

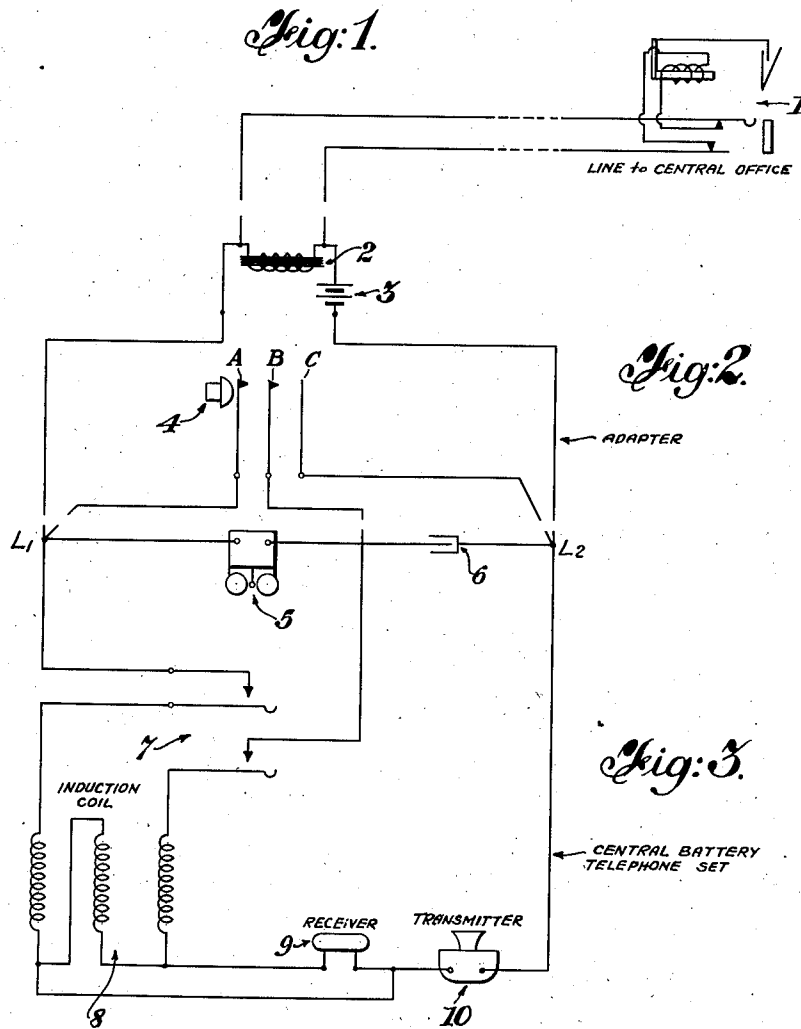
Aug. 15, 1944.

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2,356,031

TELEPHONE SUB-STATION APPARATUS

Filed Nov. 20, 1942



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## UNITED STATES PATENT OFFICE

2,356,031

## TELEPHONE SUBSTATION APPARATUS

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Application November 20, 1942, Serial No. 466,263

8 Claims. (Cl. 179—81)

This invention relates to an adapter or means for converting subscribers' telephone sets designed primarily for central battery exchange systems for use in connection with local battery or magneto exchanges.

One of the objects of the invention is the provision of a less expensive subscriber's telephone equipment as compared with the magneto telephone sets at present used at subscribers' stations served by local battery or magneto exchanges.

Another object is the provision of an adapter unit which when associated with a telephone set designed for use in a central battery exchange converts the sub-station equipment for use in local battery or magneto exchanges.

The invention contemplates the use of a retardation or choke coil located at the subscriber's station and connected in bridge between the lines to the central office and a push-button type of switch conveniently located near the subscriber's telephone set and so connected to the telephone circuit that when operated a short circuit or shunt is placed across the lines leading to the central office and a source of current at the subscriber's station is connected in series with the retardation or choke coil.

The above and other objects and features of the invention will be better understood from a reading of the following detailed description taken in conjunction with the accompanying drawing in which

Fig. 1 indicates a line to a central magneto office provided with the usual line signal and jack;

Fig. 2 shows the component parts of the adapter of my invention and the method of connecting it to the line to the central office and to the telephone set, whilst

Fig. 3 is a schematic circuit diagram of a typical central battery telephone set.

In Fig. 1, 1 is the usual signal and jack provided at a local battery central office.

Fig. 3 shows the circuit of a well known type of central battery telephone set in which 5 is the bell, 6 a condenser, 7 a hook switch, 8 a three-winding induction coil, 9 the receiver and 10 the transmitter.

The adapter unit shown in Fig. 2 comprises a retardation or choke coil 2, a battery 3 and a push-button switch 4. One side of the coil 2 is connected to one of the contacts A of the push-button switch and the other side of the coil 2 is connected to one side of the battery 3, the other side of which is connected to the third contact C of the push-button switch 4. The sides

of the retardation coil 2 are connected respectively to the two line wires to the central office, contacts A and C of the push-button switch 4 are respectively connected to the line wire terminals L1 and L2 of the central battery telephone set of Fig. 3 and the contact B of the push button switch is connected between the bell 5 and the condenser 6.

To call the central office the operation is as follows: The push-button switch 4 is operated thus connecting the battery 3 directly across the retardation coil 2; this is accomplished by pressing the button causing springs A and B to make contact thus short circuiting the windings of the ringer coils 5 after which the springs B and C make contact short circuiting the condenser 6. The push-button switch 4 is held in operation for about one-half second or longer during which time a magnetic field is built up in the retardation coil 2 due to the flow of current from the battery 3 through the winding of the coil 2 which is now connected in series with the battery 3.

The push-button switch 4 is then released and the energy stored up in the field of the retardation coil 2 is converted into a current impulse which is discharged over the subscriber's line in the direction of the central office thus operating the line drop signal thereat. It will be noted from the spring arrangement of the push-button switch 4 that after the break between the springs B and C in the battery circuit the condenser 6 is momentarily left connected in parallel with the retardation coil 2 over the springs A and B. This has the object of reducing the spark at the break contacts of springs B and C and at the same time increases the effect of the impulse sent towards the central office by discharging the stored up charge in the condenser 6 over the line. This is followed by a break between springs A and B thus removing the short circuit around the ringer coils 5 and restoring the circuit to normal.

After the central office has been signaled in the manner described above, the subscriber removes the hand set from the hook switch 7 and the operation of the telephone set is then as follows: The battery 3 supplies current through terminal L2 to the transmitter 10 and thence to the switch hook 7 via the left hand winding of the induction coil 8. The contacts of the switch hook 7 now being closed, the current continues via terminal L1 through the winding of the coil 2 to the battery 3 thus completing the transmitter battery circuit. The voice currents resulting

from conversation leave the telephone set through the sub-station line in the usual manner and continue on to the central office past the retardation coil 2 which due to its relatively high impedance produces negligible shunt effect on the voice currents.

When a call is made from the central office the ringer 5 is rung in the usual manner.

In carrying out the invention I prefer to use a retardation coil or choke 2 having a closed magnetic circuit of such dimensions and number of turns in the winding to give an impedance of approximately 3.5 henrys and a direct current resistance of not more than 20 ohms. These figures, however, are not fixed and may be varied within certain limits. Moreover, the push-button switch 4 may be modified or simplified by the elimination of the springs B since the primary function of the switch is to close the circuit of the retardation coil 2 and the battery 3 in series.

It is to be understood that the schematic diagram of the central battery set shown in Fig. 3 is only shown by way of example and the invention is not limited to any particular type of central battery telephone set, since the adapter unit will operate equally well in association with any of the central battery telephone sets now in general use.

What I claim is:

1. In a sub-station telephone set, for alternative use in a local battery or in a magneto exchange including a drop, comprising a transmitter, a receiver, a pair of line wires, a bell and a condenser connected in series across said line wires, a device for actuating the drop at the magneto exchange including a retardation coil connected directly across said line wires, a battery connected in a series circuit including said retardation coil said bell and said condenser, a first normally open pair of contacts connected so that when closed they provide a short circuit for said bell, a second normally open pair of contacts connected so that when closed they provide a short circuit for said condenser, whereby continuous current from said battery flows through said coil and establishes thereabout an electromagnetic field and means for closing said first-mentioned pair of contacts before said second-mentioned pair of contacts and for opening said second-mentioned pair of contacts before said first-mentioned pair of contacts, whereby the closure of both said pairs of contacts connects said battery directly across said coil, the opening of said second pair of contacts inserts said condenser between said battery and said coil, and the opening of said first pair of contacts allows said electromagnetic field to collapse with consequent establishment of a momentary, drop-actuating surge having a relatively high voltage and appearing across said pair of line wires.

2. A sub-station telephone set for use in a local battery or magneto exchange comprising a transmitter, a receiver, a pair of line wires, a bell and a condenser connected in series across said line wires, a retardation coil connected across said line wires, a battery connected in a series circuit including said retardation coil said bell and said condenser, a switch including first, second and third contacts respectively connected to one line wire, to the junction between said bell and said condenser, and to the other line wire, and switch actuating means for making a closure of said first and second contacts before the closure of said second and third contacts, and for opening

said second and third contacts before said first and second contacts.

3. In a telephone system a pair of line wires extending to a central office, a sub-station set connected for central battery working, comprising a receiver, a transmitter and a pair of line terminals, and an adapter unit for converting said sub-station set to local battery or magneto working comprising means for connecting said line terminals to said line wires, a retardation coil connected across said line wires, a source of current for supplying talking current, and switching means for momentarily connecting said source of current across said retardation coil to signal the central office.

4. An adapter for converting a telephone set connected for central battery working for co-operation with a central office arranged for local battery or magneto working, comprising a first pair of terminals for connection to line terminals for the telephone set, a second pair of terminals for connection to the sub-station lines extending to the central office, a retardation coil connected across said second pair of terminals, a direct connection between one of each of said pairs of terminals, a connection including a source of current between the other ones of each of said pairs of terminals and a switch for providing a short circuit between said second pair of terminals.

5. In a telephone system comprising a pair of wires having signal responsive means connected thereto, a signalling apparatus comprising a retardation coil having high impedance to speech currents connected across said wires, a normally open switch having one terminal connected to one of said wires, a source of potential connected between another terminal of said switch and the other of said wires, said switch being adapted when closed to connect said battery across said coil to build up a magnetic field therein which when said switch is opened will produce a current impulse through said wires to operate said signal responsive means.

6. A sub-station telephone set for use in a local battery or magneto exchange having a line signal operable by a relatively high voltage pulse, comprising a receiver, a transmitter, a pair of line terminals, a source of current for supplying talking current, a retardation coil connected directly across said line terminals and over which talking current is supplied to said transmitter, and a switch for directly connecting said source of current across said retardation coil, whereby electromagnetic energy is stored therein, and for disconnecting said source of current from said coil upon the opening of said switch, whereby said stored energy is discharged over said line as a relatively high voltage pulse serving to signal the magneto central office.

7. A sub-station telephone set for use in local battery or magneto exchange having a line signal operable by a relatively high potential pulse, comprising a receiver, a transmitter, a pair of line terminals, a source of current for supplying talking current, a retardation coil connected directly across said line terminals and over which talking current is supplied to said transmitter, switching means for momentarily connecting said source of current directly across said retardation coil and for then suddenly disconnecting said source of current from said coil, so as to generate a relatively high potential signal pulse and means for transmitting said signal pulse to said mag-

neto exchange, whereby said line signal at said exchange is actuated by said pulse.

8. In a sub-station telephone set, for use in a local battery or magneto exchange system, comprising a pair of line wires, a receiver and a transmitter, a source of current for supplying talking and signalling current, an inductive choke coil connected directly across said line wires, a device for actuating the drop at the magneto exchange including a switch for connecting said 10

source of current across said choke coil for a predetermined time interval, whereby storage of electromagnetic energy in said choke coil is accomplished, and means for suddenly discharging the electromagnetic energy stored in said choke coil over said line wires, said last means acting to substantially simultaneously disconnect said source of current from said choke coil.

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