

PATENT SPECIFICATION



Application Date: June 28, 1939. No. 18837/39.

531,318

Complete Specification Left: June 28, 1940.

Complete Specification Accepted: Jan. 2, 1941.

PROVISIONAL SPECIFICATION

Improvements in and relating to Electric Communication Systems

We, TELEPHONE MANUFACTURING COMPANY LIMITED, a British Company, of Hollingsworth Works, Martell Road, West Dulwich, London, S.E.21, and
5 LESLIE HAROLD PADDLE, a British subject, of 92, Lancaster Road, West Norwood, London, S.E.27, do hereby declare the nature of this invention to be as follows:—

10 This invention relates to electric communication systems, and has for its object to provide a system of telephonic communication in which secret conversation may be carried on at will and wherein the
15 change from normal to secret conversation may be obtained with the minimum of difficulty.

According to the present invention a telephone subscriber is provided with two
20 receiving instruments, one of which is used for normal conversation and one of which is used for secret conversation. Preferably the secrecy is obtained by means of a frequency inverting device
25 which may be of the type shewn in our co-pending application No. 34236/37 (Serial No. 511,420).

According to a further feature of the invention the receiving instrument which
30 is devoted to secret communication is arranged to have precedence over that which is used for normal conversation, so that in the event of the secret receiver being removed from its cradle or hook the
35 communication line is transferred to the secret receiver.

In one embodiment of the invention a telephone subscriber is provided with a
40 normal compound hand set of normal construction which is suitable for effecting normal communication. The subscriber is also provided with a second hand set of similar type which is connected to the transmission line through a
45 frequency inverting device. When the hand set employed for secret communication is removed from its cradle the cradle switch is arranged to connect the frequency inverter to the transmission line, and it may, if desired, automatically disconnect the normal receiver.
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The inverter may be of the type which is described in the application previously

referred to, and it may normally be arranged in a quiescent state, the inverter
55 being made operative when the cradle switch of the secret hand set is operated. To this end use may be made in the inverter of battery operated valves, filament potentials of which are applied
60 by a circuit controlled by the cradle switch, but preferably use is made of valves having indirectly heated cathodes. In such a case the cathodes of the valves
65 may be maintained heated in order that there may be no delay when it is desired to make use of the inverter, and the cradle switch may then be arranged to complete the high tension supply for the valves
70 when the hand set is removed. As an alternative the cathodes of the valves may be maintained in a condition just sufficient to operate by being under-run, and the cradle switch may then raise the
75 potential applied to the heaters of the valves to the normal value as soon as use is made of the inverter.

The termination to the line for normal communication in accordance with
80 current practice is preferably a two-wire termination, and the operation of the frequency inverter device is arranged to change the termination from a two-wire to a four-wire one. Alternatively a four-wire termination may be used both for
85 normal and for secret conversation.

The two hand sets which are used may be arranged with their cradles on a common housing for the inverter, or
90 alternatively separate hand sets and bases may be used connected to the inverter by flexible cords in the usual manner.

As described in the prior application referred to, the valves which are employed
95 with the inverter may be used as amplifying valves for speech in normal communication. Switches may therefore be provided in the inverter whereby this operation may be effected.

Dated this 28th day of June, 1939.

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COMPLETE SPECIFICATION

Improvements in and relating to Electric Communication Systems

We, TELEPHONE MANUFACTURING COMPANY LIMITED, a British Company, of Hollingsworth Works, Martell Road, West Dulwich, London, S.E.21, and

6 LESLIE HAROLD PADDLE, a British subject, of Riverdale, St. Paul's Cray, in the county of Kent (formerly of 92, Lancaster Road, West Norwood, London, S.E.27), do hereby declare the nature of this
10 invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to telephonic
15 communication systems and apparatus and has for its object the provision of such systems and apparatus whereby secret communication can be obtained at will and the change from normal to secret
20 communication is obtainable with the minimum of difficulty.

A telephonic communication system according to the invention comprises a
25 communication line and means whereby said line can be terminated, at the will of a person at the terminal point, by either of two telephone equipments located at
30 said terminal point, one of which appertains to normal communication and the other to secret communication.

Thus, a subscriber, that is to say a person for whom telephonic communication with another person is afforded, can use either of the two equipments alternatively and thereby effect either normal
35 communication or secret communication at will.

According to a further feature of the invention there is provided a telephonic
40 communication apparatus which comprises two telephone receivers, one appertaining to normal communication, one appertaining to secret communication, and means, operable at the will of a subscriber,
45 for coupling either of said receivers to a common communication line.

According to another feature of the invention the receiver which is devoted to
50 secret communication is arranged to have precedence over that which is used for normal communication, so that in the event of the secret receiver being removed from its cradle or hook the common
55 communication line is transferred to the secret receiver.

Preferably the desired secrecy is obtained by means of a frequency inverting device, which may be of the type set
60 forth in the applicants' United Kingdom

Patent Specification No. 511,420 and means are provided for automatically bringing such a device into operation when the secret receiver is taken up for
65 use.

One preferred embodiment of the invention will now be more particularly described with reference to the accompanying drawing, the single figure of which shows in a schematic manner the
70 relevant part of a telephone subscriber's apparatus.

In this example the apparatus includes two compound hand sets (micro-
75 telephones) designated NP and SP respectively. The former is provided for normal communication and is connected with a normal telephone equipment NE. The second hand set SP is provided for secret communication and is connected
80 with an equipment SE which incorporates a frequency inverting device. A two pole switch means I is provided in association with the cradle for the hand set SP and is adapted for connecting
85 either one or the other of the two equipments to a common communication line L. As will be appreciated from the drawing the circuit arrangement of this switch means is such that when, as shown,
90 the hand set SP is resting in its cradle the line L is connected with the normal equipment NE. Consequently normal communication can be effected by using the hand set NP.
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When however the hand set SP is removed from its cradle the switch I functions to disconnect the equipment NE from the line L and to connect to said line the equipment SE, thus enabling secret
100 communication to be effected by using the hand set SP.

Preferably the contact making and breaking means of the cradle switch I is such as to effect connection with one
105 equipment prior to disconnecting from the other equipment and in any case impedance means, under the control of the cradle switch, can be provided for maintaining circuit balance during the
110 switching operations.

Either of the two hand sets can be employed to bridge the common communication line so that it is immaterial which
115 one is raised from its cradle in response to a call. However, with the arrangement so far described and assuming the subscriber has accepted a call by using the normal hand set NP and, desiring to change over to secret communication, 120

replaces the hand set NP prior to removing the hand set SP from its cradle, there is the possibility of the subscriber failing to hold the communication line.

5 To obviate such disadvantage the following arrangement is adopted. The cradle of the hand set NP has associated therewith a switch means 2 adapted to be operated by the movement of the cradle and which includes contacts 3 and 4 connected to a source of electrical energy indicated at 5. The movable contact members 6 and 7 of this switch are connected to the ends of the coil of an electromagnet 8 adapted for operating a further switch means 9, which latter includes a pair of movable contact elements 10 and 11 and co-operative fixed contacts 12 and 13 respectively.

20 There is also provided another switch means comprising normally closed contacts 14 and 15, this switch being of the thermostatic type and the heater winding thereof being electrically connected to the movable element 10 of the switch means 9. The contact elements 11 and 13 and an impedance 16 are shunted across the line connecting the normal equipment NE to the common communication line. Other circuit connections will be apparent from reference to the drawing.

The operation of this arrangement is as follows. Assuming the hand set NP to be removed from its cradle, the contact elements 3 and 6 of the cradle operated switch will be closed and the contact elements 4 and 7 open. If now the subscriber desires to change from normal communication to secret communication it is necessary for him merely to replace the hand set NP in its cradle and take up the hand set SP whereupon conversation can be continued over the secret channel equipment SE, the circuit change-over being effected automatically by the cradle operated switch means 1 as hereinbefore described.

Now, when replacing the hand set NP, the cradle switch 2 is operated and functions first to close the contact elements 4 and 7 and, after a short time delay, open the contact elements 3 and 6. During this short time delay, both sets of contacting elements (4—7 and 3—6) are closed and the source 5 energises the electromagnet 8. This results in the operation of the switch means 9 and the closing of the two sets of contact elements 10—12 and 11—13. The former serves to assure continued energising of the electromagnet 8 after the cradle switch contacts 3—6 have been opened, whilst the closing of the contact elements 11—13 serves to insert the impedance 16 in shunt with the line to replace the impedance of

the hand set NP and thus assure maintaining the line pending the removal of the alternative hand set SP from its cradle or until such time that the shunt circuit including the impedance 16 is opened.

Thus, although it is desirable to maintain the line for a period of time amply sufficient for the subscriber to change from one hand set to the other, it is obviously also necessary to place a limit on this period and this is effected automatically by means of the thermostatic switch which, after a predetermined time interval functions to open the contacts 14 and 15 and thereby de-energise the electromagnet 8 whereupon the two sets of contacts 10—12 and 11—13 are opened. If, before the opening of the contacts 14 and 15 the hand set SP has been removed from its cradle the said subsequent operations of the switch means 9 will have no material effect, but otherwise opening of the shunt circuit which includes the impedance 16 will cause release of the line.

It will of course be understood that the cradle operated switches hereinbefore more particularly described could quite readily be replaced by hook switches in cases where the receiver or microtelephone is suspended from a hook when at rest.

As hereinbefore previously mentioned the frequency inverter employed in the secret channel may be of the type described in United Kingdom Patent Specification No. 511,420 and it may normally be arranged in a quiescent state the inverter being made operative when the cradle switch of the secret hand set is operated. To this end use may be made in the inverter of battery operated thermionic valves, the filament potentials of which are applied by a circuit controlled by the cradle or hook operated switch, but preferably use is made of thermionic valves having indirectly heated cathodes. In such a case the cathodes of the valves may be maintained heated in order that there may be no delay when it is desired to make use of the inverter and the cradle or hook operated switch may then be arranged to complete the high tension supply for the valve when the receiver is removed from its cradle or hook.

As an alternative the cathodes of the thermionic valves may be maintained in a condition just sufficient to operate by being under-run and the cradle or hook operated switch may then raise the potential applied to the heaters of the valves to the normal value as soon as use is made of the inverter.

As described in the prior specification referred to, a thermionic valve which is

employed in association with the inverter may be used as an amplifying valve for speech in normal communication and switches can be provided whereby this operation can be effected.

The two receivers which are used may be arranged upon a single base for example two microtelephones may be arranged with their cradles on a common base or housing and if desired said base or housing may comprise a casing for the frequency inverter device. Alternatively separate bases may be used and connected to the inverter by flexible cords in the usual manner.

It will be understood that the invention is not limited to the precise forms and details of the arrangements or constructions described as these may be varied to suit particular cases, without departing from the scope of the appended claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A telephonic communication apparatus comprising two telephone receivers, one appertaining to normal communication, one appertaining to secret communication, and means, operable at the will of a subscriber, for coupling either of said receivers to a common communication line.

2. An apparatus according to claim 1, comprising means whereby the removal of either of the two telephone receivers from a supporting cradle or hook serves to bridge the common communication line to enable communication to be established.

3. An apparatus according to either of the preceding claims including switch means, operable by the cradle or hook for the telephone receiver appertaining to secret communication, for automatically transferring the common communication line to said receiver when the latter is removed from its cradle or hook.

4. An apparatus according to claim 3 wherein the switch means is arranged to operate upon the removal of the receiver from its cradle or hook, to first connect the common communication line to the apparatus for secret communication and then disconnect the apparatus for normal communication from said line.

5. An apparatus according to any of the preceding claims including means whereby the common communication line is held for a time interval after the telephone receiver appertaining to normal communication has been replaced on its cradle or hook.

6. An apparatus according to claim 5

including a substitute impedance, switch means serving to insert said substitute impedance when the receiver appertaining to normal communication is replaced on its cradle or hook, and time delay means for maintaining said substitute impedance in circuit for a predetermined period.

7. An apparatus according to claim 6 including switch means directly operable by the movement of the cradle or hook for the normal communication receiver and a further switch means operated by said first switch means for "switching" the substitute impedance.

8. An apparatus according to claim 7, wherein the second mentioned switch means is arranged to be closed by the energisation of an electromagnet and a thermostatic switch device is provided for limiting the period of such energisation, for the purpose set forth.

9. An apparatus according to any of the preceding claims comprising a frequency inverting device arranged to come between the telephone receiver appertaining to secret communication and the common communication line.

10. An apparatus according to any of the preceding claims including means serving automatically to bring into operation the device whereby the communication is rendered secret when the telephone receiver appertaining to secret communication is removed from its cradle or hook.

11. An apparatus according to claim 10, wherein the device whereby the communication is rendered secret is normally maintained in a quiescent state and means are provided for automatically bringing the device to its properly operative condition when the telephone receiver appertaining to secret communication is removed from its cradle or hook.

12. An apparatus according to claim 10 or 11 wherein the device for rendering communication secret includes a thermionic valve device and means, operative by the cradle or hook for the telephone receiver appertaining to secret communication, for controlling the energising of the cathode circuit of said thermionic valve device.

13. An apparatus according to claim 10 or 11 wherein the device for rendering communication secret includes a thermionic valve device and means, operative by the cradle or hook for the telephone receiver appertaining to secret communication, for controlling the energising of the anode circuit of said thermionic valve device.

14. An apparatus according to any of the preceding claims wherein each of the

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- two telephone receivers forms part of a separate microtelephone set.
15. An apparatus according to claim 14 comprising a pair of microtelephone sets mounted upon a common base or housing.
16. An apparatus according to claim 15 wherein the said common base or housing comprises a case for the device whereby the communication is rendered secret.
- 17 An apparatus according to any of the preceding claims wherein means are provided so that a thermionic valve which functions as an amplifier in association with the device whereby communication is rendered secret, can be employed as an amplifier during the use of the telephone receiver appertaining to normal communication.
18. A telephone communication system comprising a communication line and means whereby said line can be terminated, at the will of a person at the terminal point, by either of two telephone equipments located at said point, one of which appertains to normal communication and the other to secret communication.
19. Telephone communication systems or apparatus, substantially as herein described with reference to the accompanying drawings.

Dated this 28th day of June, 1940.

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[This Drawing is a full-size reproduction of the Original.]

