W. A. WYNNE.

TELEPHONE EXCHANGE SYSTEM.

APPLICATION FILED MAR. 9, 1909.

944,120.

Patented Dec. 21, 1909.

2 SHEETS—SHEET 1.

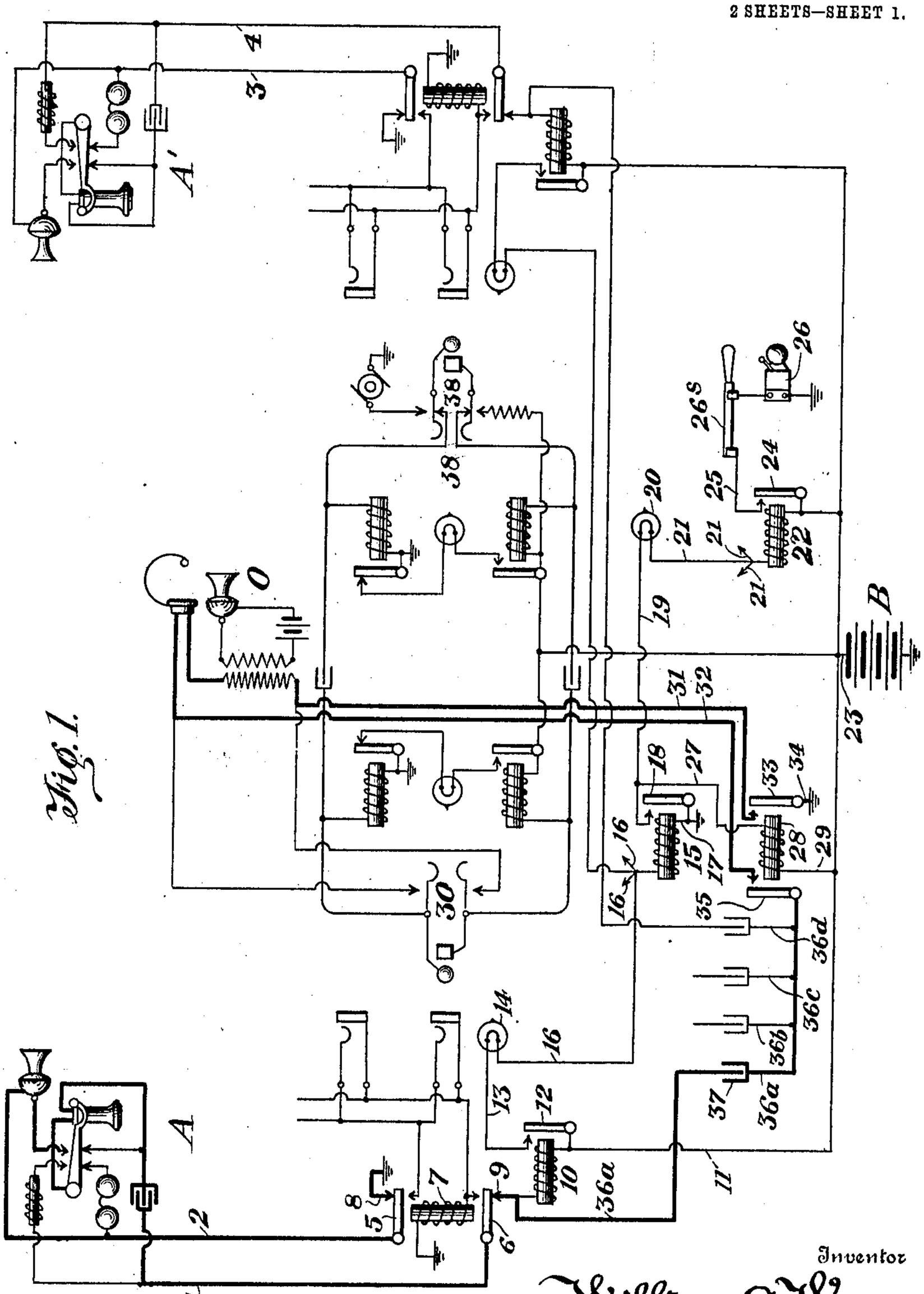

Fig. 1.

Witnesses

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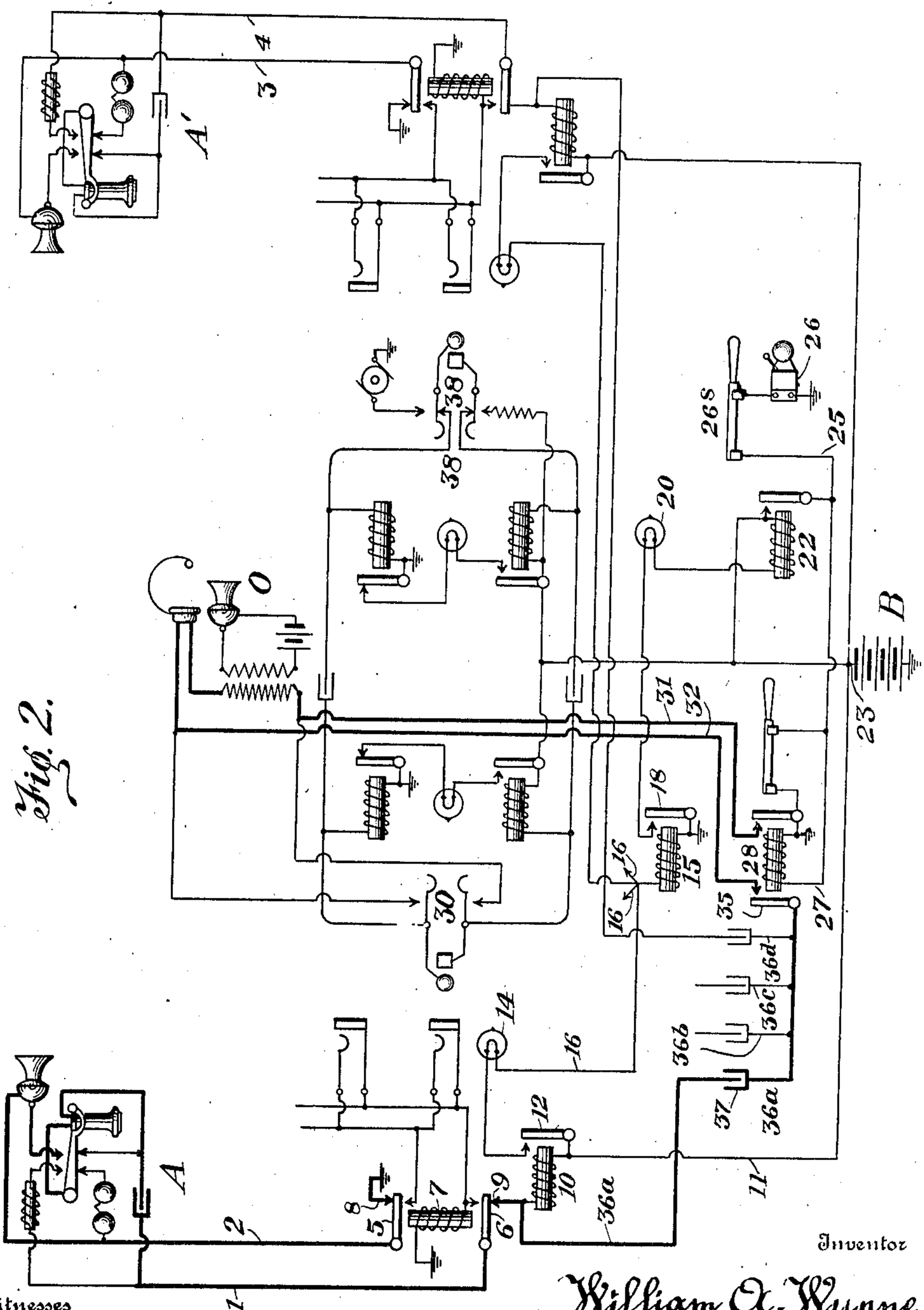

Fig. 2.

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UNITED STATES PATENT OFFICE.

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TELEPHONE-EXCHANGE SYSTEM.

944,120. Specification of Letters Patent. Patented Dec. 21, 1909.

Application filed March 9, 1909. Serial No. 482,329.

To all whom it may concern:

Be it known that I, WILLIAM ANDREW WYNNE, a citizen of the United States, residing at Raleigh, in the county of Wake and State of North Carolina, have invented certain new and useful Improvements in Telephone-Exchange Systems, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to telephone exchange systems and has for its object the provision of means whereby calling subscribers may be promptly answered without the delay usually attendant upon an operator's plugging into an answering jack.

The present invention constitutes an improvement on that for which I have been granted Letters Patent of the United States, No. 911,798, dated February 9, 1909. In that case I showed and claimed a special relay for each line, adapted to become energized when the subscriber is calling, to connect his line directly to the operator's talking circuit. In the present case I have modified the circuit so that a single relay will serve for a number of lines. This relay may be connected in various ways, but the arrangement I now consider the best places it in parallel with some portion of the pilot circuits, which are common to a group of lines.

The invention is illustrated in the accompanying drawings wherein—

Figure 1 is a diagram showing two subscribers' lines, a cord circuit, an operator's telephone set, and my special calling relay arranged in parallel with the pilot lamp. Fig. 2 is a diagram of a modified arrangement in which the special relay is in parallel with the night alarm.

Referring to the drawings, A and A' are two subscribers' stations, connected to a central office by line wires 1—2, 3—4 respectively. As the connections and arrangement of both lines are the same, a detailed description of the line 1—2 will answer for both. The wires 1 and 2 terminate at the central office on contact springs (shown for convenience as armatures) 5 and 6 of the cut-off relay 7, which are normally closed on contact points 8 and 9, connected respectively to ground and to the line relay 10, from which the wire 11 passes to the main battery B. The line relay 10 through its armature 12 controls a local circuit 13 passing to the line lamp 14 and thence to the pilot relay 15 which is common to a group of lines, as indicated by the stub wires 16, which go to the lamps 14 of other lines. The circuit of the relay 15 is completed by wire 17 to ground, and armature 12 is connected to battery through the wire 11.

The relay 15, through its grounded spring contact 18 (shown for convenience as an armature), controls the local circuit 19 of the pilot lamp 20, this circuit being completed by wire 21, which passes to the night alarm relay 22, common to a group of lines as indicated by the stub wires extending therefrom. This relay 22 is connected by wire 23 to the main battery B, and through its armature 24, also connected to battery through wire 23, it controls the local circuit 25 of the night alarm 26, which may be common to all the lines in the exchange or to any desired group thereof.

Extending from the wire 19 is a branch wire 27, which passes to the special listening relay 28, and thence by wire 29 to battery, this being in parallel with the pilot lamp connections 19, 20, 21, 22 and 23, and being closed for the passage of battery current whenever the pilot relay 15 is energized.

The operator's set is shown at O, and is connected in parallel to contacts in the listening keys 30 of all the cord circuits at the position to which this telephone set is appropriated, and of which the single cord circuit shown is a symbol. The operator's set is also connected across a pair of wires 31—32, which pass to contacts in the relay 28. One coöperating contact 33 of this relay (shown for convenience as an armature) is grounded through wire 34; and the other corresponding contact 35 (also shown as an armature) forms the terminal of a wire lead 36 having a plurality of branches 36^a, 36^b, 36^c, 36^d, etc., each of which contains a condenser 37, and is connected to contact 9 of a particular line. These branches are for the passage of talking currents only, and each of them is individual to its own line, all of them, however, being in parallel when their line circuits are simultaneously closed.

The operation of this circuit is as follows: Assuming the subscriber A to be calling, his receiver is removed from the hook, and battery current flows through the following path: B, 23, 11, 10, 9, 6, 2, substation, 1, 5, 8, ground to battery. Relay 10 pulls up, closing the following circuit: B, 23, 11, 12, 13, 14, 16, 15, 17, ground to battery. Lamp 14

lights and relay 15 pulls up, closing the following pilot signal circuit: B, 23, 22, 21, 20, 19, 18, 17, ground to battery. Pilot lamp 20 lights, and if the night alarm 26 is in service, the following circuit is closed: B, 23, 24, 25, 26, ground to battery. The pulling up of armature 18 also closes the following circuit: B, 23, 29, 28, 27, 18, 17, ground to battery. The special listening relay 28 thereupon pulls up and the line 1—2 is at once connected to the operator's telephone set by the following path: ground, 34, 33, 31, O, 32, 35, 36, 36ª, 37, 9, 6, 2, substation, 1, 5, 8, ground. The subscriber can speak to the operator as soon as he puts his receiver to his ear, and where a single line is calling, the signals 14 and 20 are therefore superfluous, except as they enable the operator to identify the line for connective purposes without the subscriber stating his number. On the other hand, if several lines are calling simultaneously, and all the subscribers speak at once, confusion is avoided by the operator immediately inserting answering plugs in all the jacks except one, or if she pleases in all of them. The subscribers' instructions are then taken separately by means of the listening keys 30 in the ordinary way. I have found in practice, however, that this condition is rare, and that it is very rare for more than two calls to come in simultaneously. An operator can handle two calls at once without resorting to the listening keys, especially as the line lamps 14 designate the two lines calling, and if she has had any experience at that position on the board, she is probably able to differentiate between the voices, and surely so by the subscribers giving their numbers, as for example, "357 on 726". It will be observed that this is similar to the method of procedure in the old and well-known "Law" system, of which this is in fact a modernized and highly improved species.

Referring now to Fig. 2, I have shown therein only the terminals of the line 1—2, which are connected as before, and the several relays and jacks belonging to the line. In this modification the special relay 28 is connected by its wire 27 to the wire 25 of the night alarm 26, becoming energized when the relay 22 pulls up. It will be observed that in both figures I have shown a switch 26ˢ for cutting off the night alarm, but this does not affect the relay 28 which is in a parallel branch, and will therefore always respond when the night alarm relay is energized. The other connections, and the operation of the circuits in this figure are the same as those of Fig. 1.

It should be noted that when the cut-off relay 7 pulls up, it connects the line to its jack or jacks (multiple jacks being shown for each line), and when the operator gets the number she connects the lines by plugging from the jack of one to the jack of another in the ordinary way. She is provided with the usual and well-known testing and ringing apparatus, symbolized by the key 38 in the single cord-circuit shown.

Various changes may be made in these circuits without departing from the scope of my invention. The system shown has common battery. To change this to a local battery system, or to change the connections of the jacks, cords, line and pilot relays, or the like, would not constitute an essential departure, as I contemplate all such changes.

I am aware that it has heretofore been proposed to use a switch or other piece of apparatus in connection with a common operator's telephone circuit, to connect the latter with any one group of lines when calling, and I therefore do not claim this idea broadly.

The essential feature of my invention is the special relay 28, controlling parallel branches from a plurality of lines to a common operator's circuit, and adapted to connect all of them thereto when any one of them is calling.

In the following claims, where I refer to "special service" or the "special relay", it should be understood that this language may refer to the ordinary pilot relay shown at 15 in my drawings, which may obviously be fitted with additional contact springs, so as to perform the functions of the extra relay 28, and save that relay. This or other substitutions are clearly within the working scope of any well informed electrician or telephone engineer, and may be regarded as involving merely the use of equivalents.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In a telephone exchange system, a plurality of subscribers' lines extending to a central office, with means therein to interconnect the lines, an operator's telephone circuit, an individual signal for each line, and a relay common to said lines acting when any line comes into use to connect them all directly with the operator's circuit.

2. In a telephone exchange system, a plurality of subscribers' lines extending to a central office, plug and cord circuits for interconnecting the lines, a listening and ringing key and operator's circuit connections to each cord, an individual signal relay for each line, a common relay for all the lines adapted to be energized when any line is calling to connect them all to the operator's circuit, and a cut-off relay acting when a cord is connected with a line to disable the line signal and disconnect the special relay therefrom.

3. In a telephone exchange system a plurality of lines, a line relay for each line, a group of pilot signal means for all the lines,

and a special relay with its windings in parallel with said pilot means, and with connections from its contacts on one side to all the lines in parallel and on the other to an operator's telephone circuit.

4. In a telephone exchange system, a plurality of lines, a central office terminal for each line, and operator's link circuits for interconnecting said terminals, a listening key for each line circuit, an operator's telephone connected in parallel to all the listening keys, a line relay and signal for each line, a common relay having its windings connected so as to be controlled by a plurality of said line relays, and having its contacts connected on one side in parallel to all of the lines by which it is thus controlled, and on the other side to the operator's telephone, whereby when any line in the group is calling, all the lines in that group will be simultaneously connected to the operator for immediate service.

5. In a telephone exchange system, a plurality of subscribers' lines, having line relays and terminal jacks at a central office, operator's cord circuits for interconnecting the several jacks, listening keys for the cord circuits, an operator's telephone connected in parallel to the listening keys, and a special service outfit comprising a listening relay common to and controlled by a plurality of the line relays, and having its contacts connected on one side through parallel branches containing condensers, to all of the lines by which it is controlled, and on the other side to the operator's telephone, whereby when any line in the special service group is calling, all the lines of that group will be connected to the operator's telephone without the insertion of a plug.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM ANDREW WYNNE.

Witnesses:

THOMAS DURANT,

EDWARD E. CLEMENT.