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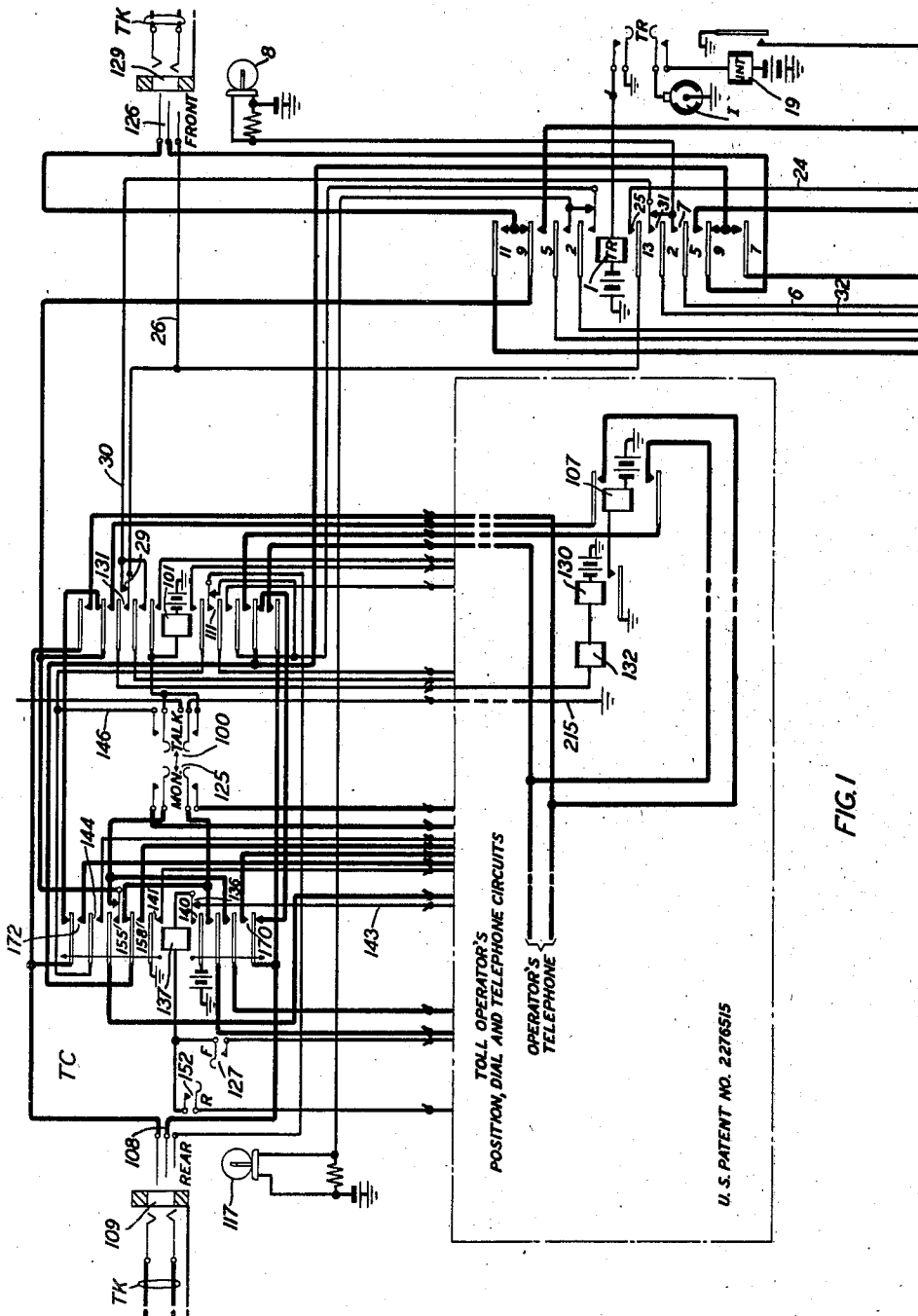
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TOLL SWITCHBOARD

Filed June 27, 1942

2 Sheets-Sheet 1



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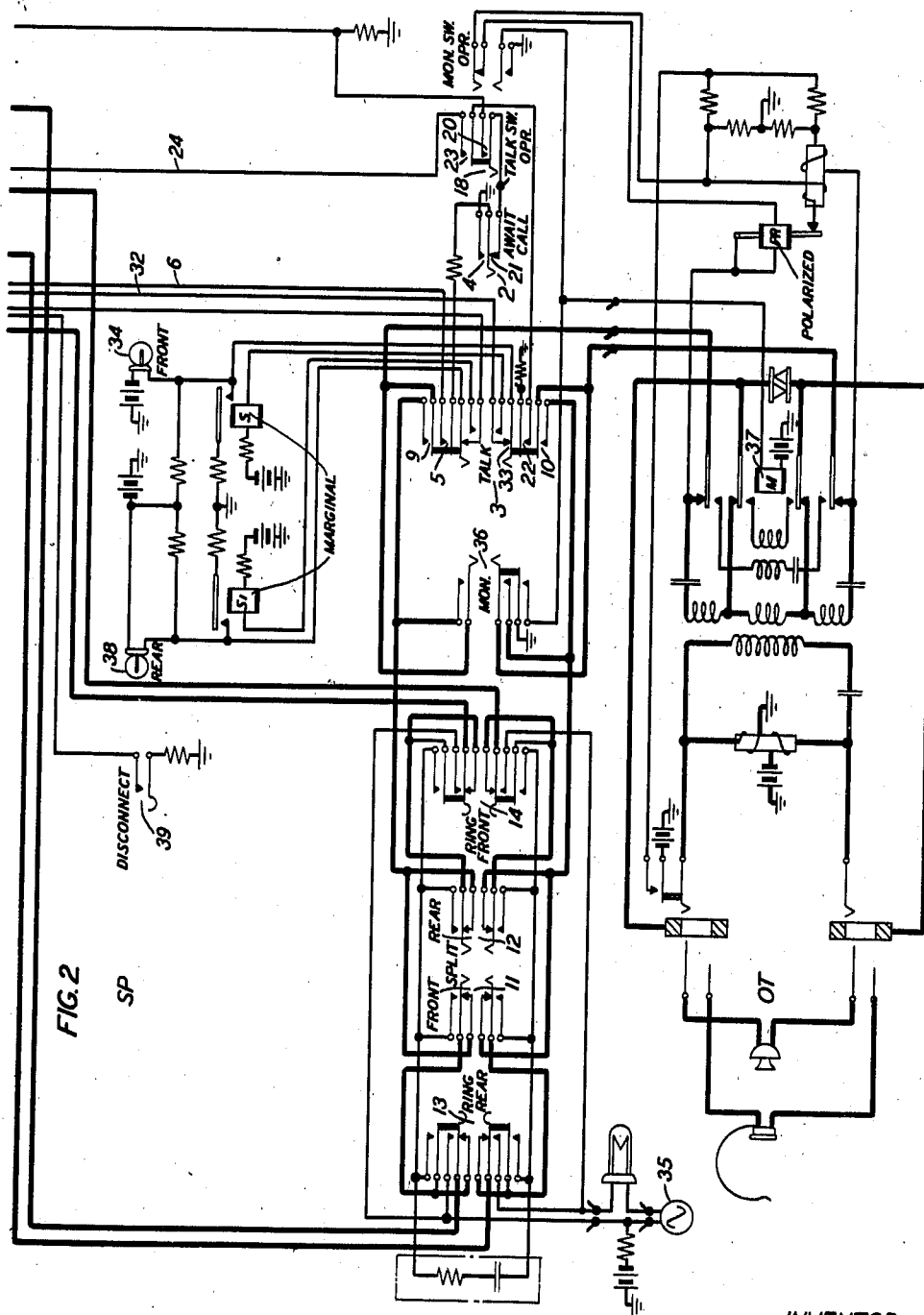
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TOLL SWITCHBOARD

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6 Claims. (Cl. 179—41)

This invention relates to toll switching systems and more particularly to a method of, and circuit arrangement for, handling a large volume of calls at existing outward toll switchboards by enabling full use to be made of all of the cord circuits at certain or all of the regular operator's positions which method and arrangement are objects of the invention.

At outward toll positions the principal work of the operator consists in answering calls from subscribers, determining the connection wanted, writing up the ticket, plugging into a trunk to the location desired, ringing when necessary, and repeating the number to the distant operator. The toll operator then times the call and disconnects its termination. Each toll operator usually has from six to eight cords, but the position is generally arranged to accommodate ten cords but the number of cords provided depend on the type of calls most commonly handled at the position, i. e., on the average amount of time required to handle each call. Traffic surveys have shown, however, that where toll positions are equipped with six cords, only two cords, on the average are in use at any one time and that where eight cords are provided, the average number in use at any one time is two and one-half cords. The comparatively large number of spare cords are provided to insure that under no condition will an operator be unable to complete calls because cords are not available.

A feature of the present invention whereby the foregoing object is attained, resides in the provision of a so-called supplementary or cabinet operator's position for every two or three pairs of cords at predetermined switchboard positions through which supplementary positions the respective two or three cord pairs can be connected or looped, at the will of the switchboard operator, by means of a manually controlled switching operation.

These cabinets or supplementary positions are so constructed and arranged that when the cords of a switchboard position are transferred thereto the insertion of an answering plug of a cord pair in a calling line jack causes an operator at the respective supplementary position to be automatically signaled whereupon she can answer and talk to the calling subscriber to obtain and record the details of the call. Thereafter the supplementary operator can signal and talk to the switchboard operator to direct her to connect the calling end of the respective cord pair to the desired outgoing line, following which the supplementary operator can ring out over either end

of the cord, talk over both the calling and called ends simultaneously, or in either direction to the exclusion of the other, time the call, receive supervisory signals from both the calling and called lines, and at the conclusion of the conversation signal the switchboard operator to remove the cord circuit plugs thus discontinuing the connection.

During the time the cords of a switchboard position are connected through supplementary operator's positions, the regular operator will normally act merely in the capacity of a switching operator, i. e., she plugs up calling lines, puts up connections to called lines and disconnects at the direction of the supplementary operator, but otherwise does not involve herself in the progress of the calls other than to perform such special function as dialing, key pulsing, coin control, and number checking, when requested to do so by the supplementary operators.

By means of this arrangement an existing regular toll position equipped with from six to ten pairs of cords can be employed to its full cord capacity with the assistance of from three to five supplementary cabinet operators, it being understood as before mentioned, that a single toll operator is normally unable to establish and supervise an average of a little more than two outward toll connections at the same time. The present invention, therefore, provides facilities for handling a greatly increased volume of traffic without increasing the number of switchboard positions which increase may not be practicable in cases of emergency.

The invention will be understood from the following description when read in connection with the accompanying drawings, Fig. 1 of which represents a single one of a plurality of toll switchboard cord pairs arranged to be connected by means of a transfer key common to all of the cords at the position, to a so-called supplementary operator's position shown in Fig. 2.

The cord circuit shown, at the top of Fig. 1, is similar to the cord circuit shown in Fig. 1 of U. S. Patent 2,276,515, issued March 17, 1942, to T. D. Robb, modified to the extent that certain of the conductors in the front or calling end of the cord are connected to a transfer relay 1, controlled by a key TR, shown in the lower right-hand corner of the drawing whereby, when the key is operated, these conductors will be extended to the supplementary position circuit SP shown in Fig. 2.

Let it be assumed that a toll operator's position represented by toll cord TC which position

is modified and arranged for emergency or supplementary operator's assistance in accordance with the invention, becomes overloaded to the extent that the number of calls awaiting attention greatly exceed the ability of the toll operator to perform the necessary acts required to give prompt and satisfactory service. When this condition is recognized, or anticipated in advance, as many auxiliary operators as appear to be required in the emergency will be assigned by a supervisor, to so-called cabinet positions SP, represented by Fig. 2 of the drawings, which cabinet positions are located wherever convenient and connected by wires to transfer relays 1 located at the toll switchboard.

The toll operator or supervisor may then operate the positional transfer key TR thereby operating relays, such as 1, individual to each cord at the position which extend certain of the respective cord conductors to the supplementary positions. In practice, two supplementary operators' positions will be located at a single cabinet or desk to which cabinet five switchboard cords will usually be extended by the operation of TR, and the consequent operation of the five individual relays corresponding to relay 1.

For simplicity we will, hereinafter, confine our consideration of the invention to a single toll cord TC and assume that an overload on the respective toll position is imminent, or has occurred, and further that the corresponding supplementary or assistant operator's position is occupied and relay 1 is operated thus connecting the cord TC to the supplementary position SP.

As we have assumed that an operator is in attendance at the supplementary position to which the cord TC is now connected, as soon as the supplementary operator is free to handle a call she will operate the "awaiting call" key 2 and the "talk" key 3. Key 2 operated connects ground over its contacts 4, contacts 5 of key 3, now operated, conductor 6, and contacts 7 of relay 1 to battery through the front cord supervisory lamp 8 which lights as an indication to the toll operator that a supplementary operator is ready to handle the next incoming call.

Operation of key 3 connects, at its contacts 9 and 10, the operator's telephone circuit OT to the tip and ring of the cord TC in an obvious circuit which includes contacts of the sleeve keys 11 and 12, ringing keys 13 and 14 and transfer relay 1.

Now, when the next call is received over an incoming trunk jack 109, the toll operator will insert the answering plug 108 of cord TC into that jack whereupon the supplementary operator, whose telephone set is connected to the cord, will distinguish the usual characteristic hum or line noise in her receiver as a signal that a calling line has been plugged up whereupon she will restore the awaiting-call key 3 thereby extinguishing supervisory lamp 8 and talk to the calling subscriber to secure the details of the desired connection which she will record in the usual manner.

After securing the necessary information on the call the supplementary operator will then operate key 18 thereby causing the front cord supervisory lamp 8 to flash under control of interrupter I in a circuit which can be traced from ground, intermittently closed contacts of interrupter relay 19, contacts 20 of key 18, contacts 21 of key 2, now released, contacts 5 of key 3, conductor 6, and contacts 7 of relay 1 to battery in series with lamp 8. Noting the flashing of lamp 8 the toll operator will actuate her talk key

100 thereby causing her telephone set, not shown, to be connected to the cord as shown in the Robb patent referred to thus placing the supplementary operator and toll operator in communication.

The operation of key 18, while the talking key 3 is operated, connects ground at contacts 22 of key 3 over contacts 23 of key 18, conductor 24, contacts 25 of relay 1, to the sleeve conductor 26 of the front toll cord to maintain the tip and ring conductors continuous from end to end during the time the toll operator's talk key is operated as shown in the aforementioned Robb patent.

After the supplementary or cabinet operator has given the toll operator the necessary instructions, she will restore keys 18 and 3. Key 18, restored, opens its contacts 20 to extinguish lamp 8 as an indication that the toll operator can insert the trunk or calling plug 126 in the designated out-trunk jack 129 and release her talk key 100. Release of the toll operator's talk key 100 releases the cord relay 101 which operated when the talk key was operated. This relay released, extends the sleeve conductor 126 over contacts 29 of relay 101, conductor 30, contacts 31 of relay 1, conductor 32, and contacts 33 of the released talk key 3 to battery through the "front" supervisory lamp 34 of the supplementary position, which lamp 34 lights when the plug 126 is inserted in jack 129, thereby connecting a low resistance ground to the sleeve conductor 26. This indicates to the supplementary operator that the calling end of the cord circuit has been connected to the desired trunk.

The supplementary operator may now ring on this connection by operating her front cord ringing key 14 thereby connecting ringing current from source 35 to the front plug 126 to the exclusion of the answering end of the cord. When the distant end of the outgoing called trunk is seized the resistance to ground on the sleeve of jack 129 is changed to a sufficiently high value to darken lamp 34.

Operation of either of the splitting keys 11 or 12, in conjunction with operation of the talk key 3, permits the supplementary operator to talk over either end of the cord to the exclusion of the other end.

The operation of monitoring key 36 connects ground to operate monitoring relay 37 which connects the operator's receiver to the tip and ring of the cord to the exclusion of the operator's transmitter.

Reoperation of talk key 3 and key 18 causes the front supervisory lamp 8 to flash, in the same manner as previously described, as a recall signal to the toll operator who answers by operating her talk key 100 whereupon the two operators can talk together.

When the distant called end of the connection is disconnected, supervisory lamp 34, at the supplementary position, relights and when the calling trunk is disconnected at its originating end the sleeve resistance to ground of jack 109 is lowered sufficiently to permit the "rear" supervisory lamp 38 in the supplementary position to light.

When the supplementary operator observes both lamps 34 and 38 lighted she may signal the toll operator to disconnect by operating the disconnect key 39 thereby connecting ground to the rear supervisory lamp 117 of the cord to cause it to light as a disconnect signal.

When the toll operator removes both plugs 108 and 126 from their respective jacks, super-

visory lamps 34 and 38 will be extinguished and the supplementary operator will immediately operate her talk key 3 and the "awaiting call" key 2 thereby placing herself in readiness for the next call.

What is claimed is:

1. In a telephone system, lines, a main operator's position, a cord circuit thereat for interconnecting said lines, an auxiliary operator's position, means for serially looping said cord circuit, intermediate the two ends thereof, through said auxiliary position, and means at said auxiliary position for enabling the performance thereat of certain of the routine operating functions normally performed at the main operator's position.
2. In a telephone system, calling and called lines, a main operator's position, a plurality of cord circuits thereat having answering and calling ends, a plurality of auxiliary operator's positions fewer in number than said cords, manually controlled switching means adapted when operated to serially connect individual ones of said auxiliary positions intermediate the ends of two or more of said cords, and switching and signaling means at said auxiliary positions for enabling the performance thereat of certain of the operations incident to the establishment and supervision of a conversational connection by an associated cord circuit which operations are normally performed at the main operator's position.
3. In a telephone system, a calling and a called line, a main operator's position, a cord circuit thereat having answering and calling ends for connecting said calling and called lines, an auxiliary operator's position, means for serially connecting said auxiliary position intermediate the ends of said cord and means at said auxiliary position for talking, ringing and monitoring on a line connected to either end of said cord independent of the operator at the main position.

4. In a telephone system, calling and called lines, a main operator's position, a cord circuit thereat having answering and calling ends for connecting a calling to a called line, a supervisory lamp at each end of the cord, an auxiliary operator's position, manually controlled switching means for serially connecting said auxiliary position intermediate the ends of said cord and means controlled at said auxiliary position for lighting either supervisory lamp independent of the connection of said cord to a line.

5. In a telephone system, calling and called lines, a main operator's position, a cord circuit thereat having answering and calling ends for connecting a calling to a called line, a supervisory lamp at each end of the cord, an auxiliary operator's position, manually controlled switching means for serially connecting said auxiliary position intermediate the ends of said cord and means controlled at said auxiliary position for lighting either supervisory lamp independent of the connection of said cord to a line and other means controlled at said auxiliary position for flashing the supervisory lamp associated with the calling end of said cord.

6. In a telephone system, calling and called lines, a main operator's position, a cord circuit thereat having answering and calling ends for connecting a calling to a called line, a supervisory lamp associated with each end of the cord, an auxiliary operator's position, manually controlled switching means for serially connecting said auxiliary position intermediate the two ends of the cord and means at said auxiliary position for receiving supervisory signals from lines connected by said cord to the exclusion of the supervisory signals from lines connected by said cord to the exclusion of the supervisory lamps associated with the cord.

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