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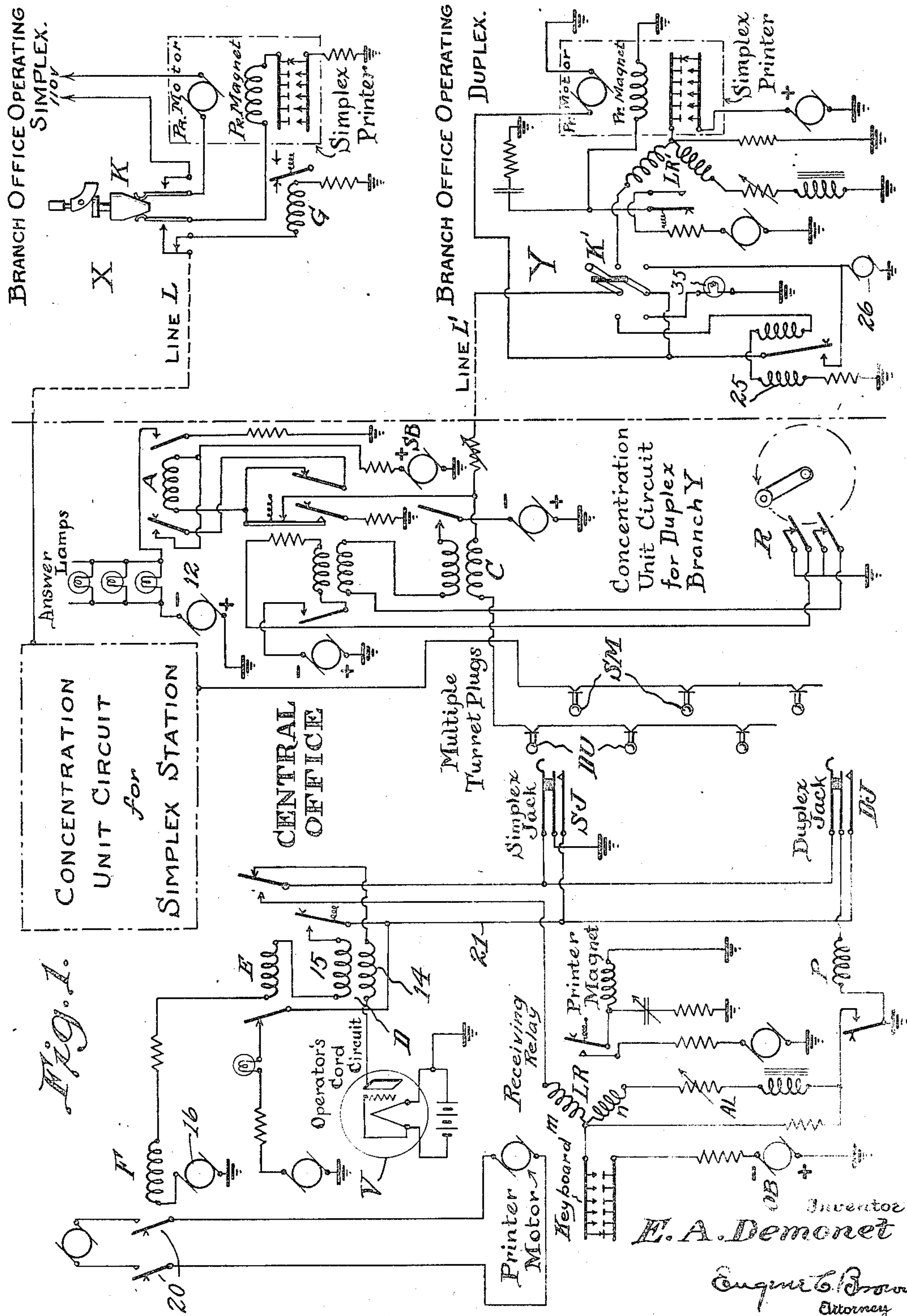
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2,106,691

PRINTING TELEGRAPH SYSTEM

Filed June 20, 1936

2 Sheets-Sheet 1



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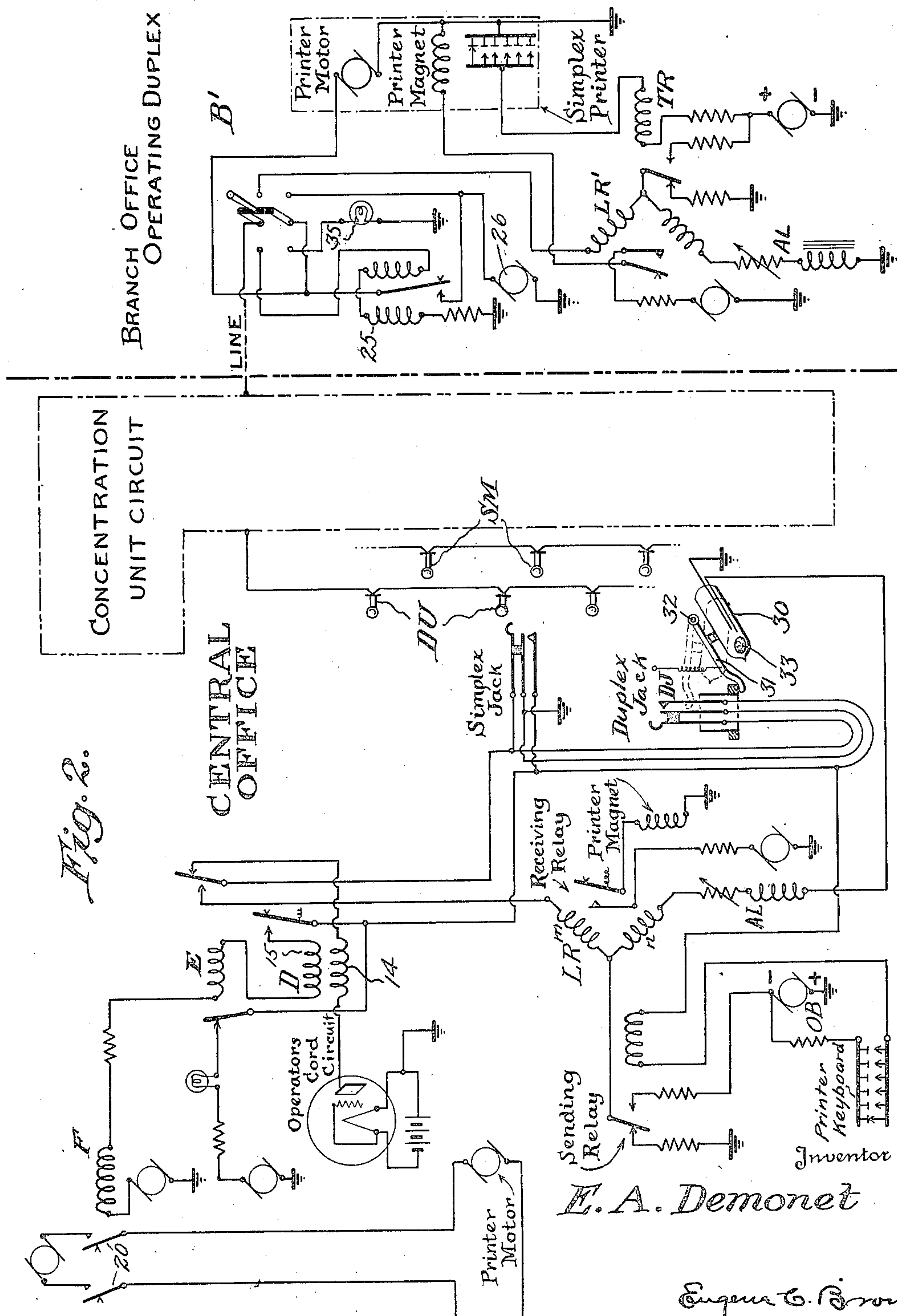
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UNITED STATES PATENT OFFICE

2,106,691

PRINTING TELEGRAPH SYSTEM

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6 Claims. (Cl. 178—58)

This invention relates to printing telegraph systems wherein a plurality of lines terminate at a central office, and more particularly to circuit arrangements whereby the operator's set at the central office or exchange is adapted to be connected to branch lines operating either duplex or simplex.

Heretofore it has been the practice to operate the branch lines extending from the central station or exchange to subscribers having a set provided with a keyboard transmitter and a printer on a simplex circuit. The traffic over certain branch lines, however, is too heavy, especially at certain periods of the day and hence those lines have been equipped to be operated on a duplex circuit. In order that an operator at the central office may connect her set with branch lines operating either upon a simplex or a duplex circuit, it is necessary that her cord circuit should correspond to that of the branch line. The object of my invention is to provide means for automatically adapting the printing telegraph equipment or set of the central office operator to either type of circuit. In the embodiment of my invention illustrated herein, the change in the circuit arrangement of the operator's set from simplex to duplex or vice versa, is automatically effected when the operator connects her jack to the calling or called circuit.

In the following detailed description, I shall refer to the accompanying drawings, in which—

Figure 1 is a diagram showing circuit arrangements at the central office and at branch or subscribers' stations embodying my invention;

Figure 2 is a similar diagram showing a modification of the automatic means for effecting a shift in the operator's set from simplex to duplex arrangement.

Referring to Fig. 1, the subscriber's equipment at branch office X arranged for simplex operation, comprising a simplex printer, a key switch K and a signal relay G and also the concentration unit circuit at the central office are substantially identical with the corresponding parts shown in patent to Drake and Blanton No. 1,804,327 to which reference is made for a detailed description of the operation.

I have only shown the concentration unit circuit in detail for the line L¹ connected to the branch office Y but it will be understood that identical concentration unit circuits are provided at the central office for each branch office line. When the printer at the branch office X is idle the circuits are as shown in the drawings, with plus battery normally impressed upon the line

L through the operating winding of the relay A from the generator SB of the concentrator unit elements assigned to subscriber X. When the subscriber at branch office X signals central office, she depresses key K, thereby connecting the simplex printer, starting the printer motor and disconnecting the signal relay G and then momentarily opens the line circuit by depressing a key on the simplex keyboard. Such interruption deenergizes relay A of the corresponding concentration unit line circuit, thereby lighting the proper answer lamp. An idle operator at the central office observing that the lighted lamp is in the group belonging to the simplex branch circuits, thereupon, connects her simplex jack SJ to a simplex plug SM. This connects the line L through the right-hand back contact of relay E, winding 14 of relay D and vacuum tube V to ground. Simultaneously the extra contacts of the jack SJ are closed and complete a circuit from ground through its tongue and locking coil 15 of relay D and through the coils of relays E and F. Operation of relay E disconnects tube V and connects the line L, through its right-hand armature, to the upper coil of the receiving relay LR, through the closed contact of the printer and generator OB to ground. Relay F operates the switch 20 to start the printer motor.

The circuit is now ready for message traffic:

Incoming signals from branch office X actuate the receiving relay LR through its upper coil *m* and the armature transmits the impulses to operate the printer magnet. The circuit through the lower coil *n* of the receiving relay LR and the artificial line AL is broken at the front contact of relay P, which is deenergized during simplex operation. Consequently when the central office operator transmits signals to the branch office X, the receiving relay LR is actuated and repeats the signals to the printer magnet of the central office printer.

Duplex operation

If a call is received at the central office from a branch office operating on a duplex circuit, such as branch office Y, the lamp assigned to line L¹ in the answer lamps of the duplex lines will be lighted. The operator therefore connects her jack DJ to one of the multiple turret plugs DU connected to that line. This connects the line through the duplex jack and right-hand back contact of relay E, winding 14 of relay D and vacuum tube V to ground. The extra contacts of the jack DJ close a circuit from generator

16, through relay F, relay E, locking coil 15 of relay D, conductor 21, relay P to ground. The armature of relay P connects the artificial line AL to ground. As the right-hand armature of relay E engages its front contact, the line is connected through conductor 22 to the upper terminal of the receiving relay LR. Operation of relay F closes the switch 20 to start the printer motor. It will be evident that incoming signals will operate the receiving relay LR, and that its armature will repeat the signals to the printer magnet. Signals transmitted by the central office operator from her printer keyboard into the apex of the relay LR pass equally in opposite directions through the coils *m* and *n*, so that the relay is unaffected by the outgoing signals.

The operator's set or equipment at the branch office Y is arranged for duplex operation. With the switch K¹ thrown to the right, signals received at the branch office operate the receiving relay LR¹, and the latter repeats them to the printer magnet. Outgoing signals sent from the printer keyboard into the apex of the relay LR¹ do not affect the latter. Upon the completion of the business or message, the operator throws the switch K¹ to the left, thereby disconnecting her printer set and connecting the signal relay 25 to the line. Positive potential from generator SB normally holds the armature of relay 25 against its right hand stop. When the operator at the central office connects her jack DJ onto a duplex line plug DU, the armature of polar magnet 25 at the branch office Y, connects the generator to light the signal lamp 35, and start the motor of the simplex printer.

Fig. 2 illustrates a modified arrangement of my invention in certain particulars. The concentration unit circuit at the central office is identical with that illustrated in Fig. 1. The transmitter of the simplex printer at the central office operates a sending relay connected to the apex of the line relay LR, whereas in Fig. 1, the simplex transmitter was directly connected to the apex of the relay LR.

Instead of employing a relay P to connect the artificial line to ground when the duplex jack DJ is connected to a plug, I have shown a mechanically operated device for accomplishing this purpose. A tiltable mercury switch 30, carried by a lever 31, pivoted at 32, is normally depressed so that the globule of mercury 33 does not connect the contacts in the tube, being held down by the weight of the duplex jack DJ when not in use. As soon as the jack is lifted for the purpose of connecting an operator's set with a branch line, the lever and attached tube swing upwardly until the globule of mercury connects the contact wires in the tube 30, thereby grounding the artificial line AL.

In Fig. 1, the transmitting contacts of the simplex machine at the branch office transmit the signal impulses directly into the apex of the line relay LR¹, whereas in the arrangement shown in Fig. 2, the transmitting contacts send the signal impulses into a relay TR which repeats the signals into the apex of the relay LR¹.

It will be apparent that the control or conversion of the operator's set at the central office may be effected by either one of the jacks. In order to employ the jack SJ to effect the change from duplex to simplex arrangement, the relay P of Fig. 1, would be connected in series with the ground connection of the jack SJ and the set conductor would terminate at the back contact instead of the front contact of relay P.

I have referred to simplex printers in the equipment at the operating positions at the central office and at the branch offices but it will be evident to telegraph engineers that the invention disclosed herein to enable the operator at the central office to connect to either a simplex branch circuit or a duplex branch circuit is equally effective if those positions are worked manually in the Morse fashion with a key and sounder in place of a transmitter keyboard and printer magnet respectively. Hence it is apparent that the arrangement which I have devised is useful in other types of concentrators than the one shown herein.

It is to be understood that by simplex line, simplex circuit or simplex operation, I refer to a line or circuit in which messages may be sent in both directions but not simultaneously, and by the term duplex I refer to the simultaneous transmission of messages in both directions, the lines, circuits, and equipment being adapted for such operation.

I have illustrated and described different circuit arrangements for the purpose of clearly disclosing the invention but it will be understood by engineers that other modifications may be made within the scope of my invention as defined in the appended claims.

I claim:

1. A printing telegraph system comprising a central office and a plurality of branch offices with lines terminating at said central office, said branch offices having telegraph apparatus arranged to operate on a simplex circuit and on a duplex circuit respectively, and telegraph apparatus at the central office provided with means operating to automatically condition said apparatus to operate either simplex or duplex when connected to a corresponding simplex or duplex line circuit.

2. A printing telegraph system comprising a central office and a plurality of branch offices with lines terminating at said central office, said branch offices having telegraph apparatus arranged to operate on a simplex circuit and on a duplex circuit respectively, and telegraph apparatus at the central office provided with an operator's cord circuit to connect said apparatus to any of said branch lines, said cord circuit being provided with means to automatically condition said apparatus to operate either simplex or duplex corresponding to the connected branch line.

3. A printing telegraph system comprising a central office and a plurality of branch offices with lines terminating at said central office, said branch offices having telegraph apparatus arranged to operate on a simplex circuit and on a duplex circuit respectively, and telegraph apparatus at the central office having a receiving relay provided with a real line coil and an artificial line coil, the latter being normally on open circuit, jacks adapted to connect respectively to line terminal plugs associated with simplex lines and duplex lines, operator's cord circuits adapted to connect said jacks and apparatus, said cord circuits including switching means to close said open circuit and ground the artificial line, effective upon connecting the terminal plug of a duplex line with a corresponding jack of said cord circuit.

4. In a central telegraph office, the combination with transmitting and receiving apparatus, of terminals connected respectively to simplex branch lines and to duplex branch lines, an operator's cord circuit arranged for connection to any of said terminals, and means effective upon connection

to a terminal of one or the other type of line circuit to condition said apparatus to operate on the selected line.

5 5. In a central telegraph office, the combination with transmitting and receiving apparatus, of terminals connected respectively to simplex branch lines and to duplex branch lines, an operator's cord circuit arranged for connection to any of said terminals, a connecting jack in said cord
10 circuit for connection to any of said terminals, and switching means operatively associated with said jack to condition said apparatus to operate on one or the other type of line circuit corresponding to the selected line.

6. In a central office of a telegraph system having simplex and duplex branch lines connected thereto, switchboard terminals corresponding to each branch line, a telegraph printer, an operator's cord circuit arranged for connection to any
5 one of said terminals, a receiving relay operatively connected to the printer and having actuating coils connected respectively to the real line and to a normally open artificial line, and means connected to said operator's cord circuit to automatically ground said artificial line coil upon connecting the operator's cord to a duplex line terminal.
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