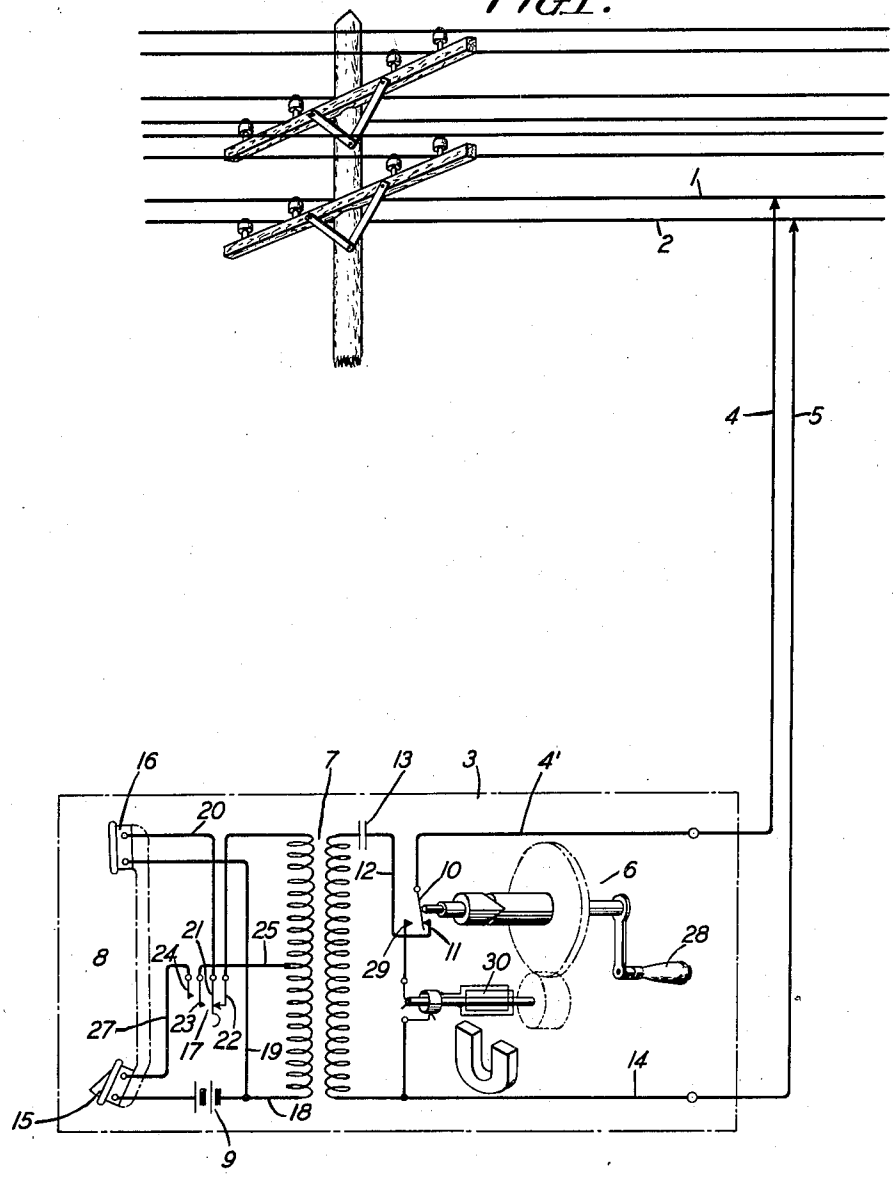
Dec. 11, 1934. J. W. FOLEY 1,984,062

TELEPHONE SET

Filed June 23, 1932 2 Sheets-Sheet 1

FIG. 1.



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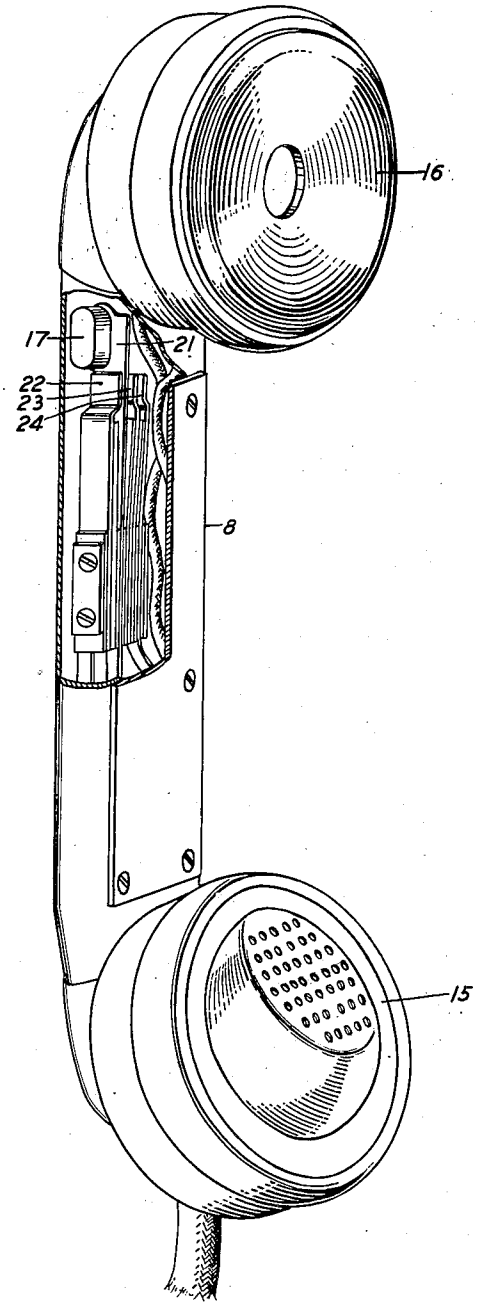

FIG.2

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Patented Dec. 11, 1934 1,984,062

UNITED STATES PATENT OFFICE

1,984,062

TELEPHONE SET

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Application June 23, 1932, Serial No. 618,819

4 Claims. (Cl. 179—29)

This invention relates to telephone sets and more particularly to portable telephone sets of the type used by members of a train crew in communicating from various parts of the system with a central station.

In using a portable telephone set the user is sometimes subjected to rather severe electrical shocks by reason of the connecting of the set to lines carrying comparatively high potentials or lines in which comparatively high voltages have been induced from nearby high potential lines. These high potentials also have a tendency to cause disruption of parts of the telephone apparatus in the portable set.

The object of this invention, therefore, is to protect the user of the set and various pieces of apparatus in the set from injurious effects from high potentials on a line.

In the present invention the telephone set has no direct connection with a bridge circuit connected to line wires but merely an inductive connection therewith through the induction coil. The switch is entirely in the local circuit in the telephone set and has no direct connection with the bridge circuit. Operation of the switch changes the effective length of only one of the windings of the induction coil and provides means for obtaining a step-up transformer effect in the inductive coupling between the telephone set and the bridge circuit when the set is being used for transmitting.

In the drawings:

Fig. 1 is a schematic of the portable telephone set of this invention connected to a pair of open wire lines which lead to a central station not shown, and

Fig. 2 is a view in perspective and partly in section of the telephone handset used in the invention.

In Fig. 1 in the drawings, 1 and 2 are open wire lines extending, for instance, along the railway system. To these open-wire lines a portable set 3 may be connected by means of the leads 4 and 5. The portable set comprises a generator 6, induction coil 7, a telephone instrument 8 and local battery 9. When the portable telephone set 3 is connected to the line wires 1 and 2 by means of the conductors 4 and 5, as shown in the drawings, the following circuit is established: Line wire 1, conductor 4, conductor 4', normal contacts 10 and 11 of the generator 6, conductor 12, condenser 13, right-hand winding of the induction coil 7, conductor 14, conductor 5 to line wire 2. It will be seen, therefore, that the telephone instrument 8 per se which has been shown in the drawings as a handset telephone comprising the transmitter 15, receiver 16, and a switch 17, located in the handset, as shown for example in K. Weman Patent 843,053, issued Feb. 5, 1907, is not in any way directly connected to line wires 1 and 2 but is only inductively associated therewith through the induction coil 7. The local circuit of the telephone set 8 per se for listening is as follows: Left-hand winding of the induction coil 7, conductor 18, conductor 19, receiver 16, conductor 20, inner right-hand spring contact 21 of switch 17, outer right-hand spring contact 22 to the left-hand winding of induction coil 7. When the switch 17 is in the listening position as shown in Fig. 1 of the drawings, with the right-hand spring contacts 21 and 22 closed, the entire left-hand winding of the induction coil 7 is in condition for inductively receiving voice currents from the right-hand winding.

When the transmitter is to be used, the switch 17 is operated to move the inner right-hand spring contact 21 away from contact 22, against the inner left-hand contact 23 and to close the inner left-hand contact 23 against the outer left-hand contact 24. The left-hand winding of the induction coil 7 is tapped in the center by conductor 25 which is led to the inner left-hand spring contact 23 of switch 17 so that by operating the switch 17 to open the contacts 21 and 22 and close the contacts 21, 23 and 24 half of the left-hand winding of the induction coil 7 is retained in the circuit of the telephone instrument 8 per se and the other half is disconnected therefrom. When the switch 17 is operated to open the normally closed spring contacts 21 and 22 and close the normally open contacts 21, 23 and 24, the following transmitter circuit for the telephone set 8 per se is obtained; Negative terminal of local battery 9, conductor 18, lower half of the left-hand winding of the induction coil 7, conductor 25, closed left-hand spring contacts 23 and 24 of switch 17, conductor 27, transmitter 15 to the positive terminal of local battery 9. A listening circuit is also maintained for the receiver 16 as follows: Lower half of the left-hand winding of induction coil 7, conductor 25, inner left-hand spring contact 23 of switch 17, inner right-hand spring contact 21, conductor 20, receiver 16, conductor 19, conductor 18, to the other end of the lower left-hand portion of the induction coil 7.

It is obvious from the foregoing description and by reference to the drawings that with the switch 17 operated to transmitting position the lower half of the left-hand winding of the induction

coil 7 is the only portion of the left-hand winding in circuit connection with the transmitter; that the entire right-hand winding of the induction coil 7 is employed as a secondary and that a step-up transformer effect is obtained in the induction coil 7 for transmitting. By operating switch 17 to the position for transmitting and thereby reducing the effective length of the left-hand winding of the induction coil 7 a step-down transformer effect is obtained in the induction coil 7 for the receiver 16 and sidetone is reduced in the receiver.

The switch 17 being entirely in the local circuit of the telephone set 8 per se and having no direct connection through any of its contacts with the bridge circuit which is connected by way of the conductors 4 and 5 to the line wires 1 and 2, respectively, does not provide a path through its comparatively closely associated contacts for any high potentials in the line wires 1 and 2.

The generator 6 is located in the bridge circuit and impresses ringing current from the portable set over the line wires 1 and 2 to the central station. When the generator handle 28 is turned, spring contact 10 is separated from contact 11 and brought into engagement with contact 29. Ringing current developed in the coil 30 of the generator 6, thereupon flows by way of conductors 4' and 4 and 14 and 5 over the respective line wires 1 and 2.

Separation of the switch and the telephone set per se from the bridge circuit in the manner above described permits the use of a standard low potential telephone instrument and switch 17, the locating of the switch within the handle of the telephone instrument 8, as shown in Fig. 2, and the employment of standard low potential telephone cords.

What is claimed is:

1. A telephone set comprising a bridge circuit to be directly connected to line wires, a handset including transmitter and receiver elements, a local battery, an induction coil inductively connecting said handset to said bridge circuit, and a switch in the handset for changing the effective length of one of the windings of the induction coil, the contacts of said switch being entirely within the circuit of the handset.

2. A telephone set comprising a bridge circuit to be connected to line wires, a handset including transmitter and receiver elements, a local battery, an induction coil forming an inductive connection between said bridge circuit and said handset, and a switch in the handset to change the effective length of one of the windings of the induction coil, the contacts of said switch being entirely within the circuit of the handset and the switch operating to change the effective length of the winding of the induction coil on the handset side of the set to obtain a step-up transformer effect in the induction coil for transmitting.

3. A telephone set comprising a bridge circuit to be connected to line wires, a handset including transmitter and receiver elements, an induction coil forming an inductive connection between said bridge circuit and said handset, a local battery, and a switch, said switch and its contacts being entirely within the handset, said switch having an intermediate connection with the winding of the induction coil on the handset side of the set and operating to change the transformer ratio between the windings of the induction coil from an efficient ratio for receiving to a ratio more efficient for transmitting.

4. In combination, a pair of line wires, a bridge circuit adapted to be connected across said line wires, a handset, an induction coil inductively connecting said handset to said bridge circuit, a local battery in circuit with said handset, and a switch in the handset for changing the transformer ratio of the induction coil solely by changing the effective length of one of the windings of the induction coil, the contacts of said switch being entirely within the circuit of the handset.

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