third preassigned permutation code signal transmitted over the system after the switching means has been conditioned for operation for causing the switching means to disconnect the first of the subscribers' stations from the third subscriber's station and to connect it to the second subscriber's station.

8. A teletypewriter communication system including in combination a teletypewriter central office and three different subscribers' teletypewriter stations, a plurality of communication channels extending from the central office to the three subscribers' stations, switching means for connecting and disconnecting one of said subscribers' stations to and from the second and third subscribers' stations alternately, activating means for conditioning the switching means for operation, means for operating said activating means in response to the transmission over the system of a preassigned permutation code signal, operating means, means for operating the operating means in response to a second and a third preassigned permutation code signals transmitted over the system after the switching means has been conditioned for operation for causing the switching means to disconnect the first of the subscribers' stations from the second of the sub-

scribers' stations and connect it to the third of the subscribers' stations, and means for operating the operating means in response to the transmission of the second and third preassigned permutation code signals over the system in reverse order after the switching means has been conditioned for operation for causing the switching means to disconnect the first of the subscribers' stations from the third subscriber's station and to connect it to the second subscriber's station.

9. A printing telegraph system including in combination a first printing telegraph machine, a second and third printing telegraph machines, a plurality of circuits for connecting the second and third printing telegraph machines alternatively to the first printing telegraph machine for communication therebetween, electroresponsive means, control means for controlling the electroresponsive means for connecting the second printing telegraph machine to the first printing telegraph machine for communication therebetween while connecting the third printing telegraph machine into an idle circuit, and additional control means for causing the electroresponsive means to disconnect the second printing telegraph machine from the first printing telegraph machine and to connect it into an idle circuit while in the same operation disconnecting the third printing telegraph station from its idle circuit and connecting it to the first printing telegraph machine for communication therebetween.

10. A printing telegraph system including in combination a first printing telegraph machine, a second and third printing telegraph machines, a plurality of circuits for connecting the second and third printing telegraph machines alternatively to the first printing telegraph machine for communication therebetween, and switching means for disconnecting one of the other printing telegraph machines from the first printing telegraph machine while in the same operation connecting the other printing telegraph machine to the first printing telegraph machine for communication therebetween.

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