H. M. POST.

SUBSCRIBER'S TELEPHONE CIRCUIT.

APPLICATION FILED JULY 31, 1905.

901,738. Patented Oct. 20, 1908.

Fig. 1.

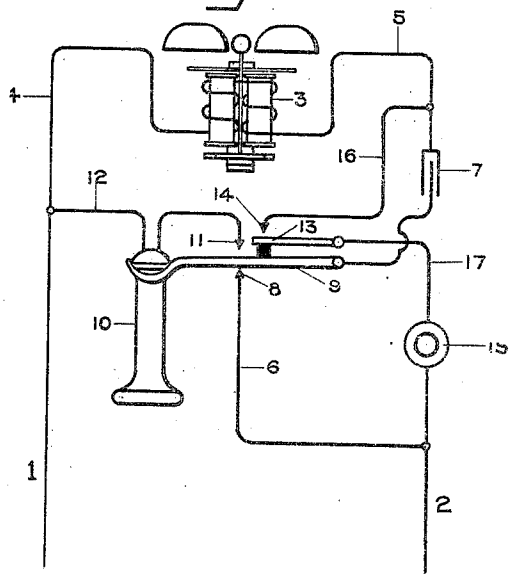
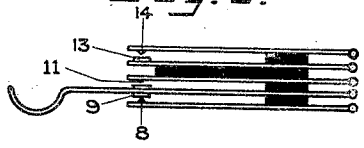


Fig. 2.



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SUBSCRIBER'S TELEPHONE-CIRCUIT.

No. 901,738. Specification of Letters Patent. Patented Oct. 20, 1908.

Application filed July 31, 1905. Serial No. 271,931.

To all whom it may concern:

Be it known that I, HOWARD M. POST, a citizen of the United States of America, and resident of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Subscribers' Telephone-Circuits, of which the following is a specification.

My invention relates to subscribers' circuits adapted for use in connection with central energy telephone systems.

In systems of the above class where a principal source of energy is located at the central office adapted to furnish current for signaling purposes between the central office and substations, and to furnish current for actuating the substation transmitters, it has been found undesirable, for various well-known reasons, to locate the telephone receiver at the substation in the path of the current from the central office for actuating the substation transmitter.

It has been customary in some cases to locate the receiver in a conductively isolated circuit from the path of direct current to the transmitter, said isolated circuit being inductively connected with said direct current path by means of an induction coil, the windings of the receiver in such case only being traversed by the high frequency voice currents. It has also been proposed to provide means such as an impedance coil which is opaque to the passage of the high frequency voice currents, in the path of direct current from the central office and to provide a shunt path around said impedance coil in which the receiver is located, said shunt path containing a condenser or other means for rendering said path opaque to the passage of direct current. By this arrangement two paths are provided, one opaque to the voice currents but transparent to direct current, and the other opaque to the passage of direct current but transparent to the high frequency voice currents, said latter path containing the receiver. My invention relates to this second-mentioned method of preventing the direct current from the central office from traversing the coils of the receiver. Such a circuit arrangement is described and generically claimed in Letters Patent of William W. Dean, No. 722,212, issued March 10, 1903.

I propose to locate the usual polarized ringer, the windings of which preferably have a comparatively low resistance, in series with a condenser in a normally-closed bridge of the line conductors, so that with the receiver upon its hook the ringer will be in the path of signaling current from the central station. The arrangement is such that when the receiver is removed from its hook the condenser is connected in series with the receiver in a shunt path of the coils of the windings of said ringer, so that during conversation the ringer is in the path of direct current from the central station, the coils of the ringer magnet possessing sufficient impedance to prevent the passage of the voice currents over said path to an appreciable degree, the voice currents being adapted to traverse the path containing the receiver and condenser in shunt of the path containing the ringer magnet.

I have illustrated my invention in the accompanying drawing, in which:

Figure 1 is a diagram of a circuit arrangement illustrating the principle of my invention and Fig. 2 shows the preferred arrangement of the contacts adapted to be actuated by the removal of the receiver from the switch hook.

My invention is adapted for use with any central energy telephone system, and as the operation of such systems is well understood I have not deemed it necessary to show the central station equipment of such a system as my invention can be clearly understood by illustrating the subscriber's station and indicating the limbs 1 and 2 of the telephone line extending to the central office. I preferably provide an ordinary polarized ringer 3, the coils of said ringer preferably being of comparatively low ohmic resistance, a resistance of from 75 to 100 ohms having been found to give satisfactory results in practice. The ringer is connected in a bridge of the line conductors 1 and 2 by means of conductors 4, 5 and 6, said bridge containing a condenser 7 and being normally closed at contact point 8 by means of the switch hook 9 when the receiver 10 is not in use. A normally-closed path for signaling current is thus provided, which contains only the coils of the ringer 3 and the condenser 7. When the receiver is removed from the switch hook said hook is adapted to break the circuit of the bell 3 at the contact point 8, and to engage the contact point 11, the receiver 10 being connected between said contact point 11 and the line conductor 1 by means of a conductor 12. A second contact 13 carried by the switch hook, but electrically

insulated therefrom, is adapted to form electrical connection with the contact point 14 when the receiver is removed from its hook, thus completing a path for direct current through the transmitter 15. A conductor 16 connects the contact point 14 with the conductor 5 and a conductor 17 containing the transmitter 15 extends from the limb 2 of the telephone line to the contact 13 carried by the hook switch.

The circuits are shown with the receiver upon the hook and the apparatus in condition to receive a call from the central office. Assuming that a call is sent to the subscriber's station represented in Fig. 1, the signaling current from the central office may be traced over the following path: line conductor 1, conductor 4, coils of the ringer 3, conductor 5, condenser 7, switch hook and contact point 8, and condenser 6 to the other limb 2 of the telephone line. Upon removing the receiver 10 from its hook a circuit will be closed for direct current from the central office over the following path: line conductor 1, conductor 4, the coils of the ringer 3, conductors 5 and 16, contact point 14 and contact 13, and conductor 17 through the transmitter 15 to the other limb 2 of the telephone line. A path for the voice currents will also be closed from limb 1 of the telephone line over conductor 12 including the coils of the receiver 10, contact point 11, hook switch 9, condenser 7, conductor 16, contacts 14 and 13 and conductor 17, including the transmitter 15 to the limb 2 of the telephone line. It will be noted that by the removal of the receiver from its hook the path for ringing current is broken at contact point 8 and condenser 7 which was in said path is included in the path for voice currents which is closed at contact points 11 and 14, said path, due to the presence of the condenser, being opaque to the passage of direct current. The coils of the ringer, as previously stated, possess sufficient impedance to prevent the passage of voice currents to an appreciable degree, but permit the passage of direct current for the actuation of the transmitter 15. The coils of the ringer thus serve the double function of signaling the substation and shunting the voice currents through the path containing the receiver and the condenser 7 during conversation.

It will be understood that other circuit arrangements may be provided without departing from the spirit of my invention, the details in the arrangement here shown not being essential, and I do not wish to limit myself to the circuit arrangement shown further than is described in the appended claims:

I claim:

1. A subscriber's telephone circuit comprising a path for signaling current containing the coils of a suitable ringer, a path for talking currents containing the coils of a receiver, means when the receiver is removed from its hook for closing a path for direct current through the coils of said ringer, said coils possessing sufficient impedance to prevent the passage of voice currents, and means in the path containing the receiver for preventing the passage of direct current, and a transmitter in series with both of said paths, substantially as described.

2. A subscriber's telephone circuit comprising a path for signaling current containing the coils of a suitable ringer, a path for talking currents containing the coils of a receiver, means when the receiver is removed from its hook for closing a path for direct current through the coils of said ringer and for connecting both said ringer coils and said receiver coils in series with the transmitter; said ringer coils possessing sufficient impedance to prevent the passage of voice currents, and means in the path containing the receiver for preventing the passage of direct current.

3. A subscriber's telephone circuit comprising two paths for current, one of said paths being opaque to direct currents and containing a receiver and a condenser, the other of said paths containing the coils of a ringer and being opaque to voice currents, a transmitter in series with both paths, and switching means under the control of the subscriber for placing said condenser and ringer coils in series in the telephone line, and for excluding said transmitter from the line circuit, substantially as described.

4. A subscriber's telephone circuit comprising a path for signaling current containing the coils of a suitable ringer and a condenser, a normally-open path for talking currents containing the coils of a receiver, means when the receiver is removed from its hook for closing a path for direct current through the coils of said ringer, and for including said condenser in the path containing the receiver and for placing a transmitter in series with both of said paths, the coils of said ringer possessing sufficient impedance to prevent the passage of voice currents, said condenser preventing the passage of direct current through the path containing the receiver, substantially as described.

5. A subscriber's telephone circuit comprising two paths for current, one of said paths containing a receiver and a condenser in series, the other of said paths containing the coils of a ringer, a transmitter in series with both paths, and means for placing said condenser and ringer in series in the telephone line, substantially as described.

6. A subscriber's telephone circuit comprising a path for signaling current containing the coils of a suitable ringer, a path for talking currents containing the coils of a receiver, means when the receiver is removed from its hook for closing a path for direct current through the coils of said ringer, said

coils possessing sufficient impedance to prevent the passage of voice currents, means in the path containing the receiver for preventing the passage of direct current, and a transmitter in the path of direct current through the coils of said ringer and in the path of the talking currents through the coils of said receiver.

7. A subscriber's telephone circuit comprising the coils of a suitable ringer and a condenser, in a normally-closed path for signaling current, a receiver in a normally-open path for voice currents, a transmitter and means when the receiver is removed from its hook for connecting the coils of said ringer in series with said transmitter and in the path of direct current, and for connecting said condenser in series with the receiver and the transmitter and in the path of talking currents, the coils of said ringer possessing sufficient impedance to prevent the passage of the talking currents.

8. A subscriber's telephone circuit comprising two paths for current, one of said paths being adapted to pass voice currents and not direct currents and containing a receiver, and the other path being adapted to pass direct currents and not voice currents and containing the coils of a ringer, a transmitter in series with both of said paths and means for placing said ringer coils in series with a portion of said former path, whereby actuating current may be sent through the ringer coils to produce a signal at the substation, but whereby direct current cannot flow therethrough to produce a signal at the central office, substantially as described.

9. A subscriber's telephone circuit having a condenser and the coils of a ringer normally in series in the telephone line circuit for signaling purposes, of a hook switch adapted by its operation to place said condenser and said ringer coils in parallel in said telephone line and in series with a transmitter for talking purposes, substantially as described.

10. In a subscriber's telephone circuit, the combination with a switching mechanism, of a condenser, a receiver and a ringer electrically associated therewith, means under one condition of said switching mechanism for connecting said condenser and ringer in series in the telephone line and excluding said receiver therefrom, and in the other condition of said switching mechanism for connecting said receiver and condenser in series and in parallel with said ringer, and a transmitter in series with both said receiver and said ringer, substantially as described.

11. In a subscriber's telephone circuit, the combination with a path for direct currents containing the coils of a ringer, of a path for voice currents in parallel with said first path containing the coils of a receiver, and a transmitter in series with each of said paths, substantially as described.

12. In a subscriber's telephone circuit, the combination of a transmitter and ringer in a bridge of the telephone line, and a condenser and receiver in parallel with the ringer and in series with the transmitter, substantially as described.

13. In a subscriber's telephone circuit, the combination of a condenser and a ringer in a normally closed shunt of the limbs of the telephone line, a receiver, a transmitter and switching mechanism adapted to connect said receiver and condenser in parallel with the ringer and in series with said transmitter, substantially as described.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

HOWARD M. POST.

Witnesses:
C. B. CAMP,
E. F. GRIER.