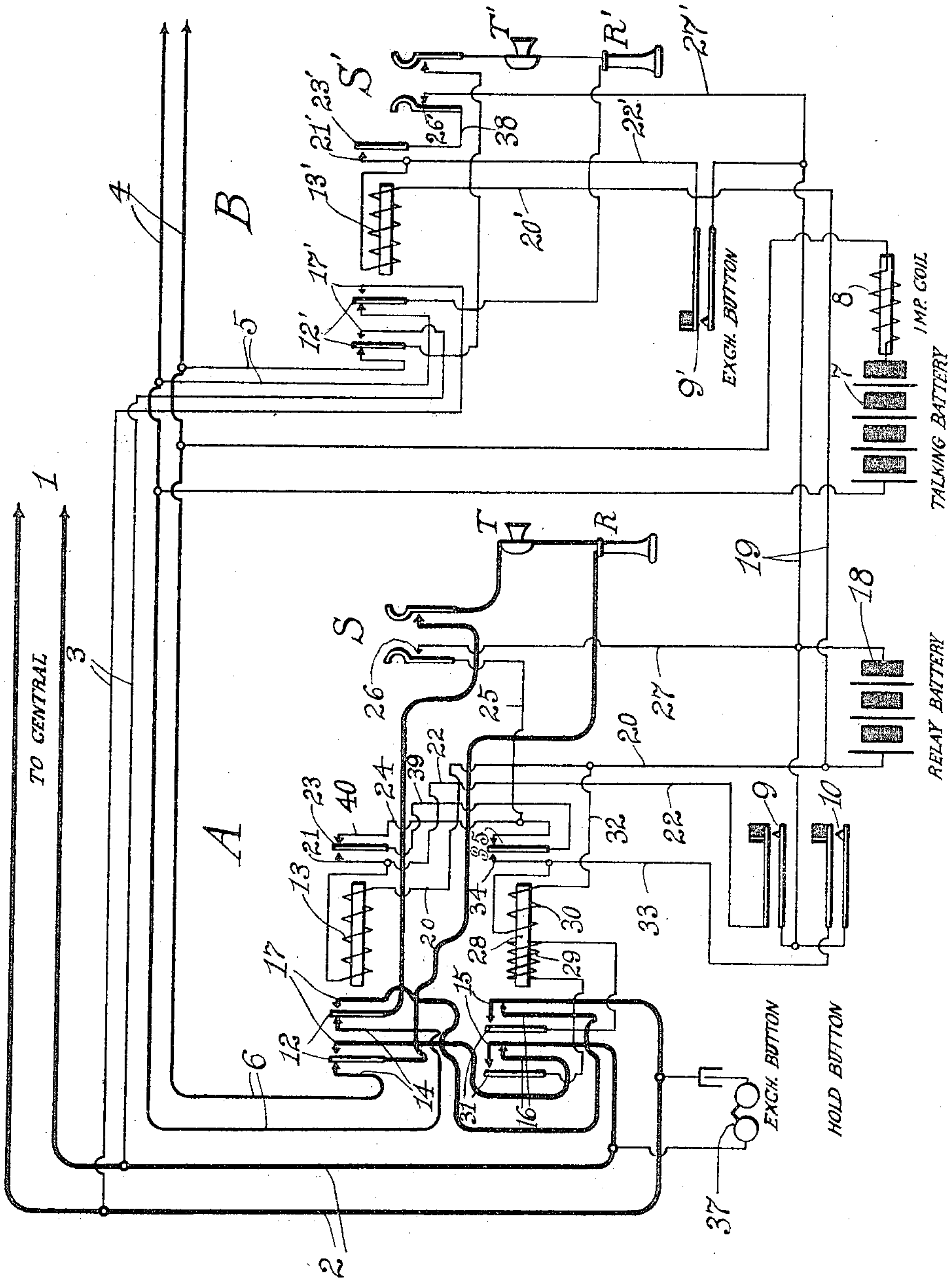


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TELEPHONE SYSTEM.
APPLICATION FILED FEB. 7, 1916.

1,210,499.

Patented Jan. 2, 1917.



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TELEPHONE SYSTEM.

1,210,499.

Specification of Letters Patent.

Patented Jan. 2, 1917.

Application filed February 7, 1916. Serial No. 76,622.

To all whom it may concern:

Be it known that I, JOHN H. LEVIS, Jr., a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Telephone 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.

The present invention is an improvement in telephone systems.

The object of the invention is to provide an intercommunicating telephone system with improved means for obtaining a central-exchange connection. It is often desirable to allow each of the subscribers' instruments which form part of a common or local talking system, to be connected to the central exchange without tying up the system. To this end my invention allows the terminals of each instrument to be connected at will to either the common or local talking pair or to the central exchange line. One station termed the control station is charged with the duty of attending calls from the central exchange, and in notifying the desired party of the fact that it is wanted. The instrument at the control station may be connected to the common talking pair to carry on an independent conversation with one of the local stations, while a special bridge is placed across the central exchange line to hold the same.

The accompanying drawing, which forms a part of the present specification, illustrates diagrammatically an embodiment of my invention.

The main line wires 1 which extend to the central exchange office have branches 2 and 3 leading to the different subscribers' stations, which may be connected in the intercommunicating system. I have shown in the present drawings only two subscribers' stations, A and B, but it is to be understood that the system is applicable to any desired number of subscribers.

The common talking pair 4, which serves as the talking wires for the intercommunicating system, has taps 5 and 6 extending to each of the telephone instruments in the system. A common talking battery 7 in series with the impedance coil 8 is bridged across the common talking pair 4. The sub-station at A is provided with the subscriber's

instrument having the usual transmitter T, receiver R, and switch-hook S, and, in addition, is provided with two buttons one of which, 9, serves to connect the terminals of the subscriber's instrument to the exchange pair 1. The other button 10 serves to place a bridge across the exchange pair, so that the telephone instrument at this sub-station may be connected to the common talking pair 4.

It is desirable to place a shunt across the exchange pair, in order that the operator at central will not take down the connection, as might occur if the line were opened at this point.

The terminals of the subscribers' instruments at the sub-station A are connected to the movable armature contacts 12, controlled by the exchange relay 13, but which are normally in contact with the stationary spring contacts 14, connected to the tap 6 of the common talking pair 4. The taps 2 to the exchange pair 1 are connected to the stationary spring contacts 15, which are normally in engagement with the spring contacts 16. The spring contacts 16 are connected to a pair of contacts 17, which form the front contacts for the armature springs 12 of the relay 13, so that when the relay 13 is energized the contacts 12, which are connected to the subscriber's instrument, will be placed in connection with the central exchange talking pair.

A common battery 18 having bus wires 19 extending to each of the subscribers' stations, provides current for operating the relay for switching back and forth the terminals of the subscribers' instruments. The relay 13 is connected to one side of the battery 18 by means of the wire 20, while the other side is normally opened through the exchange button 9. This terminal of the relay 13 is connected to a spring contact 21, and is further connected to the button 9 by the wire 22.

A movable armature contact 23 coöperates with the the spring contact 21 to close a locking circuit for the relay 13 when the same is energized. This circuit may be traced as follows: battery 18, wire 20, relay 13, wire 22, button 9, to the other side of battery 18. The energization of the relay 13 attracts the armature contact 23 against the contact 21, whereby the following circuit is established: battery 18, wire 20, re-

lay 13, contact 21, armature 23, wire 39, armature 35, back contact thereof, wire 25, contact pair 26 of the switch-hook, back to the other side of battery 18, over the wire 27.

5 A holding relay 28 having a high resistance winding 29 and a locking winding 30 is arranged, when energized, to bridge its winding 29 across the common exchange pair 2. The winding 29 which is in reality
10 merely a suitable resistance and which is disposed on the core 28 purely for mechanical reasons is connected to the armature contacts 31, which are of make-before-break type, bridging the winding 29 across the
15 pair 2 before connection is broken between the springs 15 and 16. The winding 30 is first energized by depressing the button 10 and closing the circuit over the following: battery 18, wire 20, wire 32, winding 30,
20 wire 33, switch button 10, back to the other side of battery 18.

It will be noticed that the wire 33 is connected to the front contact 34 of the relay 28, so that when the armature contact 35
25 closes against the contact 34, a locking circuit will be established for the winding 30 over the following wires: from the battery 18, wire 20, wire 32, winding 30, contacts 34 and 35, wire 39, armature contact 23,
30 back contact 40, wire 24, wire 25, contact pair 26 of the switch-hook S, back to the other side of battery 18. It can be seen that this locking circuit is broken through the back contact of the relay 13 and through
35 the contacts of the switch-hook S. Hence, it will be impossible to throw the holding bridge across the exchange pair either when the switch-hook is down or when the exchange pair is connected to the sub-station
40 instruments. In other words, when the receiver is hung up this holding circuit will be broken. It will also be noticed that the locking circuit for the relay 13 is closed through the back contact of the relay 30,
45 so as to prevent the relay 13 being energized and locked when or so long as the relay 30 is energized.

By the above arrangement either relay may operate to perform its functions, but
50 both cannot simultaneously be operated and locked.

The station B is similar to the station A except that the same is not provided with the exchange signal 37, nor does it have a
55 holding relay or holding button. Each of the other stations which may be connected to the system will be similar in all respects to the station shown at B. Inasmuch as the station at B does not employ the holding relay, it is unnecessary to cut the locking circuit for the relay 13¹ through the back contact of the holding relay, and the armature contact 23¹ of the relay 13¹ is therefore directly connected to the contact pair 26¹ of
60 the switch-hook S¹ by means of the wire 38.

Each party on the intercommunicating system is able to connect his telephone instrument directly with the exchange pair in order to call central, but there is only one exchange signal 37, which is placed adjacent
70 the sub-station A.

The operation of the system is as follows: Upon receiving a call from the central office the attendant or subscriber at the sub-station A removes the receiver from the switch-hook and depresses the exchange button 9.
75 This places her telephone instrument in communication with the central talking pair, and she may ascertain from central the name of the party desired. Assuming
80 that the desired party is subscriber B, the attendant at A will depress the holding button 10, whereby the exchange pair is shunted and the telephone instruments at the station A are connected to the common talking
85 pair 4. The attendant at A then signals the subscriber at B by a signaling system not shown, since the same is well known in the art, and notifies the subscriber B that he is wanted on the exchange pair. The
90 subscriber B thereupon depresses his exchange button 9¹ connecting his telephone instrument with the extension 3 of the central exchange pair 1. The attendant at sub-station A thereupon places her receiver on
95 the switch-hook, breaking the locking circuit of the relay 28 so that a clear talking pair may be had by the subscriber B to the central station. When the subscriber B places his receiver upon the switch-hook the
100 circuit for the relay 13¹ will be broken and all the parts restored to normal.

If either of the parties A or B desires to call central, the receiver is removed from the switch-hook and the exchange button 9
105 or 9¹ is depressed, whereby the telephone instruments are connected directly to the exchange pair 1.

It can be seen from the above description that my invention provides very convenient
110 and simple means for allowing any one of a number of subscribers to be connected to the central talking pair or to the common talking pair of the intercommunicating system. It can also be seen that the line to
115 the central exchange may be held to prevent disconnection during the time that the attendant at the station A is calling the desired party to his telephone.

It is obvious that any number of sub-
120 scribers may be connected to the system.

Numerous changes and modifications will at once suggest themselves to those skilled in the art, but I desire such modifications and variations to be considered as coming
125 within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a plurality of sub-
130

scribers' telephone instruments, a telephone line leading from a central exchange to one of said subscribers' instruments, a relay corresponding to each of said instruments for connecting the corresponding instrument to said telephone line, and a circuit for each relay closed through the corresponding switch-hook.

2. In combination, a plurality of subscribers' telephone instruments, a telephone line leading from a central exchange, normally-inactive means corresponding to each instrument to connect the same to said telephone line, said means being under the control of the switch-hook to cause disconnection when the receiver is placed thereupon.

3. In combination, a plurality of telephone instruments, a telephone line leading from a central exchange, a common talking line extending to each of said instruments, switching means normally connecting said telephone instruments with the common talking line, and means to actuate each of said switches to connect the corresponding telephone instrument with the telephone line.

4. In combination, a plurality of subscribers' instruments, a telephone line leading from an exchange office, said line having a signal operable from central adjacent one of said instruments, a single common talking pair extending to each of said instruments, a holding relay adjacent said one instrument for holding said central line while the instrument is connected to the common talking pair and switches at each station for normally connecting the instrument to said common talking pair, said switches being operable to connect said instrument to said central telephone line.

5. In combination, a plurality of telephone instruments, a telephone line leading to a central exchange office and having terminals adjacent the terminals of each of said subscribers' instruments, a common talking pair having terminals adjacent the terminals of each of said instruments, a relay corresponding to each telephone instrument, and means to operate said relay to cause connection of the terminals of each telephone instrument with the central exchange line or the common talking pair, as desired.

6. In combination, a plurality of telephone instruments, a telephone line leading to a central exchange office, said line having terminals adjacent the terminals of each of said telephone instruments, a common talking line for said instruments, having terminals adjacent the terminals of each of said instruments, a switching relay for each instrument, a circuit for said relay, and a switch for controlling said circuit.

7. In combination, a plurality of subscribers' telephone instruments, a telephone line extending to a central exchange office

and having branches with terminals adjacent each of said telephone instruments, a common talking pair normally connected to the terminals of each of said instruments, a relay at each instrument for shifting the terminals from their normal contact, into contact with the central exchange line, a locking circuit for said relays, said locking circuit controlled by the switch-hooks of the corresponding instruments.

8. In combination, a plurality of subscribers' telephone instruments, a telephone line extending to a central exchange office, a single common talking pair extending to each of said telephone instruments, and relay means under the control of the subscriber at each station for connecting the corresponding instrument to either the central exchange line or the common talking pair, and means at one of said stations for placing a bridge across said central exchange line, said means being controlled by the corresponding subscriber's switch-hook, each of said telephone instruments being normally connected to said common talking pair upon lifting the corresponding receiver.

9. In combination, a plurality of substation instrument sets, a central exchange telephone line, a signal operable from said central exchange at one of said stations, a single common talking pair, a switch hook for each instrument set, connections for normally connecting each of said substation instrument sets to said common talking pair, switching means adapted to be manually set for connecting said instrument sets to said central exchange telephone lines, and means controlled by the switch hook of the corresponding set to restore said connections to normal.

10. In combination, a plurality of subscribers' instruments, a telephone line extending from an exchange office, said line having a signal operable from central adjacent one of said instruments, a single common talking pair extending to each of said instruments, a holding relay adjacent said one instrument for holding said central line while the instrument is disconnected from said telephone line, the terminals of each of said telephone instruments being normally connected to the common talking pair, a relay at each station for switching the terminals of the corresponding instrument from the telephone line to said common talking pair, each of said relays having a locking circuit controlled by the switch hook of the corresponding instrument.

11. In combination a central exchange telephone line, a plurality of substation instruments, a single common talking pair extending to each of said substation instruments, branches from said central exchange line to each of said instruments, a central exchange signal at one of said instruments, a

relay at said one instrument, a resistance, said resistance being adapted to be bridged across said central exchange telephone line by energization of said relay, a locking circuit for said relay, a second relay at one instrument for switching the terminals of said instrument from the common talking pair said central exchange line, a key for each relay and a locking circuit for each relay, said

locking circuit of each relay being controlled 10 by the other relay and by the switch hook of the corresponding instrument.

In witness whereof, I hereunto subscribe my name this 24 day of Jany., A. D. 1916.

JOHN H. LEVIS, JR.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."