

F. E. SUMMERS.
TELEPHONE SYSTEM.
APPLICATION FILED MAR. 10, 1908.

939,756.

Patented Nov. 9, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

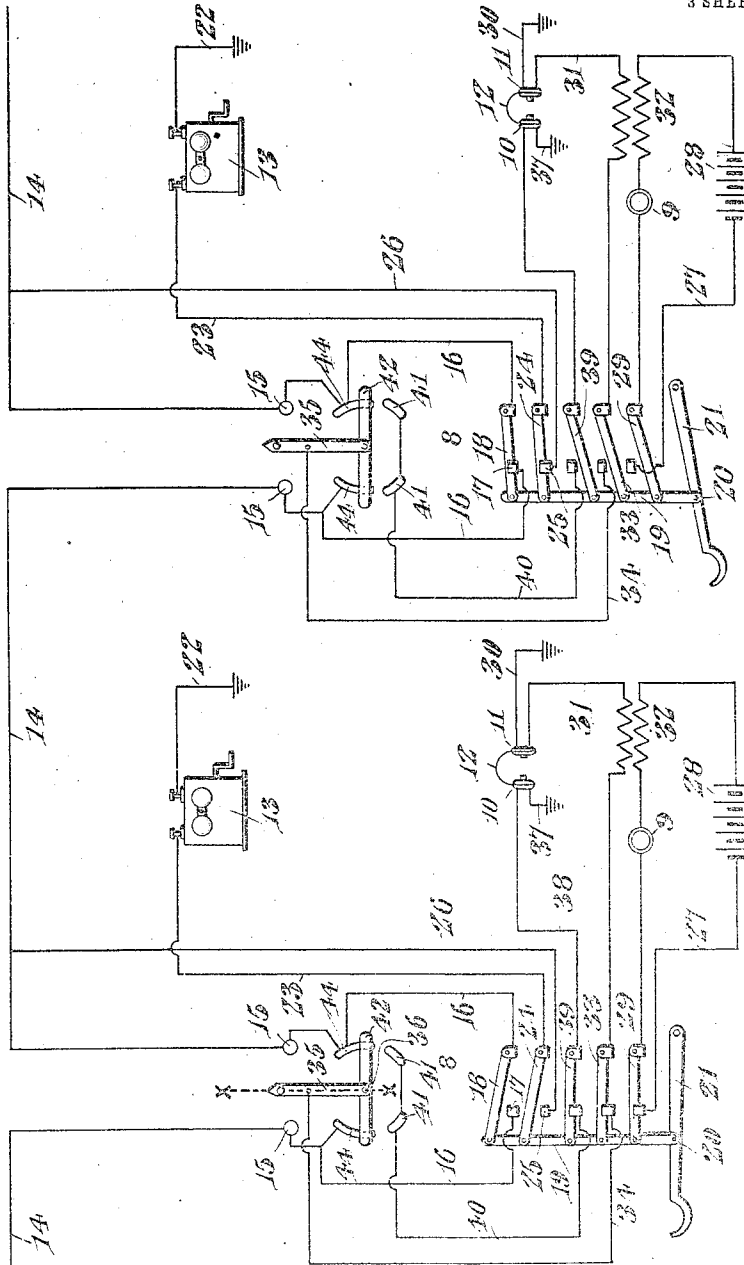


Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

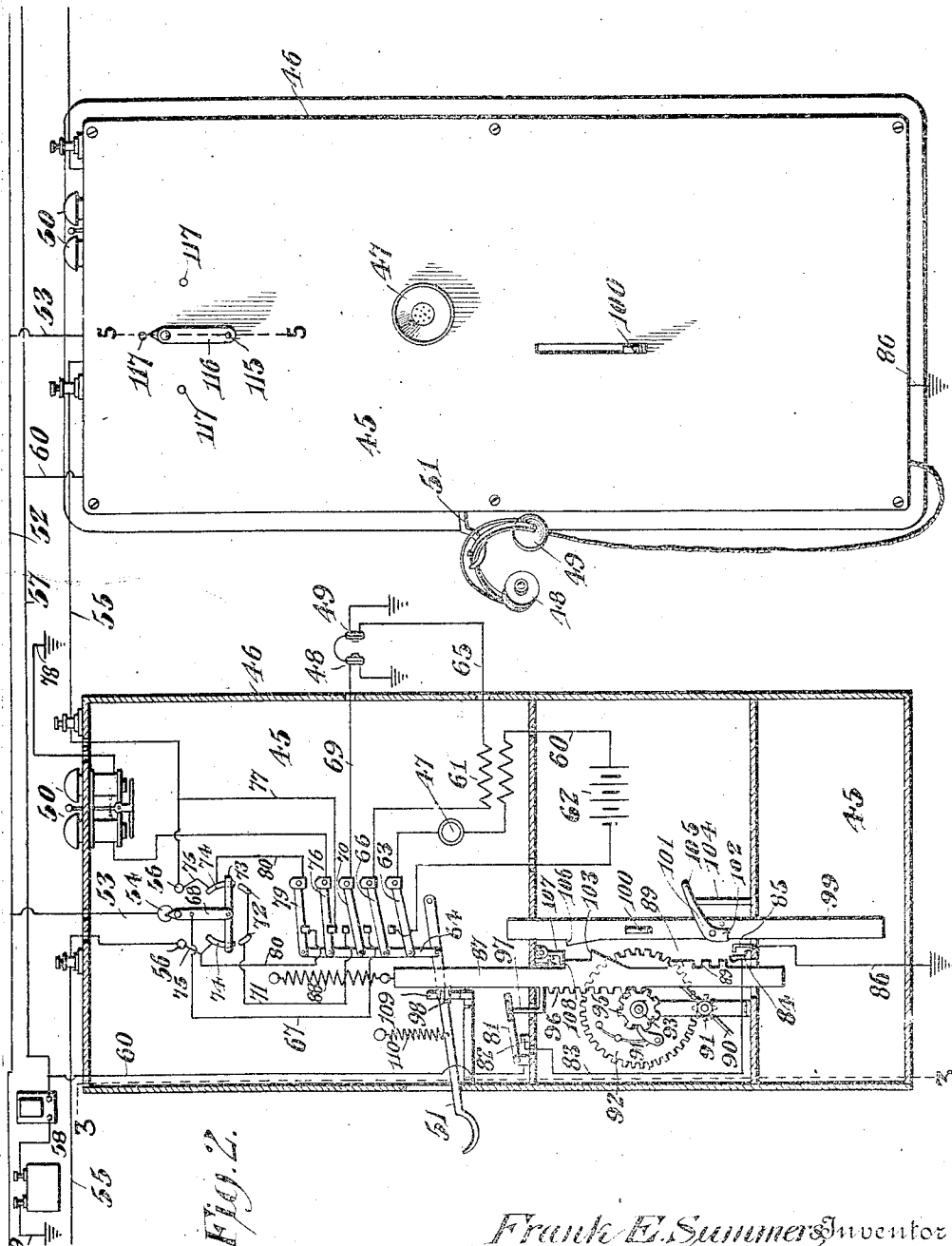


Fig. 2.

Witnesses
 Jas. K. McArthur
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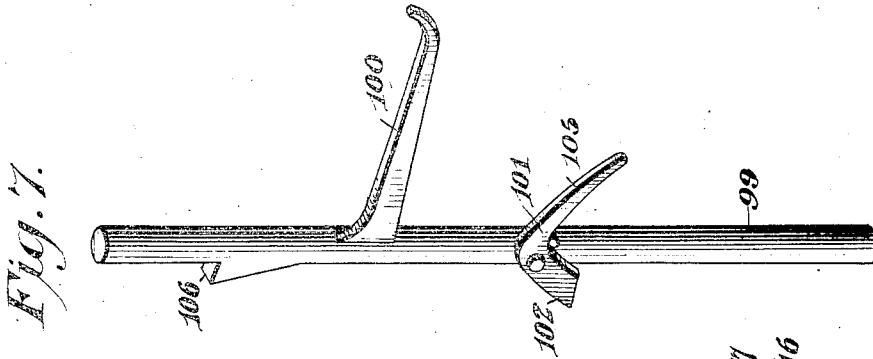


Fig. 4.

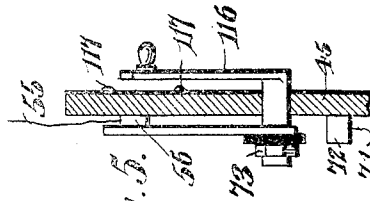
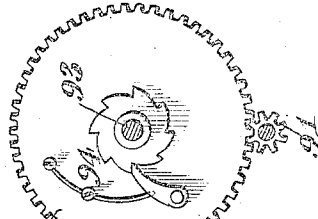


Fig. 6.

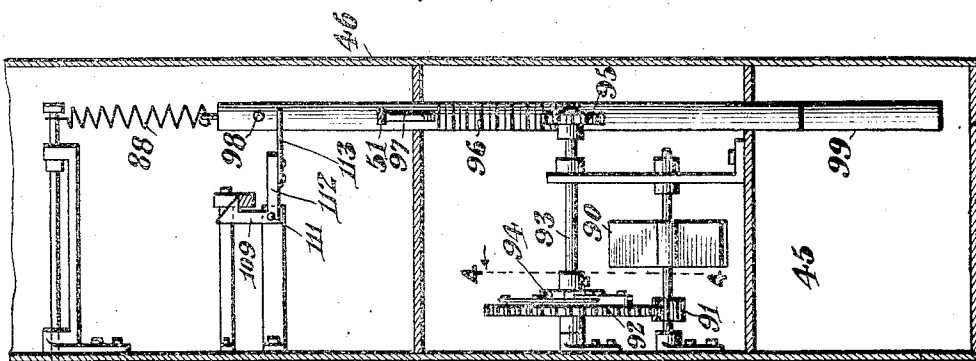
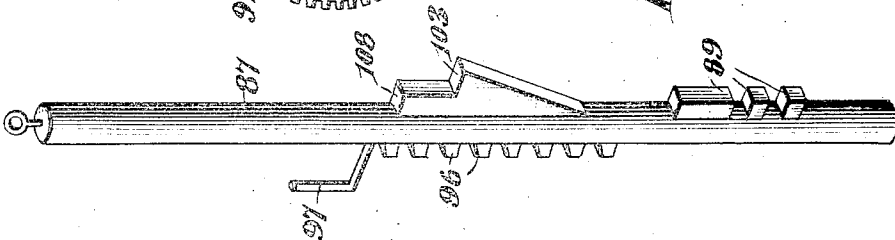


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

FRANK EZRA SUMMERS, OF SCOTLAND COUNTY, MISSOURI.

TELEPHONE SYSTEM.

939,756.

Specification of Letters Patent.

Patented Nov. 9, 1909.

Application filed March 10, 1908. Serial No. 420,188.

To all whom it may concern:

Be it known that I, FRANK E. SUMMERS, a citizen of the United States, residing in the county of Scotland and State of Missouri, have invented a new and useful Telephone System, of which the following is a specification.

The primary object of the present invention is to provide a novel, simple and effective system for party lines that will permit two parties to communicate and prohibit any one else on the line or lines from overhearing the conversation, the system being such that the systems now in use may be readily modified to include the same.

A further and important object is to provide means whereby parties along the line may communicate with those using the same, in order that the parties in communication may be notified of and give way to emergency calls.

A still further object is to provide in a system that will permit exclusive communication between two parties, means which will permit other parties along the line to communicate with each other without interfering or being interfered with by those who are using the system for exclusive purposes.

Still another object is to provide in a system of this character, means which will effect the operation of any predetermined call at the exchange from any instrument along the line, regardless of whether other instruments are in use or not, such operation acting as a check to prevent unwarranted or malicious interference with the parties talking.

Two embodiments of the invention are illustrated in the accompanying drawings, but it will be evident to those skilled in the art and by reference to the appended claims that the invention is not limited solely to the specific arrangements disclosed.

In said drawings:—Figure 1 is a diagrammatic view of a very simple form of the invention. Fig. 1^a is a detail sectional view on the line *x-x* of Fig. 1. Fig. 2 is a view partly diagrammatic in its character, showing a more involved embodiment of the invention. Fig. 3 is a vertical sectional view substantially on the line 3-3 of Fig. 2. Fig. 4 is a detail sectional view on the line 4-4 of Fig. 3. Fig. 5 is a sectional view on the line 5-5 of Fig. 2. Fig. 6 is a detail perspective view of the calling plunger.

Fig. 7 is a similar view of the actuating plunger.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

Referring first to the embodiment disclosed in Figs. 1 and 1^a, a plurality of telephone instruments 8 are employed, two only being illustrated for the purpose of explanation, though as many may be utilized as desired. Each instrument includes a transmitter 9 and two receivers 10 and 11, the receivers being mounted upon a head band 12. A suitable calling device, shown in the form of a magneto generator and bell 13, is also associated with each instrument. A single line connects the various instruments, and consists of a plurality of entirely separate sections 14 extending respectively from one instrument 8 to the next. Each instrument is provided with a pair of terminal contacts 15 electrically connected to the line sections 14 leading thereto and therefrom. Electrically connected to the contacts 15, as shown at 16, is a switch comprising a contact 17 and a knife bar 18. The bar 18 of said switch is pivotally connected to an actuating rod 19, which is pivoted as shown at 20 to a swinging receiver supporting hook 21, the arrangement being such that when the hook is down by reason of the weight of the receivers placed thereon, the switch will be closed. Consequently the line sections will be electrically connected, forming in effect a continuous line through the various instruments.

The generator 13 has one pole grounded as shown at 22, while its other pole is electrically connected as illustrated at 23 to the bar 24 of a switch having a contact 25. This contact is electrically connected by a wire 26, to the line 14, and the bar 24 is pivoted to the actuating rod 19. The two switches 18 and 24 are simultaneously closed, as will be evident by reference to the right hand instrument in Fig. 1, which illustrates the receiver holding hook in its depressed position, the left hand instrument illustrating the relation of the parts when the hook is elevated.

The transmitter 9 is located in a primary circuit 27 that includes a suitable source of electrical energy 28, and also includes a switch 29, the bar of which is connected to the actuating rod 19. One of the receivers as shown at 11, has one pole 30 grounded, the other pole being in the secondary circuit 31

of the induction coil 32 that is included in the primary circuit 27. This secondary circuit includes a switch 33, leading from which is a wire 34 connected to a switch bar 35 pivoted as shown at 36 and capable of swinging into engagement with either of the terminal contacts 15. The other receiver 10 has one pole grounded, as illustrated at 37, while its other pole is connected to a wire 38 leading through a switch 39. From this switch, extends another wire 40 connected to a pair of contacts 41 disposed in the path of movement of a cross bar 42 movable with the bar 35, but insulated therefrom, as shown at 43 in Fig. 1^a. The bar 42 also engages a pair of contacts 44 connected to the contacts 15. The parts are so arranged that when the receiver supporting hook 21 is depressed, the switches 18 and 24 will be closed, while the switches 29, 33 and 39 will be opened, as illustrated in the right hand instrument of Fig. 1. On the other hand, when the hook 21 is elevated, then the switches 29, 33 and 39 will be closed, while the switches 18 and 24 will be opened. The operation of this embodiment of the invention may now be briefly outlined as follows: Assuming the switch bar 35 in its central position, as shown in Fig. 1 and the various receiver supporting hooks 21 depressed with the receivers thereon, it will be evident that the line sections 14 will all be connected together, not only by the bars 42 engaging the contacts 44, but because the switches 18 are closed. If now any party on the line operates the generator 13, it will be evident that the call bells at the different instruments and at the exchange will be operated. For the purpose of explanation, let it be assumed that one party on the line calls another party on the same line several instruments away. The party called removes his receivers from the hook 21, whereupon the switches 18 and 24 will be opened while the switches 29, 33 and 39 will be closed. After placing the receivers to his ears, he turns the switch bar 35 in one direction or the other, until he discovers in which direction the call has come. When said bar 35 is engaged with one of the contacts 15, as for instance, the one on the right, it will be evident that the transmitter 9 and receiver 11 are electrically connected to the portion of the line on the right hand side of the instrument, while the portion on the left hand side is entirely cut off from said transmitter and the receiver 11. Therefore there can be no interference by the parties on the opposite side of the instrument to that from which the call has come. Moreover, if any party between the two talking, attempts to overhear the conversation, he must remove his receiver from the hook, which as already explained, opens the switches 18 and further than this, he must turn his switch 35 in one direction or the other, thus breaking the lines between the two parties using said line. He

therefore cannot eavesdrop. It will, however, be noted that when the transmitter 9 and receiver 11 is electrically connected to the portion of the line on one side of the instrument, the switch bar 42 will connect one of the contacts 44 and one of the contacts 41, thus closing a circuit through the opposite portion of the line and through the receiver 10. Consequently any party can get into communication with one of the parties using the line so that in case of an emergency, such parties using the line can give way to those requiring immediate attention. In other words, the mechanism is so arranged that the transmitter 9 and receiver 11 are in communication with one portion of the line when the receiver 10 alone is in communication with the other portion, and should a call come in through the receiver 10, the party receiving such call can by operating his switch 35, communicate with the person so calling, and ascertain what is wanted. The above described mechanism has been shown in connection with a single line, but the invention may be embodied in various ways. Thus in Figs. 2-7 inclusive, a very involved system is disclosed by means of which certain advantages are secured.

Two instruments 45 are disclosed, though it will be understood that any number may be employed. Each of these instruments includes a suitable case 46 and employs a transmitter 47, two receivers 48 and 49, bell mechanism 50, and a receiver supporting hook 51. A continuous party line 52 is provided having branches 53 leading to the various instruments and terminating in contacts 54. A private or secret line corresponding in all respects to the former line 14 is also provided, and it consists therefore of separate sections 55 extending successively from one instrument to the next, the sections leading to and from each instrument having terminal contacts 56. A third line 57 for automatic ringing mechanism is employed that leads through signal mechanism 58 located at the exchange mechanism, being also grounded as shown at 59. A branch 60 from the line 57, extends to each instrument 45.

As before described, each of the transmitters 47 is located in the primary circuit 60 of an induction coil 61, said circuit including a suitable source of electrical energy 62 and a switch 63 connected to an actuating rod 64 that is pivoted to the receiver supporting hook 51. The secondary circuit 65 of the induction coil 61 includes the receiver 49 and a switch 66. This switch 66 has its contact element electrically connected, as shown at 67 to a switch bar 68 that is movable into engagement with the contacts 54 and 56. The other receiver 48 is electrically connected as shown at 69 to a switch 70, from which leads a wire 71 connected to a

pair of contact elements 72 cooperating with a switch bar 73 that is connected to and operates with the bar 68, but is insulated therefrom. This bar 73 also cooperates with a pair of contact elements 74 electrically connected as shown at 75 to the contacts 56. Still another switch 76 is located in the circuit 77 that includes the bell 50, said circuit being grounded as shown at 78. Another switch 79 has its elements connected as shown at 80 with the contacts 56 of the private line sections 55.

The branch 60 from the ringing wire 67 at each instrument is connected to a switch bar 81 cooperating with a contact element 82 from which leads a wire 83 connected to a spring circuit closer 84 arranged within the instrument case 46. This closer moves into and out of engagement with a contact element 85 grounded as shown at 86. A reciprocatory plunger 87 is located within the case, and is yieldingly supported by a spring 88 connected to its upper end. This plunger 87 has a series of actuating lugs 89 formed upon one side, the number and character of said lugs depending upon the character of the call that defines the particular instrument. This mechanically-actuated call mechanism is not herein claimed as part of the present invention. These lugs, as clearly shown at the left hand of Fig. 2, are so arranged that they will strike the spring element 84 and force it into engagement with the element 85 when the plunger 87 is reciprocated. The speed at which said plunger operates is determined by a rotary fan 90 having a pinion 91 in mesh with a gear wheel 92 loosely journaled upon a shaft 93 and having a dog and ratchet connection 94 with the shaft. This shaft 93 is provided with a pinion 95 meshing with a rack 96 formed upon one side of the plunger. The said plunger also has an upstanding finger 97 disposed below and arranged to strike the switch bar 81 in order to elevate the same, when the plunger approaches its uppermost position. The plunger is also provided with an outstanding pin 98 that strikes the switch bar 81 in its downward movement to close the switch, it being understood that the frictional bearing of the bar 81 is sufficient to hold it wherever it is positioned. With this construction, it will be evident that if the bar 87 is moved from its uppermost position, as shown in Fig. 2, downwardly, the lugs 89 will pass the spring contact 84 and cause the same to engage and disengage the contact 85, but during this downward movement, the switch 81 is opened. Also during the downward movement, the shaft 93 operates freely with respect to the gear wheel 92, inasmuch as the dog will ride freely over the ratchet. When, however, the plunger 87 reaches its lowermost position, the pin 98 will have struck

the switch bar 81 and lowered it sufficiently to engage the contact element 82. If now, the bar 87 is released, it will be carried upwardly by the spring at a rate of speed, determined by the fan 90, and during this upward movement, the lugs 89 will again cause the spring contact to close and open the circuit, thus automatically calling the central operator.

For the purpose of actuating the plunger 87, another plunger 99 is provided that is located alongside the plunger 87, and has a stem 100 projecting from the case of the instrument. Pivotaly mounted on the plunger 99 is a dog 101 having one end 102 arranged to engage over a shoulder 103 formed upon the plunger 87 when the plunger 99 is elevated. A stop 104 is, however, located in the path of movement of the tail 105 of such dog when the plunger 99 is in its lowermost position. The plunger 99 is also provided near its upper end with a shoulder 106, and a spring pressed pawl 107, pivoted within the case is arranged to engage over the shoulder 106 to prevent upward movement of the plunger 99, when the plunger 87 is depressed. Said plunger 87 is, however, provided with a shoulder 108 arranged to engage the pawl 107 and carry it away from the shoulder 106, as will be evident by reference to Fig. 2.

Referring now to Figs. 2 and 3, it will be noted that a latch 109 is provided for holding the receiver supporting hook 51 in its depressed position and against the action of the elevating spring 110. This hook 109 is pivoted between its ends, as shown at 111, and has a right angularly disposed arm 112 on the end of which is mounted a leaf spring 113. The end of the spring is disposed in the path of movement of the pin 98, arranged upon the plunger 87, said pin passing the spring during the movement of said plunger. The operation of this embodiment of the invention is substantially as follows. Assuming the various receivers on the hooks, it will be evident that the sections 55 of the private or secret line will be electrically connected through the switch 79. If a call is sent over the line, it will pass through the line sections 55, the switches 79 through the wire 77 and the bells 50 to the ground. The party called removes his receivers from the hook, and places them to his ears. The hook 51 still remains depressed, as it is held by the latch 109. The party called then raises by means of the handle 100, the plunger 99 until the dog 102 engages over the shoulder 103. He then moves said plunger 99 to its lowermost position, whereupon the tail 105 of said dog will strike the stop 104, and consequently the dog will be swung out of engagement with the shoulder 103. This releases the depressed plunger 87, and in accordance with the above described mode

of operation, the plunger 87 will rise and cause the number of the instrument to be given at the exchange, showing the operator that the call has been answered. During
 5 this downward movement, the shoulder 106 of the plunger 87 having been carried away from the pawl 107, said pawl will be forced over toward the plunger 99 by the spring, and will engage over the shoulder 106, preventing the plunger 99 from being again
 10 raised until the plunger 87 has returned. Upon the return of the plunger, the shoulder 108 will again strike the shoulder 107 and will cause it to disengage the shoulder
 15 106. Furthermore upon the downward movement of the plunger 87, it will be evident by reference to Fig. 3 that the pin 98 will pass the spring 113 and upon the elevation of such plunger, the pin 98, striking
 20 the spring 113, will cause the latch 109 to disengage the hook 51. Said hook will thereupon be elevated by the spring 110, closing the switches 63, 66 and 70, and opening the switches 76 and 79. Consequently
 25 it will be evident that the transmitter and receiver 49 will be in electrical communication with the switch bar 68, while the receiver 48 will be electrically connected to the contacts 72. The party called can there-
 30 upon by turning the bar 68 in one direction or the other, ascertain in which direction the call has come, and from whom and may privately communicate with the party in the same manner as described in connection
 35 with the embodiment of the invention first set forth. But assume that parties are already using the private or secret line, it will be evident that if the bar 68 is maintained in its central position, the receiving
 40 and transmitting mechanism will be in electrical connection through the contact 54 and branch 53 with the common party line 52, so that the parties along the line may use this party line 52 indiscriminately without
 45 interfering with or being interfered with by the parties using the secret line. With this mechanism, therefore, a secret service line is provided, and also one for general conversation, one being independent of the other,
 50 and being so arranged that the instruments can be employed on either. Moreover by having the means set forth for always ringing the call prior to establishing communication over the lines, the operator at the ex-
 55 change knows whenever any instrument is used or whenever its use is attempted, and a material check is thus provided against unwarranted or malicious interference with the legitimate users of the system. It will
 60 of course be understood that the switches 68 and 73 are located inside the instrument, as will be evident by reference to Figs. 2 and 5. These switches are mounted on a suitable shaft 115 which projects from the front of the case, and has a pointer 116 co-

operating with indicating marks 117, by means of which the positions of the switches can be determined.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention, will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a telephone system, the combination of a line divided into sections, a telephone instrument located between adjacent sections and including a receiver and transmitter adapted to be connected in circuit with either section of the line, a main signaling device at the instrument normally connected in circuit with the line sections, a second receiver at the instrument arranged to be connected with one line section when the first receiver is connected with the other section for conversation between subscribers, said second receiver forming an emergency signaling device for permitting a message to be received over the idle section of the line while the main signaling device is out of circuit, and a single manually controlled means whereby a called subscriber can connect his telephone instrument with one line section or the other to determine over which the call signal is received and to converse with the calling subscriber and at the same time connect the idle section of the line with the second receiver.

2. In a telephone system, the combination of a plurality of telephone instruments, a calling signal device at each instrument normally in circuit and automatically cut out of circuit upon removal of the receiver from the hook of the instrument, a line divided into sections with adjacent sections connected with each telephone instrument, an emergency signal device at each telephone instrument, and a single switch at each instrument for connecting the receiving and transmitting devices thereof with one line section while connecting the other line section with the emergency signaling device.

3. In a system of the character set forth, the combination with a plurality of telephone instruments including receiving mechanism and contact points electrically connected thereto, of a line comprising separate sections extending from one instrument to the next, the adjacent sections having contact points at each instrument, and a switch electrically connected to the receiving mechanism and movable into simultaneous engagement with either contact point of the

line sections and a point of the receiving mechanism, and being also movable into simultaneous engagement with both of the line section contact points to connect said line sections.

4. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a line comprising separate sections extending from one instrument to the next, the sections adjacent to each instrument having contact points at said instrument, signaling means at each instrument, a switch electrically connected to the transmitting and receiving mechanism of each instrument and movable into engagement with either contact point, a movable receiver supporting hook, and a switch automatically controlled by the movement of the hook for connecting together and disconnecting the sections of the line without including the signaling means in such connection.

5. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of an electrically operated signal for each instrument, a line connecting the instruments and comprising separate sections extending successively from one instrument to the next, a movable receiver supporting hook for each instrument, a switch operated thereby and connecting the line sections that extend to and from the instrument when the receiver is on the hook and disconnecting the said line sections when the receiver is off the hook, a switch operated by said hook for cutting in and out the signal, and means for connecting the transmitting and receiving mechanism to either section independently of the other when the sections are thus disconnected by the actuation of the hook operated switch.

6. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a line comprising separate sections extending successively from one instrument to the next, each instrument having terminal contacts for the line sections leading to and from the same, a movable receiver supporting hook for each instrument, a switch for connecting and disconnecting the line sections associated with the instrument, an electrical signal for the instrument, a switch controlling the signal, a common connection between said switches and the receiver supporting hook, and a switch electrically connected to the transmitting and receiving means and cooperating with the terminal contacts for connecting said transmitting and receiving mechanisms to either line section independently of the other.

7. In a system of the character set forth,

the combination with a plurality of telephone instruments, each having a transmitter and receiver, and ringing mechanism, of a receiver supporting device, and a plurality of switches respectively electrically connected to the receiver, the transmitter and the ringing mechanism, a common actuating rod connected to the receiver supporting device and said switches, a line connecting the various instruments and comprising sections extending from one instrument to the next, a switch located at each instrument for normally connecting together the line sections leading thereto, said switch being operated by the receiver supporting hook, and a manually operated switch for connecting the receiver and transmitter of each instrument to either line section when the sections are disconnected by the opening of the switch controlling the connections.

8. In a system of the character set forth, the combination with a plurality of telephone instruments, each including transmitting mechanism and two receivers, of a line connecting the instruments and comprising separate sections extending from one instrument to the next, means at each instrument for connecting the line sections while the transmitting mechanism and receivers are cut out of said line, means for breaking the connections between the line sections at each instrument, and means for electrically connecting the transmitting mechanism and one receiver to one line section and simultaneously connecting the other receiver to the other line section at each instrument, when the connection between the line sections is broken.

9. In a system of the character set forth, the combination with a plurality of telephone instruments, each including transmitting mechanism and two receivers, of a line connecting the instruments and comprising separate sections extending from one instrument to the next, means at the instrument for connecting the line sections while the transmitting mechanism and receivers are cut out of said line, means for breaking the connections between the line sections at each instrument, and switch mechanism for electrically connecting the transmitting mechanism and one receiver to either line section and connecting the other receiver to the other line section at each instrument when the connection between the sections is broken.

10. In a system of the character set forth, the combination with a plurality of telephone instruments, each including transmitting means and two receivers, of a line connecting the instruments and comprising separate sections extending from one instrument to the next, means at each instrument for connecting the line sections while the transmitting mechanism and receivers are cut out of such line, means for breaking

the connections between the line sections at each instrument, and simultaneously operated switches for electrically connecting the transmitting mechanism and one receiver to one line section and connecting the other receiver to the other line section at each instrument when the connection between the line sections is broken.

11. In a system of the character set forth, the combination with a plurality of telephone instruments, each including transmitting mechanism and two receivers, of a line connecting the instruments and comprising separate sections extending from one instrument to the next, and movable switch mechanism comprising relatively fixed switch bars simultaneously movable to positions to connect the transmitting mechanism and one receiver to either line section and the other receiver to the other line section.

12. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a party line common to the instruments, a private line composed of separate sections extending from one instrument to the next, a switch for electrically connecting the transmitting and receiving mechanism of each instrument to either section of the private line extending to and from such instrument, when the said sections are disconnected from each other and electrically connecting said transmitting and receiving mechanism to the party line irrespective of the connection and disconnection of the private line sections, and means operating with said switch to connect the private line sections when the transmitting and receiving mechanism is connected to the party line.

13. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a line connecting the instruments and comprising separate sections extending successively from one instrument to the next, means at the different instruments for electrically connecting the sections together, a switch at each instrument for connecting the transmitting and receiving mechanism of such instrument to either line section associated with the same independently of the other, switch mechanism for electrically connecting the transmitting and receiving mechanism to and disconnecting it from the first mentioned switch, and calling means located at each instrument and constituting means for controlling the operation of the switch mechanism of such instrument.

14. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a line connecting the instruments and comprising separate

sections extending successively from one instrument to the next, means at the different instruments for electrically connecting the sections together, a switch at each instrument for connecting the transmitting and receiving mechanism of such instrument to either line section associated therewith independently of the other, switch mechanism for electrically connecting the transmitting and receiving mechanism to and disconnecting it from the first mentioned switch, a latch for holding the switch mechanism against movement, and mechanically operated calling mechanism located at each instrument and constituting operating means for the latch of such instrument.

15. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a line connecting the instruments and comprising separate sections extending successively from one instrument to the next, means at the different instruments for electrically connecting the sections together, a switch at each instrument for connecting the transmitting and receiving mechanism of such instrument to either line section associated therewith independently of the other, switch mechanism for electrically connecting the transmitting and receiving mechanism to and disconnecting it from the first mentioned switch, a latch for holding the switch mechanism against movement, calling mechanism at each instrument, and manually operated mechanism at each instrument for successively operating the calling mechanism and the latch of such instrument.

16. In a system of the character set forth, the combination with a plurality of telephone instruments including transmitting and receiving mechanism, of a line connecting the instruments and comprising separate sections extending successively from one instrument to the next, means at the different instruments for electrically connecting the sections together, a switch at each instrument for connecting the transmitting and receiving mechanism of such instrument to either line section associated with the same independently of the other, switch mechanism for electrically connecting the transmitting and receiving mechanism to and disconnecting it from the first mentioned switch, a receiver supporting hook located at each instrument and constituting actuating means for the switch mechanism, a latch engaging the hook, and calling mechanism including a reciprocatory plunger having a portion that engages the latch to operate the same, and an actuating bar cooperating with the plunger to move the same.

17. In a system of the character set forth, the combination with a plurality of telephone instruments, each including two re-

ceivers and a single movable support for both receivers, of a line comprising sections leading from one instrument to the next, switch mechanism for connecting one receiver to either line section and the other receiver to the opposite line section, and switch mechanism operated by the receiver support for connecting both receivers to and disconnecting them from the first mentioned switch mechanism.

18. In a system of the character set forth, the combination with a plurality of telephone instruments, each including two receivers and a single supporting hook for both receivers, of a line comprising sections leading from one instrument to the next,

switch mechanism associated with each instrument for connecting one of the receivers thereof to either line section and the other receiver to the opposite line section, and separate switches operated by the receiver supporting hook of such instrument for connecting both receivers to and disconnecting them from the first mentioned switch mechanism.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FRANK EZRA SUMMERS.

Witnesses:

JOHN H. SIGGERS,
LEWIS EBERLY.