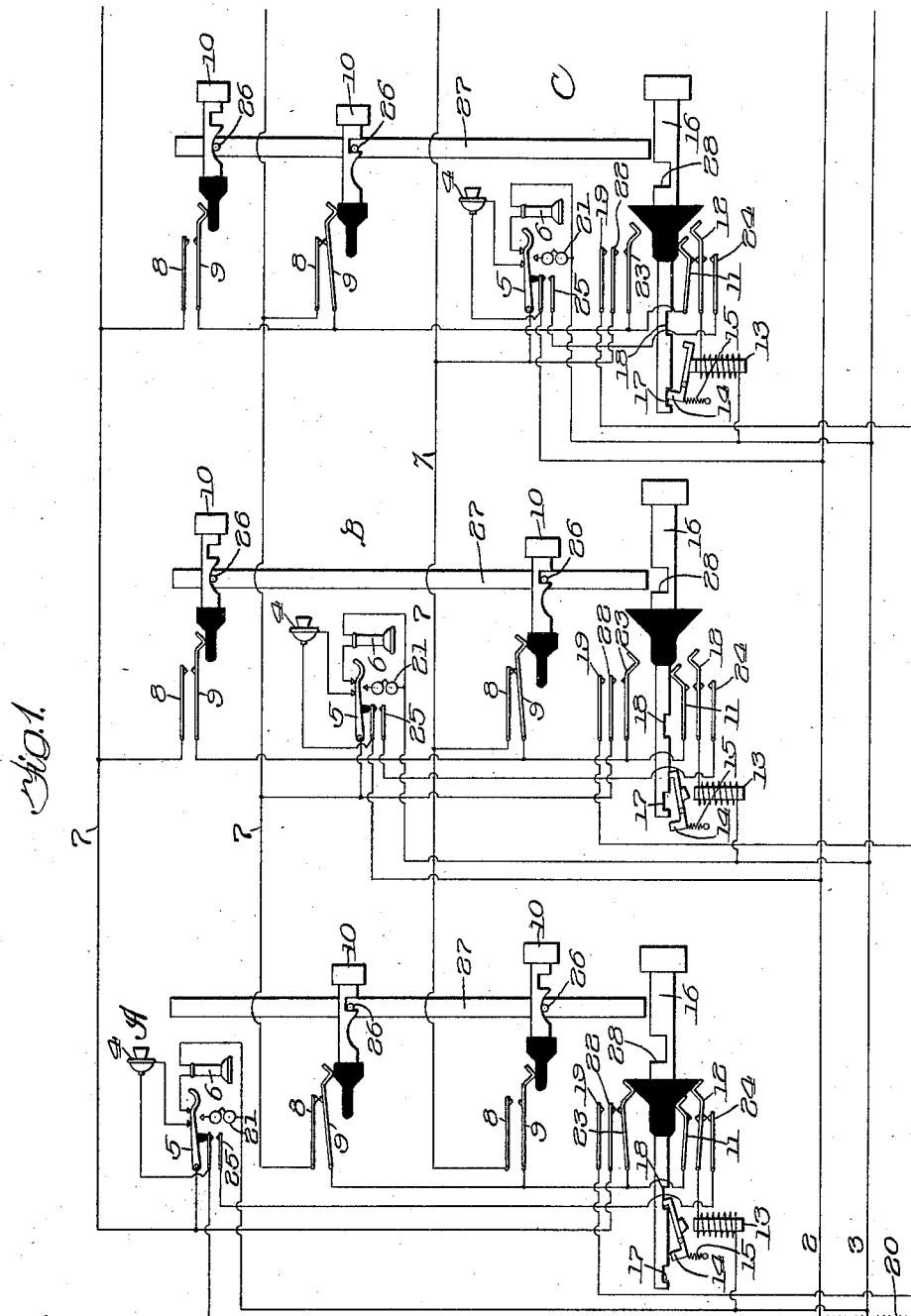


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 TELEPHONE SYSTEM.
 APPLICATION FILED MAY 18, 1911.

1,030,505.

Patented June 25, 1912.



Witnesses:
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Fig. 2.
 1 2 3 4 5
 6 7 8 9 10
 11 12 13 14 15
 16 17 18 19 20
 21 22 23 24 25
 26 27 28 29 30
 31 32 33 34 35
 36 37 38 39 40
 41 42 43 44 45
 46 47 48 49 50
 51 52 53 54 55
 56 57 58 59 60
 61 62 63 64 65
 66 67 68 69 70
 71 72 73 74 75
 76 77 78 79 80
 81 82 83 84 85
 86 87 88 89 90
 91 92 93 94 95
 96 97 98 99 100

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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

1,030,505.

Specification of Letters Patent.

Patented June 25, 1912.

Application filed May 18, 1911. Serial No. 628,084.

To all whom it may concern:

Be it known that I, ELMER R. CORWIN, 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 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.

My invention relates to telephone systems and particularly to those telephone systems in which the telephone stations are provided with means to enable intercommunication therebetween without the aid of an exchange, though the system of my invention may, if desired, be used in conjunction with an exchange. Systems of the kind to which my invention relates are commonly known as intercommunicating systems and I employ the term intercommunicating system in the sense of any system of the kind described irrespective of the location of the telephone stations and whether such stations are located within the same building or not.

My invention has for its object the simplification of the apparatus entering into the system and to this end there is provided at each station a switch which is adapted to furnish a test condition and which is also adapted to lock out the telephone of a party seeking the busy line. This switch is also desirably provided with an additional function, that of impressing ringing current upon the line of the wanted party, and while said switch at each station is preferably adapted to the performance of the three functions, I do not wish to be limited to the performance of all of these functions by this switch.

In carrying out my invention I provide an electromagnet at each station that is adapted to permit or prevent operation of the associate switch and to hold the same when actuated. This electromagnet desirably serves to obstruct movement of the switch when the line tested is busy, thereby to indicate to the seeking party the busy condition of the wanted line. The electromagnet also preferably serves, when deenergized, (this magnet preferably remaining deenergized when the wanted line is initially free) to hold the switch in a position to which it is

actuated so that the telephonic circuit established by the switch may be maintained.

I will explain my invention more fully by reference to the accompanying drawing showing the preferred embodiment thereof, and in which—

Figure 1 is a diagrammatic view illustrating a plurality of intercommunicating telephone stations in one form of circuit relation; Fig. 2 is a simplified diagram making more clear certain of the circuit connections illustrated in Fig. 1.

Like parts are indicated by similar characters of reference throughout the different figures.

I have shown a type of intercommunicating system with which the novel features of my invention are incorporated, but I do not limit myself to such a type. The type of system which I have selected for incorporation with novel features of my invention includes a battery 1 in bridge between metallic continuous conductors 2 and 3 extending from the battery to all of the stations of the intercommunicating system, stations A, B, C only being indicated. A normally open bridge between the conductors 2 and 3 is present at each of the stations A, B, C, each bridge being traceable from the conductor 2 to the transmitter 4, the uppermost contacts of the switch hook 5 that are connected by the switch hook when said switch hook is free of the telephone receiver 6 but which are normally disconnected when the receiver is in place upon the switch hook, to said receiver, thence to the conductor 3. Each station has a telephone conductor 7 individual thereto and extending to each of the other stations, each conductor 7 being permanently connected with the switch hook 5 at the station to which such conductor is individual. Each conductor 7 is connected with a contact 8 of a switch at each of the other stations, the contact 9 complementary to the contact 8 at each station being adapted for connection with the contact 8 upon the depression of a plunger 10 for the purpose of including the telephone receiver of a seeking station and a station free to be called in direct shunt exclusive of the transmitters at such stations.

In accordance with my invention the switch parts 8 and 9 of each switch at each

station are in serial relation with normally open contacts 11 and 12 at such station, the contacts 11 and 12 at each station thus being common to the switch contacts 8 and 9 at each station. I also provide a magnet 13 at each station in serial relation with the contacts 8, 9, 11 and 12 at the same station therewith. The electromagnet includes in its formation an armature 14 pivoted at its left end and adapted to have this end depressed by means of a spring 15 when the magnet is deenergized. There are preferably as many keys 10 at each station as there are conductors 7 extending to each station, each key 10 being individual to a station by having its contact 8 connected with the conductor 7 which is connected with the switch hook 5 at the station to which the key is individual. For example if the party at station A should wish to communicate with the party at station B, the seeking party at station A would depress his upper key 10 whose contact 8 is connected with the switch hook 5 at station B. If the party at station B should wish to communicate with the party at station A, the party at station B would depress his uppermost key 10 because the contact 8 of this switch is connected with the switch hook 5 at station A. If the party at station A should wish to communicate with the party at station C, the seeking party would depress his lowermost key 10 since the contact 8 of this key is connected with the switch hook at station C. If the wanted station is busy, circuit through the magnet 13 at the seeking station will be established upon the actuation of the key 10 individual to the wanted station upon the closure of the contacts 11 and 12 at the seeking station. Each station is provided with a switch or key 16 having a plunger adapted to bring the contacts 11 and 12 together when this key is slightly or initially depressed. If the wanted party has his telephone off its switch hook when the key 16 at a seeking station is initially depressed, the magnet 13 at the seeking station will be energized by a circuit which may be traced from the battery 1 over the conductor 3, the winding of the magnet 13, the contacts 11 and 12, the engaged contacts 8 and 9 of the actuated key 10 individual to the wanted station, the conductor 7 individual to the wanted station, the switch hook 5 at the wanted station, the transmitter 4 at the wanted station, the conductor 2, thence to the battery 1. The energization of the magnet 13 will cause its armature to be moved against the force of the spring 15 and will effect the insertion of the left hand end of the armature within a slot 17 provided in the stem of the key 16 slightly actuated at the seeking station to prevent the further actuation of this key. The key being ar-

rested shortly after it is pressed upon will indicate to the seeking party that the station wanted is busy. If the station wanted were free, the circuit for the magnet 13 at the seeking station would be open at the transmitter switch hook contact of the wanted station so that the armature 14 of the magnet 13 at the seeking station would not be attracted whereby the key 16 may be further depressed to a position in which the spring 15 is adapted to force the right hand end of the armature 14 into a notch 18, the notch 18 being of sufficient length to permit of slight further movement of the key 16, sufficient to bring the ringing contact 19 at the seeking station into circuit relation with a signaling source of current 20 and the signal receiver 21 at the wanted station. The signaling circuit that is established by the complete depression of the key 16 at the seeking station may be traced from the upper terminal of the battery 20 through the signal receiver 21 at the wanted station, the switch hook 5 at this station, the conductor 7 individual to the wanted station, that conductor which is permanently connected with the switch hook at that station, the contacts 8 and 9 of the actuated key or switch 10, the ringing contact 19 at the seeking station and the two contacts immediately beneath the same that are connected therewith when the key 16 in which they are included is depressed to its fullest extent, thence to the lower terminal of the battery 20. When the key 16 is relieved of pressure, the switch contacts thereof will thrust the same toward normal position to a slight extent, the notch 18 being sufficiently long for this purpose, this movement being arrested by the right hand end of the armature 14 at the seeking station while within the slot 18. When the key has been moved toward normal to this slight extent the ringing contact 19 is disengaged and the contacts 22 and 23 and the contacts 12 and 24 remain in engagement, the telephone circuit between the stations being thereupon established so far as the seeking station is concerned.

When the wanted party responds to the signal conveyed by his signal receiver 21, he removes his telephone receiver from its switch hook whereupon his telephone receiver and transmitter are connected in shunt of the battery 1 as previously described, the telephone receiver and transmitter at the seeking station already having been included in shunt of the battery 1 as will be understood from the previous description. The telephone receivers at the calling and called stations are now included in direct shunt of each other. Under the assumption that station A is a calling station and station B is the called station, the shunt containing the telephone receiver at

station A, for example, and which is established about the telephone receiver at station B, may be traced from the conductor 3 common to a terminal of each of the telephone receivers at these stations through the telephone receiver 6 at station A, the switch hook 5 at this station, the contacts 22 and 23 of the key 16 at this station, the contacts 8 and 9 of the key or switch 10 individual to station B and located at station A, the switch hook 5 at station B, to the telephone receiver 6 at this station. Telephonic current may be conveyed between the stations by the circuit connections now existing in a manner well understood by those skilled in the art and as will be also clearly understood from an inspection of the simplified diagram shown in Fig. 2. When the parties are through conversation they will restore their telephone receivers upon their switch hooks whereupon the apparatus is restored to normal. In order that the apparatus at the station which was the calling station may be restored to normal, it is necessary to withdraw the armature 14 at this station from engagement with the recess 18 to permit the contact springs of the switch 16 to restore the plunger 16 to normal. To this end circuit is closed through the magnet 13 that may be traced from the lower terminal of the battery 1 through the winding of the magnet 13 at the seeking station, the contacts 12 and 24 at the seeking station, the lowermost switch hook contact 25, the switch hook contact above the contact 25 and engaged therewith through the mechanical action of the switch hook when supporting the associate telephone receiver, thence to the upper terminal of the battery 1. The armature 14 is disengaged from the notch or slot 18 before the plunger of the key 16 is moved toward normal, and after the armature has thus been disengaged the contacts 12 and 24 are disengaged so that the circuit through the magnet 13 is opened.

Fig. 1 of the drawing shows the station C in the act of testing the line individual to the station B and the condition of the apparatus shown at this station C will be well understood from the description which has previously been given.

The keys 10 at each station are provided each with a notch, adjacent to the contacts 8 and 9, normally engaging a pin 26, the pins 26 at each station being provided upon the connecting bar 27 thereat. Each key 10 is provided with a second notch adjacent its head for holding the associate pin 26 to maintain the contacts 8 and 9 belonging to an actuated key in engagement during an established connection. An actuated key associated with a bar 27 is restored to normal when another key 10 at the same station is operated owing to the then occasioned de-

scient of the pin 26, belonging to the actuated key, out of engagement with the plunger of the actuated key.

As the system is equipped, a calling party having secured connection with an idle called party could, after the called party has restored his telephone receiver upon its switch hook, secure connection with another and busy line so as to listen in on such other line, were it not for a characteristic of my invention which I will now describe. The plunger of each key 16 has a notch 28 that is in line with the bar 27 when said key 16 is in normal position, the bar 27 being then adapted to enter the notch 28 when the key 10 associated with such bar is actuated. When the key 16 is moved into that position which will enable a calling station to establish telephonic connection with a called station, the notch 28 is out of register with the associate bar 27 so that no key 10 associated with this bar may be operated owing to the obstructing action that occurs when the key 16 is in talking position and in which position the notch 28 is out of register with the associate bar 27. Thus the calling party is forced to restore his telephone upon its switch hook in order that he may be able to actuate any key 10 after the associate key 16 has been actuated, since it is necessary to energize magnet 13 to permit the key 16 to restore to normal thereby to permit the actuation of the key 10 selected for operation.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the precise construction and circuit arrangement shown as changes may readily be made without departing from the spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent the following:

1. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; an additional switch at each station coöperating with any of the aforesaid switches in establishing connection between the telephone at the same station therewith and the selected line; means coöperatively related with and set by the operation of the additional switches upon establishment of telephone connections to prevent the former switches at the same stations from being subsequently operated; and means for occasioning the operation of the additional switches to permit the former switches to be operated and to open the previously established telephone circuits, said latter means being operated, when its

station is a seeking station, by the switch hook at the same station therewith when restored to normal by the receiver placed thereupon.

5 2. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; an additional switch at each station cooperating with any of the aforesaid switches in establishing connection between the telephone at
10 the same station therewith and the selected line; means cooperatively related with and set by the operation of the additional switches upon establishment of telephone connections to prevent the former switches
15 at the same stations from being subsequently operated; and means for occasioning the operation of the additional switches to permit the former switches to be operated and to open the previously established telephone
20 circuits, said latter means being operated, when its station is a seeking station, by the switch hook at the seeking station.

3. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; an additional switch at each station cooperating with any of the aforesaid switches in establishing connection between the telephone at the same station therewith and the selected
30 line; means cooperatively related with and set by the operation of the additional switches upon establishment of telephone connections to prevent the former switches at the same stations from being subsequently
35 operated; and means for occasioning the operation of the additional switches to permit the former switches to be operated and to open the previously established telephone circuits, said latter means being operable at a seeking station.

50 4. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its movement to denote the condition of the tested line; and an electromagnet associated
55 with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by apparatus at each of the other stations.

5. An intercommunicating telephone system

including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its movement to denote the condition of the tested line; and an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by the switch hook at each of the other stations.

6. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its movement to denote the condition of the tested line; an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by apparatus at each of the other stations; a source of signaling current; and a switch element at each station governed by the testing device thereat for including said source of signaling current in circuit with the signal receiver at a called station when the called station is idle and when the testing device at a calling station is permitted movement by the electromagnet associated therewith.

7. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its movement to denote the condition of the tested line; an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by the switch hook at each of the other stations; a source of signaling current; and a switch element at each station governed by the testing device thereat for including said source of signaling current in circuit with the signal receiver at a called station when the called station is idle and when the testing device at a calling station is permitted movement by the electromagnet associated therewith.

8. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for con-

necting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its movement to denote the condition of the
 5 tested line; an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by apparatus at each of the other stations; and
 10 a switch element at each station governed by the testing device thereat for taking part in establishing telephonic connection between calling and called stations when the testing device at a calling station is per-
 15 mitted movement by the electromagnet associated therewith.

9. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at
 20 each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its
 25 movement to denote the condition of the tested line; an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by
 30 the switch hook at each of the other stations; and a switch element at each station governed by the testing device thereat for taking part in establishing telephonic connection between calling and called stations
 35 when the testing device at a calling station is permitted movement by the electromagnet associated therewith.

10. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at
 40 each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its
 45 movement to denote the condition of the tested line; an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by
 50 apparatus at each of the other stations; a source of signaling current; a switch element at each station governed by the testing device thereat for including said source of
 55 signaling current in circuit with the signal receiver at a called station when the called station is idle and when the testing device at a calling station is permitted movement by the electromagnet associated therewith;
 60 and a switch element at each station also governed by the testing device thereat for taking part in establishing telephonic connection between calling and called stations when the testing device at a calling station

is permitted movement by the electromagnet 65 associated therewith.

11. An intercommunicating telephone system including telephone lines extending between stations of the system; switches at
 each station individual to the lines extend- 70 ing thereto from other stations and for connecting the telephone at the same station therewith with said telephone lines; a line testing device at each station serving by its
 movement to denote the condition of the 75 tested line; an electromagnet associated with each testing device for permitting and obstructing its movement, the circuit of the magnet at each station being changeable by the switch hook at each of the other sta- 80
 tions; a source of signaling current; a switch element at each station governed by the testing device thereat for including said source of signaling current in circuit with the signal receiver at a called station when 85
 the called station is idle and when the testing device at a calling station is permitted movement by the electromagnet associated therewith; and a switch element at each station also governed by the testing device 90
 thereat for taking part in establishing telephonic connection between calling and called stations when the testing device at a calling station is permitted movement by the elec- 95
 tromagnet associated therewith.

12. An intercommunicating telephone system including telephone lines extending between stations of the system; a switch at
 each station entering into the control of telephonic connections between stations and 100 operable for the purpose when at a seeking station; and an electromagnet at each station for preventing and permitting the operation of the switch at the same station therewith, the electromagnet at each station 105
 having a circuit which is changeable by the apparatus at each of the other stations.

13. An intercommunicating telephone system including telephone lines extending between stations of the system; a switch at 110
 each station entering into the control of telephonic connections between stations and operable for the purpose when at a seeking station; and an electromagnet at each station for preventing and permitting the op- 115
 eration of the switch at the same station therewith, the electromagnet at each station having a circuit which is changeable by the switch hook at each of the other stations.

14. An intercommunicating telephone sys- 120 tem including telephone lines extending between stations of the system; switches at each station individual to the lines extending thereto from other stations and for connecting the telephone at the same station 125
 therewith with said telephone lines; an additional switch at each station cooperating with any of the aforesaid switches in

establishing connection between the telephone at the same station therewith and the selected line; and means coöperatively related with and set by the operation of the additional switches upon establishment of
5 telephone connections to prevent the former switches at the same stations from being subsequently operated.

In witness whereof, I hereunto subscribe my name this sixteenth day of May A. D., 10 1911.

ELMER R. CORWIN.

Witnesses:

G. L. CROGG,
E. L. WHITE.

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