

Nov. 6, 1928.

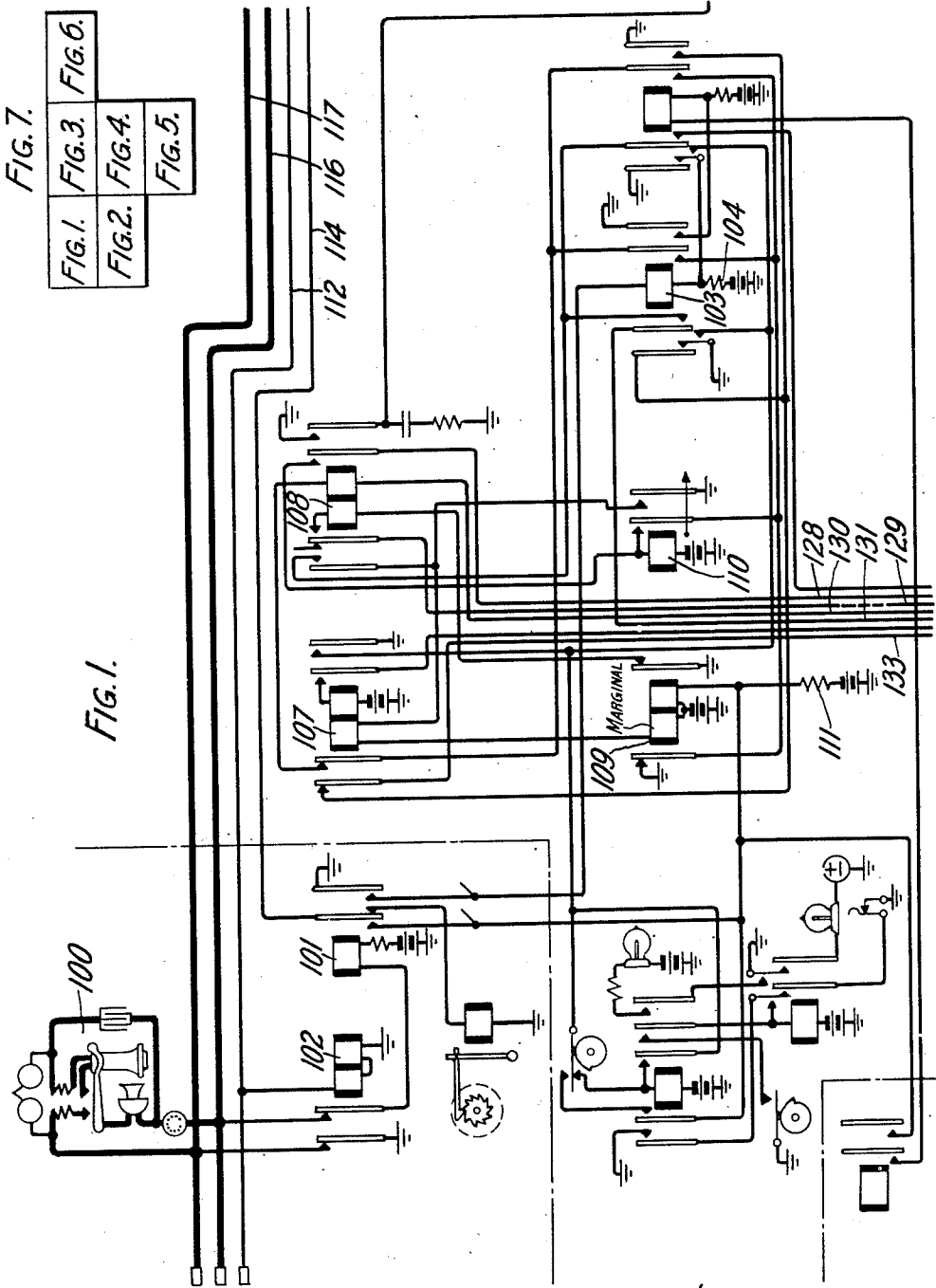
1,690,206

A. RAYNSFORD

TELEPHONE SYSTEM

Filed June 4, 1927

6 Sheets-Sheet 1



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Nov. 6, 1928.

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A. RAYNSFORD

TELEPHONE SYSTEM

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6 Sheets-Sheet 2

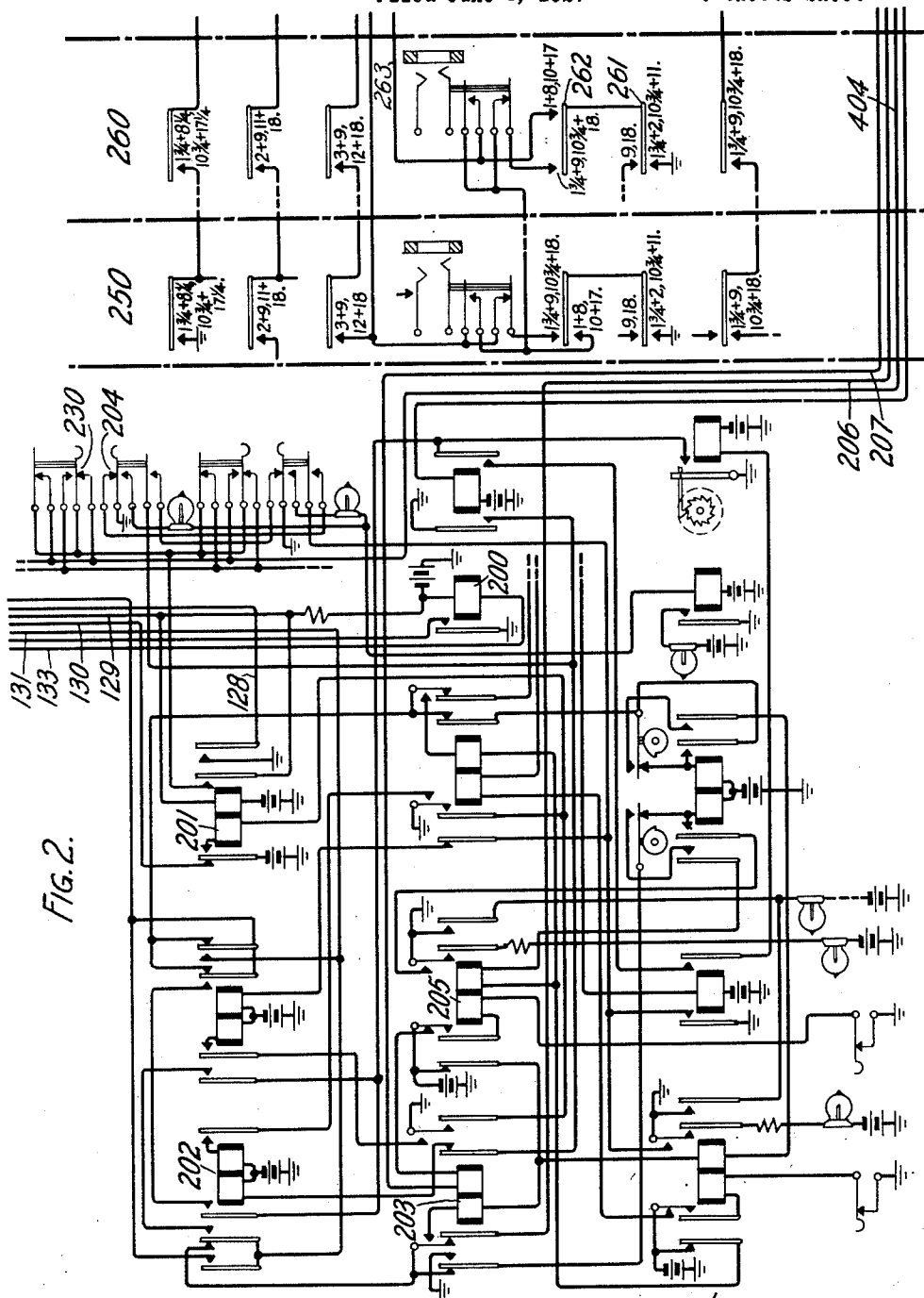


FIG. 2.

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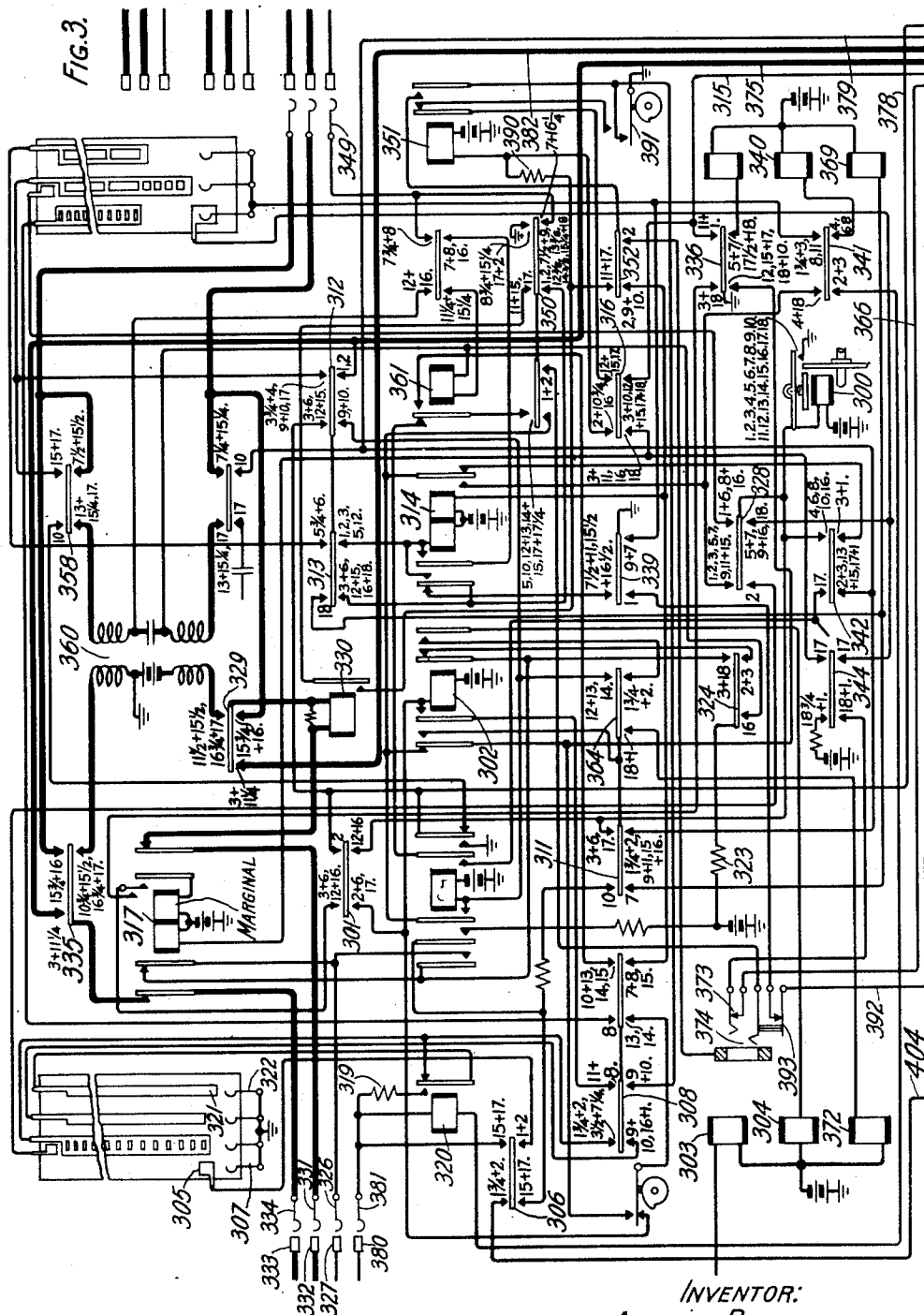
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TELEPHONE SYSTEM

Filed June 4, 1927

6 Sheets-Sheet 3



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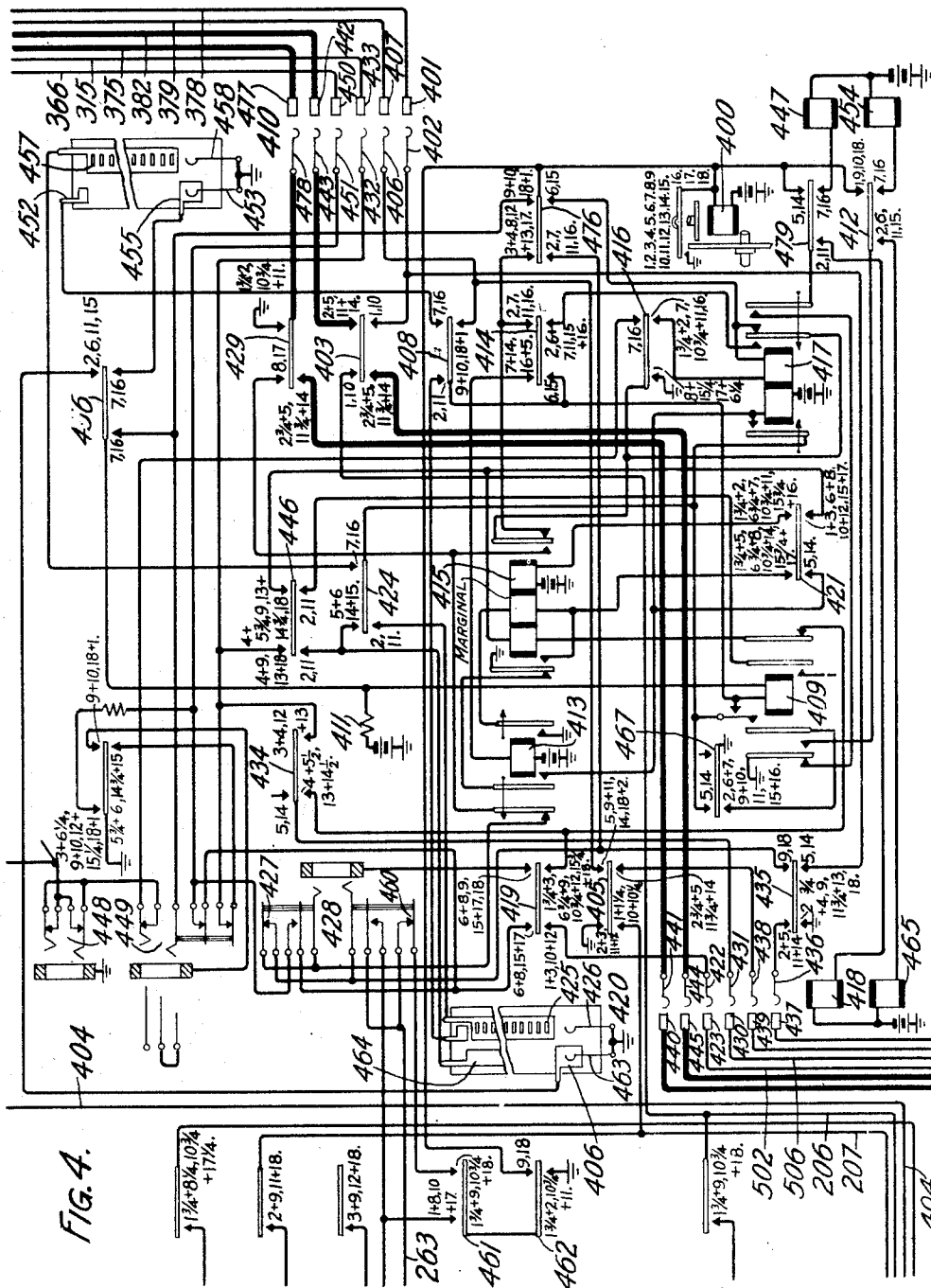
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A. RAYNSFORD

TELEPHONE SYSTEM

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A. RAYNSFORD

TELEPHONE SYSTEM

Filed June 4, 1927

6 Sheets-Sheet 5

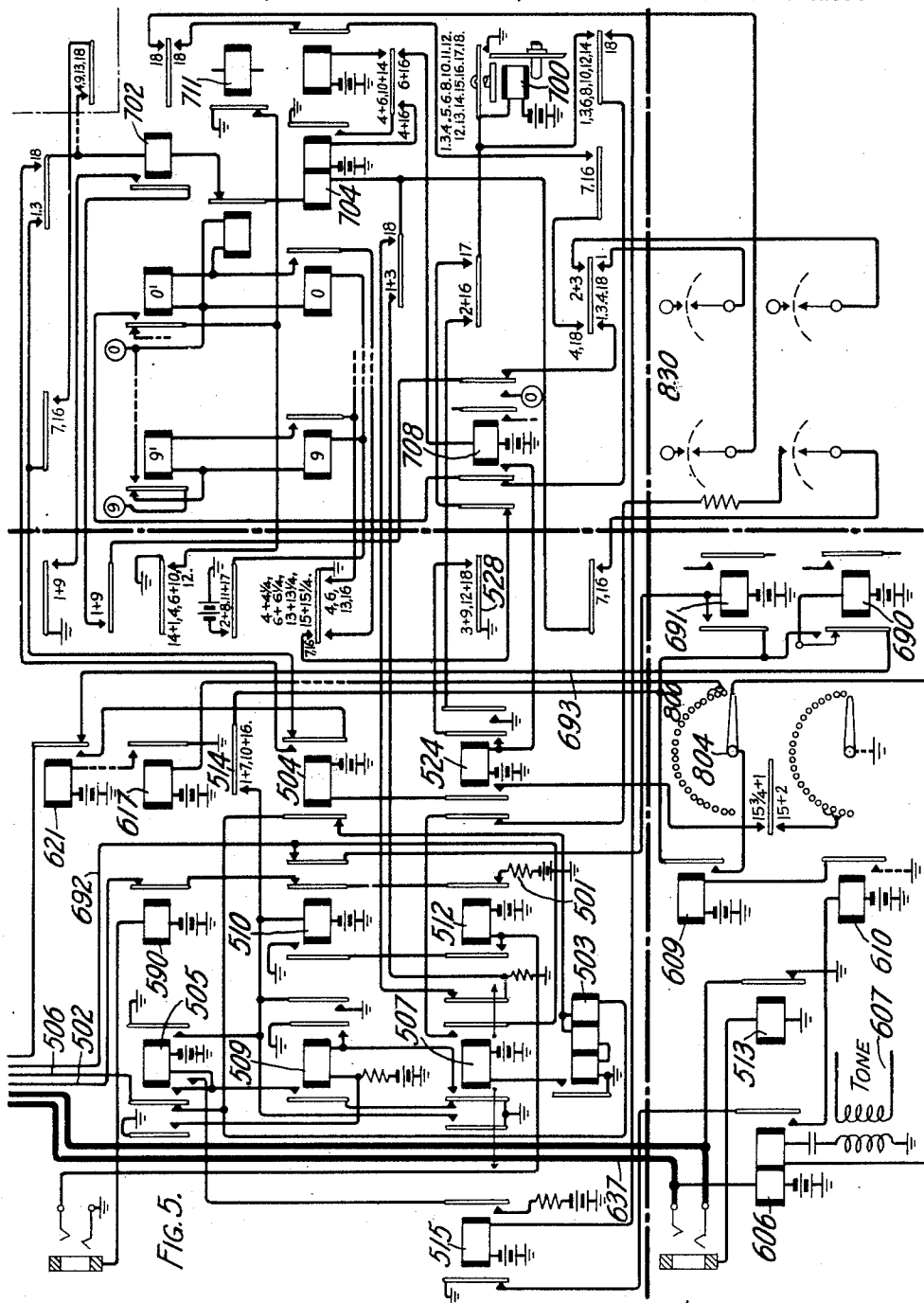


FIG. 5.

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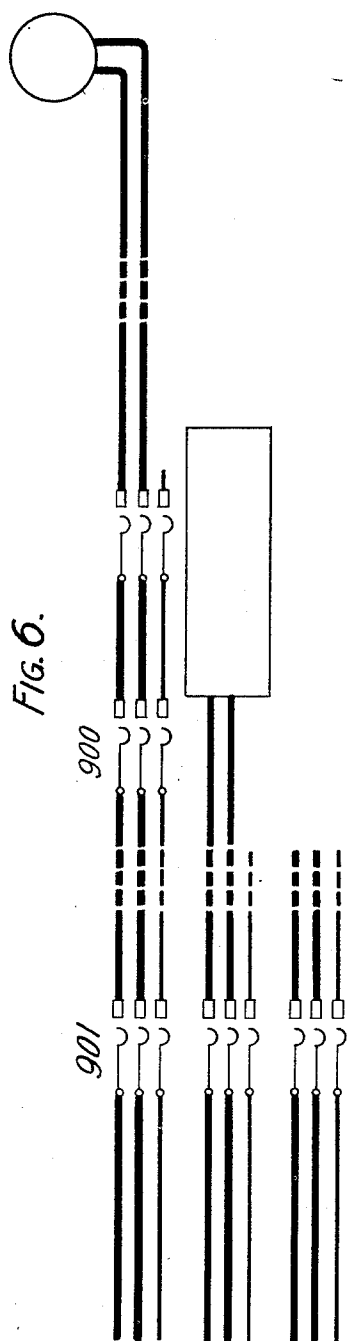
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1,690,206

TELEPHONE SYSTEM

Filed June 4, 1927

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE.

ARTHUR RAYNSFORD, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TELEPHONE SYSTEM.

Application filed June 4, 1927. Serial No. 196,449.

This invention relates to telephone exchange systems employing automatic switches for the establishment of connections and has for its object the provision of improved means for associating selection control devices, such as register senders, with selector switches to be controlled and for exercising control thereover.

In telephone systems employing register senders it has been customary to divide telephone lines into groups in accordance with the class of service to which they are entitled and to employ for each class of subscribers, senders especially equipped for controlling the extension of calls initiated by subscribers of that class. Since certain of the groups of lines may be small, this arrangement is uneconomical and senders have therefore been designed which will operate with any class of line.

According to one specific embodiment of the present invention, a link circuit for associating an idle sender with a calling party by means of an idle line finder and district selector, is equipped with panel type finders of large capacity neither of which has a normal position. In order to facilitate the finding of an idle sender, if a link, when disconnected from a sender, is standing on a set of terminals within the uppermost ten to which it has access, the sender finder is automatically restored to its lowermost position whence it may begin hunting when next taken into use. Since these link circuits are arranged in groups, each of which serves a particular group of incoming lines, it is possible to place the discrimination between classes of service under the control of the link circuit. A temporary condition established in the link circuit sets up a condition in the sender which determines the operation of the sender in accordance with the class of service to which the calling line is entitled.

A clearer conception of the scope and purpose of the invention will be obtained from a consideration of the following description in connection with the attached drawings in which:

Fig. 1 shows a calling subscriber's line together with certain relays for preventing interference between calling lines;

Fig. 2 shows a start circuit and a portion of two link circuits;

Fig. 3 shows a line finder and district selector;

Fig. 4 shows a link circuit for associating the sender with the district selector;

Fig. 5 shows a portion of the register sender;

Fig. 6 shows in schematic form selectors for completing the connection to an automatic subscriber, to a manual office or to an operator; and

Fig. 7 shows the manner in which Figs. 1 to 6 should be arranged.

The invention has been embodied in a disclosure which is substantially like that of U. S. Patent 1,567,072 to W. H. Matthies, granted December 29, 1925. Both the present disclosure and that of the Matthies patent show a skeletonized sender in which the numbers employed are for the most part the same as those in the more complete disclosure of U. S. Patent 1,589,402, granted to O. H. Kopp, June 22, 1926, and reference to the Kopp patent is made for operations not completely described.

As in the case of the above mentioned patents, a plurality of link circuits are arranged to serve a group of calling lines and are taken into service in rotation. When a link circuit completes its function, it hunts for and associates itself with a district selector which is ready for use and the link and district remain in a sub-allotted condition until the next link in the series has been put into service. The link circuit is then put into an allotted condition from which it will be advanced by the initiation of a call and the action of the start circuit of Fig. 2. The trip circuit of Fig. 1 and start circuit of Fig. 2 are so arranged that only one line may be served at a time and so that there may be cooperation between two groups of lines to each of which a group of link circuits is individual. The details of these functions are described in the above mentioned Matthies patent and, since they form no part of the present invention, will be omitted from the following description.

Assuming that the subscriber at substation 100 is one entitled to establish connections only within a limited area, the link circuit of Fig. 4 is arranged to indicate this fact to the sender in the manner to be described hereinafter. When the subscriber at substation 100 removes his receiver from the switchhook, a circuit is closed from battery through the winding of line relay 101, inner back contact of relay 102, over the subscriber's line, to

ground at the outer contact of relay 102. Relay 101, in operating, closes a circuit from battery through resistance 104, winding of relay 103, to ground at the outer front contact of relay 101. It also prepares a circuit from battery through resistance 111 and the right winding of relay 109 in parallel, inner front contact of relay 101 to conductor 114 to identify the calling line to the line finder. Relay 103 in operating closes a circuit from battery over the back contact of relay 201, conductor 130, right winding of relay 108, inner back contact of relay 107, inner right contact of relay 103, to ground at the left contact of relay 109.

Relay 108 operates in this circuit and closes a locking circuit for itself from battery through the right winding of relay 201, conductor 129, over back contacts of relays similar to relay 108 individual to other groups of lines appearing before the same line finder, inner left front contact and left winding of relay 108, to ground at the right back contact of relay 109. Relay 108 closes a circuit from ground at its outer right front contact through the winding of trip magnet 303 of the line finder to battery in preparation for tripping the proper set of brushes when the line finder is operated. Relay 201 operates in the locking circuit of relay 108 and, in combination therewith, closes a circuit from ground over its outer right contact, conductor 128, inner right contact of relay 108, winding of relay 110 to battery. Relay 110 locks over its inner right contact to ground at the left back contact of relay 109. Relay 110 closes a circuit for starting the allotted line finder. Assuming that the link and line finder shown are the ones to be used next, sequence switch 400 will be standing in position 1 and sequence switch 300 in position 2. The operation of relay 110 will therefore close a circuit from ground at its outer right contact, outer left front contact of relay 108, inner left front contact of relay 103, conductor 131, left back contact of relay 202, inner left back contact of relay 203, conductor 206, upper left and lower right contacts of cam 403, brush 402 and terminal 401, conductor 378, upper right and lower left contacts of cam 301, winding of relay 302 to battery.

Relay 302, in operating, closes a circuit from battery through the winding of up-drive magnet 304 of the line finder, right front contact of relay 302, lower right contact of cam 364, outer left front contact of relay 302, to ground at the lower left contact of cam 336. The line finder moves upward under the control of magnet 304 and, since trip magnet 303 is operated, the proper set of brushes is tripped. As soon as the line finder moves upward, a locking circuit is provided for relay 302 extending over its inner left front contact, upper contacts of cam 308, right back contact of relay 320, commutator strip 321,

brush 322 to ground, which holds relay 302 operated independent of the trip circuit. As soon as commutator brush 307 engages segment 305, a circuit is closed from ground over brush 307 and segment 305, lower right and upper left contacts of cam 306, conductor 404, contact 230 of key 204, inner right front contact of relay 201 to conductor 129 and the right winding of relay 201. This circuit shunts the winding of relay 108 and causes that relay to release, in turn releasing the trip magnet 303. When brush 307 leaves segment 305, the circuit of relay 201 is opened and that relay also releases, freeing the start circuit. When line finder brush 381 makes contact with terminal 380 which is connected to conductor 114 and therefore to battery, a circuit is completed from this battery through the winding of relay 320, lower left and upper right contacts of cam 341, to ground at the lower right contact of cam 339. Relay 320 operates in this circuit and closes a shunt around its winding through resistance 319, to ground over commutator strip 321 and brush 322. This reduces the resistance in series with the winding of marginal relay 109 sufficiently to cause that relay to operate and open the locking circuit of relay 110, which in turn opens the energizing circuit of relay 302. The operation of relay 320 also opens the locking circuit of relay 302, causing that relay to release. The release of relay 302 closes a circuit from ground through the winding of cut-off relay 102, conductor 112, terminal 327, brush 326, inner left back contact of relay 317, right back contact of relay 302, lower right contact of cam 324, resistance 323 to battery. The operation of cut-off relay 102 opens the circuit of line relay 101, removing battery from conductor 114, releasing relays 109 and 320.

At the time relay 302 operated, it closed a circuit from ground at the lower left contact of cam 336, outer left front contact of relay 302, lower right contact of cam 311, conductor 379, terminal 407 and brush 406 of the link district finder 410, lower right contact of cam 408, winding of relay 409, resistance 411 to battery. Relay 409 operates and closes a circuit from battery through the winding of sequence switch magnet 400, upper contact of cam 412, to ground at the outer left contact of relay 409, advancing the link sequence switch 400 to position 2. When sequence switch 400 leaves position 1, relay 409 is released. In position 2, a circuit is closed from battery through the winding of relay 413, upper contacts of cam 414, right back contact of relay 415, to ground at the lower left contact of cam 416. Relay 413 operates, closing a circuit from battery through the left winding of relay 417, left front contact of relay 413, to ground at the left back contact of relay 415. Relay 417, in operating, closes a circuit from battery through the

winding of up-drive magnet 418 of the sender finder 420, left contact of cam 479, outer right contact of relay 417, to ground at the left back contact of relay 409. The sender
5 finder moves upward under the control of magnet 418 in search of an idle sender.

Relay 413 also closes a circuit from battery through the right winding of relay 415, upper contacts of cam 421, middle winding of
10 relay 415, to ground at the right contact of relay 413. The current in this circuit, however, is not sufficient to operate relay 415 but does create a flux in the windings of that relay so that it becomes quick to operate when
15 the test circuit is closed. The test circuit extends from brush 422 over the lower contacts of cam 419, right back contact of relay 409, left winding of relay 415, lower right and upper left contacts of cam 421, middle winding
20 of relay 415, to ground at the right contact of relay 413. An idle sender is characterized by battery connected to conductor 502. When, therefore, brush 422, engages terminal 423, corresponding to the sender of Fig. 5
25 which is assumed to be idle, the test circuit above traced is completed over terminal 423 to battery and relay 415 operates quickly. The relay 415 in operating closes a locking circuit for itself from battery through the
30 right winding of relay 415, upper contacts of cam 421, to ground at the left front contact of relay 415. It also opens the circuit of relay 417 which releases, to in turn release magnet 418 and bring the sender finder to rest on the idle sender. The release of relay
35 417 in turn releases relay 413. With relay 413 released and relay 415 operated, a circuit is closed from battery through the winding of sequence switch magnet 400, lower left contact of cam 476, contact 427 of jack 428,
40 left back contact of relay 413, right front contact of relay 415, to ground at the lower left contact of cam 416, advancing sequence switch 400 to position 3.

When sequence switch 400 reaches position
45 $2\frac{3}{4}$, the following circuits are closed for informing the sender that the calling line is entitled to only restricted service. One circuit extends from ground, upper left and
50 lower right contacts of cam 405, brush 438, terminal 439, conductor 692, outer right contact of relay 510, winding of relay 691 to battery. The other circuit extends from ground over the left contacts of cam 435,
55 brush 436, terminal 437, right back contact of relay 621, conductor 693, normal contact and winding of relay 690 to battery. Relays 691 and 690 operate in these circuits. These relays then prepare circuits which are effective if the subscriber dials the code of a restricted area to route the call to an operator's position.
60

When sequence switch 400 reaches position
65 3, a circuit is closed from ground through the left and middle windings of relay 503, left

back contacts of relays 504 and 505, conductor 506, terminal 430, brush 431, right contact of cam 434, brush 432 and terminal 433, conductor 315, lower contacts of cam 316 (assuming that the district selector has been advanced to position 3 as above described),
70 through the left winding of relay 317 to battery, and in parallel therewith over the upper right contact of cam 316, through the winding of relay 351 to battery. Relay 317
75 is marginal and does not operate; relay 351 operates but is ineffective at this time. Relay 503 also operates and closes an obvious circuit for relay 507 which in turn closes a circuit for relay 509. Relay 509 closes a circuit
80 for relay 510. With relays 507 and 509 operated, locking ground is provided over the lower contact of cam 514 to relays 690 and 691. Relay 510, in operating, opens the energizing circuit of relay 691, and relay 690
85 opens its own energizing circuit so that the discriminating condition exists only temporarily.

As soon as sequence switch 400 arrived in position $2\frac{3}{4}$, it prepared the pulsing circuit
90 for receiving dial pulses. This circuit may be traced from battery through the left winding of relay 606, conductor 637, terminal 440, brush 441, lower contact of cam 429, brush 478, terminal 477, conductor 375, left contact
95 of cam 335, outer left back contact of relay 317, brush 334, terminal 333, conductor 117 through the subscriber's substation, conductor 116, terminal 332, brush 331, right back contact of relay 317, winding of relay 330, left
100 contact of cam 329, conductor 382, terminal 442, brush 443, upper right and lower left contacts of cam 403, brush 444 and terminal 445, to ground at the back contact of relay 513. Relay 606 operates, in turn operating
105 relay 610 in the well-known manner, relay 610 operating relay 609. A circuit is thereupon closed from the source of tone 607 through the right winding of relay 606, timing switch 804 in its normal position, front
110 contact of relay 609, lower contact of cam 514, to ground at the front contact of relay 509. This tone is transmitted to the calling subscriber to inform him that the sender is ready to receive impulses which he may then send
115 out by manipulating his dial.

When relay 510 operated, it removed battery from conductor 502, releasing relay 415. With relay 415 released, a circuit is closed from battery through the winding of sequence
120 switch magnet 400, upper left contact of cam 476, right back contact of relay 415, to ground at the lower left contact of cam 416. Sequence switch 400 advances to position 5 over this circuit and remains in this position
125 throughout the further operation of the sender.

Assuming that the calling subscriber registers a number in an office to which he is allowed to have access, relays 690 and 691
130

will be ineffective and the call will be completed in the manner described in the above identified patent to O. H. Kopp. When the connection has been set up to the called subscriber's lines, reverse battery from the incoming selector operates relays 702 and 704 in the usual manner. These relays in turn cause the operation of relay 708 and relays 524 and 504. With these relays operated, the sender is then advanced to position for making talking selection. The district selector sequence switch is advanced to position 10 in the manner described in the above identified patent. Relay 351 is operated in parallel with the winding of relay 317 throughout selections. The operation of relay 504, above mentioned, opens a shunt around the right winding of relay 503 including that winding in the circuit of relays 351 and 317. Relay 351 thereupon releases, advancing the district selector to position 11 in which position ground is connected over the upper right contact of cam 336 to conductor 315, which is extended over terminal 433, brush 432, upper contacts of cam 446, left winding of relay 415, right back contact of relay 409, left contact of cam 434, brush 431, terminal 430, conductor 506, left back contact of relay 505 to the windings of relay 503. Since these are also connected to ground, relay 503 now releases, in turn releasing relay 507. The release of relay 507 does not release relay 509 since that relay is locked to its own front contact. A circuit is therefore closed from ground over the back contact of relay 507, left front contact of relay 509, to the winding of relay 505 which locks over its middle left front contact to conductor 506 and to ground as above traced.

After talking selections are completed, relay 515 operates, connecting battery to conductor 506 in parallel with the winding of relay 505. The current in this circuit is now sufficient to operate relay 415 which closes a circuit from battery through the left winding of relay 417, left contacts of cam 421, to ground at the left front contact of relay 415. Relay 417 closes a circuit from battery through the winding of sequence switch magnet 400, upper contact of cam 479, outer right front contact of relay 417, left back contact of relay 409 to ground, advancing sequence switch 400 to position 6. In this position, all of the conductors extending to the sender are opened and the sender is completely released. As soon as sequence switch 400 leaves position 5, relay 415 releases and in turn releases relay 417 unless the sender finder 420 is standing on one of its top ten terminals. If the latter is true, relay 417 is held operated in a circuit from battery over its left winding, left front contact, upper left contact of cam 424, commutator segment 464, brush 463 to ground. With relay 417 held operated at this time, a circuit is closed from battery through resistance 411, winding of relay 409, lower contacts

of cam 414, inner right front contact of relay 417, lower left contact of cam 416 to ground. Relay 409 locks through its inner left contacts to ground at the lower contact of cam 467 and also closes a second locking circuit for relay 417. With relay 409 operated, a circuit is closed from battery through the winding of down-drive magnet 465 of the sender finder 420, left contact of cam 412, to ground at the left front contact of relay 409. When the sender finder reaches its lowermost position, a circuit is closed from ground over brush 463, bottom commutator segment 406, upper contact of cam 456 to resistance 411, shunting the winding of relay 409 and causing that relay to release and in turn release relay 417. With relay 417 released in position 6, a circuit is closed from battery through the winding of sequence switch magnet 400, lower right contact of cam 476, right back contact of relay 417, to ground at the lower left contact of cam 416, advancing sequence switch 400 to position 7.

When sequence switch 400 reaches position 7, the link circuit is ready to associate itself with another district. If another district is standing in position 1 waiting association with a link, a circuit will be closed from ground over the lower left contact of cam 339 of that district, contact 393 of jack 374, conductor 392, contact of jack 448, contact of jack 449, upper contact of cam 416, right back contact of relay 415, upper contacts of cam 414, winding of relay 413 to battery. Relay 413 closes a circuit from battery through the left winding of relay 417, left front contact of relay 413, to ground at the left back contact of relay 415. Relay 417, in operating, closes a circuit for up-drive magnet 447 of the district finder 410, lower right contact of cam 479, outer right front contact of relay 417, left back contact of relay 409, to ground. The district finder moves upward under control of magnet 447 in search of the district which is awaiting a link. Such a district is identified by battery connected over the left contacts of cam 344 of that district, contact 373 of jack 374, to conductor 366. Relay 413, in operating, closes the same circuit through the right and middle windings of relay 415 as it closed in position 2. At this time the test circuit extends from ground at the right front contact of relay 413, through the middle winding of relay 415, upper left and lower right contacts of cam 421, left winding of relay 415, right back contact of relay 409, lower right and upper left contacts of cam 419, contact of jack 449 to brush 451.

If the district for which the district finder is hunting does not lie between the last position occupied by the finder and the top of its bank, it will continue to move upward until brush 453 engages segment 452, completing a circuit over the upper right contact of cam 408, winding of relay 409, resistance 411 to

battery. The operation of relay 409 opens the test circuit, opens the circuit of up-drive magnet 447 and closes a circuit from battery through the winding of down-drive magnet 454, lower right contact of cam 412, left front contact of relay 409 to ground. The district finder is restored to its lowermost position under the control of magnet 454, at which time a circuit is closed from ground over brush 453, bottom segment 455 of the district finder commutator, lower right contact of cam 456 to resistance 411, shunting and releasing relay 409 which restores the test circuit and the circuit of up-drive magnet 447. When brush 451 encounters terminal 450 to which conductor 366 extends, the test circuit is completed and relay 415 operates quickly as in the previous case. Relay 415 locks through its right winding, the upper contact of cam 421, to ground at its left front contact, opening the circuit of relay 417 to release magnet 447 and bring the district finder to rest on the terminals of the district. With relay 415 operated and relay 417 released, a circuit is closed from battery through the winding of sequence switch magnet 400, lower left contact of cam 476, contact 427 of jack 428, back contact of relay 413, right front contact of relay 415, upper right contact of cam 416, contacts of jacks 449 and 448 to conductor 392. Sequence switch 400 advances to position 8 in this circuit.

Relay 415 is held operated in position 8 from battery at the district over terminal 450, brush 451, contact of jack 449, upper left and lower right contacts of cam 419, back contact of relay 409, left winding of relay 415, lower right and upper left contacts of cam 421, to ground at the left front contact of relay 415. With relay 415 operated, a circuit is closed from ground at the lower left contact of cam 416, right front contact of relay 415, upper left contact of cam 429, brush 478, terminal 477, conductor 375, lower right contact of cam 312, lower right contact of cam 313, left winding of relay 314 to battery. Relay 314 closes a circuit from battery through the winding of sequence switch 300, upper left contact of cam 328, right front contact of relay 314, left back contact of relay 302, to ground at the lower left contact of cam 336. Sequence switch 300 advances to position 2 in this circuit, releasing relay 314. The advance to position 2 removes ground from conductor 392 and battery from conductor 366. The removal of battery from conductor 366 opens the circuit of relay 415, and that relay releases, closing a circuit from battery through the winding of sequence switch magnet 400, upper left contact of cam 476, right back contact of relay 415, to ground at the lower left contact of cam 416. Sequence switch 400 advances to position 9.

The link circuit remains in this position until the link circuit standing next to it in

the series is advanced from position 1 for the purpose of selecting a sender. Link circuit 260 occupying that relationship to the link circuit of Fig. 4, a circuit may be traced from ground over the lower contact of cam 261, upper right contact of cam 262, conductor 263, contact 460 of jack 428, upper right contacts of cams 461 and 462, winding of sequence switch magnet 400 to battery, advancing the link circuit to position 10 which is the equivalent of position 1, so that the link circuit is ready to operate in response to the next call in the group of lines served thereby.

Referring again to the registration of the class of the calling line in the sender, it is possible with the present showing to have as many as four classes of subscribers, that is, ground may be connected to both cams 405 and 435 as shown, or ground may be connected to only one of these cams or neither of them with the corresponding operation or non-operation of the relays 690 and 691. For the purpose of making a larger number of discriminations, a marginal relay might be connected in series with each of the relays 690 and 691 and the discriminating condition be either an open circuit, a ground through a resistance or a direct ground, making possible nine classes of calling lines. The relays 690 and 691 serve to restrict registration by canceling the setting of the translator and causing it to reset on a terminal which will route the connection to the proper operator.

Inasmuch as the present invention is not concerned with the specific operation of the district selector of Fig. 3, or the operation of selectors to further extend the calling line and the functioning of the sender to control selections no detailed description thereof has been given herein. The selector circuits employed in the establishment of the talking connection are released following the termination of the conversation in the manner fully set forth in the patents hereinbefore referred to.

What is claimed is:

1. In a telephone system, an automatic switch, a series of elements to which said switch has access, means to characterize said elements as busy or idle, means to cause said switch to test said elements in succession and to connect itself with the next idle one, means to disconnect said switch from said element, and means thereupon effective only if said element lies within a particular group of said elements to return said switch to a position to test the first element of the series.

2. In a telephone system, an automatic switch having no normal position, a series of elements to which said switch has access, means to characterize said elements as busy or idle, means to start said switch from a position of rest to test said elements in succession and to connect itself with the next idle

one, means to disconnect said switch from said element, and means thereupon effective if said element lies within a particular group of said elements to return said switch to a position to test the first element of the series.

3. In a telephone system, a link circuit, an automatic switch in said link circuit, a series of control devices to which said switch has access, means to mark said control devices as busy or idle, means to operate said switch to associate said link circuit with an idle control device, means to disconnect said link circuit from said control device without restoring said switch, and means effective if said control device is one of a particular group to return said switch to a position to test the first device of the series.

4. In a telephone system, a link circuit, a switch in said link circuit of a type driven from a continuously operating source of kinetic energy, a plurality of control devices appearing in the terminal bank of said switch, means to operate said switch to select an idle control device, means to disconnect said link circuit from said control device without restoring said switch, and means effective if said control device, appears in one of the uppermost ten of the terminals of said switch to return said switch to its lowermost position.

5. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups for controlling the automatic establishment of connections, means responsive to the initiation of a call by one of said lines to cause one of the corresponding link circuits to associate a control device with said line, means on said calling line to set up on said control device a registration of the number of the wanted line, and means in said link circuit to set up in said control device a registration of the class of the calling line.

6. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups for controlling the automatic establishment of connections, means responsive to the initiation of a call by one of said lines to cause one of the corresponding link circuits to associate a control device with said line, means on said calling line to set up on said control device a registration of the number of the wanted line, and

means in said link circuit to establish momentary circuits for setting up a registration in said control device of the class of the calling line.

7. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups, said control devices being associated with calling lines through the intermediation of said link circuits, a plurality of temporary circuits normally prepared by said control devices, and means in said link circuits to variably complete said circuits to record the class of the calling line.

8. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups, said control devices being associated with calling lines through the intermediation of said link circuits, a plurality of relays in each of said control devices, and means in said link circuits for variably operating said relays to record the class of the calling line.

9. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups, said control devices being associated with calling lines through the intermediation of said link circuits, a plurality of relays in each of said control devices, circuits therefor normally prepared by said control devices, and means in said link circuits for variably completing said circuits to establish a record of the class of the calling line.

10. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups, selector switches for extending connections from said lines, means responsive to the initiation of a call by one of said lines to cause one of said link circuits to associate an idle control device with said line and with a selector switch, means to establish a control circuit for said switch through said link circuit, and means to temporarily ground one or more of the conductors of said control circuit to set up a registration in the control device of the class of the calling line.

In witness whereof, I hereunto subscribe my name this 26th day of May, A. D., 1927.

ARTHUR RAYNSFORD.

DISCLAIMER

1,690,206.—*Arthur Raynsford*, New York, N. Y. TELEPHONE SYSTEM. Patent dated November 6, 1928. Disclaimer filed July 11, 1931, by the assignee, *Western Electric Company, Incorporated*.

Hereby enters this disclaimer to the said claims of said Letters Patent which are in the following words to wit:

"5. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups for controlling the automatic establishment of connections, means responsive to the initiation of a call by one of said lines to cause one of the corresponding link circuits to associate a control device with said lines, means on said calling line to set upon said control device a registration of the number of the wanted line, and means in said link circuit to set up in said control device a registration of the class of the calling line."

"8. In a telephone system, calling lines arranged in groups according to the class of service to which they are entitled, link circuits individual to each group, control devices common to all groups, said control devices being associated with calling lines through the intermediation of said link circuits, a plurality of relays in each of said control devices, and means in said link circuits for variably operating said relays to record the class of the calling line."

[*Official Gazette August 11, 1931.*]