

Aug. 1, 1933.

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1,920,453

TELEGRAPHIC INTERCOMMUNICATING SYSTEM

Filed Jan. 13, 1932

5 Sheets-Sheet 1

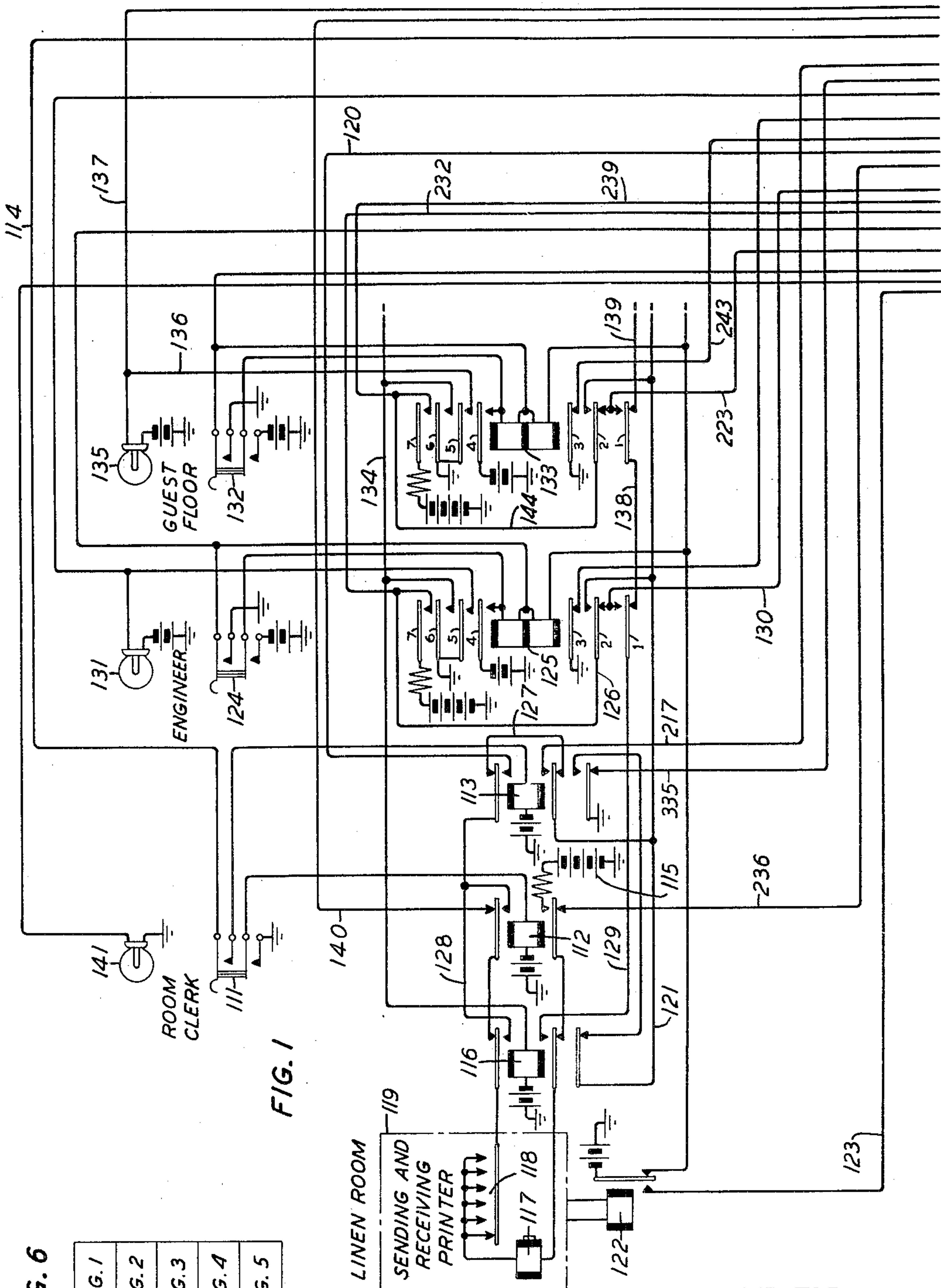


FIG. 6

FIG. 1
FIG. 2
FIG. 3
FIG. 4
FIG. 5

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5 Sheets-Sheet 2

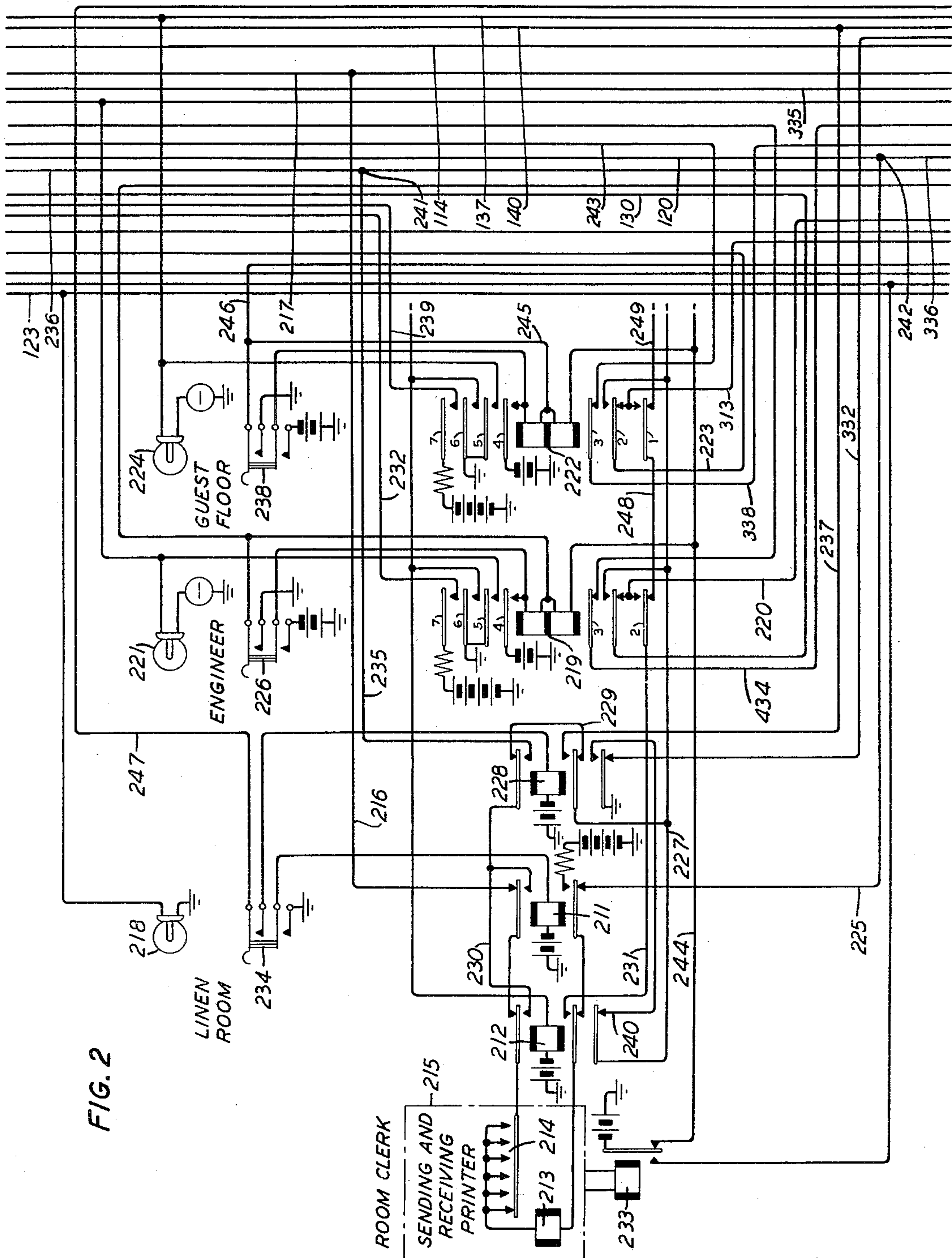


FIG. 2

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5 Sheets-Sheet 3

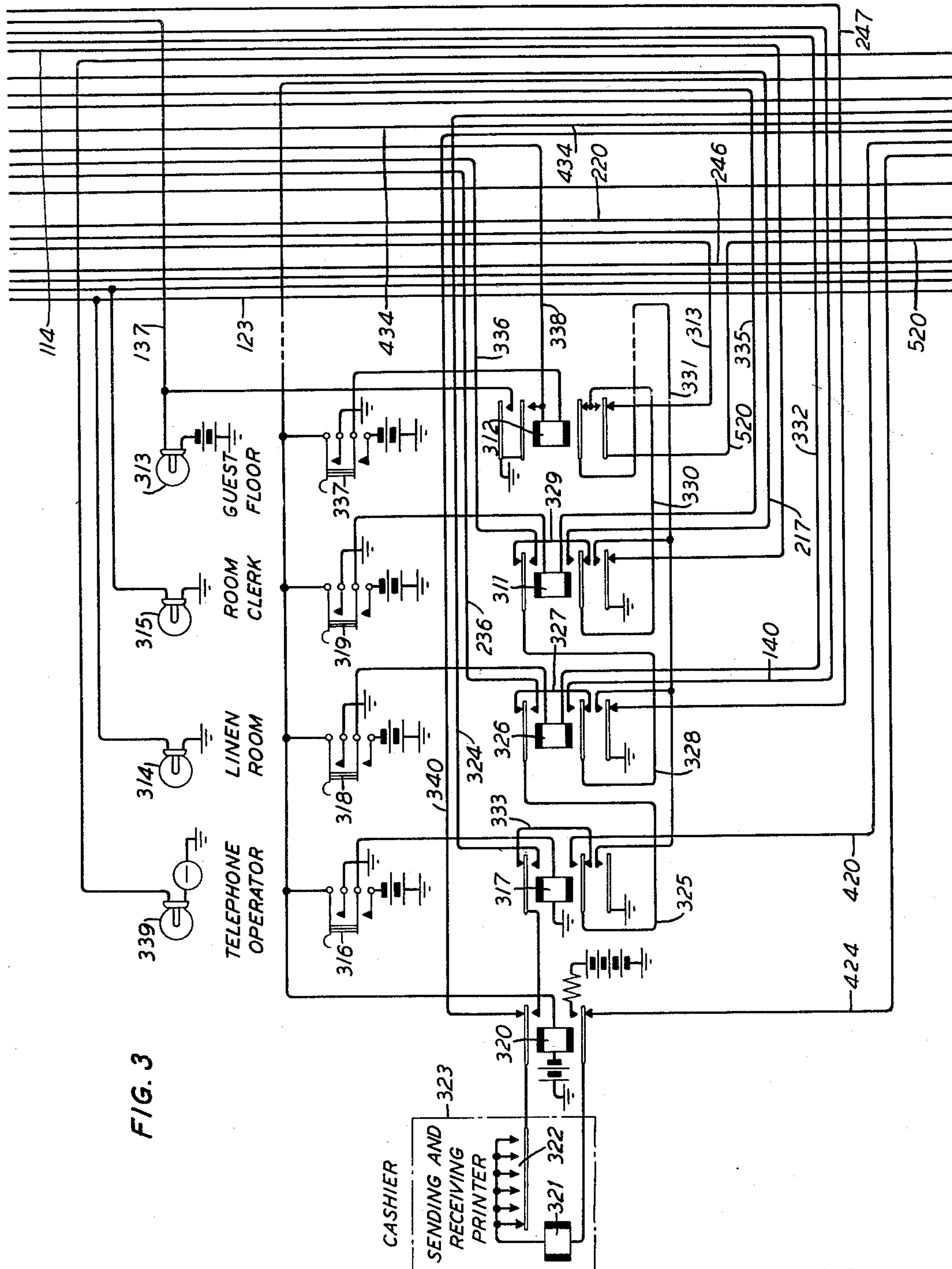


FIG. 3

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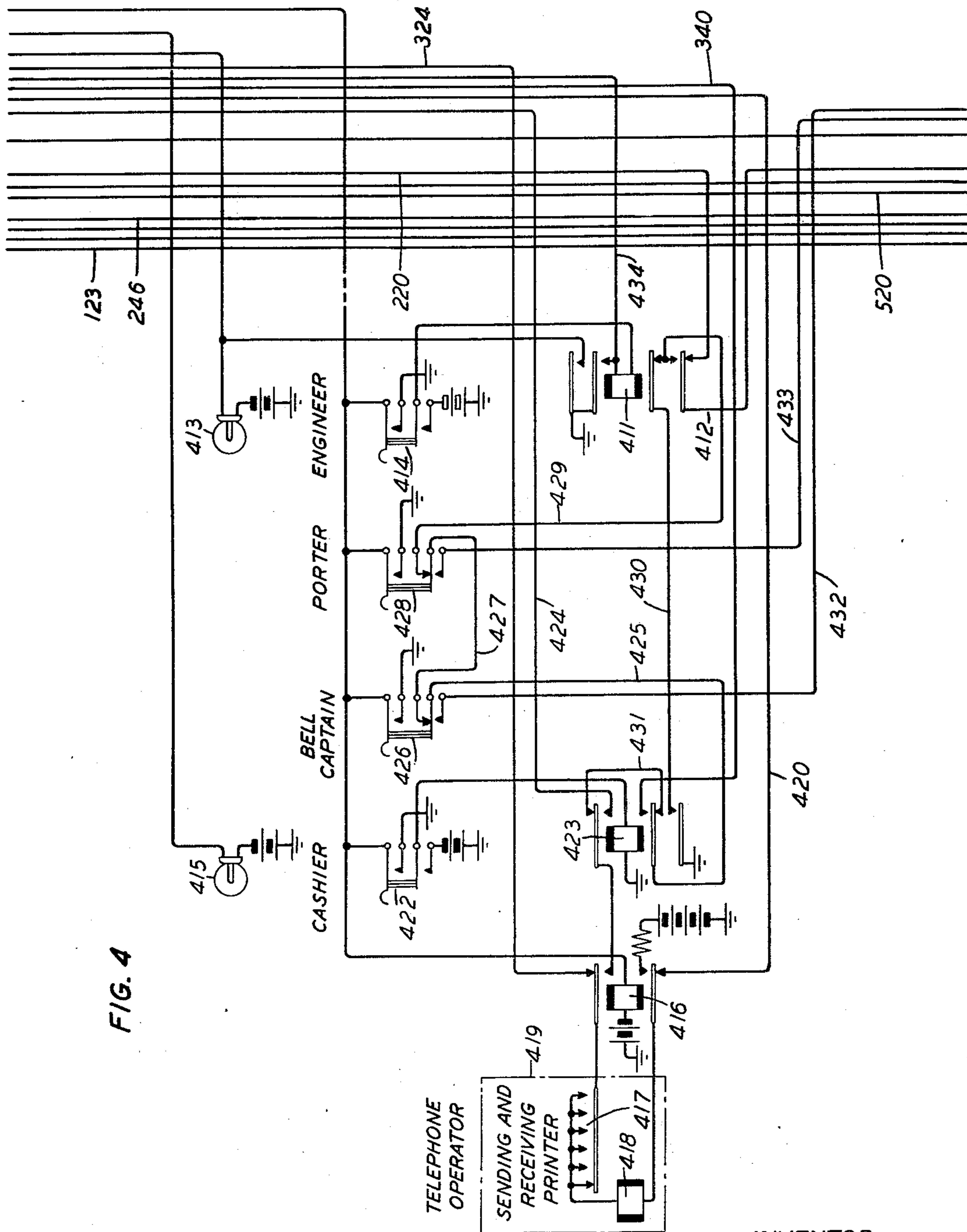
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TELEGRAPHIC INTERCOMMUNICATING SYSTEM

Filed Jan. 13, 1932

5 Sheets-Sheet 4



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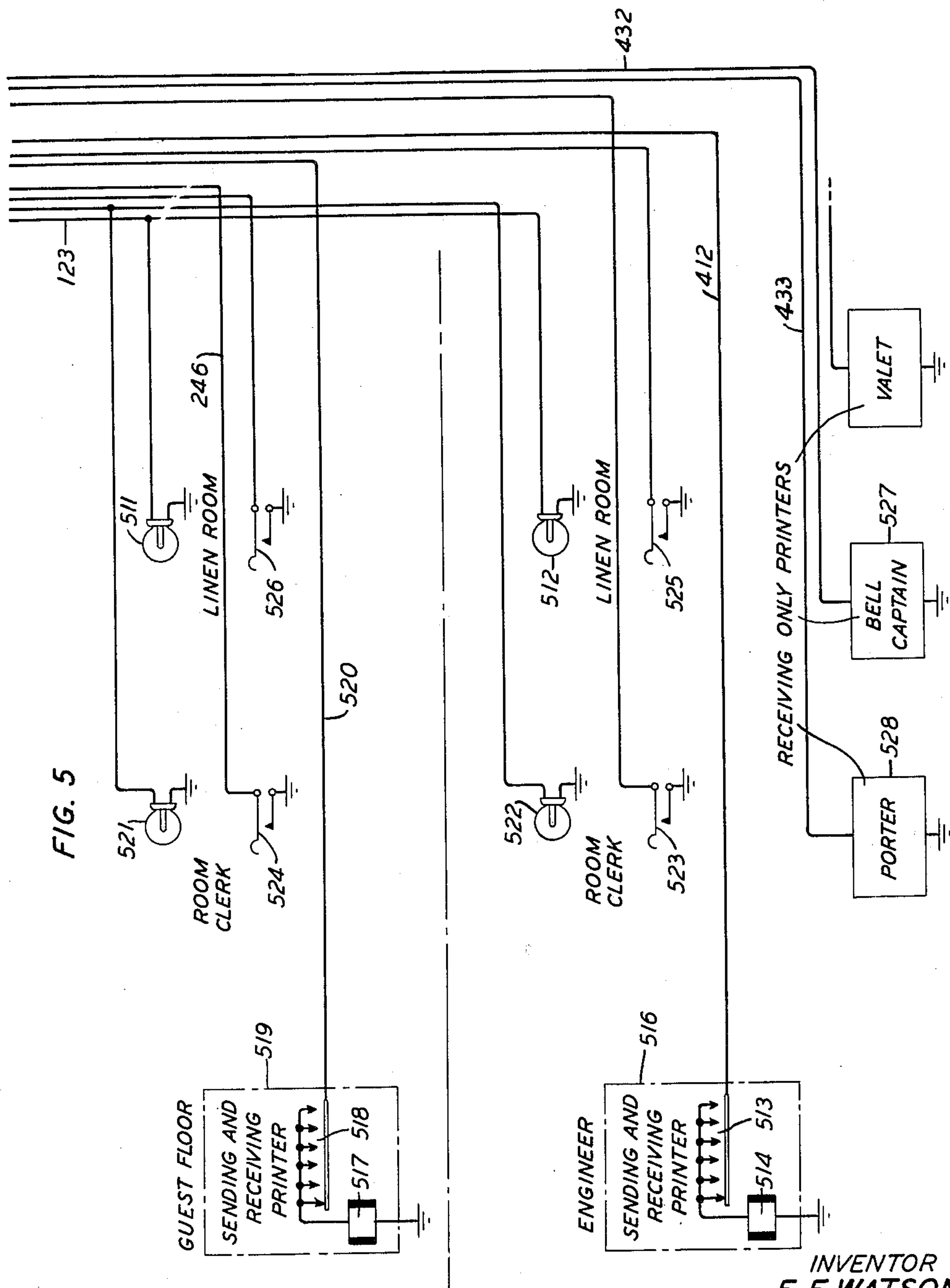
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TELEGRAPHIC INTERCOMMUNICATING SYSTEM

Filed Jan. 13, 1932

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

1,920,453

TELEGRAPHIC INTERCOMMUNICATING
SYSTEM

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Application January 13, 1932. Serial No. 536,451

17 Claims. (Cl. 178-4.1)

This invention relates to printing telegraph exchange systems and more especially to sub-stations whereat switching means are employed for establishing and controlling communication circuits between separated stations.

An object of this invention is to enable an attendant at one station to establish a connection quickly between his own printer and the printer or printers at the station or stations with whom he desires to communicate.

Another object of this invention is to provide a remote control arrangement whereby a calling party may start the motor at the called station in the absence of an attendant at that station.

A further object of this invention is to provide a broadcasting arrangement whereby a message may be broadcast from one station to a plurality of selected receiving stations.

A still further object of this invention is to provide a system for connecting at will, one or more main, or "sending and receiving", stations and one or more outlying or "receiving only", stations.

Heretofore in private intercommunication systems employing printing telegraph equipment and operating on an automatic basis, complicated switching mechanisms were required to establish a connection between separated stations. Considerable time was consumed in establishing the connections, particularly in systems wherein selective rotary step-by-step switches were used. Furthermore, the auxiliary apparatus required for testing idle and busy conditions of a called station were equally complicated and expensive.

According to the present invention no complicated or expensive apparatus is required other than a "sending and receiving printer" or a "receiving only" printer at each station as is required in the older systems over which the present system is an improvement. The present invention provides a system wherein a plurality of stations may be interconnected, as desired, automatically. The system comprises a plurality of main or central stations whereat "sending and receiving printers" are provided and a plurality of outlying stations some of which have "sending and receiving" printers and others have "receiving only" printers. The main stations and some of the outlying stations are each provided with a calling key for one or more of the other stations and when the key associated with any one desired station is operated, a normally opened line extending to the desired station is immediately

closed, provided, of course, the desired station is not busy at the time. The operation of the key lights a "busy" lamp at each of the other stations from which connections to the calling station may be made, indicating that the calling station is busy. The line circuit between any two interconnected main stations is common to both sending and receiving at each station and includes at each of the interconnected stations a printer in series connection. The printers are provided with control arrangements which permit automatic starting immediately upon a closure after an open condition of the line. The starting of the motor at certain main stations or the closure of the "call" circuit at the other main stations and at the outlying stations is utilized for operating at each of the other main stations which are also arranged to establish connections to the called stations, a "busy" lamp indicating that the called station is busy. The printers are also provided with a mechanical control feature so that transmission of a special printer code signal stops the printer motors. Before disconnecting at the end of a message the operator at either station sends this code signal to stop the printer motors. Two or more main and outlying stations may be selectively connected to a calling station in which event two or more busy lamps respectively associated with the called stations and located at the calling station, are lighted as soon as the line circuits are closed.

A feature of this invention is an arrangement wherein the line connecting two or more stations is normally opened, thereby permitting current to flow through the printer mechanisms only while it is in use.

A feature of this arrangement is that the line circuit batteries are situated at the main stations and there is no need for battery supply at the outlying stations.

Another feature is the provision of a lock-out arrangement for only certain of the main stations whereby such stations are prevented from interrupting an established connection between two or more other stations in the system.

Another feature is the selective broadcast arrangement whereby any main station is capable of sending a broadcast to two or more other stations.

Another feature is the arrangement whereby a calling station is notified as soon as two or more stations are interconnected that such stations are busy.

A preferred embodiment will now be described with respect to the accompanying drawings which illustrate a hotel intercommunicating system comprising main or central stations such as the linen room, the room clerk, the cashier and the telephone operator's stations, and outlying station such as the guest floor, the engineer's, the porter's, the bell captain's, the valet's rooms. The drawings illustrate a system arranged as follows:

Figure 1 shows the equipment at the linen room;

Fig. 2 shows the equipment at the room clerk's station;

Fig. 3 shows the equipment for the cashier's station;

Fig. 4 shows the equipment for the telephone operator's room;

Fig. 5 shows the equipment for the first guest floor, the engineer's room and each of the other outlying stations such as would be provided for the porter, the bell captain and the valet, the equipment for the last three stations being a "receiving only" printer which is represented diagrammatically by rectangles. The equipment at each of the other guest floors is the same as that shown for the first floor; and

Fig. 6 shows the arrangement of the various sheets of the drawings.

Only so much of the equipment as is necessary to give a clear understanding of the invention is shown.

The system described herein is arranged to establish the following connections:

Linen room

From linen room to engineer's or room clerk's and guest floor stations separately. The connections to the room clerk's and any guest floor stations may also be made simultaneously.

Room clerk's station

From the room clerk's station to the engineer's room, the linen room and each of the guest floor stations separately. Simultaneous connections may be made to the linen room and to the engineer or any guest floor.

Cashier's station

From the cashier's station to the telephone operator's, the linen room, the room clerk's and any guest floor station. All these connections may also be established separately or simultaneously.

Telephone operator's station

From the telephone operator's station to the valet's, the porter's, the bell captain's and the engineer's stations and any other outlying stations that may be desired. The connections are established separately or simultaneously.

Guest floor

From each guest floor to the linen room and the room clerk's stations, either separately or to both stations simultaneously.

Engineer's station

From the engineer's station to the room clerk's and the linen room stations separately or simultaneously.

Valet's, porter's, bell captain's stations, etc.

Connections to these outlying stations can terminate only; no connections can originate at

these stations. The reason for this is that the printers at these stations are, as stated above, of the "receiving only" type.

Other main and outlying stations may be added as desired. It is understood that the scope of the invention is not limited to the arrangement shown herein, that is, to a hotel intercommunicating system, but may also be adapted for many other uses.

APPARATUS IN GENERAL

At the linen room station

The equipment at the linen room station comprises a "sending and receiving" printer, a "busy" lamp and a call key for the room clerk and a "busy" lamp, a call key and a multi-contact double winding relay for each of the guest floors and the engineer's station, two single-winding relays for establishing the connection of the local printer to the printer at the room clerk's station, a single-winding relay for effecting a connection between the local printer and the printer at either of the guest floors or the engineer's stations and a single winding relay for simultaneously closing circuits extending to the room clerk's, the cashier's, the engineer's, and the guest floor stations whereat "busy" lamps are located to indicate to the operators at these stations when the linen room printer is busy.

At the room clerk's station

The equipment at the room clerk's station comprises a "sending and receiving" printer, a "busy" lamp and a call key for the linen room, a "busy" lamp, a call key and a multi-contact double-winding relay for each of the guest floors and the engineer's stations, two single-winding relays for establishing the connection of the local printer to the printer at the linen room, a single-winding relay for effecting a connection between the local printer and the printer at either of the guest floors or engineer's stations, and a single-winding relay for simultaneously closing "busy lamp" circuits to the linen room, the cashier's, the engineer's and the guest floor stations. The "busy" lamps at these different stations indicate that the printer at the room clerk's station is busy.

At the cashier's station

The equipment at the cashier's station comprises a "sending and receiving" printer, a "busy" lamp and a call key for each of the telephone operator's the linen room, the room clerk's and the guest floor stations, a single-winding relay for preparing a connection between the local printer and the printer at the telephone operator's, the linen room, the room clerk's or the guest floor stations, and a plurality of single-winding relays for respectively completing the circuits so prepared. The "busy" lamp circuits which extend to the telephone operator's, the linen room, the room clerk's and the guest floor stations are respectively controlled either directly or indirectly by the call keys located at their respective stations.

At the telephone operator's station

The equipment at the telephone operator's station comprises a "sending and receiving" printer, a "busy" lamp and a call key for each of the cashier's and the engineer's stations, a call key for the bell captain's and the porter's stations, a single-winding relay for preparing

a connection between the local printer and the printer at either the cashier's or the engineer's stations, and a single winding relay for completing such connections. The "busy" lamp circuits which extend to the cashier's, and the engineer's stations are respectively controlled from the call keys located at their respective stations.

At the guest floor station

The equipment shown above the dot and dash line in Fig. 5 is that located at the guest floor station. This equipment comprises a "sending and receiving" printer, and a "busy" lamp and a call key for each of the room clerk's and the linen room stations. The busy circuits which extend to the room clerk's and the linen room stations are respectively controlled by the call keys located at their respective stations.

At the engineer's station

The equipment shown immediately below the dot and dash line and in the middle portion of Fig. 5 represents that for the engineer's station. This equipment comprises a "sending and receiving" printer, and a busy lamp and a call key for each of the room clerk's and the linen room stations. The busy circuits which extend to the room clerk's and the linen room stations are respectively controlled over the call keys located at their respective stations.

At the porter's, the bell captain's and the valet's stations

The equipment at each of these stations is shown below the equipment for the engineer's station in Fig. 5, and comprises a "receiving only" printer. This equipment is represented diagrammatically by rectangles.

It is understood that other guest floor stations may be employed, the equipment for the additional station being identical with that of the guest floor station shown.

The printers are of the start-stop type, and as stated above, are each equipped with a control arrangement for permitting it to automatically start when an interconnecting line circuit between printers is closed and to stop in response to a special printer code signal from either of the printers interconnected by such line circuit. A suitable type of printer is disclosed in U. S. Patent 1,745,633 granted to S. Morton et al. on February 4, 1930. The "call" keys are of the locking type.

A description of the operation involved in establishing connections from each of the main stations to the other main stations and to the outlying stations will now be described.

OPERATION OF THE SYSTEM LINEN ROOM STATION

As stated above, the linen room station equipment is adapted to establish connections to the room clerk's station, or the engineer's and the guest floor stations, either separately or simultaneously. Also connections may be made to the linen room station from either of the room clerk's or cashier's, or engineer's or guest floor stations. The latter connections will be hereinafter described under the heading of the office in which the connection originates.

Linen room station to the room clerk's station

To establish a connection from the linen room station to the room clerk's station, the room clerk's "call" key 111 at the linen room station

is operated and thereby connects ground at its lower operated contacts to an obvious operating circuit for a single winding relay 112. The operation of the key closes at the upper operated contacts of the key the operating circuit for the single winding relay 113. The latter circuit may be traced from grounded battery, through the winding of relay 113, upper operated contacts of key 111, conductor 114, to ground at the lower outer armature of single winding relay 311 at the cashier's station. Relays 112 and 113 operate simultaneously and close the line circuit between the printers at the linen room and the room clerk's stations. The line circuit may be traced from grounded battery 115, front contact and lower armature of relay 112, back contact and lower inner armature of single winding relay 116, through the winding of printer magnet 117 and the sending contacts 118 of the printer 119, upper armature and back contact of relay 116, upper armature and front contact of relay 112, upper armature and front contact of relay 113, conductors 120 and 225, back contact and lower armature of single winding relay 211, back contact and lower inner armature of single winding relay 212, through the winding of printer magnet 213, sending contacts 214 of printer 215 at the room clerk's station, upper armature and back contact of relay 212, upper armature and back contact of relay 211, conductors 216 and 217, front contact and lower inner armature of relay 113, conductor 121, lower outer armature and back contact of relay 116, front contact and lower outer armature of relay 113 to ground. The closure of this line circuit starts the motors (not shown) of the printers 119 and 215 and the motors, in operating, respectively close operating circuit for relays 122 and 233. Relay 122, in operating, closes at its armature and front contact a circuit extending over conductor 123 and then over parallel paths through the linen room station "busy" lamps 218, 314, 511 and 512 which are respectively located at the room clerk's, cashier's, guest floor and engineer's stations. These lamps light to thereby indicate to the attendants at the stations where the lamps are located that the printer at the linen room station is busy. Likewise relay 233, in operating, closes at its armature and front contact a circuit extending over conductor 225, and then over parallel paths to the room clerk's station "busy" lamps 141, 315, 521 and 522 which are respectively located at the linen room, cashier's, guest floor and engineer's stations.

Should a call for the linen room station be made from the engineer's or guest floor station at the time the linen room station is busy, the "call" circuit for either of these calling stations would be found opened at the back contact and armature of relay 122, and therefore the circuit could not be completed.

Should a call be made from the cashier's station to the linen room at the time the linen room and room clerk's printers are interconnected, the line circuit for interconnecting the linen room printer and the cashier's printer would be found open at the back contact and lower armature of relay 112 or the back contact and lower inner armature of relay 116.

Should a call be made from the cashier's or the guest floor or the engineer's station to the room clerk's station at the time the latter station is connected for operation to the linen room station, the "call" circuit from cashier's station

would be found open at the back contact and lower outer armature of relay 113, and the "call" circuits from both, the guest floor and the engineer's stations would be found open at the back contact of relay 233.

Linen room station to the engineer's station

To establish a connection to the engineer's station the engineer's "call" key 124 at the linen room station is operated and thereby simultaneously connects ground at its upper operated contacts and grounded battery at its lower operated contacts to the lower and the upper windings, respectively, of the double winding relay 125, the circuit including the lower winding extending to grounded battery at the back contact and armature of relay 122 and the circuit including the upper winding extending to ground at the upper operated contacts of key 124. Relay 125 operates and closes at its armature No. 4 a locking circuit for itself extending through its upper winding to ground at the upper operated contacts of key 124. Also, it closes at its armature No. 6 and contact an operating circuit for relay 116. As its armatures Nos. 2 and 7 and their respectively associated front contacts the line circuit including printers 119 and 516 is closed, the line circuit extending from grounded battery at armature No. 7 of relay 125, conductor 126, armature No. 2 and its front contact of relay 125, conductor 121, lower inner armature and back contact of relay 113, conductor 127, upper armature and back contact of relay 113, conductor 128, front contact and upper armature of relay 116, sending contacts 118 and through the winding of printer magnet 117 of printer 119, lower inner armature and front contact of relay 116, conductor 129, armature No. 1 and its front contact of relay 125, conductor 130, armature No. 2 and its back contact of relay 219, conductor 220, back contact and lower outer armature of relay 411, conductor 412, sending contacts 513 and through the winding of printer magnet 514 of printer 516 to ground. At armature No. 5 of relay 125 and its front contact, a circuit is closed to light the engineer's "busy" lamps 131, 221, 413 respectively located at the linen room, the room clerk's and the telephone operator's stations. When the line including printers 119 and 516 is closed, the printer motors start and the relay 122 operates. Relay 122, in operating, connects grounded battery at its armature and front contact to conductor 123 which extends in parallel paths to the linen room "busy" lamps 218, 314, 511 and 512 to light these lamps.

Should a call from the room clerk's station be made to the linen room station at the time a connection is established between the latter station and the engineer's station, the operation of the linen room "call" key 234 at the room clerk's station would close a circuit extending from grounded battery, through the winding of relay 228, upper operated contacts of key 234, conductor 247, back contact and lower outer armature of relay 326 to ground. Also, at the lower operated contacts of key 234 in obvious operating circuit for relay 211 would be operated. Relays 228 and 221 would operate to connect the room clerk's printer in a circuit extending from grounded battery at the front contact and lower armature of relay 211, back contact and lower inner armature of relay 212, through the winding of printer magnet 213 and sending contacts

214 of printer 215, upper armature and back contact of relay 212, upper armatures and front contacts in series, of relays 211 and 228, conductors 235 and 236, back contact and lower armature of relay 112 to back contact of the lower inner armature of relay 116. Relay 116 would be in an operated position and no connection would be established at the back contact and lower inner armature of relay 112. Therefore, the room clerk's station can not be cut in on an established connection between the linen room and the engineer's stations by operating "call" key 234. However, in the system described herein it is desirable to permit the room clerk to have access to this established connection and therefore the room clerk may cut in on the connection by operating the engineer's "call" key 226, which, when operated closes parallel circuits respectively extending through the two windings of relay 219. One of these circuits is traceable from the grounded battery at the lower operated contacts of key 226, through the upper winding of relay 219, back to ground at the upper operated contacts of key 226 and the other from grounded battery at the armature and back contact of relay 233, conductor 244, through the lower winding of relay 219, to ground at the upper closed contacts of key 226. Relay 219 operates and closes an operating circuit for relay 212 which in turn operates to include the room clerk's printer in the established line circuit which may now be traced from grounded battery at armature No. 7 and its front contact of relay 219, conductors 232 and 126 (at the junction of conductors 232 and 126 grounded battery at armature No. 7 and its front contact of relay 125 is also connected, as hereinbefore stated), armature No. 2 and its front contact of relay 125, conductor 121, lower inner armature and back contact of relay 113, conductor 127, back contact and upper armature of relay 113, conductor 128, front contact and upper armature of relay 116, sending contacts 118 and through the winding of printer magnet 117 of printer 119, lower inner armature and front contact of relay 116, conductor 129, armature No. 1 and front contact of relay 125, conductor 130, armature No. 2 and its front contact of relay 219, conductor 227, lower inner armature and back contact of relay 228, conductor 229, back contact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212, sending contacts 214 and through the winding of printer magnet 213 of printer 215, lower inner armature and front contact of relay 212 conductor 231, armature No. 1 and its front contact of relay 219, conductor 220, back contact and lower outer armature of relay 411, conductor 412, sending contacts 513 and through the winding of printer magnet 514 of printer 516 to ground. The room clerk's "busy" lamps 141, 315, 521 and 522 will operate in a manner described above.

Should a call from the cashier's station be made to the linen room at the time the line circuit between the linen room and the engineer's station is established, the operation of the linen room "call" key 318 closes separate operating circuits for relays 320 and 326. The operating circuit for relay 320 is obvious and that for relay 326 may be traced from grounded positive battery, over the lower operated contacts of key 318, through the winding of relay 326, conductor 332, back contact and lower outer armature of relay 228 to ground. Relays 320 and 326

operate and prepare the line circuit for cashier's printer 323. This line circuit, however, cannot be completed during the time that the linen room printer 119 is busy because the line circuit is open at the back contact and lower inner armature of relay 116, the prepared line circuit being traceable from grounded battery, front contact and lower armature relay 320, through the winding of printer magnet 321 and sending contacts of printer 323, upper armature and front contact of relay 320, upper armature and back contact of relay 317, conductor 333, back contact and lower inner armature of relay 317, conductor 325, upper armature and front contact of relay 326, conductor 334, back contact and lower armature of relay 112, back contact of the lower inner armature of relay 116, which being in an operated position at the time, holds the latter armature in engagement with its front contact. Therefore, the cashier's station cannot be cut in on an established connection between the linen room and engineer's stations.

The telephone operator's station can not be cut in on an established connection between the linen room and the engineer's stations because when the engineer's "call" key 414 at the telephone operator's station is operated, the "call" circuit controlled by key 414 is maintained opened by the operation of relay 219 at the linen room station, the circuit being traceable from grounded battery at the lower operated contacts of key 414, through the winding of relay 411, conductor 434, to armature No. 3 which is in an operated position at the time.

The guest floor station likewise can not be cut in on an established connection between the linen room and the engineer's stations because when the linen room "call" key 526 at the guest floor station is operated the "call" circuit controlled by key 526 is open at the armature and back contact of relay 122 which will be in an operated position at the time.

Linen room station to the guest floor station

To establish a connection to the guest floor, the guest floor "call" key 132 is operated and thereby causes the operation of relays 133 and 116. Relay 133 operates and completes circuits somewhat similar to those described above for relay 125. The line circuit between the linen room and the guest floor stations is completed by the operation of relays 133 and 166 and may be traced from ground, through the winding of printer magnet 517 and sending contacts 518 of printer 519 at the guest floor station, conductor 520, lower outer armature and back contact of relay 312, conductor 313, back contact and armature No. 2 of relays 222, conductor 223, front contact and armature No. 1 of relay 133, conductor 128, back contact and armature No. 1 of relay 125, conductor 129, front contact and lower inner armature of relay 116, through the winding of printer magnet 117 and sending contacts 118 of printer 119, upper armature and front contact of relay 116, conductor 128, upper armature and back contact of relay 113, conductor 127, back contact and lower inner armature of relay 113, conductor 121, front contact and armature No. 2 of relay 133, conductor 144, contact and armature No. 7 to grounded battery. The guest floor "busy" lamps 135, 224, and 313 at the linen room, the room clerk's and the cashier's stations, respectively, are lighted by the circuit extending over conductors 136 and 137 and the respective conductors connected to the

lamps to indicate that the guest floor station is busy. The linen room "busy" lamps 218, 314 and 511 are also lighted when relay 122 operates, as described above, to indicate that the linen room station is busy.

The room clerk's station may be cut in on an established connection between the linen room and the guest floor station by operating the guest floor station "call" key 238 which, when operated, causes the operation of relays 222 and 212. The operation of the two latter relays causes the room clerk's printer to be included in the established line circuit. The extended established line circuit may be traced from grounded battery at armature No. 7 and front contact of relay 222, conductors 239 and 144 (at the junction of conductors 239 and 144 another grounded battery is furnished), armature No. 2 and front contact of relay 133, conductor 121, lower inner armature and back contact of relay 113, conductor 127, back contact and upper armature of relay 113, conductor 128, front contact and upper armature of relay 116, sending contacts 118 and through the winding of printer magnet 117 of printer 119, lower inner armature and front contact conductor 129, armature No. 1 and back contact of relay 125, conductor 128, armature No. 1 and front contact of relay 133, conductor 223, armature No. 2 and front contact of relay 222, conductor 227, lower inner armature and back contact of relay 228, conductor 229, back contact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212, sending contacts 214, through the winding of printer magnet 213 of printer 215, lower inner armature and front contact of relay 212, conductor 231, armature No. 1 and its back contact of relay 219, conductor 248, armature No. 1 and its front contact of relay 222, conductor 313, back contact and lower inner armature of relay 312, conductor 520, sending contacts 518 and through the winding of printer magnet 517 of printer 519 to ground.

The cashier's station can not be cut in on an established connection between the linen room and the guest floor stations because; first, should the guest floor station "call" key 337 at the cashier's station be operated the "call" circuit controlled by key 337 would be open at armature No. 3 and back contact of relay 133 which happens to be in an operated position at the time, and secondly, should the linen room station "call" key 318 be operated, the "call" circuit which is controlled by key 318 and would be capable of being closed at this time because relay 228 is in a non-operated position, normally would cause the closure of the line circuit of the cashier printer 323 but inasmuch as the linen room station is busy at this moment, the line circuit of the cashier's printer will be found open at the back contact and lower inner armature of relay 116.

The engineer's station can not be cut in on an established connection between the linen room and the guest floor stations because when the linen room "call" key 525 at the engineer's station is operated, the "call" circuit controlled by key 525, can not be closed inasmuch as it is maintained opened at the back contact and armature of relay 122.

Simultaneous connections from the linen room station to the room clerk's and guest floor stations

To establish a connection from the linen room

station to the guest floor and the room clerk's stations simultaneously, the room clerk's "call" key 124 and the guest floor "call" key 132 are operated. Relays 133, 116, 112 and 113 operate and close a line circuit which includes in series connection the printers at the linen room, the room clerk's and the guest floor stations. This broadcasting line circuit is identical with the extended established line circuit traced above in describing the manner in which the room clerk's station may be cut in on an established connection between the linen room and the guest floor stations. The closure of this line circuit starts the motors and printers 119, 215 and 519 respectively located at the linen room, room clerk's and guest floor stations for sending messages simultaneously between three stations.

ROOM CLERK'S STATION

As stated above, the room clerk's station equipment is adapted to establish connections to the engineer's station alone, or to the linen room and guest floor stations, either separately or simultaneously. Also connections may be made to the room clerk's station from the linen room, as described above, or from the cashier's, engineer's or the guest floor stations, the latter connections being hereinafter described under the heading of the office in which the connection originates.

Room clerk's station to engineer's station

To establish a connection from the room clerk's to the engineer's station "call" key 226 is operated, causing the operation of relay 219 and the subsequent operation of relay 212 and the lighting of the engineer's "busy" lamps 221, 131 and 413 at the room clerk's, linen room and the telephone operator's stations, respectively. The line circuit closed by the operation of relays 219 and 212 may be traced from grounded battery at armature No. 7 and front contact of relay 219, conductors 232 and 126, armature No. 2 and back contact of relay 125, conductor 130, armature No. 2 and front contact of relay 219, conductor 227, lower inner armature and back contact of relay 228, conductor 229, back contact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212, sending contacts 214 and through the winding of printer magnet 213 of printer 215, lower inner armature and front contact of relay 212, conductor 231, armature No. 1 and front contact of relay 219, conductor 220, back contact and lower outer armature of relay 411, conductor 412, sending contacts 513 and through the winding of printer magnet 514 of printer 516 to ground. The closure of this line circuit starts the motors at printers 215 and 516 and causes relay 233 to operate. The operation of relay 233 lights the room clerk's "busy" lamps at the linen room, cashier's guest floor and the engineer's stations.

The linen room station may be cut in on an established connection between the room clerk's and the engineer's stations by operating the engineer's "call" key 124 whereby relay 125 operates to close an operating circuit for relay 116. The operation of relays 116 and 125 closes the line circuit for printer 119 which circuit may be traced from grounded battery at armature No. 7 and contact of relay 125, conductor 126, armature No. 2 and front contact of relay 125, conductor 121, lower inner armature and back contact of relay 113, conductor 127, upper armature and back contact of relay 113, conductor

128, front contact and upper armature of relay 116, sending contacts 118 and through the winding of magnet 117 of printer 119, lower inner armature and front contact of relay 116, conductor 129, armature No. 1 and front contact of relay 125, conductor 130, armature No. 2 and front contact of relay 219, conductor 227, lower inner armature and back contact of relay 228, conductor 229, back contact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212 through the printer 215 and over the circuit established to the engineer's station.

The cashier's station can not be cut in on any connection to the engineer's station. In the connection established between the room clerk's and the engineer's stations the line circuit of the cashier's printer 323 is open at the back contact and lower inner armature of relay 212.

The telephone operator's station can not be cut in on the connection because the circuit controlled by "call" key 414 is open at armature No. 3 and back contact of relay 219.

Likewise the guest floor can not be cut in on the connection because the circuit controlled by call key 524 is open at the back contact and armature of relay 233.

Room clerk's station to linen room station

To establish a connection from the room clerk's station to the linen room station, call key 234 is operated, causing the operation of single-winding relays 211 and 228 in circuits hereinbefore traced. The operation of relays 211 and 228 closes the line circuit between the room clerk's and the linen room printers. This circuit may be traced from grounded battery on the front contact and lower armature of relay 211, back contact and lower inner armature of relay 212, through the winding of printer magnet 213 and sending contacts 214 of printer 215, upper armature and back contact of relay 212, upper armature and front contact of relay 211, conductor 230, upper armature and front contact of relay 228, conductors 235 and 236, back contact and lower armature of relay 112, back contact and lower inner armature of relay 116, through the winding of printer magnet 117 and sending contacts 118 of printer 119, upper armature and back contact of relay 116, upper armature and back contact of relay 112, conductors 140 and 237, front contact and lower inner armature of relay 228, conductor 227, lower outer armature and contact of relay 212, conductor 240 front contact and lower outer armature of relay 228 to ground. The closure of this line circuit starts the motors of printers 215 and 119 and causes relays 233 and 122 to operate. The operation of relays 233 and 122 causes to light the room clerk's "busy" lamps 141, 315, 521 and 522 at the linen room, cashier's, guest floor and the engineer's stations, respectively, and the linen room "busy" lamps 218, 314, 511 and 512 at the room clerk's, the cashier's, guest floor and the engineer's stations, respectively.

The cashier's station can not be cut in on this connection between the room clerk's and the linen room stations because the two circuits respectively controlled by "call" keys 318 and 319 are open at the back contacts and lower armatures of relays 228 and 113, or the line circuit of the cashier's printers 323 is open at the back contacts and lower armature of relay 211 or at the back contact and lower armature of relay 112.

The guest floor and the engineer's stations likewise can not be cut in on the connection because the four circuits respectively controlled by "call" keys 523, 524, 525 and 526 are open at the back contacts and armatures of relays 233 and 122.

Room clerk's station to guest floor

To establish a connection from the room clerk's station to the guest floor station, "call" key 238 is operated, causing the operation of the double winding relay 222 and the subsequent operation of relay 212 and the lighting of the guest floor "busy" lamps 224, 135, 313, respectively located at the room clerk's, the linen room and the cashier's stations. The line circuit closed by the operation of relays 222 and 212 may be traced from grounded battery, armature No. 7 and front contact of relay 222, conductors 239 and 144, armature No. 2 and back contact of relay 133, conductor 223, armature No. 2 and front contact of relay 222, conductor 227, lower inner armature and back contact of relay 228, conductor 229, back contact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212, sending contacts 214 and through the winding of printer magnet 213 of printer 215, lower inner armature and front contact of relay 212, conductor 231, armature No. 1 and back contact of relay 219, armature No. 1 and front contact of relay 222, conductor 313, lower outer armature and back contact of relay 312, conductor 520, sending contacts 518 and through the winding of printer magnet 517 of printer 519 to ground. The closure of this circuit starts the motors of printers 215 and 519 and relay 233 operates. The operation of relay 233 causes the room clerk's "busy" lamps 141, 315, 521 and 522 to light.

The linen room station may be cut in on this connection between the room clerk's and the guest floor stations by operating the guest floor "call" key 132 at the linen room station. The cashier's station cannot be cut in because the line circuit of the cashier's printer will be open at armature No. 3 of relay 222.

The engineer's station can not be cut in on the connection because the circuit controlled by the "call" key 523 is open at the armature of relay 233 and consequently relay 219 does not operate.

Room clerk's station to linen room and guest floor station simultaneously

To establish a connection from the room clerk's station to the linen room and the guest floor stations simultaneously, "call" keys 234 and 238 are operated, causing the operation of relays 222, 223 and 211 and the subsequent operation of relay 212 and the lighting of the guest floor "busy" lamps mentioned above. The line circuit closed by the operation of these relays may be traced from grounded battery at armature No. 7 and front contact of relay 222, conductors 239 and 144, armature No. 2 and back contact of relay 133, conductor 223, armature No. 2 and front contact of relay 222, conductor 227, lower inner armature and front contact of relay 228, conductors 237 and 140, back contact and upper armature of relay 112, back contact and upper armature of relay 116, sending contacts 118 and through the winding of printer magnet 117 of printer 119, lower armature and back contact of relay 116, lower armature and back contact of relay 112, conductors 236 and 235, front con-

tact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212, sending contacts 214 and through the winding of printer magnet 213 of printer 215, lower inner armature and front contact of relay 212, conductor 231, armature No. 1 and back contact of relay 219, armature No. 1 and front contact of relay 222, conductor 313, back contact and lower outer armature of relay 312, conductor 520, sending contacts 518 and through the winding of printer magnet 517 of printer 519 to ground. The closure of this circuit starts the motors or printers 119, 215 and 519 and causes the operation of relays 122 and 233. The operation of relays 122 and 233 closes operating circuits for the linen room station and the guest floor station "busy" lamps mentioned above.

CASHIER'S STATION

As stated above, the cashier's station equipment is adapted to establish connections to the telephone operator's, the linen room, the room clerk's and the guest floor stations either separately or simultaneously. Also connections may be made to the cashier's station from the telephone operator's station only which will be hereinafter described under the heading "Telephone operator's station".

Cashier's station to the telephone operator's station

To establish a connection from the cashier's station to the telephone operator's station, "call" key 316 is operated causing the operation of relays 317 and 320 and the lighting of the cashier's "busy" lamp 415 at the telephone operator's station. The line circuit closed by the operation of relay 317 and 320 may be traced from grounded battery at the front contact and lower armature of relay 320, through the winding of printer magnet 321 and the sending contacts 322 of printer 323, upper armature and front contact of relay 320, upper armature and front contact of relay 317, conductor 423, back contact and upper armature of relay 416, sending contacts 417 and through the winding of the printer magnet 418 of the printer 419, lower armature and back contact of relay 416, conductor 420, front contact and upper inner armature of relay 317, conductor 325, upper armature and back contact of relay 326, conductor 327, back contact and lower inner armature of relay 326, conductor 328, upper armature and back contact of relay 311, conductor 329, back contact and lower inner armature of relay 311, conductor 330, back contact and lower inner armature of relay 312, conductor 331, front contact and lower outer armature of relay 317 to ground. The closure of this line circuit starts the motors of printers 323 and 419.

Cashier's station to the linen room station

To establish a connection from the cashier's station to the linen room station, "call" key 318 is operated causing the operation of relays 326 and 320 and the lighting of the cashier's "busy" lamp 415. The operating circuit for relay 326 may be traced from grounded battery at the lower operated contacts of key 318, through the winding of relay 326, conductor 332, back contact and lower outer armature of relay 228 to ground. The operation of relays 326 and 320 closes the line circuit which may be traced from grounded battery at the front contact and lower armature of relay 320, through the winding of

printer magnet 321 and the sending contacts 322 of printer 323, upper armature and front contact of relay 320, upper armature and back contact of relay 317, conductor 333, back contact and lower inner armature of relay 317, conductor 325, upper armature and front contact of relay 326, conductor 236, back contact and lower armature of relay 112, back contact and lower armature of relay 116, through the winding of printer magnet 117 and the sending contacts 118 of printer 119, upper armature and back contact of relay 116, upper armature and back contact of relay 112, conductor 140, front contact and lower inner armature of relay 326, conductor 328 and over the normal contacts and armatures, in series, of relays 311 and 312 to the grounded conductor 331 as described above. The closure of the last mentioned circuit starts the motors of printers 323 and 119. The starting of printer motor 119 operates relay 122 the operation of which causes the linen room "busy" lamps 218, 314, 511 and 512 to light.

The room clerk's station may be cut in on this connection by operating the linen room "call" key 234 thereby causing relays 211 and 228 to operate. The room clerk's printer 215 is connected in parallel with the cashier's printer 323 to the line circuit at point 241 by the operation of relays 211 and 228. The attendants at the guest floor and the engineer's stations are prevented from cutting in on this connection by the operation of relay 122. Likewise the attendant at the telephone operator's station is prevented from cutting in on this line circuit by the open connection at the back contact and lower armature of relay 320. However, the attendant at the cashier's station may include the guest floor printer by operating "call" key 337 and the telephone operator's printer by operating "call" key 316.

Cashier's station to the room clerk's station

To establish a connection from the cashier's station to the room clerk's station, "call" key 319 is operated causing the operation of relays 311 and 320 and the lighting of the cashier's "busy" lamp 415. The operating circuit for relay 311 may be traced from grounded battery at the lower operated contacts of key 319, through the winding of relay 311, conductor 335, back contact and lower outer armature of relay 113 to ground. The operation of relays 311 and 320 closes the line circuit which may be traced from grounded battery at the front contact and lower armature of relay 320, through the winding of printer magnet 321 and the sending contacts 322 of printer 323, upper armature and front contact of relay 320, upper armature and back contact of relay 317, conductor 333, back contact and lower inner armature of relay 317, conductor 325, upper armature and back contact of relay 326, conductor 327, back contact and lower inner armature of relay 326, conductor 328, upper armature and front contact of relay 311, conductors 336 and 225, back contact and lower armature of relay 211, back contact and lower inner armature of relay 212, through the winding of printer magnet 213 and sending contacts 214 of printer 215, upper armature and back contact of relay 212, upper armature and back contact of relay 211, conductors 216 and 217, front contact and lower inner armature of relay 311, conductor 330, back contact and lower inner armature of relay 312, conductor 331, front con-

tact and lower outer armature of relay 326 to ground. The closure of this line circuit starts the motors of printers 323 and 215. The starting of the motor of printer 215 operates relay 233, the operation of which causes the room clerk's "busy" lamps 141, 315, 521 and 522 to light.

The linen room station may be cut in on this connection by operating the room clerk's "call" key 111 thereby causing relays 112 and 113 to operate. The linen room printer 119 is connected in parallel with the room clerk's printer 215 to the line circuit at point 242 by the operation of relays 112 and 113. The attendants at the guest floor and the engineer's stations are prevented from cutting in on the circuit by the operation of relay 233. Likewise the attendant at the telephone operator's station is prevented from cutting in on this line circuit by the open connection at the back contact and lower armature of relay 320. However, the attendant at the cashier's station may include the guest floor printer by operating "call" key 337 and the telephone operator's printer by operating "call" key 316.

Cashier's station to the guest floor

To establish a connection from the cashier's station to the guest floor station, "call" key 337 is operated causing the operation of relays 312 and 320 and the lighting of the cashier's "busy" lamp 415. The operating circuit for relay 312 may be traced from grounded battery at the lower operated contact of key 337, through the winding of relay 312, conductor 338, armature No. 3 and back contact of relay 222, conductor 243, back contact and armature No. 3 of relay 133 to ground. The operation of relay 312 closes an operating circuit for the guest floor "busy" lamps 313, 224 and 135, respectively located at the cashier's, the room clerk's and the linen room stations. Relay 312, in operating, closes an obvious locking circuit for itself at its upper inner armature to prevent the release of relay 313 should a call from the linen room station to the guest floor station be started immediately after the call from the cashier's station starts. The joint operation of relays 312 and 320 closes the line circuit between the cashier's and the guest floor stations which may be traced from grounded battery at the front contact and lower armature of relay 320, through the winding of printer magnet 321 and sender contacts 322 of printer 323, upper contact and armature of relay 320, upper armature and back contact of relay 317, conductor 333, back contact and lower inner armature of relay 317, conductor 325, upper armature and back contact of relay 326, conductor 337, back contact and lower inner armature of relay 327, conductor 328, upper armature and back contact of relay 311, conductor 329, back contact and lower inner armature of relay 311, conductor 330, front contact and lower outer armature of relay 312, conductor 520, sending contacts 513 and through the winding of printer magnet 517 of the printer 519 to ground. The closure of this line circuit starts the motors of printers 333 and 519.

The linen room and the room clerk's stations are prevented from cutting in on this line circuit by the open connection at the back contact and lower outer armature of relay 312. The telephone operator's station is also prevented from cutting in on this circuit by the open connection at the back contact and lower armature of relay 320.

Cashier's station to the telephone operator's, linen room, room clerk's and guest floor stations simultaneously

To establish connections from the cashier's station to the telephone operator's, linen room, room clerk's and guest floor stations simultaneously, "call" keys 316, 318, 319 and 337 are operated and thereby cause the operation of relays 320, 317, 326, 311 and 312 and the lighting of the cashier's station "busy" lamp 415 at the telephone operator's station and the guest floor station "busy" lamps 313, 224 and 135 at the cashier's, room clerk's and linen room stations, respectively. The operation of these relays closes a line circuit including the printers at the stations involved in the broadcast connection. The circuit may be traced from grounded battery at the front contact and lower armature of relay 320, through the winding of magnet 321, sending contacts 322, upper armatures and front contacts, in series, of relays 320 and 317, conductor 324, back contact and upper armature of relay 416, sending contacts 417, through the winding of magnet 418, lower armature and back contact of relay 416, conductor 420, front contact and inner lower armature of relay 317, conductor 325, upper armature and front contact relay 326, conductor 236, back contact and lower armature of relay 112, back contact and lower inner armature of relay 116, through the winding of magnet 117 and sending contacts 118 of printer 119, upper armatures and back contacts, in series, of relays 116 and 112, conductor 140, front contact and lower inner armature of relay 326, conductor 328, upper armature and front contact of relay 311, conductors 336 and 225, back contact and lower armature of relay 211, back contact and lower inner armature of relay 212, through the winding of magnet 213 and sending contacts 214 of printer 215, upper armatures and back contacts, in series, of relays 212 and 211, conductors 216 and 217, front contact and lower inner armature of relay 311, conductor 330, front contact and lower outer armature of relay 312, conductor 520, sending contacts 518 and through the winding of magnet 517 of printer 519 to ground. The printer motors at the telephone operator's, linen room, room clerk's and guest floor stations start simultaneously. The starting of the printer motors at the linen room and the room clerk's stations operate relays 122 and 233 respectively. Relay 122 closes a circuit for lighting the linen room station "busy" lamps 218, 314, 511 and 512. Relay 233 closes a circuit for lighting the room clerk's station "busy" lamps 141, 315, 521 and 522. The telephone operator's "busy" lamp 339 does not light when the call originates at the cashier's station; this lamp is controlled by any of the "call" keys 422, 426, 428 and 414 at the telephone operator's station.

TELEPHONE OPERATOR'S STATION

As stated above, the telephone operator's station equipment is adapted to establish connections to the cashier's, bell captain's, the porter's and the engineer's stations. Also connections may be made to the telephone operator's station from the cashier's station, as described above, and from the engineer's station which will be hereinafter described.

Telephone operator's station to the cashier's station

To establish a connection from the telephone

operator's station to the cashier's station, "call" key 422 is operated causing the operation of relays 423 and 416 and the lighting of the operator's station "busy" lamp 339 at the cashier's station. The operation of relays 423 and 416 closes the line circuit between these stations, which circuit may be traced from grounded battery at the front contact and lower armature of relay 416, through the winding of printer magnet 418 and sending contacts 417 of printer 419, upper armature and front contact of relay 416, upper armature and front contact of relay 423, conductor 424, back contact and lower armature of relay 320, through the winding of printer magnet 321 and printer contacts 322 of printer 323, upper armature and back contact of relay 320, conductor 340, front contact and lower inner armature of relay 423, conductor 425, normal contact of key 426, conductor 427, normal contact of key 428, conductor 429, back contact and lower inner armature of relay 411, conductor 430, front contact and lower outer armature of relay 423, to ground. The closure of the line circuit starts the motors of printers 419 and 323. The cashier's station "busy" lamp 415 does not light when the call originates at the telephone operator's station.

Telephone operator's station to the engineer's station

To establish a connection from the telephone operator's station to the engineer's station, "call" key 414 is operated causing the operation of relays 411 and 416 and the lighting of the telephone operator's station "busy" lamp 339 at the cashier's station. The operation of relay 411 closes the operating circuit for the engineer's station "busy" lamps 413, 221 and 131. Also relay 411, in operating, closes a locking circuit for itself in order to prevent its release should a call to the operator's station originate at the linen room or the room clerk's station immediately after the call between the operator's and the engineer's stations has started. The joint operation of relays 411 and 416 closes the line circuit between the operator's and the engineer's stations, which circuit may be traced from grounded battery at the front contact and lower armature of relay 416, through the winding of printer magnet 418 and sending contacts 417 of printer 419, upper armature and front contact of relay 416, upper armature and back contact of relay 423, conductor 431, back contact and lower inner armature of relay 423, conductor 425, normal contact of key 426, conductor 427, normal contact of key 428, conductor 429, front contact and lower outer armature of relay 411, conductor 412, sending contacts 513 and through the winding of printer magnet 514 of printer 516 to ground. The closure of this line circuit starts the motors of printers 419 and 516.

The linen room and the room clerk's stations are prevented from cutting in on this line circuit by the open connection at the back contact and lower outer armature of relay 411.

Telephone operator's station to the bell captain's station

To establish a connection from the telephone operator's station to the bell captain's station, "call" key 426 is operated causing the operation of relay 416 and the lighting of the operator's station "busy" lamp 339 at the cashier's station. The operation of relay 416 closes a line circuit to the bell captain's station which circuit

may be traced from grounded battery at the front contact and lower armature of relay 416, through printer 419, upper armature and front contact of relay 416, upper armature and back contact of relay 423, conductor 431, back contact and lower inner armature of relay 423, conductor 425, lower operated contacts of key 426, conductor 432, through the printer at the bell captain's station shown diagrammatically by the rectangular block 527, to ground. The closure of this line circuit starts the motors at printers 419 and 527.

Telephone operator's station to the porter's station

To establish a connection from the telephone operator's station to the porter's station, "call" key 428 is operated and a line circuit is completed in substantially the same manner as that to the bell captain's station except that the circuit is sent over the normal contacts of key 426 and the lower operated contacts of key 428, conductor 433, through the printer at the porter's station shown diagrammatically by rectangular block 528 to ground. The closure of this line circuit starts the motors of printers 419 and 528.

The cashier's station is prevented from cutting in on the line circuits from the telephone operator's station to either the engineer's, bell captain's or the porter's station by the open connection at the back contact and upper armature of relay 416.

GUEST FLOOR STATION

As stated above, the guest floor station equipment is adapted to establish connections to the room clerk's and the linen room stations. Also connections may be made to the guest floor station from the linen room, room clerk's and the cashier's stations; the latter connections are described above.

Guest floor station to the room clerk's station

To establish a connection from the guest floor station to the room clerk's station, "call" key 524 is operated thereby closing an operating circuit for relay 222. This circuit may be traced from grounded battery at the armature and back contact of relay 233, conductor 244, through the lower winding of relay 222, conductors 245 and 246 to ground at the contact of key 524. Relay 222 operates thereby closing a locking circuit for itself, an operating circuit for the guest floor station "busy" lamps 135, 224 and 313, and an operating circuit for relay 212. Relay 212 operates and in conjunction with relay 222 closes a line circuit between the guest floor and the room clerk's stations, which circuit may be traced from grounded battery at armature No. 7 and contact of relay 222, conductors 239 and 144, armature No. 2 and back contact of relay 133, conductor 223, armature No. 2 and front contact of relay 222, conductor 227, lower inner armature and back contact of relay 228, conductor 229, back contact and upper armature of relay 228, conductor 230, front contact and upper armature of relay 212, through the printer 215, lower inner armature and front contact of relay 212, conductor 231, armature No. 1 and back contact of relay 219, armature No. 1 and front contact of relay 222, conductor 313, back contact and lower outer armature of relay 312, conductor 520, through the printer 519 to ground. The closure of this line circuit starts

the motors of printers 215 and 519. The starting of the motor at 215 operates relay 233 which operates to thereby close the operating circuit for the room clerk's station "busy" lamps 141, 315, 521 and 522.

The linen room printer may be connected to the established line circuit between the guest floor and the room clerk's station by operating "call" key 132 thereby causing the operation of relays 133 and 116. The operation of relay 133 prepares printer 119 for connection to the line circuit and the operation of relay 116 completes the connection. The line circuit including the printers at the linen room, room clerk's and the guest floor stations is described above under the heading "Linen Room Station".

The cashier's station can not cut in on the established line circuit between the guest floor and the room clerk's stations.

Guest floor station to the linen room station

To establish a connection from the guest floor station to the linen room station, "call" key 526 is operated, thereby closing an operating circuit for relay 133. This circuit is obvious and needs no tracing here inasmuch as it is similar to the operating circuit for relay 222 which was traced in the foregoing description under "Guest floor station to room clerk's station". The room clerk's station only may cut in on this connection.

ENGINEER'S STATION

Engineer's station to the room clerk's station

To establish a connection from the engineer's station to the room clerk's station, "call" key 523 is operated thereby closing an operating circuit for relay 219. This circuit is obvious and needs no tracing here inasmuch as it is similar to the operating circuit for relay 222 which was traced in the foregoing description under "Guest floor station to the room clerk's station".

Engineer's station to the linen room station

To establish a connection from the engineer's station to the linen room station, "call" key 525 is operated thereby closing an operating circuit for relay 125. This circuit is obvious and needs no tracing here inasmuch as it is similar to the operating circuit for relay 222 which was traced in the foregoing description under "Guest floor station to the room clerk's station".

The linen room and room clerk's stations may each cut in on the other's connection to the engineer's station by operating the "call" keys 124 and 226 at their respective stations.

ADDITIONAL GUEST FLOOR STATIONS

Additional guest floor stations may be provided as required, equipment for each floor being identical with that shown in the upper part of Fig. 5 of the drawing. Also there will be provided at the linen room, room clerk's and the cashier's stations additional equipment corresponding to that now shown at these stations and designated "guest floor". The latter equipment may be connected to that shown at the linen room, room clerk's and the cashier's stations, conductors 139, 249 and 331, respectively extending to the next guest floor relay at these stations. The dashed line section of conductor 331 at the cashier's station represents the continuation of the conductor extending over lower inner armatures and front contacts of the additional relays corresponding to relay 312.

What is claimed is:

1. In a telegraph system, a plurality of central offices, a plurality of outlying stations, normally opened line circuits interconnecting said offices and connecting certain of said offices with said stations, circuit closing devices at each of said central offices and certain of said outlying stations for closing the line circuits extending to certain other central offices and certain outlying stations either separately or simultaneously.
2. In a telegraph system according to claim 1, wherein the circuit closing devices at certain of said outlying stations are further adapted to close said line circuits to two or more central offices simultaneously.
3. In a telegraph system according to claim 1, wherein the circuit closing devices at a central office for closing a line circuit to an outlying station are adapted to prevent another station from interfering with the closed circuit.
4. In a telegraph system according to claim 1, wherein the circuit closing devices at a central office for closing a line circuit to an outlying station are adapted to permit another central office to connect itself to said closed line circuit.
5. In a telegraph system according to claim 1, wherein the circuit closing devices at an outlying station is adapted to selectively connect one of its associated line circuits to line circuits extending to two or more central stations.
6. In a telegraph system according to claim 1, wherein the circuit closing devices are provided at certain of said central offices for preventing establishment of operative connection to such offices when engaged in a previously established connection and other devices dependent on the first mentioned devices for indicating at the calling station the "busy" position of the engaged station.
7. In a telegraph system according to claim 1 wherein the line circuits terminate at each of said central offices and at certain of said stations in a signal transmitting and receiving device, and at each of the other stations in a signal "receiving only" device, and switching means for conditioning for operation said device at two or more interconnected central offices when the line circuits interconnecting said two or more central offices are closed, said switching means being also adapted to condition for operation the device at one of said central offices and the device at one of said stations when the line circuit extending between the central office and the station is closed.
8. In a telegraph system according to claim 1 wherein the line circuits terminate at each of said central offices and at certain of said stations in a signal transmitting and receiving device, and at each of the other stations in a signal "receiving only" device, and switching means for conditioning for operation said devices at two or more central offices when the line circuits interconnecting said two or more central offices are closed, said switching means being also adapted to condition for operation the device at one of said central offices and one of said stations when the line circuit extending between said office and said station is closed, and "busy" indicating means at each of said offices and said stations arranged when the devices at said offices and said stations are conditioned for operation, to operate and to release when said devices are restored to normal.
9. A telegraph system comprising a subscriber's station, a second subscriber's station, a

transmitting and receiving device at each of said stations, a normally opened line circuit extending directly between said devices, circuit closing devices at each of said stations for closing said line circuit, a source of electrical energy at one of said stations for transmitting signaling currents over the line circuit when closed, a third subscriber's station, normally opened line circuits extending directly to both the first and second stations, a signal transmitting and receiving device at said third station, and circuit closing devices at said third station for selectively closing the line circuit to said first and second stations either separately or simultaneously, one of said last mentioned circuit closing devices being further adapted to connecting its associated line circuit and transmitting and receiving device to the transmitting and receiving devices at the two other stations over the line circuit, closed therebetween, during a signaling interval for the purpose of interrupting the message or receiving the signals transmitted from either said first or said second station.

10. A telegraph system according to claim 9, wherein a signal transmitting and receiving device at one of the first two stations is furnished signaling current from the source of energy at the other of the first two mentioned stations.

11. A telegraph system comprising a plurality of stations, normally opened line circuits extending directly between said stations, circuit closing devices at each of said station for selectively closing the line circuit to the other stations either separately or simultaneously, a source of energy at each of certain stations for energizing each of the closed line circuits, the other of said stations having their portions of said closed line circuits energized by the sources at certain stations to which the closed line circuit extends.

12. A telegraph system according to claim 11 wherein the circuit closing devices at certain of said stations are adapted to connect their respectively associated normally opened line circuits to certain of said closed line circuits for communication purposes and wherein the circuit closing devices at the other of said stations are prevented from connecting their respectively associated normally opened line circuits to any of said closed line circuits.

13. A printing telegraph system, a subscriber's station, a second subscriber's station, a signal sending and receiving device at each of said stations, a normally opened line circuit interconnecting said devices, circuit closing devices at each of said stations for closing said line circuit, a third subscriber's station, a signal sending and receiving device at said third station, a normally opened line circuit extending from said signal device at the third station to the signal devices at said first and second stations, and circuit closing devices at each of said stations for closing its normally opened line circuit to either of the other stations, said circuit closing devices at one of said stations being adapted to close its normally opened line circuit and thereby to connect its signaling device to the signal devices at the other two stations during the time the signal devices at the latter stations are operatively connected to each other.

14. A printing telegraph system comprising a plurality of stations, a signal sending and receiving device at each of said stations, normally opened line circuits extending between said devices, circuit closing devices at each of said stations for selectively closing the normally opened

- line circuits to one or more of the other stations simultaneously, and a source of electrical energy at each of certain stations for energizing each of the closed line circuits and said signal devices
 5 connected thereto, the other of said stations having their respective portions of the closed line circuits and their respective said signal devices energized by the sources of energy at said certain stations to which the closed circuits extend.
- 10 15. In a telegraph system, a central office having a signal transmitting and receiving mechanism, a plurality of conductors extending to outlying stations, a relay associated with each of said conductors for connecting the conductor to
 15 the signal mechanism, remote control means at an outlying station for operating the associated relay to connect the stations with the signal mechanism, characterized by a busy signal device at an outlying station, and relaying means responsive to the operation of any of the relays
 20 for operating said busy signal device.
16. In a signaling system, a central office having a signal mechanism, a plurality of conductors extending to outlying stations, a relay associated with each of said conductors for connecting
 25 the conductor to the signal mechanism, an outlying station, signal mechanism at said outlying station, remote control means at said outlying station for operating the associated relay to connect the signal mechanism at said station
 30 to the signal mechanism at said central office,
- switching means at the central office for operating any desired relay, characterized by relaying means for preventing remote control operation of any one relay while any other relay is energized, but permitting the operation by the central
 80 office of more than one relay at the same time, whereby simultaneous transmission between the central office and more than one outlying station is controlled exclusively from the central office.
- 85 17. In a telegraph system, a sending station comprising a transmitter, a plurality of receiving stations each having a receiver and an associated relay, switching means for connecting the transmitter with any desired receiver or receivers; a transmission circuit comprising in series a
 90 source of current, a transmitter and a plurality of links, consecutive links being normally joined together by non-operated contacts of the respective relays and the last link being connectable to
 95 said current source each relay having also operative contacts for interposing the associated receiver serially between the two adjoining links, other switching means controlled at the sending station for operating any desired relay or relays,
 100 characterized in this that the operation of any relay is effective to connect the last link to the current source whereby the transmission circuit is closed only when one or more receivers are included therein.
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