

April 17, 1934.

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1,954,932

TELEPHONE AND DIRECT CONVERSATION CIRCUITS

Filed Aug. 30, 1932

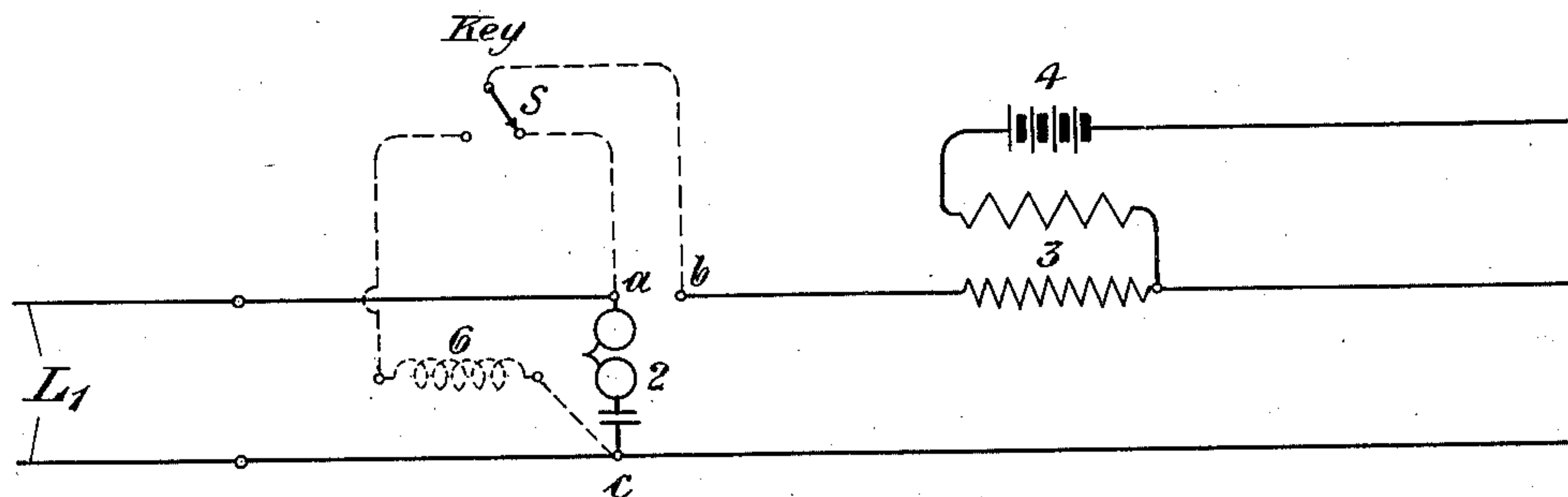


Fig. 1

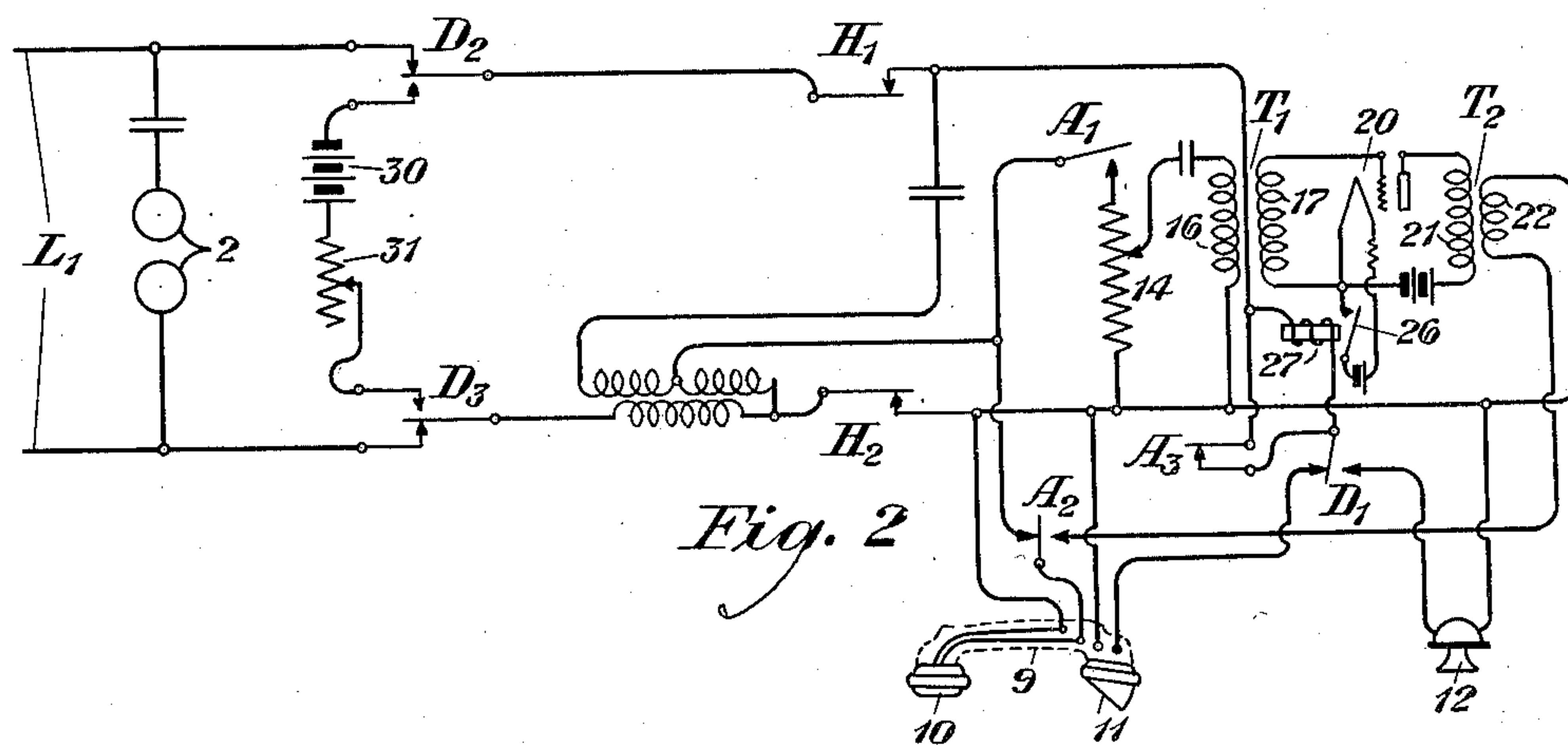


Fig. 2

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1,954,932

TELEPHONE AND DIRECT CONVERSATION
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Application August 30, 1932, Serial No. 631,086

7 Claims. (Cl. 179—81)

This invention relates to improvements in telephone circuits and more especially to rendering such circuits of greater use to those of impaired hearing whereby at a subscriber station they may have not only the benefit of amplifying means for telephone conversation but may also be able to carry on direct conversation with others, making use of the same circuit elements and amplifying means.

10 The purpose, more specifically, is to use the present telephone circuits of subscriber sets either for telephone conversation or for direct conversation, whereby the latter term is meant conversation between two persons near each other. 15 In general one of these is a person who has such impaired hearing as to require aid of some form. Such aid may be through the inherent amplifying properties of telephone transmitters or, in addition, may comprise certain other 20 amplifying means such as the well-known vacuum tube amplifiers.

Another purpose of this invention is to combine with the use of a vacuum tube amplifier which is already available for amplifying incoming telephone conversations its use for direct conversation by so rearranging the circuit at will as to adapt the equipment of the subscriber set for such direct conversation.

The invention will be better understood by 30 reference to the following specification and the accompanying drawing in which Figure 1 shows in simplified form one method of rearranging the circuit to permit of its use for direct conversation, this circuit relating more specifically 35 to a local battery talking, common battery signaling subscriber set. Fig. 2 shows a modification adapted for common battery telephone circuits and at the same time this figure shows in greater detail the elements which go into a subscriber station equipped with a vacuum tube 40 amplifier.

Referring more specifically to Fig. 1, there is shown an incoming line L_1 connected to a subscriber set of which the only parts shown are the 45 ringer circuit 2, an induction coil 3 with local battery 4, and three terminals going to the remainder of the station equipment in a manner to be shown and more fully described in connection with Fig. 2. In order to rearrange the circuit for direct conversation a break in the line is made at $a-b$ and additional connections as shown in dotted lines are introduced at this break. These connections include the key S 50 which in the one position closes the gap from

a to b leaving the circuit as before and in condition for telephone conversation. In its second position the key effectively disconnects the line L_1 and the ringer circuit 2 from the subset and bridges across the subset from b to c an impedance element 6 which, if desired, may be a short circuit or a pure resistance of any desired magnitude. 60

Upon the removal of the receiver from its switchhook and with key S in its second position 65 a person may speak into the microphone and one of impaired hearing will find substantial aid by listening at the receiver, advantage being taken of the inherent amplifying properties of a microphone. In addition to this, an amplifier 70 such as a vacuum tube amplifier may be provided, all in the manner to be described more fully in connection with Fig. 2.

In its normal condition the impedance of the line as seen from the subscriber set is such that 75 the amount of side tone in the telephone receiver, particularly in case of anti-side tone sets, is lower than is desirable for purposes of direct conversation. If, however, a short-circuit should be connected from b to c then the unbalance introduced 80 would be such as to substantially increase the side tone thus rendering the set more efficient for direct conversation. However, in place of making a short-circuit from b to c , it may be convenient to control the amount of side tone by adjusting the impedance of the element 6 until the 85 desired effect is produced.

Referring more specifically to Fig. 2, there is shown a circuit adapted for common battery operation, and for a person who needs no special 90 aid the circuit is one characteristic of a common form of subscriber set with anti-side tone characteristics. Upon removal of the switchhook, hereafter referred to as H, the circuit is closed at the points H_1 and H_2 and the hand-set 9, comprising receiver 10 and transmitter 11, is connected in circuit, all in a manner well-known in the art. 95

Additional amplifying means are provided in the form of a vacuum tube amplifier which may 100 be connected or disconnected at will by operation of a suitable key, hereafter referred to as A, which includes the switches A_1 , A_2 and A_3 . Upon the operation of this key, switch A_1 is closed to introduce the potentiometer 14 any portion of which 105 is then connected across the primary winding 16 of the transformer T_1 . The potentiometer thus becomes a convenient volume control. The secondary of this transformer is connected to the input circuit of the vacuum tube 20, the output 110

of which includes the transformer T₂ with its primary winding 21 and secondary 22. The operation of the key A transfers the receiver 10 at the point A₂ from its former position to that of a series connection with secondary 22. The operation of the vacuum tube is controlled by relay contacts 26 in the filament circuit. These contacts may be closed by a relay 27 normally supplied by current from the common battery.

When the key A is in its non-operated position the switch point A₃ is closed and this places a direct short-circuit across the relay 27. When, however, the amplifier is to be used, operation of the key A will close the switch at A₁, transfer the receiver by the switch A₂ to the output of the amplifier, open switch A₃ and close the contacts 26. With this connection, one of impaired hearing may listen to an incoming telephone conversation through the amplifier.

Usually such a person will have such impaired hearing as to require aid in direct conversation with someone in the room. Such direct aid may be obtained by operating a key, hereafter referred to as D, with switch points D₁, D₂ and D₃. The operation of this key will disconnect the line L₁ and ringer circuit 2 and will introduce in its place a battery 30 and resistance or other impedance element 31. This will leave the ringer connected to line and receptive to incoming calls. The transfer will so unbalance the circuit as to introduce a large amount of side tone in the receiver 10 and a person speaking into the transmitter 11 will be heard in the receiver 10. The amount of side tone introduced may be adjusted to a desired value by the impedance element 31. The connection is such as to permit direct conversation whether the key A is in its operated or non-operated position. In the latter case the amplifier is not in use and reliance is placed on the amplifying characteristics of the transmitter. If the key A is operated then the amplifier is introduced as previously described. The battery 30 is used to supply the direct current for the set which would otherwise come from common battery.

In case the subscriber set is supplied with a handset the receiver and the transmitter will be so close that a second party cannot conveniently use the transmitter. For this reason I find it desirable to supply an additional transmitter 12 which may be substituted for the transmitter 11. This is conveniently accomplished by associating the previously mentioned switch D₁ with switches D₂ and D₃ into a single key referred to above as the key D. Such additional transmitter or transmitters could also be used in the circuit of Fig. 1.

While the different switches may be associated separately or in any other manner, I find it convenient to combine certain ones for simple operation thus, as stated above, the switches D₁, D₂ and D₃ may be combined into a single key; A₁, A₂ and A₃ may be combined into another single key A, and H₁ and H₂ would be combined to constitute the switchhook in the usual way. It will thus be seen that with keys A and D in non-operated position and the receiver off the hook the subscriber set works in a normal manner. A person of impaired hearing would operate key A thus introducing the amplifier. When direct conversation is desired the receiver is removed from its hook and key D is operated whereupon transmitter 12 is substituted for 11. If additional aid is required, and this would usually be the case for a person of impaired hearing, key A is operated whereupon the amplifier is introduced.

It is evident that the circuits may be modified in many respects without departing from the spirit of the invention.

What is claimed is:

1. In a telephone system comprising a line and a subscriber set, said set including a transmitter, a receiver and an amplifier, a local ringer associated with the subscriber set, means within the set for introducing the amplifier when desired but without effecting the relationship of the set to the line, a switch for disconnecting the telephone line and local ringer from the set leaving the internal set connections unaltered.
2. In a telephone system comprising a line and a telephone subscriber set with a transmitter, a receiver and a ringer circuit, means for disconnecting the transmitter and the receiver part of the circuit from the line and leaving the ringer circuit operatively connected to the line, said means connecting a bridging member across the subscriber set whereby the local circuit is connected for efficient direct conversation from the transmitter to the receiver and the ringer remains operative to incoming calls to the line.
3. In a telephone system comprising a line and a telephone subscriber set with a transmitter, a receiver and a ringer circuit, means for disconnecting the transmitter and the receiver part of the set from the line and leaving the ringer circuit operatively connected to the line, means connecting a bridging member of adjustable impedance across the disconnected portion of the subscriber set, whereby the set is connected for efficient direct conversation from the transmitter to the receiver and the ringer remains operative to incoming calls from the line.
4. In a telephone subscriber set with a transmitter and a receiver adapted for a connection to a telephone line, an amplifier, means for connecting and disconnecting the amplifier at will without affecting the response to outside calls, means for disconnecting the subscriber set from the line at will, said last named means rendering the circuit suitable for direct conversation from the transmitter to the receiver.
5. In a central station telephone system, a line and a subscriber deaf set equipment comprising a subscriber set and an amplifier, means for connecting or disconnecting the amplifier at will, a local battery and a switch adapted in the one position to connect the set to the line and in the other position to replace the line by the local battery, whereby the set is connected for direct conversation with or without the amplifier.
6. In a central station telephone system, a line and a subscriber deaf set equipment comprising a subscriber set and an amplifier, means for connecting or disconnecting the amplifier at will, a local battery and a switch adapted in the one position to connect the set to the line and in the other position to replace the line by the local battery and to introduce a supplementary transmitter, whereby the set is connected for direct conversation either with or without the amplifier.
7. In a central station telephone system, a line and an anti-side tone subscriber set comprising the subscriber set and an amplifier, means for connecting or disconnecting the amplifier at will, a local battery and a switch adapted in the one position to connect the set to the line and in the other position to replace the line by the local battery to introduce large side tone, whereby the set is connected efficiently for direct conversation either with or without the amplifier.

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