

Oct. 4, 1932.

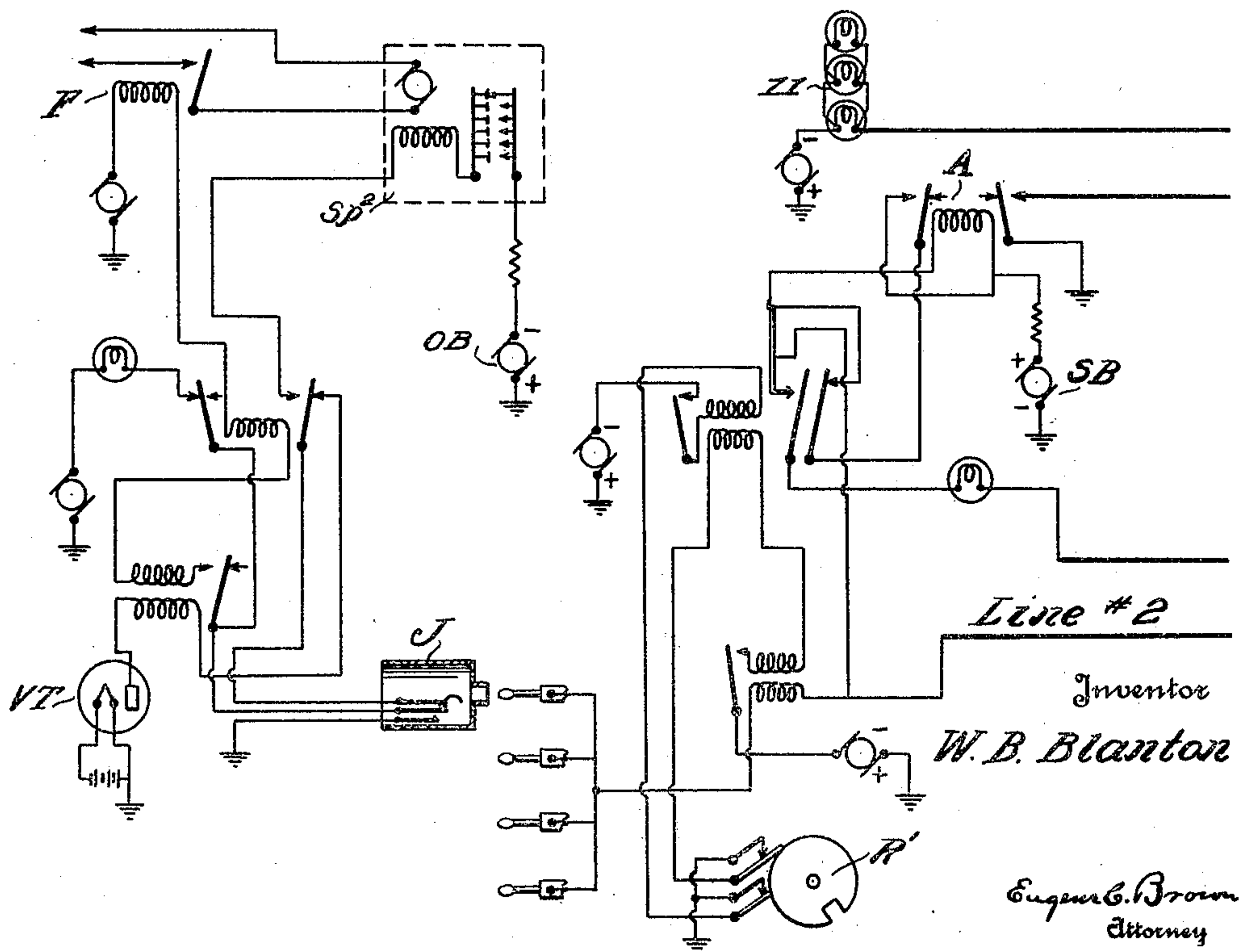
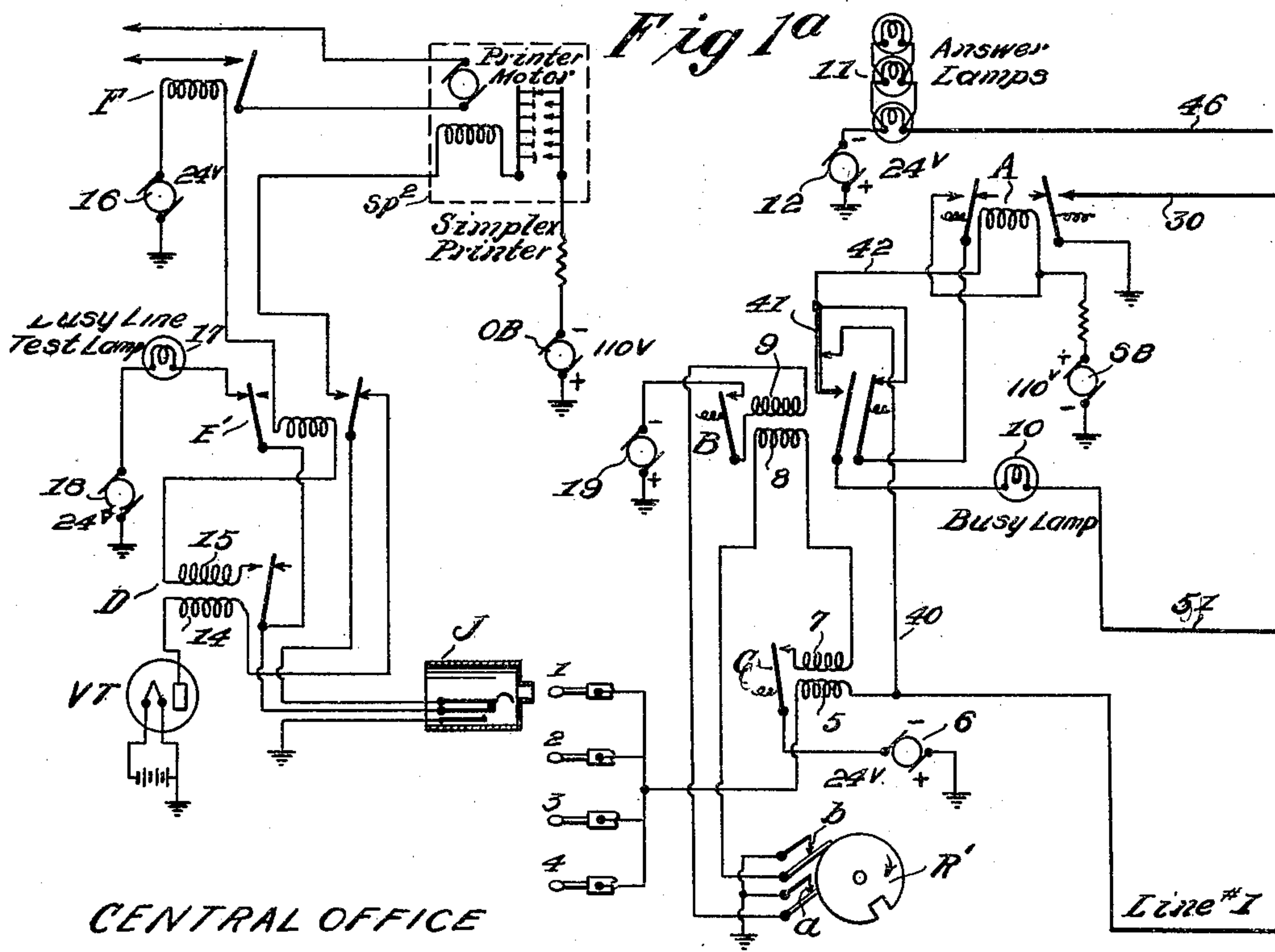
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CALL DISTRIBUTING SYSTEM FOR CONCENTRATION CIRCUITS

Filed May 26, 1931

3 Sheets-Sheet 1



Oct. 4, 1932.

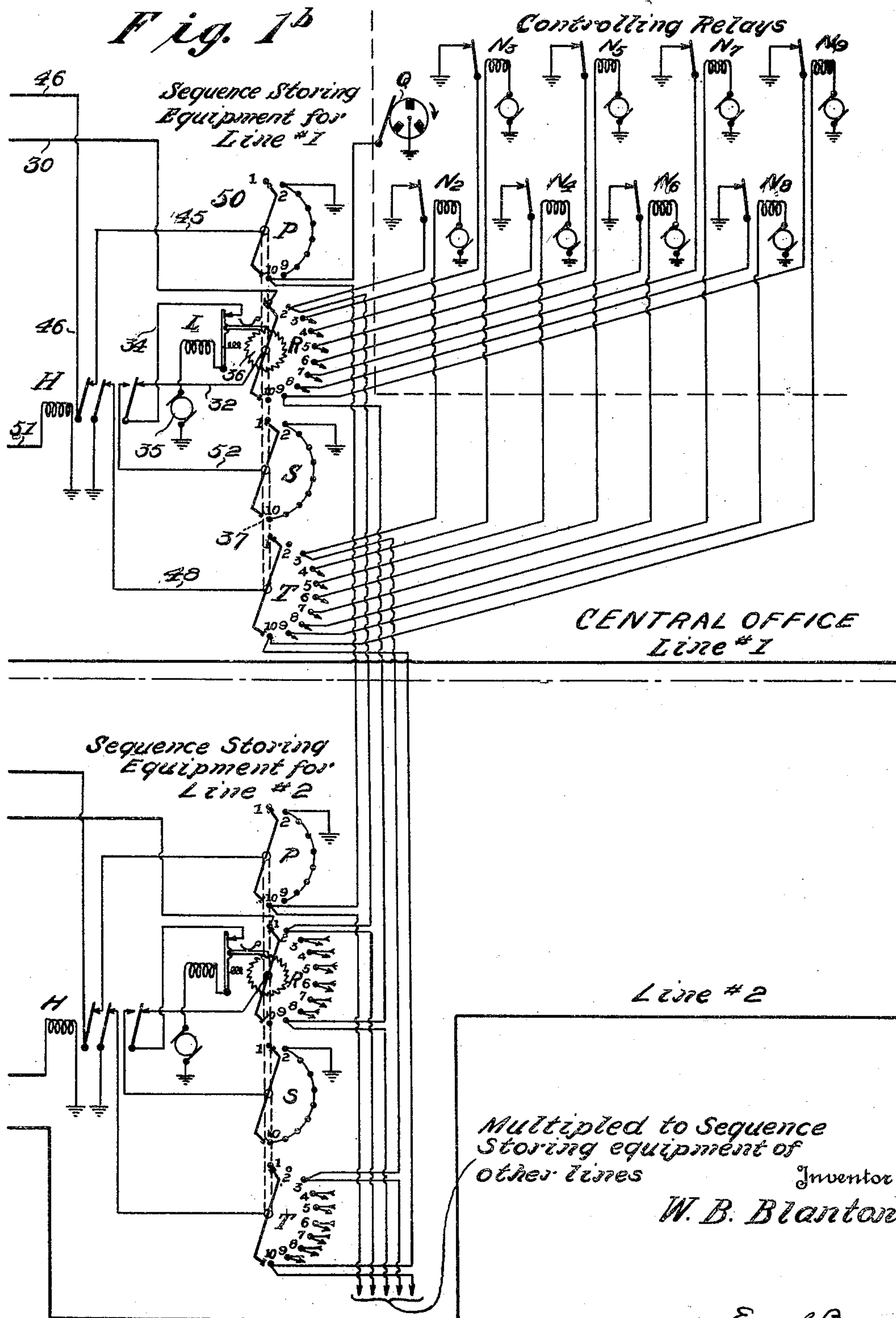
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CALL DISTRIBUTING SYSTEM FOR CONCENTRATION CIRCUITS

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3 Sheets-Sheet 2



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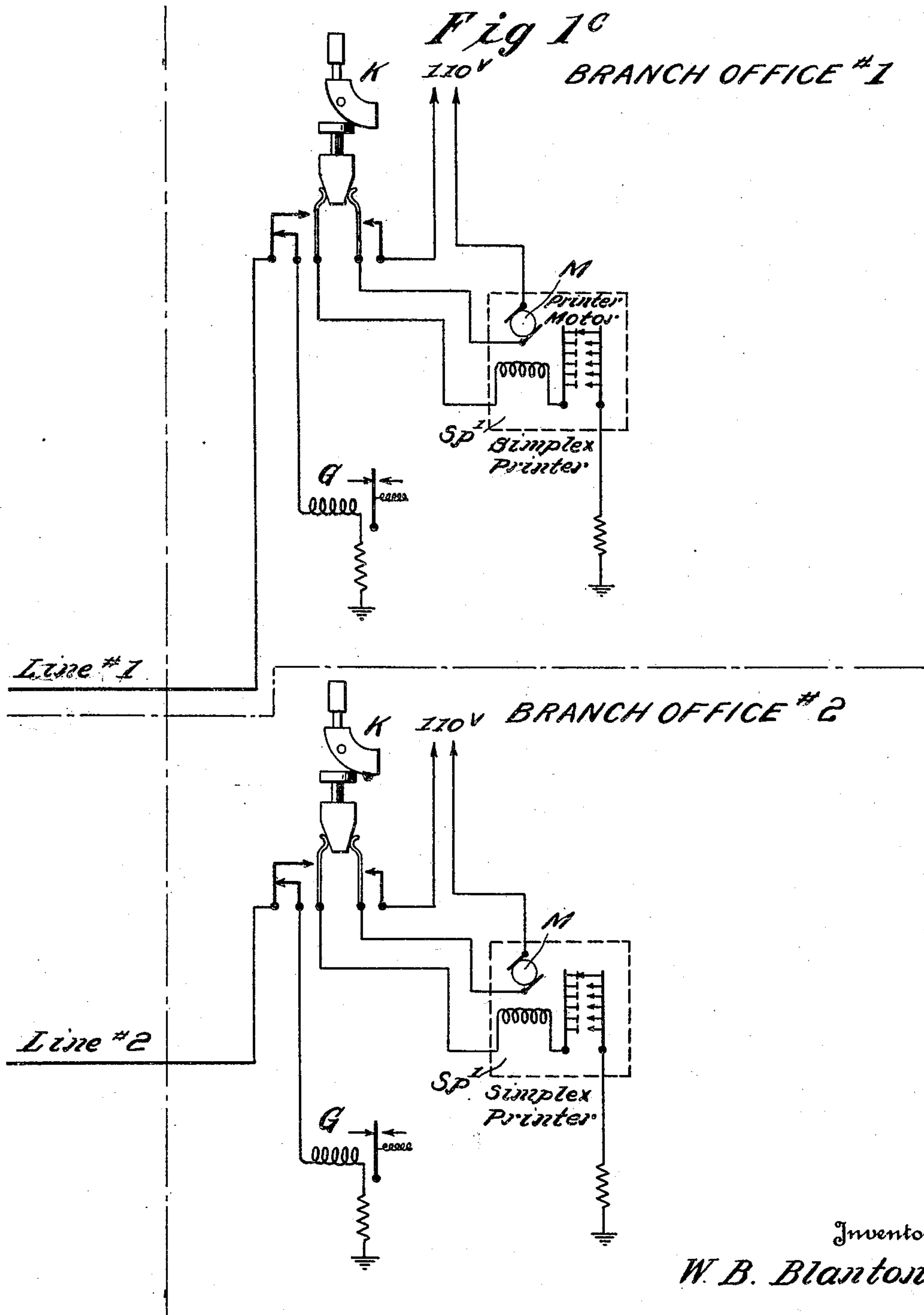
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CALL DISTRIBUTING SYSTEM FOR CONCENTRATION CIRCUITS

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3 Sheets-Sheet 3



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CALL DISTRIBUTING SYSTEM FOR CONCENTRATION CIRCUITS

Application filed May 26, 1931. Serial No. 540,125.

This invention relates to the handling of traffic to and from subscriber's lines at a concentration or central station where a large number of lines are terminated before a small number of operators and particularly to an arrangement for indicating to the operators the oldest call and for automatically arranging the calls in the order in which they were received.

10 In central control stations where a large number of simplex printer lines are concentrated, each line is terminated in multiplied jacks or multiplied plugs located at the various operator's positions or turrets, the incoming calls being indicated by the lighting of
15 "answer" lamps in lamp cabinets so located that at least one cabinet is visible to each operator. When an operator becomes idle, she notes the incoming calls as registered by these
20 answer lamps and answers one of them by connecting her cord circuit to the corresponding line.

It is desirable that the operator should in every instance answer the call which was first
25 received. This arrangement tends to equalize the answering speed of all incoming calls. It also results in operating economies since the central station or concentrator may be
30 staffed within closer limits without appreciably decreasing the speed of answering calls than is possible where the sequence of incoming calls is not indicated.

In the arrangement herein described, the oldest call is indicated to the operators by
35 causing the corresponding lamp to flash. Thus if for instance, when an idle operator proceeds to answer a call, there are five incoming calls awaiting, the lamp associated with the oldest call will be flashing, while the
40 four lamps corresponding to the other calls will glow steadily. When the call has been answered, the lamp associated with the next oldest call will begin to flash. In this manner all of the calls will be answered in sequence. Likewise if other incoming calls are
45 received before all of the five calls have been answered, these additional calls will be stored and answered in the sequence in which they were received.

50 In the following description I shall refer

to the accompanying drawings in which Figures 1^a, 1^b and 1^c taken together illustrate a circuit arrangement embodying my invention.

For the purpose of illustration I have 55 shown my sequence storing arrangement as applied to the concentrator disclosed in patent to Drake and Blanton No. 1,804,327 dated May 5, 1931. The same reference characters have been applied to corresponding elements 60 so that reference may be made to said patent for a detailed explanation of the operation. It will be understood, however, that my invention may be applied to other types of multiplied turret concentrator circuits. 65

Associated with each incoming line from a branch office at the central station is a four-part rotary switch, the four brush arms carrying the contacting brushes or wipers being secured to a shaft which may be actuated 70 step-by-step by a magnet controlled ratchet device.

The operation of my sequence storing and indicating equipment will be understood from the following example:— 75

Assume that a call is initiated at branch office No. 1. By operating key K, the operator closes the circuit to start the motor M of her simplex printer and connects its transmitting circuits to the line #1. By depressing 80 any one of the keys of the printer the line is momentarily opened, thereby deenergizing relay A at the central station which is held in this condition by the short circuit around its winding when its left hand armature 85 moves to its back contact. This circuit may be traced from ground at the branch office through the printer, contacts of switch K, line #1, conductor 40, contact and spring arm 41, conductor 42, winding of relay A, and 90 signaling battery SB to ground. The right hand armature of relay A closes a circuit from ground through conductor 30, contact No. 1 and wiper of the R part of the sequence storing switch 50, conductor 32, outer armature of relay H, conductor 34, back contact, armature and winding of stepping magnet L, battery or generator 35 to ground. The energization of the stepping magnet attracts its armature thereby moving the pawl over 100

one tooth of the ratchet 36 and breaking its own circuit. The retractile spring returns the armature to its back contact and steps the ratchet 36 forward the distance of one tooth, thereby moving the four brush arms carried by the shaft 37 from the contacts No. 1 to contacts No. 2 of the switches. If the armature of controlling relay N_2 is on its back contact a circuit through the winding of stepping magnet L will be again closed over a circuit from ground through the back contact and armature of relay N_2 , contact 2 and wiper of the R section of sequence storing switch 50, conductor 32, back contact and outer armature of relay H, conductor 34, back contact, armature and winding of stepping magnet L, battery or generator 35 to ground. The stepping magnet will therefore operate to move the brush arms and wiper from contact 2 to contact 3 of the four sections of switch 50. If all of the controlling relays $N_2 \dots N_9$ are deenergized, so that their armatures are grounded, the stepping magnet will continue to move the brush arms around until the wipers engage the contacts 10 of the four switch sections.

It will be noted that when the wipers were advanced to the second contact in each of the four sections of the switch 50, a circuit was completed from ground through contact 2 and wiper of switch section P, conductor 45, back contact and inner armature of relay H, conductor 46, "answer" lamps 11 and battery 12 to ground. This circuit remains closed as long as the wiper of the P section of the switch 50 is on any of its contacts from No. 2 to No. 9 inclusive, thus causing the "answer" lamps to glow steadily. When the wiper of the P section is stepped to its 10th contact this circuit to the answer lamps is opened and closed for short intervals by the motor-operated commutator or interrupter Q which is connected to the 10th contact. Thus as long as the wipers of the rotary switch 50 remain on the 10th contacts, the answer lamps 11 associated with this rotary switch will continue to flash.

The brush carrying the wipers of the T section of the rotary switch 50 is connected to ground through conductor 48 and the back contact and middle armature of relay H. The contacts 3 to 10 inclusive of this T switch section are connected respectively to the windings of controlling relays N_2 to N_9 . Hence when the wiper of this section is resting on any of its contacts from 3 to 10, the corresponding controlling relay will be energized. Thus when this wiper is resting on contact 10, relay N_9 will be energized, attracting its armature and removing the ground from contact 9 of the R switch section of all of the rotary switches. It will be noted that the 10th contact of the P section is connected to a corresponding contact of all of the rotary switches connected to the

various branch offices and that the contacts 2 to 9 inclusive of the R sections of all of the rotary switches are multiplied and likewise the contacts 3 to 10 inclusive of all of the T sections of the various switches are connected together. If, therefore, while the call received over line 1 is being answered, a second call arrives over one of the other lines, the rotary switch 50 associated with that line will function to rotate the wiper arms step-by-step in the manner above described, but when the wiper of the R section of said second rotary switch reaches its contact No. 9, it will come to rest on this contact because the circuit to its stepping magnet is open, due to the fact that controlling relay N_9 was energized by the operation of rotary switch 50 associated with line 1 upon which a previous call is being answered. The answer lamps associated with this second calling line will glow steadily as the wiper on the P section of its switch 50 is resting on contact 9 to which a steady ground is connected. The wiper of the T section of said second rotary switch is also resting on its 9th contact, which causes the operation of controlling relay N_8 , thereby removing the ground from the 8th contact of the R section of all of the rotary switches. This, of course, would cause the rotary switch associated with a line upon which a third incoming call is received, to stop its wipers on the 8th contact.

In the same manner all incoming calls which arrive before the first call is answered, will be stored on successive contacts of the rotary switches in the sequence in which they arrive. The use of a ten point rotary switch as illustrated in the drawings, permits the storing of nine calls in proper sequence. Obviously, if a twenty-five point switch were used, twenty-four calls could be stored in their proper sequence. Rotary switches with any convenient number of contacts could be employed. When an operator answers the oldest call, denoted by the flashing of the corresponding answer lamp, relays B and C of the concentrator circuit operate in the manner described in said Patent No. 1,804,327. The operation of relay B completes a circuit through the busy lamp 10 and the relay H which extends from the signaling battery or generator SB through the winding of relay A (the short circuit through the winding having been opened by the operation of the outer right hand armature of relay B) thence through conductor 42, front contact and inner right hand armature of relay B, busy lamp 10, conductor 51 and winding of relay H to ground. The busy lamp is thus lighted while the answer lamps are extinguished by the opening of the circuit at the inner armature and back contact of relay H. As the outer armature of relay H moves from its back contact to its front

contact, a circuit is completed through the stepping magnet L over conductor 52, wiper and contact 10 of the S section of rotary switch 50 to ground. This causes the rotary switch to step its wiper to No. 1 contacts, there being no ground on this contact of the S section.

When the wiper of the T section moves off of contact 10, controlling relay N, will be deenergized, thereby causing a ground to be placed on the No. 9 contacts of the R section of all of the rotary switches. Hence the rotary switch which was moved in response to the reception of the second call and was brought to rest on contact 9 will now advance to its contact 10, thereby causing its associated answer lamp to flash, thus denoting that the incoming call on the line associated with that rotary switch has now become the oldest call.

In the same manner the rotary switches which have been brought to rest on contacts from No. 8 to No. 2 inclusive, will now advance one position. It will now be evident that the oldest incoming call will always be indicated to the operators by the flashing of the answer lamps associated with this oldest call. When the first call has been concluded and the operator disconnects from line No. 1, relays C and B are deenergized in the manner described in said patent. Relay A is connected to the line and remains energized in readiness to respond to another incoming call. Relay H is deenergized so that the rotary switch 50 is in readiness to store up another incoming call.

If one of the calls should be answered out of its regular turn, that is while the rotary switch is resting on any of the contacts from 2 to 9, no confusion is caused to the normal operation of the sequence storing equipment. Thus if nine calls were stored up and an operator should answer the call on the line whose rotary switch is resting on contact 6, the operation of relay H corresponding to this line would cause this rotary switch to advance to its No. 1 position, due to the operation of the outer armature of this relay. The movement of the wiper on the T section from its No. 6 contact would allow controlling relay N, to be deenergized. The closure of the contacts on this relay would place a ground on the No. 5 contact of the R section of all of the rotary switches. Thus the switch then resting on No. 5 contact would advance to its No. 6 contact. In a similar manner, the rotary switches resting on lower numbered contacts would all advance one position. If an operator at the central station initiates a call on a line, the rotary switch 50 associated with this line will remain at rest on its No. 1 contact. When the operator disconnects from this line, the rotary switch still remains at rest on its No. 1 contact and is therefore in readiness to store up an incoming call.

I have described in detail the particular construction illustrated in the accompanying drawings for the purpose of clearly disclosing one embodiment of my invention, but it will be evident to engineers that various changes and other adaptations may be made within the scope of my claims.

I claim:

1. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a plurality of indicators at the central station, one cooperating with each sub-station to display a continuous signal upon receipt of a call, and call storage means actuated by the first or oldest incoming call to cause its signal to be of a different character than the signals associated with later incoming calls.

2. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a plurality of indicators at the central station, one cooperating with each sub-station to display a continuous signal upon receipt of a call, means actuated by the last incoming call for determining the sequential position of the next succeeding call, and means actuated by the first or oldest incoming call to cause its signal to be of a different character than the signals associated with other incoming calls.

3. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a plurality of signal lamps at the central station, one cooperating with each sub-station, and call storage means actuated by the first or oldest incoming call to cause its signal to be of a different character than the signals associated with later incoming calls.

4. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a signal circuit between each sub-station and the central station, means in each sub-station for momentarily altering its signal circuit to operate an indicator at the central station, means in the central station for disconnecting the signal circuit of a calling sub-station and establishing an intelligence circuit therewith, and call storage means actuated by the latter for changing the character of the signal on the indicator actuated by the next oldest call received over a signal circuit.

5. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a plurality of sequence storing devices at the central station, one cooperating with each sub-station, and means actuated by an incoming call for operating the storing device of the calling line and for determining the amount of movement of the storing device to be actuated by the next succeeding incoming call.

6. In an intercommunicating system of the character described, a central station and a

plurality of sub-stations, a plurality of sequence storing devices at the central station, one cooperating with each sub-station, means actuated by an incoming call for operating
5 the storing device of the calling line and for determining the amount of movement of the storing device to be actuated by the next succeeding incoming call, and means actuated by the seizure of a calling line for causing
10 each of the storing devices to move through a unit distance.

7. In a system as set forth in claim 6, means associated with each storing device for displaying a signal upon receipt of an incoming call and means for changing the character of each signal successively as it becomes
15 the oldest in sequence.

8. In an intercommunicating system of the character described, a central station and a
20 plurality of sub-stations, a plurality of interconnected sequence storing devices at the central station, one cooperating with each sub-station, said devices being arranged to move step-by-step to a series of positions,
25 means actuated by the movement of any one of said devices for determining the maximum succeeding movement of any of the other devices, and means at each sub-station for causing the operation of the corresponding
30 storing device.

9. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a plurality of interconnected sequence storing devices at the
35 central station, one cooperating with each sub-station, said devices being arranged to move step-by-step to a series of positions, controlling means connected to all of said devices for determining the amount of movement of the individual devices, and means at
40 each sub-station for causing the operation of the corresponding storing device, the latter operating to cause said controlling means to determine the position to which the next operating
45 storing device shall move.

10. In an intercommunicating system of the character described, a central station and a plurality of sub-stations, a plurality of indicators at the central station, one cooperating
50 with each sub-station to display a continuous signal upon receipt of a call, call storage means actuated by the first or oldest incoming call to cause its signal to be of a different character than the signals associated with
55 other incoming calls, and said means actuated by the seizure of this line to change the character of the signal on the next oldest incoming call.

60 In testimony whereof, I affix my signature.
WILLIAM B. BLANTON.