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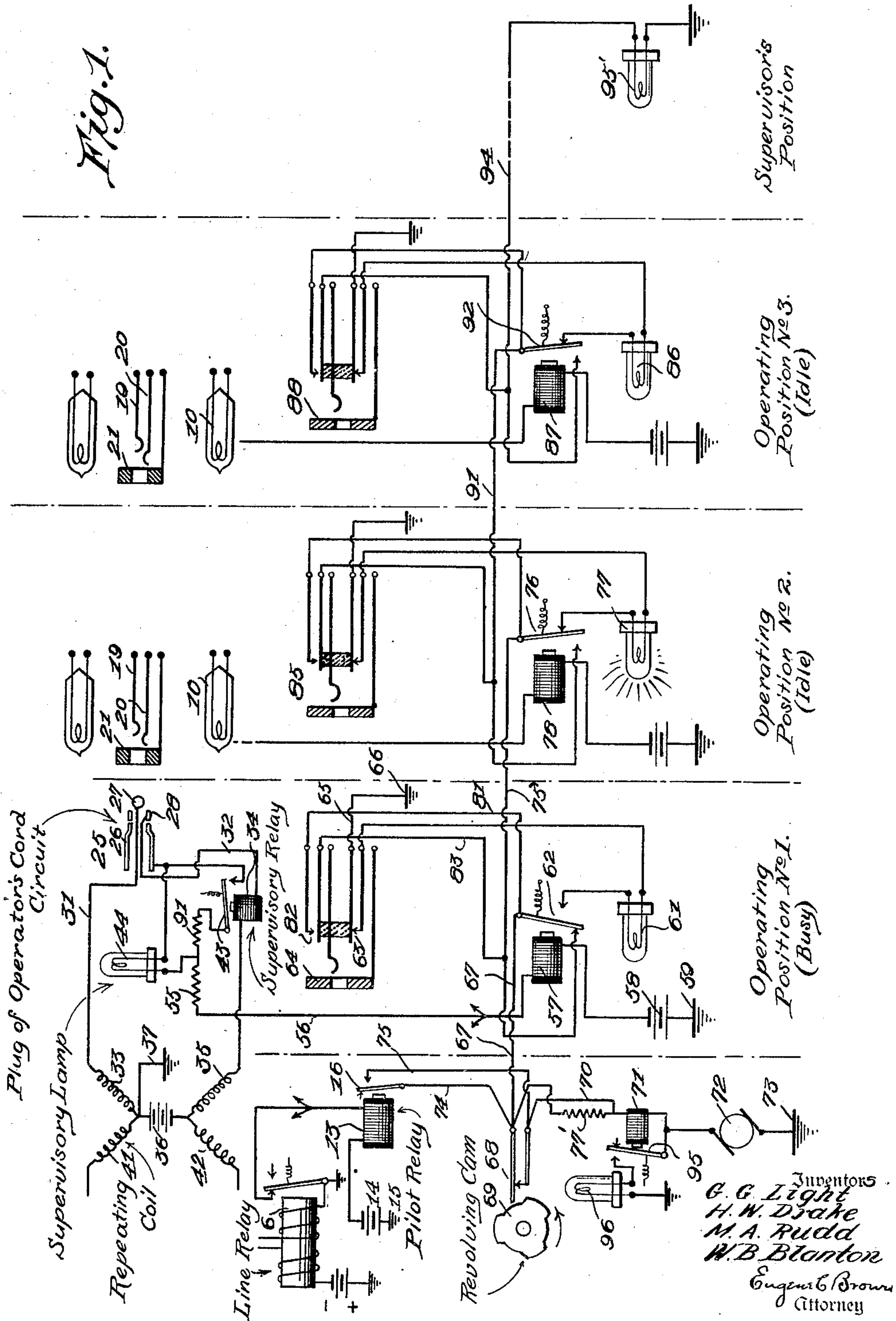
G. G. LIGHT ET AL

1,778,679

CALL DISTRIBUTING SYSTEM

Filed Sept. 18, 1929

3 Sheets-Sheet 1



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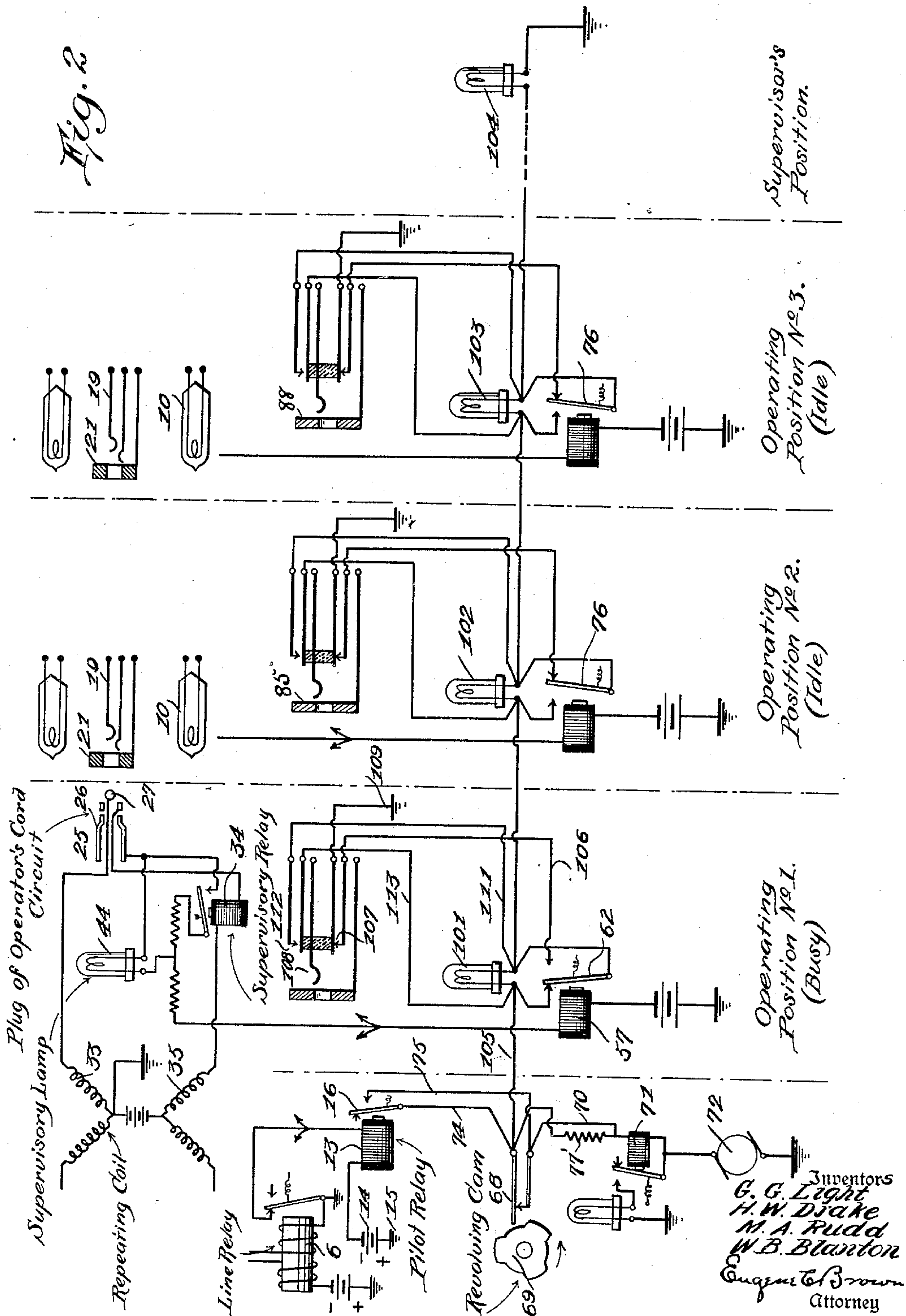
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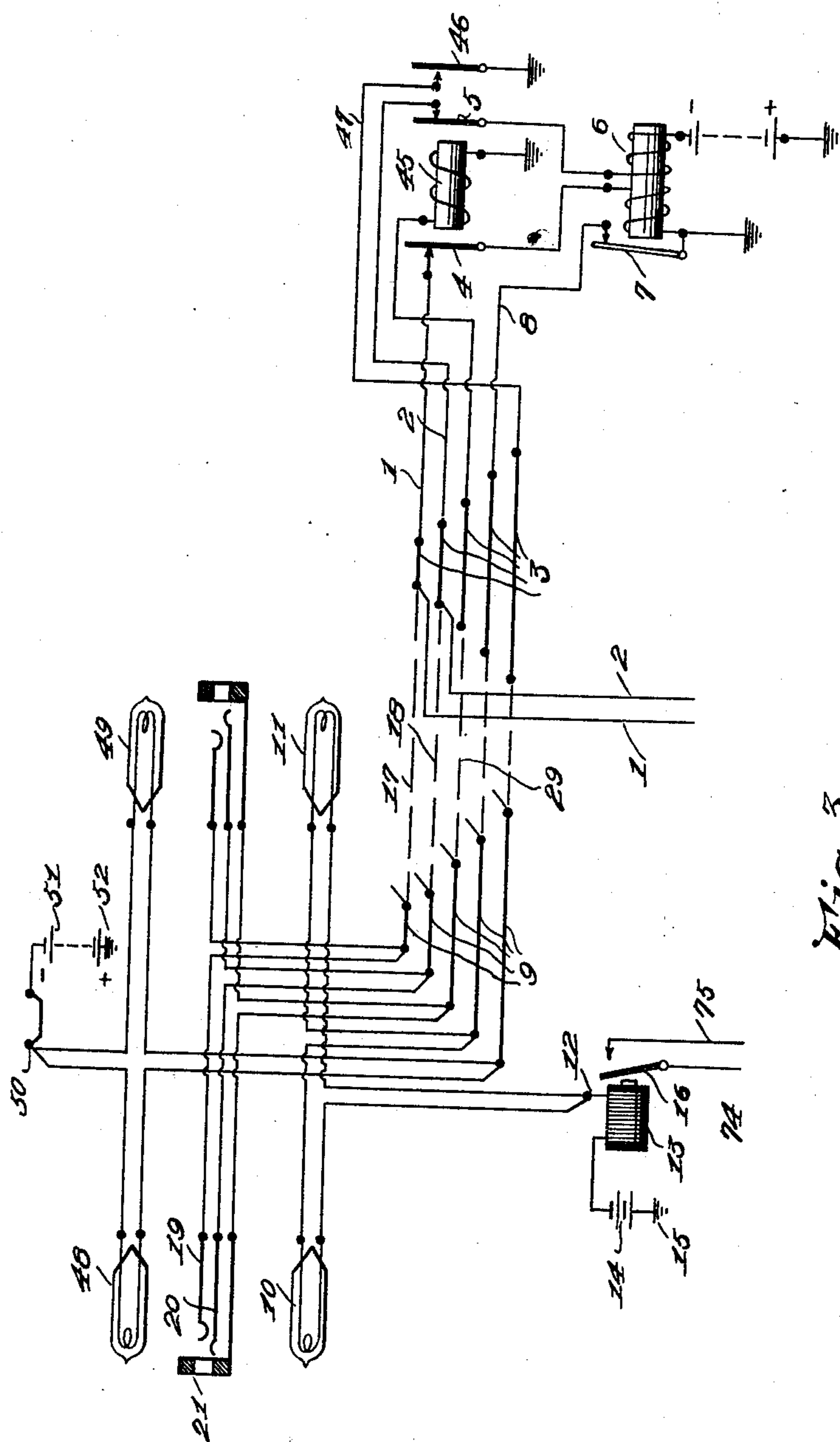


Fig. 3

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CALL-DISTRIBUTING SYSTEM

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Our invention relates to methods of switchboard call signal operations and apparatus and circuits therefor, and particularly to arrangements for facilitating the answering of incoming calls.

Subscribers' lines and other types of line circuits at present are commonly provided, not only with a single answering lamp and answering jack, but with additional lamps and jacks at a plurality of operators' positions at the switchboard. All the lamps for any line are connected in multiple and consequently they operate simultaneously in response to an incoming call. As a result, all of the operators who are not "busy" attempt to answer the same call and in doing so not only perform unnecessary work, but create a certain amount of confusion and delay.

Furthermore with a number of operators attempting to answer a call simultaneously, the succeeding incoming call is often left unattended until one of the many operators answering the first call completes the call relieving the other operators for the succeeding call.

This system of answering calls results in the further difficulty that it is not possible to tell whether a sufficient or insufficient number of operators are available for the rate at which incoming calls are received.

These and other difficulties are overcome by our invention, which has for one of its objects the provision of means for preventing confusion by the simultaneous answering of incoming calls by a plurality of operators.

A further object of our invention is to provide means for assigning or dispatching successive incoming calls in advance of their arrival to predetermined operators.

Still a further object of our invention is to provide means in an exchange system for determining the correct number of operators needed to handle the signaling traffic at any time.

Still another object of our invention is to provide means for advising an operator in advance of an incoming call that that operator and that operator only is to answer the next incoming call.

Still another object of our invention is to

provide means for warning the operator who is to answer the next call that an incoming call is received which must be answered.

Still a further object of our invention is to provide means for warning the supervisory operator that all of the available operators are busy.

Another object of our invention is to provide means for readily cutting off or on additional operator circuits.

A further object of our invention is to provide means for indicating when any of the "answer next" lamps are burned out or are not in operative condition.

There are other objects of our invention which together with the foregoing will appear in detail in the description to follow.

By the present invention, a series of "answer next" lamps are provided, one for each of the operators at a switchboard, arranged under ordinary circumstances to assign each succeeding call to a predetermined operator.

Heretofore, each incoming call on arrival has been assigned to predetermined operators by providing answering lamps on various positions in front of operators and arranging the circuits therefor so that the answer lamp is lighted at only one position at a time in response to an incoming call. This has the obvious disadvantages that it does not apprise the operator that she is to answer the call until the instant when the call is received which accordingly invariably results in delay.

The present invention overcomes this disadvantage by operating independently of incoming calls or the lighting of answering lamps. By means of our circuits, an "answer next" lamp individual to each operator's position is lighted independent of the usual answer lamp. It provides an indication to the operator at whose position this "answer next" lamp lights, that when a call comes in, this operator is to be the only one to answer it. As will appear from the following, this "answer next" lamp is illuminated even when no incoming calls are being received. When a call is received, however, it appears as a lighted answer lamp in front of all operators, but by virtue of the "answer next" circuit ar-

rangement, only one operator answers that call; namely, the operator at whose position the "answer next" lamp is lighted.

By means of this "answer next" system of signaling, the supervisory operator is aided in determining the correct number of operators needed to handle the traffic at any time at a concentration unit. This is accomplished by arranging the operators in a predetermined sequence and invariably indicating to the lowest numbered idle operator that she is to answer the next incoming call, thereby keeping the first operator the busiest, the second operator the next busiest and so on. For example, if six operators were stationed at a concentration unit and the last two never received an indication to answer the next incoming call, they could be transferred to some other unit.

The above will be clear from a detailed description in connection with the figures, in which—

Figure 1 is a diagrammatic view of the circuit and apparatus employed in a preferred embodiment of our invention.

Figure 2 is a diagrammatic view of the circuit and apparatus employed in a modified form of our invention, and

Figure 3 is a diagrammatic view of the circuit and apparatus at a switchboard including a subscriber's jack, answering lamps, busy lamps and common equipment therefor.

As shown in Fig. 3, an individual subscriber's circuit 1 and 2 extends through the terminal strips 3 and through the back contacts and armatures 4 and 5 respectively of cut-off relay 45 to the windings of a line relay 6 which is individual to this particular subscriber's line and which is energized by the closing of this circuit when the subscriber lifts the receiver.

The relay 6 is provided with an armature 7 which at its front contact extends a circuit over the conductor 8 and one of the terminal strips 9 to answering lamps such as 10 and 11 in parallel individual to each subscriber and appearing at each operator's position. This circuit extends over the conductor 12 to a pilot relay 13, the opposite terminal of which is connected to the battery 14 and then to ground at 15.

As is well known, when the line relay is energized, the answering lamps 10 and 11 are illuminated over the circuit traced above to indicate to the operator or operators which of the subscriber's lines is calling. In addition to these lamps, the pilot relay 13 is energized to control a pilot light which is common to all of the subscribers so that the operator need observe only the pilot light to be advised that a call is coming in.

In the present case, the energization of the pilot relay 13 controls an armature 16 which in turn controls one of the features of the novel circuit to be described in detail herein-

after for distributing successive calls coming in to the various operators.

It will be noted that the subscribers' lines 1 and 2 in addition to the connection to the line relay 6 are multipled over the conductors 17 and 18 to the terminals 19 and 20 of a plurality of jacks which are individual to this particular subscriber's line, jack 21 being one of these jacks.

When a call is received over this subscriber's line as indicated by the operation of lamps 10 and 11, the operator who is to answer the call inserts an operator's plug 25, Fig. 1, comprising a sleeve 26 and tip and ring terminals 27 and 28, into the jack 21 individual to the calling subscriber. The tip and ring terminals 27 and 28 are connected to the operator's cord conductors 31 and 32 respectively, the conductor 31 extending to the primary winding 33 of a repeating coil and the conductor 32 extending through the supervisory relay 34 to the second winding 35 of the repeating coil and thence through battery 36 to ground 37. The windings 41 and 42 of the repeating coil extend to the operator's head set and talking set over well known circuits which accordingly need not be described here. As will be understood by those skilled in the art, each operator's position may be provided with a plurality of such cord circuits.

As will appear more fully hereinafter in the description of the operation, when the plug 25 is inserted into the jack 21, the circuit for the supervisory relay 34 is energized if/when the subscriber's receiver is removed from the hook switch and it operates its armature 43 to engage its front contact, bypassing a circuit for the supervisory lamp 44. When the supervisory lamp is extinguished in this manner, the operator is advised that the talking circuit has been completed.

One terminal of the supervisory lamp 44 is connected to the sleeve 26 which, when the plug thereof is inserted in the jack 21, extends a circuit over the conductor 29 to a cut off relay 45 of Fig. 3, the energizing circuit for which is controlled in this manner.

The cut off relay 45 comprises in addition to the armatures 4 and 5 which control the line relay, an armature 46 which controls a circuit over conductor 47 to busy lamps 48 and 49 appearing before each operator's position. The opposite terminals of lamps 48 and 49 are completed over conductor 50 and battery 51 to ground at 52. When the plug 25 is inserted in the jack 21 and the relay 45 is energized, the busy lamps 48 and 49 are illuminated, indicating that this particular subscriber's line is now busy and no other operator may seize this line, all of which is well known in the art.

Referring now again to the supervisory lamp 44, it will be noted that the opposite terminal thereof from that which extends to the sleeve 26, is connected through resistance

55 and conductor 56 to a relay 57 which is individual to an operator; the opposite terminal of relay 57 being grounded through battery 58 at 59.

5 In addition to the operator's cord circuits 31 and 32, supervisory lamp 44 and relay 57, there is individual to an operator an "answer next" lamp 61, the circuit for which is controlled by the armature 62 of the relay 57 and by the contact 63 on the jack 64.

10 As shown, the contact 63 is normally closed and extends the circuit for lamp 61 over conductor 65 to ground at 66 so that the lamp 61 is normally grounded. When its individual relay 57 is deenergized, the circuit for the lamp 61 extends over the back contact and armature 62 to the line 67.

20 The line 67 is connected through the make and break contactor 68, controlled by cam 69 to the conductor 70 and thence through winding of relay 71 to the source of energy 72 grounded at 73. The conductor 67 is also multiplied over the conductor 74 and armature 16 and its back contact and conductor 75 to the conductor 70 and relay 71. A further multiple extension from conductor 67 extends through resistance 77'. Accordingly energy from the source 72 may be impressed upon the conductor 67 over any one of the three circuits described above for functions to be described in connection with the detailed description of the operation hereinafter.

35 It will be noted that the conductor 67 in addition to being connected to the armature 62 at the first operator's position, is also multiplied over a conductor 81 to the normally open contact 82 on the jack 64, which when closed connects conductor 67 directly to conductor 75' over conductor 81, contact 82, and conductor 83. Also, the circuit from lamp 61 passes to ground 66, through the normally closed contact 63 on jack 64, which when opened disconnects ground from lamp 61. 45 By this arrangement, any one operator's position may be shunted out of the "answer next" circuit (i. e., "busied") by inserting a plug in the jack 64, which in effect, performs the same functions as if relay 57 were energized, as described in the following paragraph.

50 As described above, the conductor 67 is connected to the lamp 61 when the armature 62 is in engagement with its back contact. When, however, armature 62 moves to engage its front contact upon energization of relay 57 in a manner to be described, the conductor 67 is switched from the lamp 61 and is connected over conductor 75' and armature 76 and its back contact to a lamp 77 similar to lamp 61 but individual to the second operator in the sequence.

55 This operator has in addition to the "answer next" lamp 77, the relay 78 which controls the circuit for this answer lamp and

other similar equipment individual thereto as described in connection with the first operator.

As in the case of the first operator, the second operator is provided with jack 85 for rendering this operator's position non-operative. The third operator is similarly provided with an "answer next" lamp 86 controlled by relay 87 and jack 88 as in the case of the first two operators. In addition, this operator is also provided with a complete set as described in detail in connection with the first operator. In a similar manner each operator's position is equipped with individual equipment as described in connection with the first operator.

Having described the arrangement and circuits of the apparatus, a detailed description of the operation as the successive calls come in will now be given.

85 It will be assumed that no calls have been received and that accordingly the line relays 6 for all of the subscribers are deenergized. Accordingly the pilot relay 13 which is energized in multiple by any one of the line relays is also deenergized and the armature 16 is in engagement with its back contact. Inasmuch as none of the plugs is inserted in any jack under the above assumed conditions, all of the individual operating relays 57, 78 and 87 are deenergized.

Accordingly a circuit is completed extending from ground at 73 through the source 72 through the winding of the relay 71, conductor 70, conductor 75, back contact and armature 16, conductor 74, conductor 67, armature 62 and its back contact to the "answer next" lamp 61, contact 63 and conductor 65 to ground at 66. The lamp 61 is accordingly illuminated and the first operator is advised that upon receipt of the next call she should answer it. As the cam 69 rotates, periodically opening the contact 68, this has no effect inasmuch as the contacts are short circuited by conductor 74, armature and back contact 16, and conductor 75.

100 If now a subscriber such as the one connected to the conductors 1 and 2, Fig. 3, closes his circuit by lifting his receiver, the circuit will extend through the back contact and armature 5, through the winding of the line relay 6 to battery and ground, through the second winding of the relay 6, armature 4 and its back contact and back over the conductor 1 and the relay 6 is energized. Energization of line relay 6 operates its armature to engage its front contact and a circuit is completed from ground to the armature 7 and its front contact, conductor 8, through the lamps 10 and 11 in multiple, conductor 12, the winding of the pilot relay 13 and through battery 14 to ground at 15. The lamps 10 and 11, upon illumination, indicate to all the operators which of the subscribers is calling; as stated above.

The energization of relay 13, opens the circuit traced above extending through the back contact and armature 16 and conductors 75 and 74. However, the lamp 61 which was energized over this circuit continues to be illuminated over a circuit from ground through the source 72, the winding of relay 71, conductor 70, contact 68, when the revolving cam permits this contact to be closed, conductor 67, through the armature 62 in engagement with its back contact and thence through the lamp 61 and over the circuit as traced above. When the revolving cam, however, opens the contact 68, the lamp 61 goes out and is again illuminated when the circuit is closed on further movement of the revolving cam to close the contact 68. As a result the lamp 61 now flickers and the operator opposite the flickering lamp is warned of the incoming call which she must now answer.

Accordingly the operator will insert her plug 25 in the jack 21 individual to the calling subscriber. The circuit over the conductors 1 and 2, which was traced as extending through the line relay 6, now extends over a multiple conductor 17 and 18 to the terminals 19 and 20 of jack 21 and to the tip and ring 27 and 28 respectively of the plug 25, conductors 31 and 32 through supervisory relay 34 and through the repeating coil windings 33 and 35 to battery 36.

The supervisory relay 34 is energized, by-passing the lamp 44 over a circuit including resistance 91. The value of resistance 91 is so chosen with respect to the resistance 55 that a substantial bypass circuit for the lamp 44 is provided without seriously affecting the total resistance of this circuit.

A further result of the insertion of plug 25 in the jack 21 is to complete an energizing circuit for the cut off relay 45 and the individual relay 57 over a circuit from ground through the winding of the cut off relay 45, conductor 29 (see Fig. 3), the jack 21, sleeve 26 of the plug 25, front contact and armature 43, resistances 91 and 55 in series, conductor 56, the winding of the relay 57, battery 58 and ground at 59.

Energization of the relay 57 operates its armature 62 from engagement with its back contact to engagement with its front contact, opening the circuit of the lamp 61 which is accordingly extinguished, extending the circuit which was previously traced from the lamp 61 to the lamp 77, the circuit now extending from source 72, over conductor 67 as traced above, armature 62 and in engagement with its front contact, conductor 75', armature 76, in engagement with its back contact and through the lamp 77 to the closed contact of the jack 85 to ground.

The illumination of the lamp 77 apprises the second operator that the first operator is now busy and upon the receipt of the next

call, this operator must answer the call. This is the condition shown in Fig. 1.

The energization of the cut off relay 45 operates its armatures 4 and 5 from engagement with their back contacts, opening the circuit of the line relay 6. As a result, the line relay 6 is deenergized and in turn opens the circuit of the pilot relay 13 at armature 7, which now moves from in engagement with its front contact. As a result of the deenergization of the pilot relay 13, its pilot lamp goes out indicating that the connection to the calling party has been completed.

The circuit for the lamp 77 now extends over conductor 75 and the back contact and armature 16, conductor 74 over conductor 67, armature 62 in engagement with its front contact, conductor 75' and armature 76 and its back contact to the lamp 77, this lamp being continually illuminated advising the second operator to be in preparation for the next call.

If now a call comes in over any other subscriber's line such as lines 1 and 2, the line relay individual thereto is energized and in turn closes one of the multiple circuits to the pilot relay 13. Pilot relay 13 upon energization opens the circuit for the lamp 77, which extended over conductors 74 and 75 as traced above, so that this lamp is flickered as the multiple circuit therefor through the contact 68 is opened and closed by the revolving cam 69 and the operator at the second position is advised of an incoming call.

The line over which this call is being received, is, as in the previous case, indicated by answering lamps similar to the lamps 10 and 11 which are individual to the calling subscriber's line. The second operator will accordingly insert her individual cord circuit plug into the calling subscriber's line jack.

As in the previous case, one result of this will be to energize relay 78, operating armature 76 to engage its front contact and extending the circuit of the source of power 72 over conductor 67 armature 62 in engagement with its front contact, conductor 75', armature 76 in engagement with its front contact to conductor 91, armature 92 in engagement with its back contact and through the "answer next" lamp 86 of the third operator, thence to ground through the closed contacts of jack 88.

This is assuming that the first and second operators are still busy at the time when the third call comes in. The third operator upon observing illumination of lamp 86 will be advised that she must be in preparation for receiving the third call and will accordingly watch lamp 86, which, if it begins to flicker, in a manner described in connection with lamps 61 and 77, will indicate an incoming call. If, however, before such call comes in, the first operator is no longer busy and removes the plug 25 from the jack 21

of the first calling subscriber, relay 57 individual thereto will deenergize, the circuit therefor being opened when the sleeve of plug 25 is removed from the jack. Upon deenergization of relay 57 the circuit for the lamp 61 individual thereto is again completed from conductor 67 and accordingly lamp 61 will be illuminated and simultaneously the circuit for the lamp 86, traced above, will be opened by reason of the fact that the armature 62 is now in engagement with its back contact and the lamp 86 will be extinguished. Accordingly the first operator will receive the next call instead of the third operator.

Similarly if under the conditions as described above, the lamp 86 of the third operator is illuminated, but the second operator completes her call and is no longer busy before a third call comes in, relay 78 will be deenergized and armature 76 upon moving to engage its back contact illuminates the lamp 77, if the first operator is still busy. The lamp 86 will be extinguished again, the next call being thereupon answered by the second operator. If both the first and second operators are no longer busy by the time the third call is received, the call will be received by the first operator as will now be obvious.

If on the other hand, the two operators are still busy when the third call is received, the third operator will answer this call and upon inserting her plug into the jack of the calling subscriber, relay 87 will be energized and the circuit extending over conductor 91 will extend over armature 92 in engagement with its front contact and conductor 94 to the lamp 95' at the supervisor's position, which upon illumination advises the supervisory operator that all of the operators are busy and no one is free to receive the next incoming call.

In order to permit absence of an operator or repairs to be made to the switchboard, the operator's plug 25 or an idler plug is inserted in the corresponding jacks 64, 85 or 88 of that operating position which automatically cuts the corresponding "answer next" lamp out of the signaling system. The circuit for conductor 67, in case of a plug being inserted in jack 64, then extends over conductor 81 to the contact 82, conductor 83 through the conductor 75', to the succeeding operator's position. The first operator's position in that case is thus removed from the "answer next" system. It will be noted that the operator's plug in this case does not make any electrical connections with the jack, but merely acts as a convenient idler plug to operate the extra normal contact of the jack 64 and as a visual indication that the vacant position has been "busied."

This feature of being able to make a position automatically busy, by cutting it out of the signaling system, is made use of by the

supervisor in checking the operator load. Assume that a concentration unit has 10 operating positions but that only operators 1 to 6 are on duty. By inserting the cord circuit plug of positions 7 to 10 inclusive in the corresponding jacks, the lamp at the supervisor's position will be illuminated each time all six operators are handling traffic. Should this occur frequently or should the lamp at the supervisor's position remain lighted for a considerable time, and it is noted by the supervisor that calls are unanswered, it is an indication that an additional operator or operators are required. Should the lamp at the supervisor's position remain unlighted or extinguished for a period, it would probably indicate that more operators than are necessary are on duty.

It will be noted that in all the circuits for lamps 61, 77 and 86, the relay 71 is invariably energized. Relay 71 controls an armature 95 which in turn controls an obvious energizing circuit for a lamp 96. As long as the relay 71 is energized over a circuit traced above, the circuit of lamp 96 is held open by armature 95. This condition prevails as long as the apparatus is in normal condition and a circuit for one of the operating positions closed. If, however, for example when the armature 62 is in engagement with its back contact, the first operator being in condition for receiving an incoming call, the lamp 61 burns out, the circuit from the source 72 and the relay 71 is opened and relay 71 is deenergized, closing a circuit for the trouble indicating lamp 96.

In Fig. 1, the lamps 61, 77 and 86 are shown as controlled over the back contact of armatures 62, 76 and 92 respectively. In a modified form of our invention shown in Fig. 2, the equivalent lamps 101, 102 and 103 and lamp 104 at the supervisor's position, are connected in series with the conductor 105, equivalent to the conductor 67. As in case of Fig. 1, the conductor 105 is connected to the contactor 68 operated by the rotating cam 69 at a predetermined frequency and in multiple over the conductors 75 and 74 to the armature 16 of the pilot relay 13, which in turn is controlled in multiple by a plurality of line relays 6.

Inasmuch as the remaining apparatus for each operator is similar to that described in connection with Fig. 1, this is not again described.

The circuit 105, it will be noted, after passing through the lamp 101, may also be bypassed through the armature 62 of the relay 57, individual to the first operator. The armature 62 when in engagement with its back contact, extends the circuit from conductor 105 over the conductor 106 to the contact 107 of the jack 108 and the contact being grounded at 109. A further circuit to the jack extends from one of the terminals of the lamp 101 over conductor 111 to the contact 112,

which, when closed, short circuits the lamp 101 by means of the circuit extending from one lamp terminal over conductor 111, contact 112, and conductor 113 to the opposite terminal of the lamp. Similar circuits are provided for each of the succeeding operator's positions. In this case when the apparatus is in a non-operating condition, no calls having been received and no operator busy, as assumed in the first instance in connection with Fig. 1, the circuit from source 72 extends through the relay 71, conductor 70, conductor 75, back contact and armature 16, conductor 74 and over conductor 105 through the lamp 101, armature 62 in engagement with its back contact, conductor 106, contact 107 and ground at 109. The remaining circuits are short-circuited by the ground at 109.

When now a subscriber lifts the receiver and an incoming call is received, the line relay individual thereto is energized in a manner described in detail above to in turn energize the pilot relay 13. The pilot relay 13, upon energization, operates its armature 16 from engagement with its back contact and the circuit for the "answer next" lamp 101 is completed through the periodically operated contactor 68 as described above. The lamp 101 flickers and the first operator is apprised of the incoming call. The particular party calling is indicated by the individual answering lamps as described above. When the first operator inserts the operator's plug into the jack of the calling party, relay 57 is energized over the circuit described above and upon its energization operates the armature 62 from engagement with its back contact to engagement with its front contact. Upon operation of the armature 62 into engagement with its front contact, the circuit for lamp 101 is bypassed around the front contact and armature 62 and at the same time the ground over conductor 106 is removed from the conductor 105, so that the circuit therefor now extends over the front contact and armature 62 to the succeeding lamp 102 of the second operator and through the back contact and armature 76 to ground over the second operator's jack 85. Lamp 102 is now illuminated over the circuit described in connection with the first circuit for lamp 101 and the second operator is thus advised to be in readiness to answer the second call. If, however, before the second call comes in the first operator is no longer busy, relay 57 will be deenergized and the original energizing circuit for lamp 101 will be completed over armature 62 and its back contact and conductor 106, lamp 102 thereupon being extinguished.

The remaining operations are similar to those described in connection with Fig. 1, the lamp 104 at the supervisor's position, being illuminated when all three operators are busy.

In order to remove any operating position from the "answer next" system, a plug is in-

serted in the jack 108, individual thereto, closing the contact 112 and opening the contact 107. As a result, the circuit over conductor 105 extends over conductor 113 through contactor 112 and over conductor 111 bypassing the lamp 101. Although the "answer next" system described in the above is shown in connection with telephone circuits, as a means of insuring that the "answer next" lamps will be lighted on the proper idle position, it will be noted that each point of connection is in the sleeve circuit of the operator's cord, and in no way connected to the line or line relay which controls the incoming calls. This connection in the form of a relay simply temporarily excludes any busy position from participation in the "answer next" system.

Although the description is shown in connection with apparatus as applied to a telephone concentration unit, it will be clear to those skilled in the art that it is equally applicable to other signaling systems, such as telegraphy and simplex printer concentration units which permit the grouping of a large number of underloaded circuits in front of a smaller number of operators.

It will be further clear that the invention is drawn in connection with one form only and that it may take other forms and we accordingly do not intend to limit ourselves by the specific showing thereof but only in so far as set forth in the appended claims.

We claim:

1. In a switchboard having a number of positions arranged in a predetermined sequence, the combination of means including circuit connections for indicating an incoming call at the lowest numbered idle position and means including circuit connections whereby if a still lower numbered position becomes idle before an incoming call comes in, said incoming call will be indicated only at said still lower idle numbered position.

2. In a switchboard having a number of positions, means including circuit connections for indicating prior to its reception on the first free position in order of sequence of a number of positions, that its operator is to respond to the next incoming call and plug and jack means for converting the operator's receiver to receive the call.

3. In a switchboard having a number of positions, means including circuit connections for invariably indicating on the first free position of a number, that its operator is to respond to the next incoming call and means including circuit connections for invariably indicating to the next succeeding free position that its operator is to answer the next following incoming call while the said first position is busy.

4. In a switchboard having a number of positions, means for invariably indicating on the first free position of a number, that its operator is to respond to the next incom-

ing call, circuit means for invariably indicating to the next succeeding free position, that its operator is to answer the next following incoming call while the said first position is busy and means including circuit connections for again indicating at said first position that its operator should operate in response to the next said following incoming call in the event that the first position becomes idle before the said last mentioned call comes in.

5. In a signaling system, a plurality of incoming subscribers' lines, a line relay individual to each of said subscriber lines, a pilot relay common to all of said line relays, a plurality of operators' positions, switching means individual to each of said positions and an operator's cord circuit individual to each of said operators' positions, an "answer next" indicating device individual to each of said operators' positions, said "answer next" indicating devices being in a predetermined sequence with relation to said pilot relay and controlled thereby, means including circuit connections whereby said "answer next" indicating devices are jointly controlled by said pilot relay and their individual switching means, the first "answer next" indicating device being normally controlled by said pilot relay, while said other succeeding "answer next" devices being normally not affected by said pilot relay, means including circuit connections whereby the switching means individual to said first operating position is operated in response to the connection of the individual operator's cord circuit with a calling party subscriber's line, means responsive to the operation of said switching means for rendering the operating devices individual thereto non-effective by said pilot relay and for simultaneously rendering the succeeding "answer next" indicating device responsive to said pilot relay means.

6. In a signaling system, a plurality of incoming subscribers' lines, a line relay individual to each of said subscriber lines, a pilot relay, common to all of said line relays, a plurality of operators' positions, relay means individual to each of said positions, an operator's cord circuit individual to each of said operators' positions, an "answer next" indicating device individual to each of said operators' positions, said "answer next" indicating means being in a predetermined sequence with relation to said pilot relay and controlled thereby, means including circuit connections whereby said "answer next" indicating devices are jointly controlled by said pilot relay and their individual relay, said first "answer next" indicating device being normally controlled by said pilot relay, while said other succeeding "answer next" devices being normally not affected by said pilot relay, means including circuit connections

whereby the relay individual to said first operating position is energized in response to the connection of the individual operator's cord circuit with a subscriber's line, means responsive to the energization of the relay individual to said first position for rendering the operating devices individual thereto non-effective by said pilot relay and for simultaneously rendering the succeeding "answer next" indicating device responsive to said pilot relay means, and means whereby when said first operator is disconnected from said party, said first "answer next" indicating device is again rendered responsive to said pilot relay and the succeeding said "answer next" indicating device including said second "answer next" indicating device is again rendered non-responsive to said pilot relay.

7. In a signaling system, a plurality of indicating devices, means for operating said indicating device, means including circuit connections whereby only the indicating device nearest said means is responsive thereto, said other indicating devices being normally non-responsive thereto, means for rendering said first indicating device non-responsive to said means and for rendering the next adjacent indicating means responsive to said first means, said second means being operated to again render said first indicating device responsive to said first means and for rendering the second and other indicating means non-responsive to said first means.

8. In a telegraph system, a first station, a plurality of second stations, signaling lines connecting said first station with each of said second stations, a plurality of telegraph receivers at said first station, means for originating calls at said second stations, and means at said first station for invariably switching incoming calls originating at said second stations to predetermined ones of said first station receivers if said predetermined receivers are idle when said messages are received.

9. In a telegraph system, a first station, a plurality of second stations, signaling lines connecting said first station with each of said second stations, a plurality of telegraph receivers at said first station, means for indicating at a predetermined idle receiver that it is to receive the next incoming call, means at said first station for invariably switching the next incoming call originating at one of said second stations to said predetermined idle receiver, and means including circuit connections for detecting trouble in any of said indicating means.

10. In a telegraph system, a first station, a plurality of second stations, signaling lines connecting said first station with each of said second stations, a plurality of telegraph receivers at said first station, means operative prior to receipt of a call for indicating at a

predetermined idle receiver that it is to receive the next incoming call, and means at said first station for invariably switching the next incoming call originating at one of said second stations to said predetermined idle receiver.

11. In a telegraph system, including lines extending from a plurality of outlying telegraph stations to a central receiving station, transmitting apparatus at said outlying stations for initiating calls, a plurality of telegraph receivers at said central receiving station arranged in a predetermined sequence, and means for invariably assigning incoming calls to the lowest numbered idle receiver.

12. In a telegraph system including lines extending from a plurality of outlying telegraph stations to a central receiving station, transmitting apparatus at said outlying station for initiating calls, a plurality of receivers at said central receiving station arranged in a predetermined sequence, means for indicating at the lowest numbered idle receiver that the next incoming signal is to be received thereat, and means operative in response to the receipt of a message for indicating that the signal is being received at said idle receiver.

13. In a telegraph system including lines extending from a plurality of outlying telegraph stations to a central receiving station, transmitting apparatus at said outlying station for initiating calls, a plurality of receivers at said central receiving station arranged in a predetermined sequence, means for indicating at the lowest numbered idle receiver that the next incoming signal is to be received thereat, means operative in response to the receipt of a message for indicating that the signal is being received at said idle receiver, and means operative immediately upon receipt of a message by said lowest numbered idle receiver for indicating to the next lowest numbered idle receiver that it is to receive the next incoming message.

14. In a telegraph system including lines extending from a plurality of outlying stations to a central receiving station, transmitting apparatus at said outlying station for initiating calls, a plurality of receivers at said central receiving station arranged in a predetermined sequence, means for invariably assigning incoming calls to the lowest numbered idle receiver, and means whereby any one of said receivers may be rendered non-operative to receive any incoming signals.

15. In a telegraph system, a first station, a plurality of second stations, signaling lines connecting said first station with each of said second stations, a plurality of telegraph receivers at said first station, an operator's cord having a plug individual to each of said receivers for connecting said receivers to any of said signaling lines, means whereby sig-

nals are initiated from any one of said second stations, means at said first station for invariably switching incoming calls to a predetermined one of said first station receivers if said receiver is idle when said message is received.

16. In a telegraph system, a first station, a plurality of second stations, signaling lines connecting said first station with each of said second stations, a plurality of telegraph receivers at said first station, an operator's cord having a plug individual to each of said receivers for connecting said receivers to any of said signaling lines, means whereby signals are initiated from any one of said second stations, means at said first station for invariably switching incoming calls to a predetermined one of said first station receivers if said receiver is idle when said message is received, and means for indicating at the next predetermined idle receiver that it is to receive the next incoming call.

In testimony whereof we affix our signatures.

GEORGE G. LIGHT.
HERBERT W. DRAKE.
MAURICE A. RUDD.
WILLIAM B. BLANTON.

DISCLAIMER

1,778,679.—*George G. Light*, Elizabeth, *Herbert W. Drake*, East Orange, and *Maurice A. Ruud*, North Plainfield, N. J., and *William B. Blanton*, Brooklyn, N. Y.
CALL-DISTRIBUTING SYSTEM. Patent dated October 14, 1930. Disclaimer filed February 4, 1932, by the assignee, *The Western Union Telegraph Co.*, said patentees *Light, Drake, Ruud*, and *Blanton*, concurring.

Hereby enters a disclaimer to claims 8, 11 and 14 of said patent;

In claims 9, 10, 15 and 16, limiting the word “switching” to mean *indicating* so that said claims shall be read by substituting the word *indicating* for the word “switching” in line 8 of claim 9, in line 9 of claim 10, and in line 11 of claims 15 and 16; and by changing the word “to” to *at* in line 10 of claim 9 and line 11 of claims 10, 15 and 16.

[*Official Gazette March 15, 1932.*]