

1,218,563.

M. L. JOHNSON.
SIGNALING SYSTEM.
APPLICATION FILED DEC. 4, 1915.

Patented Mar. 6, 1917.

4 SHEETS—SHEET 1.

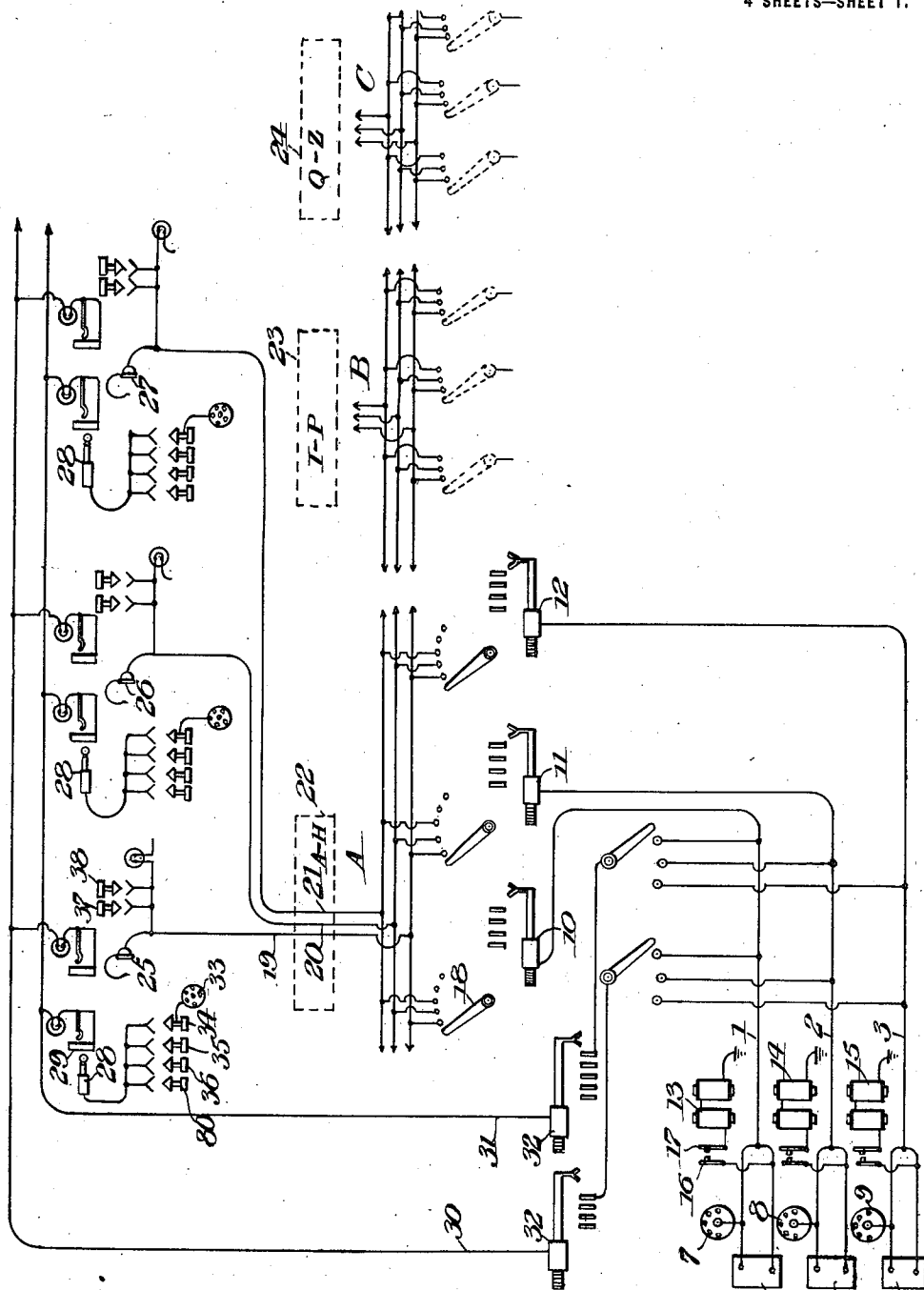


Fig. 1.

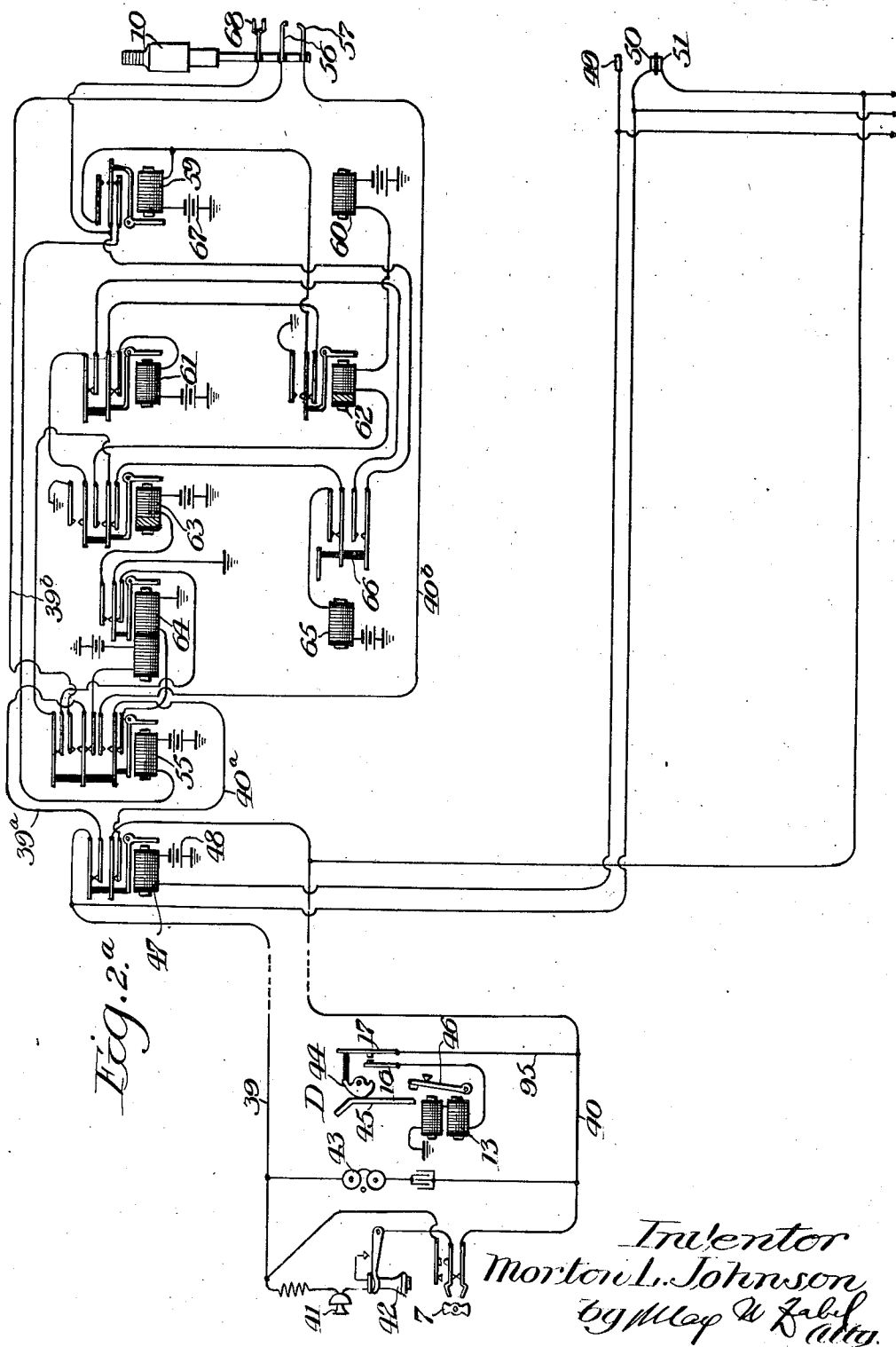
Inventor
Morton L. Johnson
by May W. Fabel
att'y.

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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

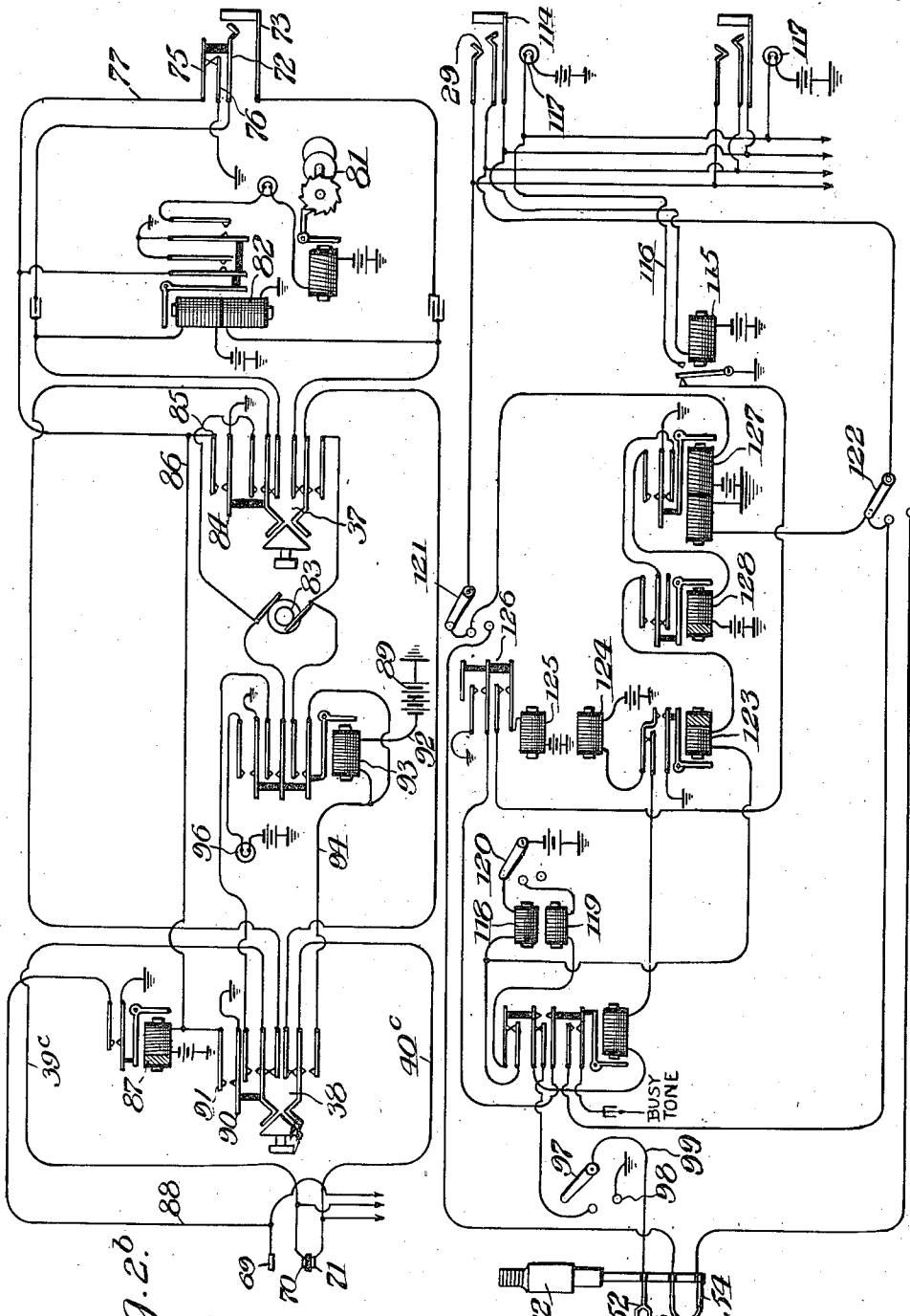


Fig. 2b.

Inventor
 Morton L. Johnson
 by Wm. W. Zabeling

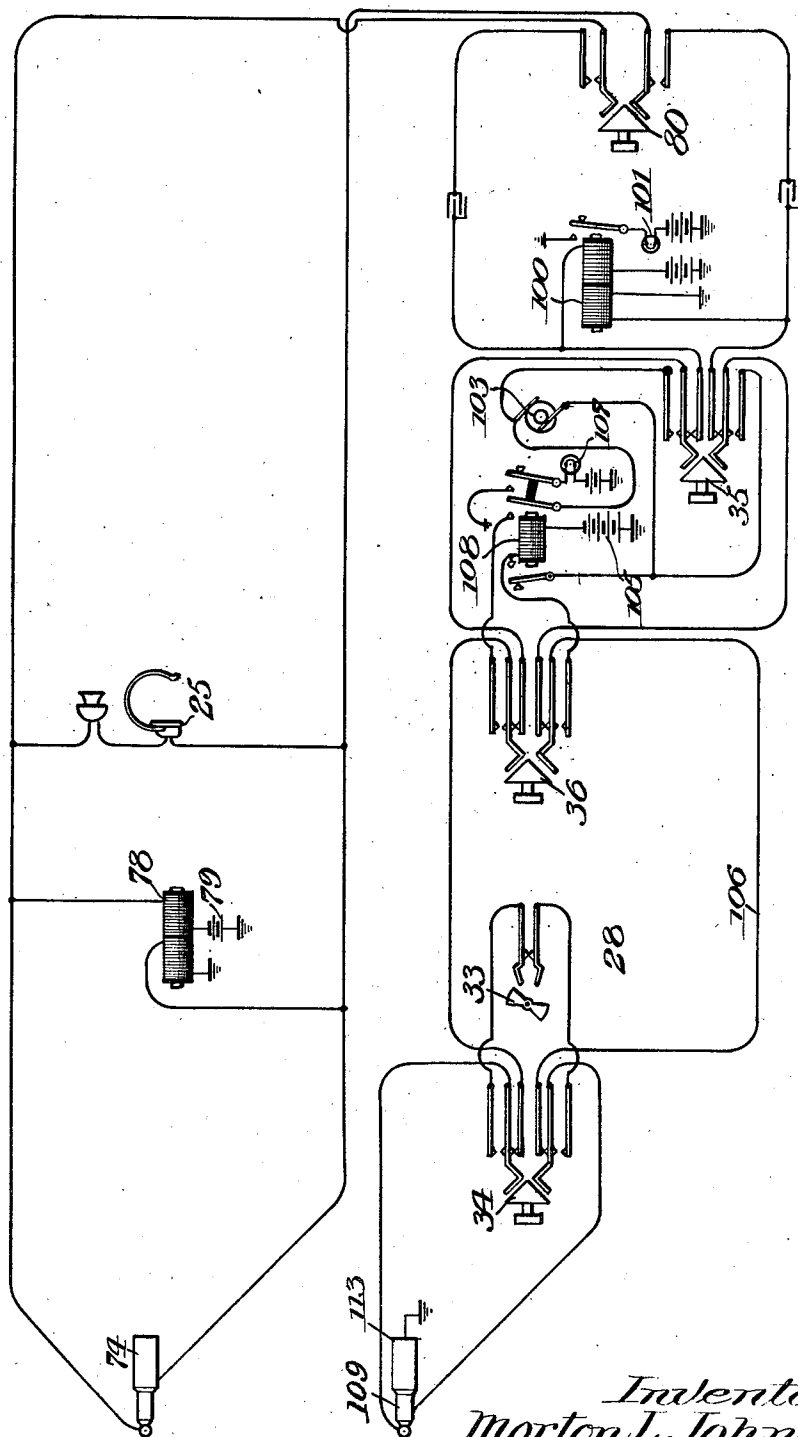
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4 SHEETS—SHEET 4.

Fig. 2.



Inventor
Morton L. Johnson
by May W. Feltner

UNITED STATES PATENT OFFICE.

MORTON L. JOHNSON, OF CHICAGO, ILLINOIS.

SIGNALING SYSTEM.

1,218,563.

Specification of Letters Patent.

Patented Mar. 6, 1917.

Application filed December 4, 1915. Serial No. 64,982.

To all whom it may concern:

Be it known that I, MORTON L. JOHNSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Signaling Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to signaling systems and is in its preferred embodiment of particular utility for instance in connection with a system wherein a central information bureau dispenses information to operators at various substations.

The particular form of the invention which is hereinafter set forth in detail is designed for use in a department store, for instance, where an extensive credit system prevails. A central operator is provided with a complete card or other index system upon which the credit ratings of all of the customers of the concern are given. This operator has a telephone switchboard to which any number of clerks may set themselves into communication with this operator. The switching facilities are preferably more or less automatic so that an idle operator of the plurality may be obtained. The operator also has facilities for getting into communication with any one of the clerks. The clerks at their talking instruments also have facilities wherein a card may be inserted, which card must be stamped or perforated through instrumentalities operable by the central station operator before the clerk is supposed to extend credit to the customer.

I will explain this particular form which my invention may take more in detail by referring to the accompanying drawings illustrating the same, in which—

Figure 1 is a schematic arrangement merely to illustrate the general application, and

Figs. 2^A, 2^B and 2^C represent together a complete system when these figures are placed end to end.

In explaining my invention in detail, I will refer firstly to Fig. 1 in order to give a general idea of what the system is designed to accomplish, Fig. 1 being merely schematic and not setting forth in detail the circuit arrangements, which circuit arrangements for a unit are set forth clearly in Figs. 2^A, 2^B and 2^C.

This Fig. 1 shows a central station to which a plurality of lines lead, only three lines 1, 2 and 3 being here shown. These lines have the ordinary substation telephone equipment indicated at 4, 5 and 6, and have operating dials 7, 8 and 9 for operating automatic switches 10, 11 and 12 at the central station. Each line also has an operating magnet, namely the magnets 13, 14 and 15, which magnets are controlled from a central station, and likewise have their circuits controlled by contacts such as the contacts 16 and 17. These contacts 16 and 17 are closed when a card is inserted in a holder as will appear hereinafter, whereupon the magnet may be energized to perforate or otherwise stamp the card to indicate to the clerk that the central operator has found the credit rating of the purchaser satisfactory. The clerk at every one of the stations 4, 5 and 6, by operating the corresponding dial may bring the switch arm 18 of the automatic switch into a given contact level, for instance, the level indicated at A, or into the other level indicated at B, or the third level indicated at C, whereupon suitable automatic appliances, not necessary to be described, will select any operator's line such as the line 19, or 20 or 21. The operators at the central station are divided into as many groups as may be necessary. In the drawing I have shown the operators as divided into three groups. The operators of the first group for instance, have a filing cabinet 22, the operators of the second group a filing cabinet 23, and the operators of the third group a filing cabinet 24. These filing cabinets together hold all of the cards relating to the business which the central station operators are supposed to have in their charge. Filing cabinet 22 for instance

may have all of the customers' accounts from A to H, filing cabinet 23 may have all of the customers' accounts from I to P, and filing cabinet 24 may have all of the accounts from Q to Z. There are then as many operators for each section, such as the section 22 as may be required. I have shown three operators' sets indicated by the head receivers 25, 26 and 27 to indicate three operators, and automatically the switch arm 18 selects an idle operator as soon as the right level has been reached by the operation of the dial 7, for instance.

Each operator has a cord circuit such as the cord circuit 28 by means of which through the agency of jacks 29 connection may be established with the clerks through lines such as 30 and 31, which lines terminate in automatic switches 32 as will readily appear. Each cord circuit will then have an operating dial 33 controlled by the push button 34, and such cord circuit also has a push button 35 to ring the telephone of the clerk, and also has a push button 36 which operates the magnet 13, for instance, to stamp the card. In case the operator, for instance, can give the information when the clerk first makes the connection, then of course the cord circuit 28 is not required, but in this case the operator has a push button 37 to ring back the clerk while the line remains in connection if needed, and also has a push button 38 which controls the magnet 13 to do the stamping.

From this general description it will be readily apparent what the system is designed to do. The clerk at station 4, for instance, operates her dial to reach the level at the section A provided she wants to find out the credit rating of a customer between the letters A to H. The switch automatically selects an idle operator and the clerk asks the operator what the credit rating is. At the same time the clerk inserts a card into the holder, thereby closing the contacts 16 and 17. If the operator can immediately find the credit rating she will press the button 38 which operates the magnet 13 to stamp the card. The card must be properly stamped, otherwise the shipping department will not send out the goods. If the credit rating is unsatisfactory, the operator so notifies the clerk over the telephone, calling the clerk back to the telephone by means of the push buttons 37 or 35, if necessary. If it takes some time on the part of the operator to get the information she tells the clerk to hang up, whereupon the operator when she has the information uses the cord circuit 28 and either notifies the clerk that the credit rating is unsatisfactory, or stamps the card which has been inserted.

Of course only single lines are indicated in this diagrammatic view, no attempt being

made to draw the circuits correctly, as these appear correctly in the remaining figures, which I will now describe in detail.

The circuits appearing upon sheets 2^A, 2^B and 2^C must be placed end to end to set forth a complete system as readily apparent. A clerk's station is shown at D and is united by means of line conductors 39 and 40 with the central station. The equipment at the station D is of course similar to the three clerks' stations connected to the lines 1, 2 and 3 of Fig. 1. This clerk's station D has the ordinary telephone equipment including the transmitter 41, receiver 42, bell 43, and the dial 7, which is similar to the ordinary form of automatic operating dial as readily understood. The further equipment at this station includes two contacts 16 and 17, a cam 44 for controlling these contacts, and a card holder 45 between which and the cam the shipping card is to be inserted. A stamping lever 46 is controlled by the magnet 13 and when the card is inserted and the contacts 16 and 17 closed an impulse over the line wire 40 can actuate the magnet 13 over the ground as readily apparent to stamp the card. As will be apparent later, the closure of the contacts 16 and 17 is used to indicate to the central operator that the stamping signal has been properly sent, through the agency of a lamp 96 or 107 illuminated at the central station under such conditions. The line wires 39 and 40 are continued by means of a cut-off relay 47, which cut off relay is included in series with a battery 48 in a grounded circuit extending to the private wiper contact 49. The purpose of this cut off relay is to disconnect the lines 39 and 40 from their normal extensions 39^a and 40^a whenever the central operator calls back a clerk with one of the cord circuits provided for this purpose at the central station. The line conductors 39 and 40 at the central station are likewise connected to wiper contacts 50 and 51. Wiper contacts 49, 50 and 51 are to be engaged by the wipers 52, 53 and 54 of an automatic switch, thus diagrammatically indicated. The conductors 39^a and 40^a are, when the line switching relay 55 is actuated, connected through to their conductive extensions 39^b and 40^b, terminating in wipers 56 and 57 of an automatic switch 10 designed to connect the clerk with an idle operator of any desired group in accordance with the actuations of said automatic switch 10. Any suitable system or means whereby the automatic switch 10 is controlled through the dial 7 may be employed, the equipment here shown being standard and including the private relay 59, the vertical magnet 60, the rotary magnet 61, private control relay 62, the slow relay 63, the double wound relay 64, the release magnet 65, and the offnormal switch 66. The

line and slow relays respond in the usual manner to the breaking of the circuit at the clerk's calling device by making and breaking the circuit through the private control relay and the vertical magnet. Just as the first vertical step of the shaft is completed, the off normal switch is closed completing a circuit from earth through the springs of the slow relay, the rotary magnet contacts, off normal springs, and through the make contact of the private relay 59 and the private relay winding to the battery 67. This constitutes a locking circuit for the private relay which causes it to retain its armature after the vertical movements of the shaft have been completed, and private control relay 62 has released its armature. This locking circuit is opened each time the armature of the rotary magnet 61 is attracted during the rotary movement of the wipers so that as soon as the private wiper rests on an idle bank contact, the private relay releases its armature. The circuit through the rotary magnet 61 is closed as soon as the private control relay armature drops back after the completion of the vertical steps. The circuit which energizes the rotary magnet is practically the same which locks the private magnet. The automatic switch 58, of course, establishes contact by means of its wipers 68, 56 and 57 with the wiper contacts 69, 70 and 71 to thus continue the line conductors 39^b and 40^b to conductors 39^c and 40^c which are normally continuous through the stamping key 38 and the ringing key 37, extending thence to the jack contacts 72 and 73 respectively which are normally connected with a plug 74.

Selector switch 10 is of the type employed in automatic telephone systems and controlled by dial 7 as follows: removal of receiver 42 at station D closes a circuit, then relay 64 of switch 10, traceable from ground, then right hand winding of relay 64, back contact and lower switch of relay 55, conductor 40^a, lower contacts of relay 47, conductor 40, lower contacts of dial 7, switch hook and its contact, receiver 42, transmitter 41, winding, conductor 39, upper normal contacts of relay 47, conductor 39^a, intermediate switch and back contact of relay 55, left hand winding of relay 64 to grounded battery. Energized relay 64 then through its upper contacts closes a circuit through sluggish relay 63. During operation of dial 7 relay 64 operates while slow acting relay 63 remains energized. Impulses are now transmitted through vertical magnet 60 to raise the wipers 56, 57 and 68 of switch 10 to the proper level. Circuit for vertical magnet 60 is traceable from grounded battery, winding of magnet 60, winding of sluggish relay 62 (this sluggish relay 62 remains energized while impulses are being

transmitted) make contact of lower switch 65 of relay 63, upper sets of normal make contacts of relay 55, back contact of relay 64, to ground. Upon completion of impulses, circuit for relay 62 and magnet 60 is opened. A circuit is now completed through the rotary magnet 61 traceable from grounded battery winding of the magnet 61, lower set of normal break contacts of magnet 61, back contact and switch of sluggish relay 62, make contact and switch of relay 59, lower set of "off normal" contacts of switch 66 (contacts of switch 66 being closed upon the operation of shaft of switch 10 with the first impulse) upper normal contacts of relay 61, upper switch and make contact of relay 63, to ground.

Circuit for relay 59 is traceable from grounded battery winding, make contact and switch of relay 59, lower contacts of "off normal" switch 66, upper contacts of magnet 61, upper contacts of relay 63, relay having been energized through the make contacts of sluggish relay 62. Rotary magnet 61 moves the wipers into engagement with bank contacts 69, 70 and 71, until private wiper 68 engages an ungrounded contact 69, whereupon circuit from relay 59 is opened, the other circuit for relay 59 previously traced being opened when rotary magnet 61 is operated through the breaking of the upper set of contacts on magnet 61. When private wiper 68 engages an ungrounded contact 69, circuit for rotary magnet 61 is opened through release of relay 59 and opening of make contact of relay 59. When private wiper 68 engages an ungrounded contact 69 a circuit is completed for relay 55 traceable from grounded battery, winding of relay 55, switch and normal contact of relay 59, lower contacts of "off normal" switch 66, upper contacts of rotary magnet 61, upper switch and make contact of relay 63, to ground. A circuit is now completed for relay 82 traceable from grounded battery, upper winding of relay 82, contacts of ringing key 37 and stamping key 38, conductor 39^c, contact 70, wiper 56, conductor 39^b, intermediate switch and make contacts of relay 55, conductor 39^a, upper contacts of relay 48, conductor 39, transmitter, receiver, switch hook, dial contacts of station D, conductor 40, lower contacts of relay 48, conductor 40^a, lower switch and make contact of relay 55, conductor 40^b, wiper 57, bank contact 71, conductor 40^c, contacts of stamping key 38 and ringing key 37, lower winding of relay 82, to ground. Relay 82 completes a circuit for relay 87 through its left hand contacts, and relay 87 maintains circuit for relay 55 when circuit is broken at relay 63. When party at station D places receiver upon switch hook, circuit for relay 82 is opened, which releases relay 87, open-

ing circuit for relay 55, which closes circuit for release magnet 65, traceable from grounded battery, winding of relay 65, upper contacts of "off normal" switch 66, lower switch and normal contact of relay 63, upper contacts of relay 55, back contact and switch of relay 64 to ground. Switch 10 is restored to normal, whereupon the contacts of "off normal" switch 66 are opened.

10. The spring 72 also controls contacts 75 and 76 which are normally disconnected when the plug 74 is in the jack but which connect to ground the private conductor 77 to thereby make the particular line test busy should the operator have the plug 74 withdrawn from the jack. As stated, however, the plug is normally in the jack so that when connection is established with this particular line the operator's talking set 25 is available for use to converse with the clerk. The coils 78 are interposed between the battery 79 and the ground to furnish current for talking when connection is finally established.

25 The operator at the central station has the cord circuit 28 for initiating on her own account connection with any clerk, and this cord circuit is not provided with an operator's set, but may use the operator's set 25 when the key 80 is actuated. A meter 81 may be used if so desired, it not having anything to do with this invention, therefore not being described in detail. The connection of the wipers 56 and 57 with the wiper contacts 70 and 71 of course causes an energization of the line relay 82 to supply current to the line, and this of course can actuate the meter as readily apparent.

35 It is not thought necessary to describe the further various automatic features of these interconnecting features as they are readily apparent to those skilled in the art. However, in connection with the conductors 39^e and 40^e, with which the clerk finally establishes connection to reach an idle operator I have provided the switching keys 37 and 38. The switching key 37 serves as a ringing key to send ringing current from the generator 83 back to the clerk's telephone should the clerk be temporarily away from the telephone while awaiting the stamping operation. This switching key 37 is the ordinary make and break key and it is thought requires no further description. In addition to its ringing function, however, it controls a spring 84, which spring coöperates with the spring 85 so that when the ringing key is depressed, a ground is placed upon the conductor 86 to thereby energize the slow relay 87 and ground the private conductor 88 to maintain energization of the relay 55, to prevent the release of switch 58. Whenever the plug 74 is withdrawn and the conductor 77 is grounded,

this energizes the relay 87 to thereby ground the conductor 88 so that the particular operator's line tests busy at the contact 69. The stamping key 38 controls the connection of a battery 89 to the circuit to actuate the magnet 13, and this battery 89 preferably has double the voltage of the ordinary batteries used for interconnection and talking purposes. Thus when this switching key 38 is actuated springs 90 and 91 are closed so that a ground is again established in connection with the conductor 88 to hold the line switching relay 55 in its energized condition. The actuation of the stamping key 38, this being of the ordinary double break variety, connects the battery 89 into a circuit which extends from the ground, through battery 89, conductor 92, relay 93, conductor 94, springs of the key 38, conductor 40^e, conductor 40^b, conductor 40^a, conductor 40, conductor 95, contacts 16 and 17 (being of course assumed that the card is in position) magnet 13, to ground. This actuates the magnet 13 to stamp the card indicating that the credit rating of the customer is satisfactory. At the same time the actuation of the relay 93 establishes a circuit through the lamp 96, as readily apparent, to indicate that a stamping operation has taken place. Of course, if there is no card inserted then the contacts 16 and 17 are not closed and therefore relay 93 is not operated and gives no current so that the lamp 96 under those conditions is not energized. At the same time the ringing generator 83 is connected across the conductors 39^e and 40^e to ring to bell 43, to call the clerk's attention to the fact that the stamping operation has been completed.

Now in case the operator is not in a position to give the clerk the information immediately, then she advises the clerk to hang up her receiver, thus restoring the connections, and then when the operator has the information she uses a cord circuit 28 to call back the clerk by the use of an automatic switch 32 indicated by the wipers 52, 53 and 54, which when properly actuated are used under those conditions to establish contact with the wiper contacts 49, 50 and 51. Now whenever such contact is established, then the side switch 97 when it is moved to its last or third position 98 grounds the private conductor 99 to thus establish a circuit for the cut off relay 47 to disconnect the line wires 39 and 40 from the line wires 39^a and 40^a. The cord circuit 28 has the relay 100 to provide it with current as readily apparent, and at the same time controls the circuit through the lamp 101, which lamp is illuminated when the cord circuit 28 is in use and clerk's telephone in talking position. The operator's equipment 25 serves for the cord circuit 28 upon

actuation of the key 80. The cord circuit 28 has the customary ringing key 35 supplying current from the generator 103. There is also provided a stamping key 36 which
 5 furnishes current from the double voltage battery 105 over the cord conductor 106 which represents the same side of the line, for instance, as the conductor 40, thus to actuate the magnet 13. At the same time
 10 ringing current is supplied to both sides of the line from the generator 103. And at the same time a lamp 107 is actuated to indicate that the stamping has taken place, it being understood of course that the relay 108 will
 15 not operate unless the switch contacts 16 and 17 are closed.

In connection with the cord circuit 28 which has the plug 109 there is also provided a switching key 34 which is actuated
 20 when the calling dial 33 is to be operated to call a given clerk. The plug 109 of course is inserted into any of the vacant jacks 29, the contact 113 serving to ground the thimbles 114 of the jacks in the customary
 25 way. This grounding of the thimble establishes a circuit through the relay 115 to thereby throw ground upon the conductor 116, thus energizing the lamp 117 to indicate through the multiple jacks of that line
 30 that the line is in use. The automatic switch indicated at 32 and comprising substantially the entire equipment between the jack 29 and the wiper contacts 52, 53 and 54 may be
 35 of the customary design having the vertical magnet 118, rotary magnet 119, side switches 97, 120, 121, and 122. There is also the slow relay 123 which responds quickly but releases slowly and also the private magnet 124 operable in the customary way. There
 40 is also the release magnet 125 and the off normal switch 126, likewise the line operating relay 127, and the slow relay 128.

It is not thought necessary to describe this automatic circuit in detail as any suitable
 45 automatic circuit by which through the actuation of the dial 33 the wiper contacts 52, 53 and 54 can be actuated to select a desired line. The relay 123 operates the side switches on its return movement as readily
 50 understood.

The selector switch 10 is similar to that shown and described in pages 60, 62, 63 and 64 in book on "*Automatic Telephony*" by
 55 Smith & Campbell—1914. The connector switch 32 used is similar to that shown and described on pages 57 and 58; switch simplified by omission of relays B. B. R., W. C. O. R., R. R., and R. C. O. R.

It will be understood of course that the
 60 clerks' telephones and selector switches 10, 11 and 12 are available for private branch exchange work also.

From what has been described it is thought the operation of the system will be

readily understood. Having however thus 65 described one form which my invention may take, what I claim as new and desire to secure by Letters Patent is:

1. A system of the character described comprising a central station and substations, 70 means controlled from the substation for establishing intercommunication between said central station and said substations, a card receiver at the various substations, means controlled at the central station and 75 the cooperating substation to place an indication upon said card, and automatic means controlled at the central station to select for intercommunication any desired substation, said last aforesaid means having means to 80 control the placing of an indication upon said card.

2. A system of the character described comprising a central station and substations, automatic means controlled from the substation 85 for establishing intercommunication between said central station and said substations, a card receiver at the various substations, means controlled at the central station and the cooperating substation to place an 90 indication upon said card, and automatic means controlled at the central station to select for intercommunication any desired substation, said last aforesaid means having 95 means to control the placing of an indication upon said card.

3. A system of the character described comprising a central station and substations, a plurality of operators' sets at said central 100 station, means controlled from each substation for establishing intercommunication between said substation and an idle operator's position, a card receiver at the 105 various substations, means controlled at the central station and the cooperating substation to place an indication upon a card inserted in said receiver, and automatic 110 means controlled at the central station to select an idle operator of a selected group, said last aforesaid means to control the position of an indication upon said card.

4. A system of the character described comprising a central station and substations, a plurality of operators' sets at said central 115 station, means controlled from each substation for establishing intercommunication between said substation and an idle operator's position, a card receiver at the 120 various substations, means controlled at the central station and the cooperating substation to place an indication upon a card inserted in said receiver, and automatic 125 means controlled at the central station to select for intercommunication any desired substation, said last aforesaid means having means to control the position of an indication upon said card.

5. A system of the character described

comprising a central station and substations,
a plurality of operators' sets at said central
station, automatic means controlled at each
substation for establishing intercommunica-
5 tion between said substation, and an idle
operator's set, a card receiver at each sub-
station, means under the control of each of
the said operators' sets at the central station
and the coöperating substation to place an
10 indication upon said card placed in said
card receiver, and means associated with

each operator's set to select for intercommu-
nication any desired substation and control
the position of an indication upon the said
card.

In witness whereof I hereunto subscribe
my name this 1st day of December, A. D.
1915.

MORTON L. JOHNSON.

Witnesses:

HAZEL A. JONES,
OTTO M. WERMICH.