Sept. 29, 1925. 1,555,001

E. A. GRAY

TELEPHONE SIGNALING SYSTEM

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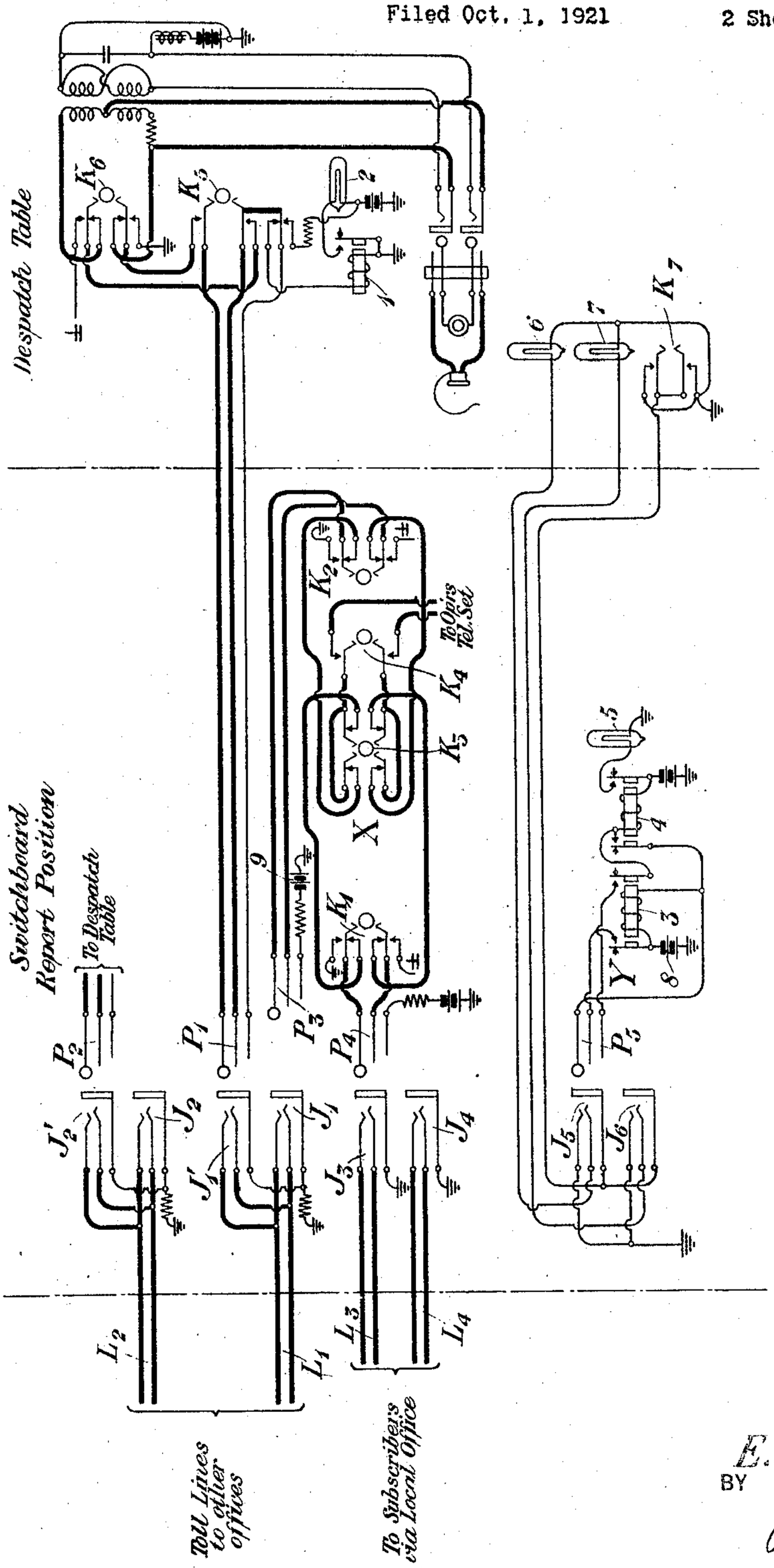

Fig. 1

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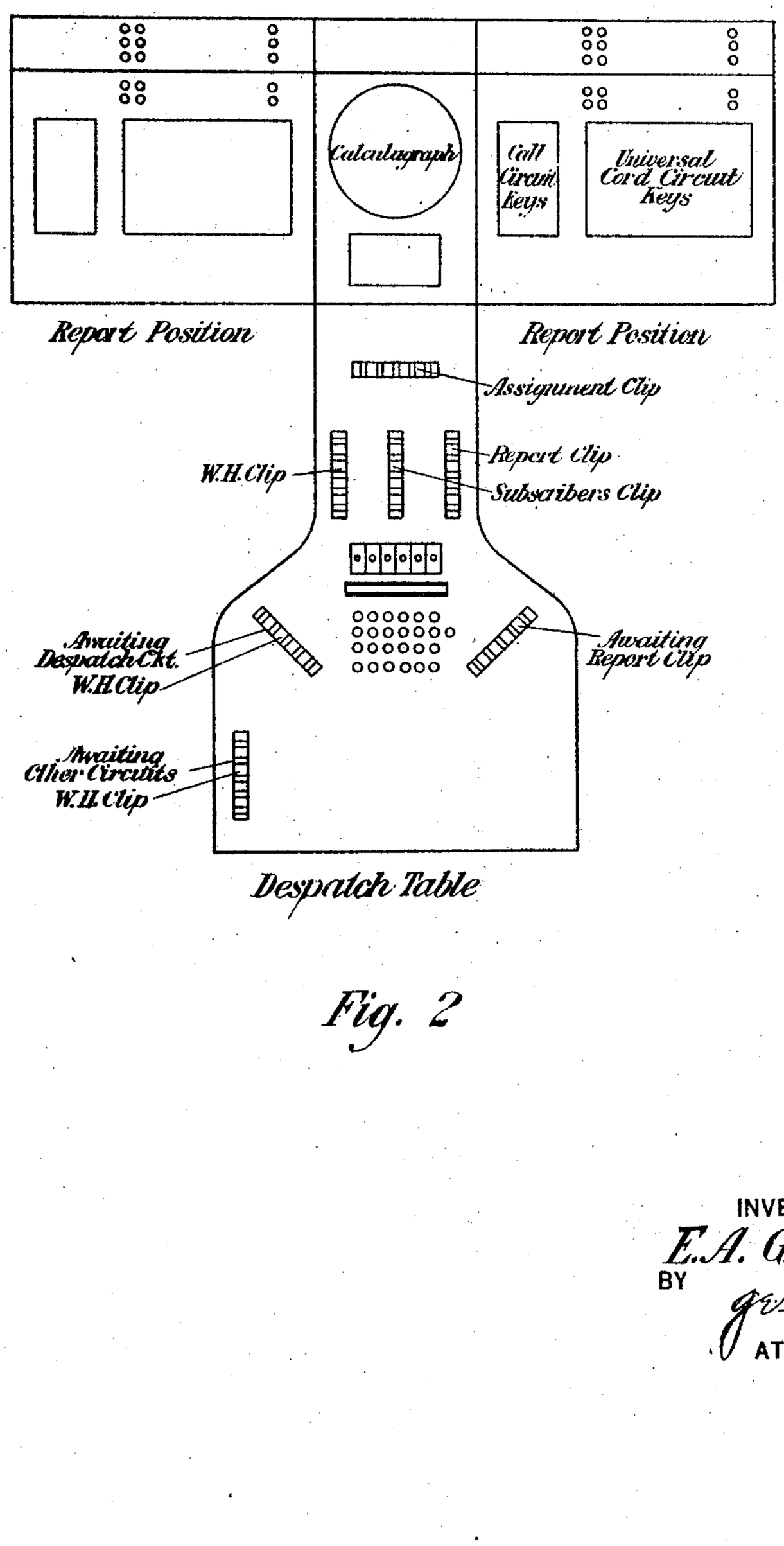

Fig. 2

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Patented Sept. 29, 1925. 1,555,001

UNITED STATES PATENT OFFICE.

ERNEST A. GRAY, OF ROSLYN, NEW YORK, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

TELEPHONE SIGNALING SYSTEM.

Application filed October 1, 1921. Serial No. 504,695.

To all whom it may concern:

Be it known that I, ERNEST A. GRAY, residing at Roslyn, in the county of Nassau and State of New York, have invented certain Improvements in Telephone Signaling Systems, of which the following is a specification.

This invention relates to telephone signaling systems and particularly to means for, and method of operating the toll telephone lines in order to increase the efficiency of the operation of the toll telephone system.

In the system heretofore employed for operating toll telephone lines, commonly known as the ring down method of operation, it has been customary for the operator at the office where the call originates to signal the operator at the distant office and after transmitting the call to the said distant operator, to hold the long distance toll line until the distant operator obtains a report upon the call. Such report might be either that they have the called party or that the called party is not available or a report along similar lines. It is obvious that during the time in which the calling operator is waiting for a report from the called operator that the toll line is not available for useful revenue producing purposes.

It is the object of this invention to provide means for and a method of operating a signaling circuit and particularly a toll telephone system whereby a greater volume of revenue producing traffic can be handled over a toll line than is now possible by the present ring down method of operation.

With this new method, known as the dispatch method of operation, the toll lines are not held by the calling operators while reports are being obtained by the called operators, as in the case of the ring down method of operation but they are used to pass the details of desired connections up to the time the parties are ready to talk. It will be clearly seen from the following description that during any interval in which the toll lines are not being used by the parties for the purpose of conversation between themselves, the details of a plurality of calls may be transmitted by the calling operator to the called operator, and, similarly, reports may be transmitted by the called operator to the calling operator whereby the proper terminal circuit arrangements for a plurality of calls may be established in advance, so that when a toll line becomes available the proper terminal connections for the next call will be established, thereby greatly increasing the efficiency of operation of the toll line system.

The dispatch method of operation normally involves the use of from two to four operators at each end of a group of toll line circuits, one of whom is known as the dispatch operator and the others as report operators. For the purpose of describing this system, only the dispatch operator and one report operator will be referred to. The report operator deals with subscribers, and with the operators at local offices reached over ring-down or other types of circuits, receiving calls from the subscribers through the said offices, giving reports on the calls, and supervising the starting of conversation and the timing of messages. The dispatch operator controls the toll line circuits, passing and receiving calls, reports and orders over the said circuits, and turning the toll line over to the report operator when both the calling and the called parties are at their telephones ready to talk.

This invention will be better understood from the following description when read in connection with the attached drawing, of which Fig. 1 shows a circuit arrangement in which the invention is embodied, and Fig. 2 shows the relative positions of the operators at the switchboard by means of which this method is carried out.

Terminal dispatch system.

The terminal apparatus of the circuit arrangement shown in Fig. 1 is located in two places, as shown in the figure, viz., at the report position of the switchboard and the dispatch table. In the figure L_1 and L_2 represent two toll lines extending between two long distance toll offices. The line L_1 terminates at the report position of the switchboard in the jack J_1, having another jack J_1' multiplied therewith. Similarly, the line L_2 terminates at the same position in a jack J_2 having another jack J_2' multiplied therewith. These lines, which may be of the well known ring-down type of trunks are shown in simple form in which the other terminal apparatus normally associated with these trunks but not necessary to describe this invention has been omitted.

The lines L_3 and L_4 represent either ring-

down trunks or order-wire trunks, which extend from the said report position to other local offices for the purpose of connecting subscribers' lines with the long distance toll office. These lines terminate at the report position in the jacks J_3 and J_4 respectively. Other terminal apparatus normally connected with such circuits but not necessary for describing this invention has been omitted from the drawing for the purpose of simplicity. Also located at the report position are jacks J_5 and J_6 which terminate a signaling circuit extending from the report position to the dispatch table. It is to be understood that the number of toll lines, such as L_1 and L_2, and the number of local trunks such as L_3 and L_4, are not limited as shown in the drawing but any number of circuits may extend to and terminate at the report position without varying the scope of the invention. Similarly any number of signal circuits, such as are terminated by jacks J_5 and J_6, may be used, depending upon traffic requirements.

Associated with the jack J_1' is the plug P_1 of a cord circuit extending to the dispatch table and terminating there in signaling apparatus and also in an operator's telephone set. The plug P_1 is adapted for insertion in the jack J_1' or similar jacks of other toll lines terminating at the report position and with the cord circuit associated therewith, serves to extend the toll line to the dispatch table. At the dispatch table are located the keys K_5 and K_6, K_5 serving to effectively connect the operator's telephone set with any toll line with which the plug P_1 may be connected, and K_6 enables ringing current to be applied over the said toll line to signal the distant operator. Associated with the key K_5 is the relay 1 and a lamp 2, the functions of which will be made clear hereafter. The operator's telephone set is of a well known type and needs no further description. Any number of such cord circuits may extend from the dispatch table to the report position of the switchboard, terminating there in plugs such as P_1 and P_2.

Also located at the report position of the switchboard are a plurality of cord circuits of well known types, such as X, terminating in the plugs P_3 and P_4, which are intended to connect the local trunks such as L_3 or L_4 with the long distance toll lines such as L_1 or L_2. Only sufficient apparatus has been shown in connection with the cord circuit X as is necessary to properly describe this invention. Keys K_1 and K_2 are adapted to apply ringing current to the lines connected with the plugs P_4 and P_3 respectively. K_3 represents a splitting key and K_4 a listening key by means of which the operator's telephone set at the report position may be connected with the lines with which the plugs P_4 and P_3 may be connected. It is to be understood that proper supervisory apparatus would normally be connected with such cord circuits.

The signaling circuit terminating in the jacks J_5 and J_6 is adapted to have associated therewith a suitable signaling circuit Y by the insertion of the plug P_5 in the appropriate jack. This circuit comprises the relays 3 and 4 and the lamp 5, the purpose of which will be clear from the following description of the mode of operation of the circuit. At the dispatch table the signal circuit terminates in the lamps 6 and 7 and also has associated therewith a key K_7 by means of which the operator at the dispatch table can signal the operator at the report position.

Having in mind the foregoing description of the apparatus associated with the circuits shown in Fig. 1, these circuits will be better understood from the following description of their method of operation.

In the dispatch method of operation, any of the toll lines such as L_1 and L_2 may be made available at the dispatch table by means of the cord circuits heretofore referred to, terminating at the report position in the plugs P_1 and P_2. Accordingly, assuming that the lines L_1 and L_2 are to be operated by the dispatch method, the plugs P_1 and P_2 will be inserted in the jacks J_1' and J_2' respectively. The call is received at the recording board of the toll office and the details of the call are noted upon a ticket which is transmitted to the report operator of the dispatch toll line. This ticket gives to the report operator the name, address and telephone number of the called party, and also the name and telephone number of the calling party. Upon receipt of this ticket, the operator at the report position inserts the plug P_4 of the cord circuit X in the jack J_3 and operates the key K_4 which connects her telephone set with the calling subscriber, in order to hold that line until a report is obtained regarding the called subscriber. This ticket would be placed in the report clip of the dispatch table, as shown in Fig. 2. It will be seen that the dispatch table, as shown in the said figure, is placed in close juxtaposition to the operating positions of the switchboard. The dispatch table comprises in addition to the keys and lamps heretofore referred to in the description of Fig. 1, a plurality of clips which serve to hold the tickets at various stages of the process of establishing and completing the desired connection. The object of these clips and the relation that they bear to the process of carrying out this invention will be clearly understood from the following description of the mode of establishing long distance telephone connections.

As stated, the report operator has taken up the calling line and has placed the ticket in the report clip of the dispatch table. The dispatch operator takes the ticket from the report clip and transmits to the distant dispatch operator the details of the call. It is to be understood that the circuit equipment and the terminal switchboard arrangement at the distant end of the toll line operated by the dispatch method are the same as those shown in the said figures. Furthermore, the dispatch operators at the opposite ends of the toll lines are always in direct communication with each other over any spare toll line so that calls, reports etc. may be promptly and rapidly transmitted without the actuation of any signaling apparatus, thereby increasing the speed of operation of the system.

In describing this method of operation the operators at the calling end will be referred to as dispatch operator A and report operator A, and the operators at the called end as dispatch operator B and report operator B. When the dispatch operator A transmitted the details of the call to the dispatch operator B she used any non-busy toll line which for illustration will be assumed to be line L_1. If all the toll lines are busy in transmitting conversation between parties the dispatch operators use the first circuit which becomes idle. If more than one circuit is idle the dispatch operators use the lowest numbered circuit as the order wire circuit. The dispatch operator B places the details of the call upon a ticket, assigning a serial number thereto, which serial number is given to the calling dispatch operator A who in turn places the same serial number upon the corresponding ticket. The dispatch operator A places the ticket in the awaiting report clip shown in Fig. 2. The dispatch operator B places the ticket which she has prepared in the subscriber's clip at her position, which, as stated would be similar to Fig. 2. It is to be noted that as soon as the details of this call have been passed over the line the line is either released or details of other calls will be transmitted over the said line. A report operator B takes the ticket from the subscriber's clip and calls the desired number in order to secure a report. If she reaches the desired party she advises him that he will be called again and places upon the ticket a notation such as W. H. (we have), indicating that the called party is available to complete the connection. This ticket is placed in the W. H. clip of the B dispatch table shown in Fig. 2, but if the report is other than W. H. such as for example, that the party is not there or that they do not answer their telephone etc., the ticket with the report inscribed on it is placed in the report clip at the B table.

The dispatch operator B takes the ticket from the W. H. or the report clip and passes the report to the dispatch operator A, who records it on the original ticket, dispatch operator B assigning a toll line for the establishment of the connection if one is available when the report is W. H. If no toll line is available and the report is W. H. each dispatch operator places the ticket in the awaiting dispatch circuit clip. If a toll line is available and has been assigned to this call both dispatch operators write the number of the toll assignment on their tickets and place the tickets in their respective assignment clips. If the report is not W. H. dispatch operator A places the ticket in the subscriber's clip, from which a report operator A will take it and transmit the report to the calling subscriber over the local trunk lines, such as L_3 and L_4.

If the report upon the call is W. H. the report operators A and B remove the tickets from their assignment clips and call their respective parties. This the report operator A would do by inserting the plug P_4 in the jack J_3 for example, and ringing over the line L_3, whereby the connection would be established through the local office at which the line L_3 terminated. When the report operator A has secured her party she inserts the plug P_5 of one of her signal cord circuits Y into what may be termed the "ready with" jack J_5 of the signal circuit extending to the dispatch table. When the plug P_5 is inserted in the jack J_5, current will flow from the source 8 through the windings of the relay 3 over the tip contacts of the plug P_5 and the jack J_5 to ground thereby energizing relay 3 and closing its contacts. By the closing of the left-hand contact, current will flow from the source 8 over the ring contacts of the plug P_5 and the jack J_5 through the lamp 6 to ground thereby lighting the said lamp, which indicates to the dispatch operator A that the report operator A has secured her party and that he is ready to talk. In a similar manner the report operator B at the distant toll office, when she has secured her party will signal to her dispatch operator to indicate that she has reached the called party that he is ready to talk with the calling party.

It will be seen that while the report operators are establishing the proper terminal circuit arrangements neither of the terminal circuits are connected with the toll lines. Consequently the said lines are available throughout this period for the transmission between the respective dispatch operators of other calls, reports, etc.

The dispatch operator who first receives a signal from her report operator by the lighting of the lamp 6, indicating that her report operator has the subscriber ready to talk, advises the other dispatch operator that she is ready on the assigned circuit, giv-

ing the number of the said circuit. The dispatch operator who last receives the signal from her report operator that the proper terminal circuit arrangements have been completed then reports to the said first dispatch operator to go ahead on the assigned circuit number, giving the number of the said circuit. Upon the transmittal and receipt of this last report, each dispatch operator will press the key K_7 at her position which lights a lamp 5 at the respective report positions through the energization of the relay 4. Upon the receipt of the signal given by the lighting of the lamp 5 at the respective report positions, the report operators A and B immediately establish the connection between the subscriber connected with a line such as L_3 with the assigned toll line such as L_1, by the insertion of the plug P_3 in the jack J_1. The report operators will then supervise the connection and the operator at the calling position will time the duration of the conversation. Each report operator will also disconnect their respective cord circuits Y from their signaling circuit to the dispatch table by the removal of the plug P_5 from the jack J_5.

When a report operator, such as at A, inserts plug P_3 in the jack J_1, the sleeves of the jacks associated with the line L_1 will be energized from the source 9 and consequently relay 1, associated with the key K_5 at the dispatch table, will be energized, which in turn lights the lamp 2 and indicates to the dispatch operator that the toll line with which the cord circuit having a plug P_1 is associated is busy.

When the respective report operators receive their supervisory signals indicating that their respective parties have terminated their conversation, they disconnect the local circuit from the toll line by removing the plugs of the cord circuit such as X from the respective jacks. The removal for example of the plug P_3 from the jack J_1 will release the relay 1 of the cord circuit at the dispatch table, which extinguishes the lamp 2 and thereby apprises the dispatch operator that the toll line is now free for other messages. If the distant report operator is slow in removing her circuit connections the dispatch operator may signal her by the operation of the ringing key K_6 in conjunction with the key K_5 associated with the cord circuit at the dispatch table.

Built-up dispatch system.

If a call is received at one of two toll offices of the dispatch system from another toll office which is not operated on the dispatch basis but which is to be completed over the dispatch system, the method of operation is somewhat different. The said other toll office would be connected with one of the dispatch toll offices over a ring down trunk such as, for example, L_3 which terminates at the report position in the jack J_3. The calling subscriber would probably be connected with the said other toll office over a ring down trunk so that before the assignment of this call could be made to a dispatch toll circuit, all of the sections of the ring down circuit extending from the report position of the dispatch office through the said other toll office and the other local office to the calling subscriber would have to be secured and held. The following description covers the procedure in handling a call originating at a toll office which is not a dispatch office and which is completed through a dispatch system.

The operator at the originating office (by which is meant the other toll office not operated on the dispatch basis) reaches the report operator at the dispatch office A, as shown in Fig. 1 and passes to her the complete details of the call. The toll line between the report position of the dispatch office A and the said originating office is released as soon as the details of the call are noted on a ticket and the said connection is not reestablished until later in a manner which will be made clear. The report operator A places the ticket in the report clip of the dispatch table and the dispatch operator A passes the details of the call to the dispatch operator B over any non-busy toll line. The dispatch operator B places the details of the call upon a ticket, assigning a serial number which is given to the dispatch operator A and places the ticket in the subscriber's clip at the dispatch position B. The dispatch operator A places her ticket in the awaiting report clip. The report operator B takes the ticket from the subscriber's clip and reaches the called number and secures a report. If the report is W. H. (we have) the called subscriber is advised that he will be called again and the ticket is placed by the report operator in the W. H. clip at the dispatch table B. The dispatch operator B takes the ticket from the W. H. clip and after passing the report to the dispatch operator A she places the ticket in the awaiting dispatch circuit clip. The dispatch operator A writes the report on her ticket, entering the notation "secure line" (meaning to secure the ring down toll line to the originating office) and places the ticket in the assignment clip at the dispatch table A. The report operator A takes the ticket from the assignment clip, builds up a connection to the originating toll office and orders the operator there to establish a connection with the calling line but not to ring the same. The report operator A then enters on the ticket the number of the toll line she is holding to the originating office, and places the ticket in the W. H. clip of the dispatch table A. The report

operator A establishes this connection with the originating office by the insertion of the plug P_4 in the jack J_3 of the ring down trunk L_3 and after establishing the circuit she leaves the connections in that position.

The dispatch operator A takes the said ticket from the W. H. clip and as soon as a dispatch toll line to the distant dispatch toll office is available she makes the toll line assignment to the dispatch operator B. Both dispatch operators A and B enter the number of the toll line assignment on their tickets and place the tickets in their respective assignment clips. The report operator A calls the originating office over the toll line L_3 and requests the operator to wait on the circuit. She (the report operator A) then inserts the plug P_5 of one of her signal cord circuits Y in the "ring party" jack J_6 of the signal circuit extending to her associated dispatch table, which by the operation of the relay 3 lights the lamp 7 at the dispatch table. The jack J_6 and the lamp 7 have a distinguishing color such as green, in order to distinguish them from the jack J_5 and the lamp 6 which are colored white.

As soon as the report operator B gets the ticket from her assignment clip she inserts the plug of a similar cord circuit Y into a jack similar to J_6 which lights a green lamp such as 7 at the dispatch table B. The first dispatch operator to receive a green lamp signal reports to the other dispatch operator "ready to ring on (circuit number)," designating the agreed circuit number given on the ticket. The dispatch operator who last receives the green lamp signal reports to the distant operator "ring party on (circuit number)" indicating the circuit number agreed upon. Both dispatch operators A and B will then press keys such as K_7, associated with their lamp signals which will light a lamp such as 5 at the report positions thereby notifying the report operators to proceed with arrangements to have their respective subscribers ready to talk on the call. The report operator A after ordering the originating toll office operator over the line L_3 to ring her party and advise when "ready" removes the plug P_5 of her cord circuit Y from the jack J_5, thereby extinguishing the lamp 7. The report operator B rings her party and similarly disconnects her cord circuit similar to Y from the jack to the corresponding signal circuit. When the report operator A receives a "ready" report from the operator at the originating office she (report operator A) inserts the plug from the cord circuit Y into the jack J_5, thereby lighting the lamp 6 at the dispatch table, which indicates to the dispatch operator A that the terminal circuit arrangements have been completed and that the calling party is ready to talk to the called party. When the report operator B establishes communication with the called party she inserts the plug of her cord circuit similar to Y in a jack similar to jack J_5, which lights a lamp similar to 6 at the dispatch table B, thereby indicating to the dispatch operator B that the called party is ready to talk with the calling party.

It will be seen that up to this time neither of the terminal circuits have been connected with any of the dispatch toll circuits which consequently leaves these latter circuits entirely free and clear for the transmission of other calls, reports, etc. between the dispatch operators at the ends of these toll circuits.

The dispatch operator who first receives the signal given by the lighting of the white lamp 6, reports to the distant dispatch operator "ready on (circuit number)" giving the number of the designated circuit. The dispatch operator who last receives the signal given by the lighting of the lamp 6, reports to the distant operator "go ahead on (circuit number)," giving the number of the designated circuit. Both dispatch operators will then press their keys such as K_7, which lights a lamp such as 5, thereby indicating to each report operator that the terminal circuit arrangement at the other end of the toll line has been completed. Accordingly the report operator A connects the line L_3 with the designated dispatch toll line such as L_1, by the insertion of the plug P_3 into jack J_1 and the said report operator also orders the operator at the originating toll office to start the conversation. The report operator B connects her terminal circuit with the assigned toll line by the insertion of the other plug of her cord circuit into the said toll line. When the report operators have completed the connections to the toll line in the dispatch group, a busy signal is given at each dispatch table by the lighting of their respective lamps such as 2. The report operators continue to supervise the established connection and when they receive supervisory signals indicating that the conversation has terminated they disconnect their cord circuit from the toll line, thereby extinguishing the lamp 2 at the dispatch table and indicating to the dispatch operator that the toll line is now again free for the transmission of further messages.

In the foregoing description of the method of operation of the toll line system, where one of the report operators at a dispatch office has not entire control over the calling subscriber, we have assumed that the report operator at the called office, that is to say, the report operator B, reported a W. H. when the call was first transmitted to her. If the report which this operator had obtained when she tried to get the called subscriber had been something else

than W. H. this report would have been passed back over the dispatch group to the dispatch operator A and in turn to the report operator A and no toll circuits would have been held.

In the case of a built-up circuit connection requiring the use of a repeater at the dispatch toll office, the report operator at said office at the time she secures a ring down circuit for the completion of the call to either the calling or the called offices orders the repeater operator at the dispatch office to take up and hold the toll line to the calling or the called offices and also to hold a repeater in reserve for completing the connection. When the toll line assigned in the dispatch group of toll lines is turned over to the report operators for completing the connection, the report operator, instead of completing the connection at the report position, reaches the repeater operator and orders her to connect the ring down toll line to the calling office, to the assigned dispatch toll line. It will thus be seen that the connection is completed through the repeater position instead of at the report position of the switchboard.

Tandem dispatch system.

The following description covers the procedure necessary for handling a call which originates at a toll office connected with one dispatch system and which requires the use of a second dispatch system connected in tandem with the first dispatch system in order to complete the transmission of the call. Let it be assumed that a call originates at office A, which is one of the toll offices connected with a toll dispatch system, which, for the purpose of description, will be referred to as system No. 1. By originating is meant that the transmission of the call on the toll line system begins at office A, although as a matter of fact it is transmitted by a subscriber over the ring-down trunk from his local office to the toll office A. Furthermore let it be assumed that this call is to be transmitted through an intermediate toll office B to a subscriber in the territory served by the toll office C, the said latter office being connected with the intermediate office B by a second dispatch system, which for the purpose of this description, will be referred to as system No. 2. Thus it will be seen that system No. 1 extends from office A to office B, and system No. 2, from office B to office C. The dispatch and the report operators at office A will be designated dispatch operator A and report operator A, and the similar operators of system No. 1 at office B will be designated dispatch operator B and report operator B. Since system No. 2 would have different operators at the intermediate office, the corresponding operators at the said office will be designated dispatch operator B′ and report operator B′, and the similar operators at office C will be designated dispatch operator C and report operator C. When the report operator A receives a ticket from the recording operator, she places the ticket in the report clip of the associated dispatch table, and the dispatch operator A transmits the call over any non-busy toll line to the dispatch operator B, who assigns a serial number to the call and gives the number to the dispatch operator A. This ticket is transmitted to the report operator B as in the other methods heretofore described, and the said report operator after noting that the call requires the use of another dispatch system in order to complete it, makes a duplicate of the said ticket, which duplicate is transmitted to the report operator B′. The report operator B′ passes the ticket to her dispatch operator, who transmits it over any non-busy toll line of system No. 2 to dispatch operator C, who assigns a serial number thereto and transmits the ticket to the report operator C. If the called party is not reached, the report is transmitted over system No. 2 to the intermediate office, and the report operator B′ transmits the report to report operator B over an interposition trunk at office B. The report is then transmitted over system 1 to the report operator at office A in a manner similar to that described in connection with the other methods of operation, and the report operator A gives the report to the calling subscriber.

If the report operator C reports a W. H. indicating that the called party has been reached, the report is transmitted over system No. 2 by the dispatch operator C to the dispatch operator B′, who notes upon the ticket the designation W. H. followed by the notation "secure line." This ticket is placed in the subscriber's clip at the B′ position and the report operator B′ reaches the report operator B and passes the report to her. The report operator B enters the report on her ticket followed by the notation T. D. indicating that the call involves two dispatch systems, or tandem dispatch, and places the ticket in the W. H. clip at her dispatch table. Dispatch operator B of system No. 1 passes the report to the dispatch operator A and also the code designation T. D. As soon as a circuit in system No. 1 is available, it is assigned for completing the call. Both dispatch operators A and B, upon noting the designation T. D. indicating that a call involves more than one dispatch system, place a special sleeve or other indicating device over the handle of the key K_5 of the assigned circuit and immediately cut in on that circuit. The ticket with the circuit assignment thereon

is placed in the assignment clip at each dispatch table. The report operator A takes up the assigned toll line and connects it to the trunk over which the calling subscriber will be reached in a manner similar to that followed in the other methods heretofore described. The said report operator also places a special clip or other designating device upon the cord connecting the calling line with the toll line to indicate that the connection involves more than one dispatch system and that it must not be disturbed until she receives the proper signal to go ahead. The report operator B at the intermediate office calls the report operator B′ over an interposition trunk and passes to her the number of the toll circuit assigned for the call in system No. 1. The report operator B′ takes up the assigned circuit in system No. 1 by plugging into the toll line multiple, and places a special clip or other designating device upon the cord of the cord circuit to indicate that it is a tandem connection and that special action will be required by her when the proper advice is received from her dispatch operator. The report operator B′ also notes upon her ticket the number of the circuit in system No. 1 and places the ticket in the W. H. clip on her dispatch table. The dispatch operator B′ assigns a circuit to this call as soon as one is available, which number she makes known to dispatch operator C. Both dispatch operators put this number upon their respective tickets and place the tickets in the assignment clips at their respective positions. The report operator C completes the assignment by calling the called subscriber. The report operator B′ cuts in on the assigned circuit which she is holding in dispatch system No. 1 and says "dispatch operators cut out." It will be seen that up to this time although the circuit has been assigned for the completion of this call, it has been used by the dispatch operators A and B for the transmission of other calls and reports between their respective offices. Upon the receipt of the aforementioned signal, both dispatch operators A and B cut out of the circuit. The report operator B′ then rings on the circuit to the report operator A in order to effect the proper connection of the calling subscriber to the toll line circuit. The method of operation is, from this point on, similar to that described in connection with the transmission of a call that originated at a toll office of a non-dispatch system and which was completed over a circuit in the dispatch system, herein designated "built-up dispatch system."

During periods of heavy traffic calls are passed between dispatch operators faster than they can be completed. Consequently W. H.'s obtained as hereinbefore described accumulate waiting circuits. As each circuit is released, it is assigned to the next W. H. in order, and for each such assignment there is, of course, one assignment interval as it might be termed, that is, the period from the making of an assignment until both parties concerned are at their telephones ready to talk. During the assignment interval the dispatch operators use the circuits to pass new calls, which in turn create new W. H.'s and to receive reports on calls previously passed. In practice it develops that these assignment periods are usually of sufficient length to maintain W. H.'s ahead of the available circuits as long as new business continues to come in heavily. The fundamental principle upon which the dispatch method of operation is based is to utilize the assignment periods to the utmost for the purpose of passing a plurality of calls in advance of the time when such calls can be completed, thereby creating a reservoir of parties ready to talk as soon as the toll lines are available. Since in practice it has proved possible during periods of traffic congestion to keep W. H.'s continually awaiting assignment, the lost circuit time per message, that is to say, the time not available for conversation, has been approximately reduced to the minimum required to bring to their telephones the persons known to be available. The application of the aforementioned fundamental principle which underlies the method and means in which this invention is embodied, results in greatly increasing the circuit efficiency of the dispatch system of operation by cutting down the amount of lost circuit time (time not available for conversation) which in the ring-down method of operation and in other known methods of operation heretofore employed was relatively large and therefore resulted in low operating efficiency.

It has been found in practice that if W. H. reports are allowed to accumulate so that there is too long a delay in establishing the circuit connection one or both of the parties involved will not be available after the assignment has been made to a toll line trunk. To avoid these cancelled assignments which reduce the efficiency of the operation it has been found desirable to pass no new calls between the dispatch operators after the number of W. H.'s awaiting assignment to toll lines is equal to twice the number of toll circuits in the dispatch group, until the number of W. H.'s has been reduced to the number of circuits in the group.

Although this invention has been described as embodied in a certain arrangement of means it is to be understood that it is not so limited but is capable of embodiment in other and different means without departing from the spirit and scope of

the invention as defined in the appended claims.

What is claimed is:

1. The method of operating a despatch toll telephone system characterized by a despatch operator and a report operator at each end of a toll line, which consists in the transmittal of the details of a call by one despatch operator to the other despatch operator, receiving a report by the said first despatch operator from the said second despatch operator, effecting the proper terminal circuit arrangements by the respective report operators and connecting the terminal circuits to the toll line only when the terminal arrangements at both ends of the toll line are such that the parties are ready to begin conversation.

2. The method of operating a despatch toll telephone system which consists in transmitting a call from a calling office to a called office over any non-busy toll line between the said offices, establishing the proper terminal circuit arrangements for both the calling and the called subscribers prior to the connection of either terminal circuit to the toll line whereby the said toll line may be available for the passing of other call details between the said offices up to the instant when both subscribers are ready to begin conversation and connecting both terminal circuits to the said toll line substantially simultaneously.

3. The method of operating a despatch toll telephone system which consists in transmitting calls and orders between two toll offices over any non-busy toll line between the said offices, completing the terminal circuit arrangements of both the calling and the called parties prior to the connection of either terminal circuit to any toll line, thereby rendering the said toll line available for the transmittal of operating information up to the instant when both parties are ready to begin conversation.

4. The method of operating a despatch toll telephone system which consists in receiving a call from a calling subscriber, releasing said subscriber's line after noting the details of the call, transmitting the call details over any non-busy toll line between the calling and the called toll offices, releasing the said toll line after the said details have been transmitted, obtaining information regarding the said call at the said called office, transmitting a report upon the said call from the said called office to the calling office over any non-busy toll line and releasing said toll line, completing the terminal circuit arrangements for both subscribers and connecting both terminal circuits to the said toll line substantially simultaneously, whereby the said toll line may be rendered available for the transmittal of operating information between the said offices up to the instant when both parties are at their telephones ready to begin conversation.

5. The method of operating a terminal despatch toll telephone system comprising a plurality of toll lines connecting two toll offices and terminating at each of the said offices at the report position of the switchboard, a cord circuit to effectively extend each of said toll lines from the said report position to a despatch table associated with the report position at each of said offices, a signaling circuit extending from each report position to its respective despatch table, and a telephone line extending from each report position to a subscriber, which consists in receiving a call over one of said telephone lines at the report position of one of the said toll offices, noting the details respecting the called and the calling parties transferring the said details to the despatch table associated with the said report position, transmitting the said details over any spare toll line from the said first despatch table to said second despatch table at the other toll office, transferring the said details from the said second despatch table to its associated report position, obtaining a report upon the said call over a telephone line connecting the said second report position with the called subscriber, transferring the report on the said call from the said second report position to the said second despatch table, transmitting the said report from the said second to the said first despatch table over any spare toll line, transferring the said report from the said first despatch table to its associated report position and transmitting the said report from the said first report position over the said telephone line to the calling subscriber.

6. The method of operating a despatch toll telephone system comprising a plurality of toll lines connecting two toll offices and terminating at each of the said offices at the report position of the switchboard, a cord circuit to effectively extend each of said toll lines from the said report position to a despatch table associated with the report position at each of said offices, a signaling circuit extending from each report position to its respective despatch table, and a telephone line extending from each report position to a subscriber, which consists in receiving a call over one of said telephone lines at the report position of one of the said toll offices, noting the details respecting the called and the calling parties, transferring the said details to the despatch table associated with the said report position, transmitting the said details over any spare toll line from the first said despatch table to a said second despatch table at the other toll office, transferring the said details from the said second despatch table to its as-

sociated report position, obtaining a report upon the said call over a telephone line connecting the said second report position with the called subscriber, transferring the report on the said call from the said second report position to the said second despatch table, transmitting the said report from the said second to the said first despatch table over any spare toll line, and assigning a toll line for the handling of the said call, transferring the assigned call from the said despatch tables to their respective report positions, completing the terminal circuit arrangements by calling the respective parties to their telephones, signaling from each report position to each associated despatch table when the respective terminal circuit arrangements are completed, transmitting between the despatch tables information regarding the status of the terminal circuit arrangements over any spare toll line and signaling from each despatch table to its associated report position when the terminal circuit arrangements at both ends of the toll line are completed, and connecting both terminal circuits to the said assigned toll line substantially simultaneously.

7. In a built-up despatch system of toll lines, the method of operation, which consists in receiving a call at an office of a non-despatch toll system, transmitting the said call over any non-busy toll line to the report operator of a despatch toll system, releasing the said toll line and passing the call to the associated despatch operator, transmitting the said call over any non-busy despatch toll line to a second despatch operator, passing the said call to a second report operator associated with the said second despatch operator, signaling the called party and obtaining a report, releasing the called party's line and passing the said report to the said second despatch operator, transmitting the report over any non-busy despatch toll line to the said first despatch operator and releasing the said line, passing the report to the said first report operator and transmitting the report by the said first report operator over any non-busy toll line to the operator at the originating office.

8. In a built-up despatch system of toll lines, the method of operation, which consists in receiving a call at an office of a non-despatch toll system, transmitting the said call over a toll line to the report operator of a despatch toll system, passing the said call to the associated despatch operator, transmitting the said call over any non-busy toll line of the despatch system to a second despatch operator and releasing the said toll line, passing the said call to a second report operator, signaling the called party and releasing the called party's line, passing the report to the second despatch operator, transmitting the report to the said first despatch operator over any non-busy toll line and releasing the said line, passing the report to the said first report operator, signaling the originating toll line operator of the non-despatch system and ordering the subscriber's circuit to be connected to the toll line, assigning a toll line of the despatch system, establishing the circuit of the called party, but not signaling the said party, signaling the respective despatch operators by the respective report operators whenever the terminal arrangements have been completed, signaling the respective report operators by the respective despatch operators as soon as the last terminal arrangement has been completed, advising the originating toll line operator to ring the calling party and to notify when ready, ringing the called party's line, transmitting a "ready-on" signal to the respective despatch operators by the respective report operators as soon as each party is ready to talk, transmitting a "ready-on" report to the distant despatch operator by the first despatch operator to receive the said signal from her associated report operator, transmitting a "go-ahead" signal to the other despatch operator by the last operator to receive a "ready-on" report, connecting the terminal circuits to the assigned toll line by the respective report operators.

9. In a tandem despatch system of operation comprising the use of two despatch toll lines in series to effect the establishment of a talking connection between two parties, the method which consists in transmitting the call over any non-busy toll line of the first despatch system to the despatch operator of that system at the intermediate office, passing the said call to the report operator associated therewith, transmitting the call to the report operator of the second despatch system at the intermediate office, passing the call to her associated despatch operator and transmitting the call over any non-busy toll line of the second despatch system to the despatch operator at the terminating office, passing the said call to the associated report operator at the terminating office, obtaining a report respecting the called subscriber, transmitting the report over any non-busy toll line of the said second despatch system to the despatch operator of that system at the intermediate office, passing the call to the report operator of that system at the intermediate office, transmitting the report to the report operator at that office of the first despatch system, transmitting the call through her associated despatch operator over any non-busy toll line of the said first despatch system to the originating toll office, passing the said call to the report operator of the first system at the originating toll office, assigning any non-busy toll line of the first system, but not connecting the calling

subscriber circuit thereto, attaching a designating mark to the assigned toll line at each despatch position of the first system to indicate that the circuit is to be used on a tandem connection connecting the calling subscriber's line by the report operator at the originating office to the assigned toll line and attaching a designating mark to the connection to indicate tandem operation, advising the report operator of the second despatch system at the intermediate office of the number of the assigned toll line of the first despatch system, taking up the assigned toll line by the report operator of the second system at the intermediate office, taking up the called party's line by the report operator at the terminating office, assigning a non-busy toll line of the second despatch system for the completion of the call, signaling the respective despatch operators of the second system by their respective report operators as soon as the terminal arrangements have been completed, signaling the respective report operators of the second system by their despatch operators as soon as the last terminal arrangement has been employed, ordering the despatch operators of the said first system to disconnect from the assigned circuit and ringing the calling party, transmitting a "ready-on" signal to the respective despatch operators of the second system by their report operators as soon as both parties are ready to talk, transmitting a "ready-on" report by the first operator to receive the said signal to the other despatch operator of the said system, transmitting a "go-ahead" signal by the last operator to receive a "ready-on" report to the other despatch operator of the said system and connecting the terminal circuits by the respective report operators to the assigned toll line of the second despatch system.

In testimony whereof, I have signed my name to this specification this 29th day of September, 1921.

ERNEST A. GRAY.