

## PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION

## Improvements in and relating to Electrical 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 Riverdale, St. Paul's Cray, Kent, do hereby declare the nature of our invention to be as follows:—

This invention relates to electrical communication systems in which the transmitted intelligence, such as voice signals, are rendered secret. In our co-pending Applications Nos. 18837/39 (Serial No. 531,318) and 30969/39 (Serial No. 536,945) we have described systems of this type in which two hand sets are used pertaining one to normal and one to secret communication, and in which in an exchange system, the number of secret equipments may be made less than the number of subscribers requiring secret facilities.

The invention has for its object to provide certain improvements in systems of the type referred to, and in particular to systems as described in our co-pending applications.

In certain circumstances it is desirable that an operator should be able to break into an established call, for example to enquire whether one of the subscribers will accept a trunk call. With normal arrangements, this does not present any great difficulty, but where the communication is a secret one the transmitted signals are unintelligible and the connection of a normal instrument would be impossible. Further it is undesirable that the operator should be provided with "secret" equipment since this would permit eavesdropping, and defeat the object of rendering the transmission secret.

According to the present invention the subscriber is enabled to remove the secrecy equipment from the communication line when it is desired to answer a calling operator. The system is arranged so that the trunk operator may cut into the established line in the usual way when the desired subscriber will hear the inverted speech of the operator. By means of a suitable key switch or the like under his control, the subscriber may

cause his secret apparatus to be removed from the line so that the equipment will revert to normal communication in order that the subscriber may then converse with the operator in the usual manner.

In one embodiment of the invention there is provided an exchange equipment for obtaining secret communication. The incoming line or lines are brought to an operator's position in the usual manner and the operator is provided with means whereby connection may be made from the incoming line to any one of a number of subscribers who are afforded secret facilities. This may comprise a secret equipment which may be included in the circuit by means of key switches. The output from a single secret apparatus may be connected by operating one of the key switches so as to include the apparatus between the incoming line and any one but not more of the subscribers who are afforded the special facilities. In each of the individual subscribers' lines is included a change over switch by which connection may be made direct from the subscriber's position and under the subscriber's control to the normal part of the communication line (or the secrecy apparatus may be removed from the line) at will. The operation of the circuit is as follows: On receipt of an incoming call when it is announced that secret facilities are desired, the operator may call the desired subscriber in the usual manner on the normal telephone, or alternatively the operator may send out a distinctive call indicative of the fact that secret communication is desired. When the subscriber answers the operator may then throw the key switch pertaining to the subscriber so as to include in the communication circuit the secrecy apparatus. Secret communication is then established between the subscriber and the distant end.

If now there should be received a trunk call which the trunk operator desires to offer to the subscriber, the trunk operator may break into the established line in the usual way. As the secrecy apparatus is included in the communication line between the junction and the subscriber

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the speech from the trunk operator will be heard by the called subscriber as an unintelligible sound which will, however, indicate that someone is endeavouring to speak to him on the line. By means of the switch provided at the subscriber's position the subscriber may then remove the secrecy apparatus from the communication line and may thus speak to the trunk operator to enquire the reason for the break in.

As an alternative to the use of key switches for including the secrecy equipment in the line to the subscriber, it may in some cases be more desirable to provide plugs at the "in" and the "out" terminals of the secrecy equipment.

Dated this 27th day of March, 1940.

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For the Applicants.

## COMPLETE SPECIFICATION

### Improvements in and relating to Electrical Communication Systems

We, TELEPHONE MANUFACTURING COMPANY LIMITED, a British Company, of Hollingsworth Works, Martell Road, West Dulwich, London, S.E.21, and LESLIE HAROLD PADDLE, a British Subject, of Riverdale, St. Paul's Cray, Kent, do hereby declare the nature of this 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 communication systems of the kind affording subscribers, that is to say persons between whom communication may be established over the system, facilities for either normal or secret communication.

In certain circumstances it is desirable that an operator should be able to break into an established call, for example, to enquire whether one of the subscribers will accept a trunk call. When the normal communication facilities are in use this does not present any great difficulty, but when communication is taking place via a secrecy equipment, such for example as a frequency inverter, the operator's speech will be unintelligible to the subscriber and obviously it is undesirable that the operator should be provided with a secrecy equipment capable of modifying the speech to render it intelligible, since this would permit eavesdropping and defeat the object of the secret communication facilities. However, the subscriber will be aware of this unintelligible intrusion and will sense that someone is endeavouring to speak to him. Consequently if the subscriber can nullify the effect of the secrecy equipment he can converse with the operator in the usual way.

Now it is the object of the present invention to provide telephonic communication systems which incorporate means whereby a subscriber can, when desired, nullify the effect of the secrecy equip-

ment in a simple and expeditious manner, said means being supplementary to the primary means provided to enable the exchange operator to introduce the secrecy equipment into a communication line.

The application of the invention to a system, such for example as that described in applicants' copending United Kingdom Patent Application No. 30969/39 (Serial No. 536,945), wherein equipment for rendering communication secret is adapted to be introduced into the communication line under the control of an exchange operator; enables a subscriber who is engaged in secret communication to convert to normal communication without the intervention of said operator. According to the invention, there is provided a telephonic communication system which enables either normal or secret communication to be effected and comprises means whereby an exchange operator can control the introduction, into the communication line, of a secrecy equipment for rendering communication secret, and switching means, arranged under the control of a subscriber, whereby the latter, when engaged in secret communication via said secrecy equipment, can convert to normal communication.

One example of such a system comprises two separate circuits extending between an exchange and each of a number of subscribers who are to be afforded secret communication facilities, one of said circuits pertaining to normal communication and the other to secret communication, a secrecy equipment located at said exchange and adapted to be connected with said "secret" circuit, and switching means under the individual control of each such subscriber whereby the latter, when engaged in communication over the "secret" circuit, may convert to the "normal" circuit.

It is to be understood that the term

"exchange" as herein used is also intended to embrace a private branch exchange, in which case the secrecy equipment is adapted to be introduced into the communication line by the operator at the private branch exchange, and there is provided a switching means at a subscriber's extension station whereby a subscriber engaged in secret communication can convert to normal communication without the intervention of the operator at said private branch exchange.

The said switching means which is arranged under the control of a subscriber may comprise a simple switch device forming part of a subscriber's telephone set, for example a key switch or in some cases a push button switch. Conveniently, such a switch device may be carried upon a micro-telephone thus enabling a subscriber engaged in secret communication via such micro-telephone to convert to normal communication by simply operating the switch by a finger of the hand supporting the micro-telephone.

The switching means operable by the subscriber may function to effect the required circuit changes either directly or through the intermediary of one or more relay devices.

In order that the invention more readily can be appreciated, reference will now be made to the accompanying drawing, which shows by way of example and schematically, certain equipment of an exchange and four subscribers' stations of a telephonic communication system embodying the invention.

In this particular arrangement each of the subscribers stations S1, S2, S3 and S4 to be afforded secret communication facilities is connected with an exchange X by two separate lines, one of which, N, pertains to normal communication and the other, S, to secret communication. At the exchange end each subscriber's line N is terminated by a separate jack J in the usual manner and is also bifurcated to provide two lines which are connectible, by separately operable and normally open switches A and B, to circuits A1 and B1 respectively. Each subscriber's line S is also bifurcated at the exchange end to provide two lines, which are connectible by separately operable and normally open switches C and D, to circuits C1 and D1 respectively.

Secrecy equipments SE1, SE2, comprising, for example, frequency inverting means, are provided at the exchange and the equipment SE1 is connected between the circuit C1 and the circuit A1 whilst the other equipment SE2 is connected between the circuit D1 and the circuit B1.

The switches A, B, C and D are arranged under the control of the exchange operator who is provided for example with a control panel P which carries switch operating keys AC1, AC2, AC3 and AC4 adapted to control, either directly or through relay means, the switches A and C corresponding to the subscribers' stations S1, S2, S3 and S4 respectively and thereby effect a primary control over the secrecy equipment SE1. The panel P also carries a further set of switch operating keys BD1, BD2, BD3 and BD4 which serve to control the switches B and D corresponding to the subscribers' stations S1, S2, S3 and S4 respectively and thus effect a primary control over the secrecy equipment SE2. The said keys or the corresponding switches are preferably interlocked so that only one key corresponding to a given subscriber's station can be effectively operated at one time and also one key corresponding to one given secrecy equipment can be effectively operated at one time.

Thus, it will be observed that by appropriate selective operation of the switch operating keys it is possible for the exchange operator to put either of the two secrecy equipments at the disposal of any one of the subscribers, the interlocking of the keys preventing undesirable duplicate connection. Indicator lamps L1, L2, corresponding to the secrecy equipments, SE1 and SE2 respectively, can be provided to indicate to the operator when the equipments are engaged.

Each of the subscribers' stations S1 and S2 comprises a subscriber's telephone T and switch means NS adapted for connecting said telephone to either of the two subscriber's lines N or S alternatively.

The subscribers' stations S3 and S4 comprise a modified form of apparatus which includes two separate telephones NT and ST connected to the subscriber's lines N and S respectively. Thus the telephone NT pertains to normal communication whilst the telephone ST pertains to secret communication and is normally connected to the line S through a switch means CS which is adapted, in its other position, to connect the telephone ST to the subscriber's line N.

The switch means NS and CS are under the control of a subscriber and constitute supplementary switching means whereby, when desired, a subscriber engaged in secret communication can nullify the effect of the secrecy equipment, by converting to the communication line reserved for normal communication. Thus for example a subscriber at station S1 for whom the exchange operator has

made available the secrecy equipment SE1 by operating the switch key AC1, may, when desired, operate the switch NS and thus transfer the telephone to the  
 5 line N for normal communication. During the time that station S1, for example, is connected with the secrecy equipment SE1, any one of the other subscriber's stations can be connected with the  
 10 secrecy equipment SE2. For example the exchange operator may actuate the key BD4 to render the equipment SE2 available to a subscriber at the station S4 and at any time during this subscriber's  
 15 secret communication by means of the "secret" telephone ST, he may convert to normal communication by operating the switch means CS to transfer the "secret" telephone ST to the normal  
 20 line N.

It will of course be understood that the exchange X may be a private branch exchange and the stations S1, S2, S3 and S4 subscribers' extension stations.

25 It will of course also be understood that the complete communication line for secret communication must include not only means whereby normal speech signals are rendered secret, but also means for reconstituting intelligence  
 30 signals from said secret signals. Consequently, in order to establish a "secret" communication line a jack J must be connected to another subscriber's station that is either provided with a co-operating  
 35 secrecy equipment or is able to obtain the services of such an equipment which may, for example, be at another exchange.

The invention is not limited to the precise arrangements herein more particularly described as these may be varied to suit particular cases without departing  
 40 from the scope of the appended claims.

45 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 system, enabling either normal or secret communication to be effected, comprising a secrecy equipment for rendering communication secret, means whereby an exchange operator can control the introduction of said  
 50 secrecy equipment into a communication line, and switching means arranged under the control of a subscriber whereby the latter, when engaged in secret communication via said secrecy equipment, can  
 55 convert to normal communication.

2. A telephonic communication system according to the preceding claim, comprising two separate circuits extending between an exchange and a subscriber who is to be afforded secret communication facilities, one of said circuits pertaining to normal communication and the other to secret communication, a secrecy-equipment located at said exchange and adapted to be connected with said  
 65 "secret" circuit, and switching means under the control of a subscriber whereby the latter, when engaged in communication over the "secret" circuit, may convert to the "normal" circuit. 70  
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3. A telephonic communication system according to either of the preceding claims, wherein a subscriber, who is to be afforded secret communication facilities, is provided with two telephone receivers, one of which pertains to secret communication and the other to normal communication, and switching means arranged under the control of a subscriber whereby the latter, when engaged in communication by means of the "secret" receiver may transfer said receiver to a circuit pertaining to normal communication. 80  
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4. A telephonic communication system according to any of the preceding claims, comprising a secrecy equipment and circuit means whereby said equipment can be made available to any one, at a time, of a plurality of subscribers. 90

5. A telephonic communication system according to any of the preceding claims, comprising a plurality of secrecy equipments and circuit means whereby one only of said equipments, at a time, can be made available to a given subscriber. 95  
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6. A telephone communication system according to any one of the preceding claims wherein a subscriber's station equipment comprises a micro-telephone upon which there is carried the switch means adapted to be controlled by the subscriber. 105

7. Telephonic communication systems enabling either normal or secret communication to be effected, arranged and adapted to operate substantially as herein shown or described. 110

Dated this 4th day of March, 1941.

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[This Drawing is a reproduction of the Original on a reduced scale.]

