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HOLDING CIRCUIT FOR SUBSCRIBERS' STATIONS

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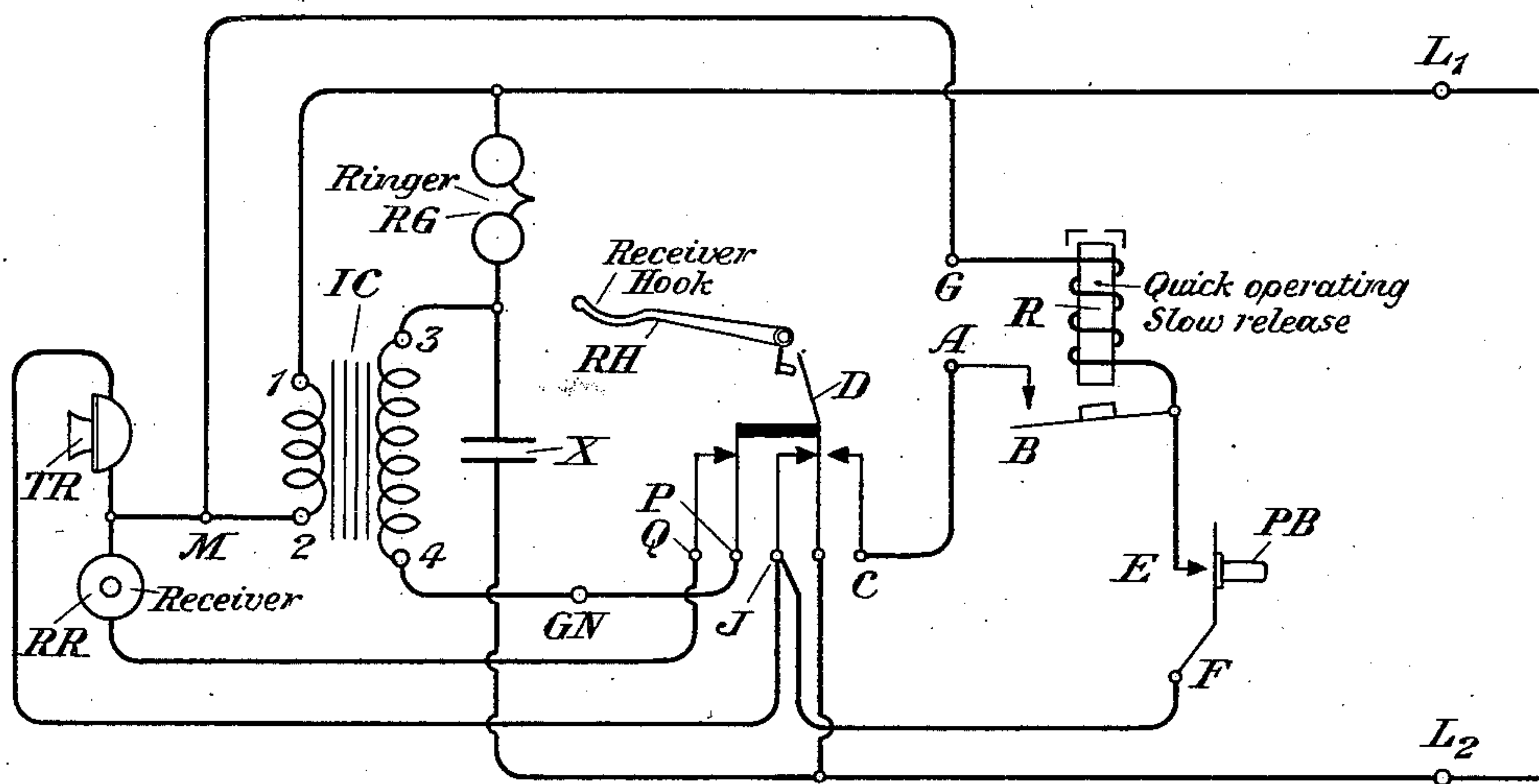


Fig. 1

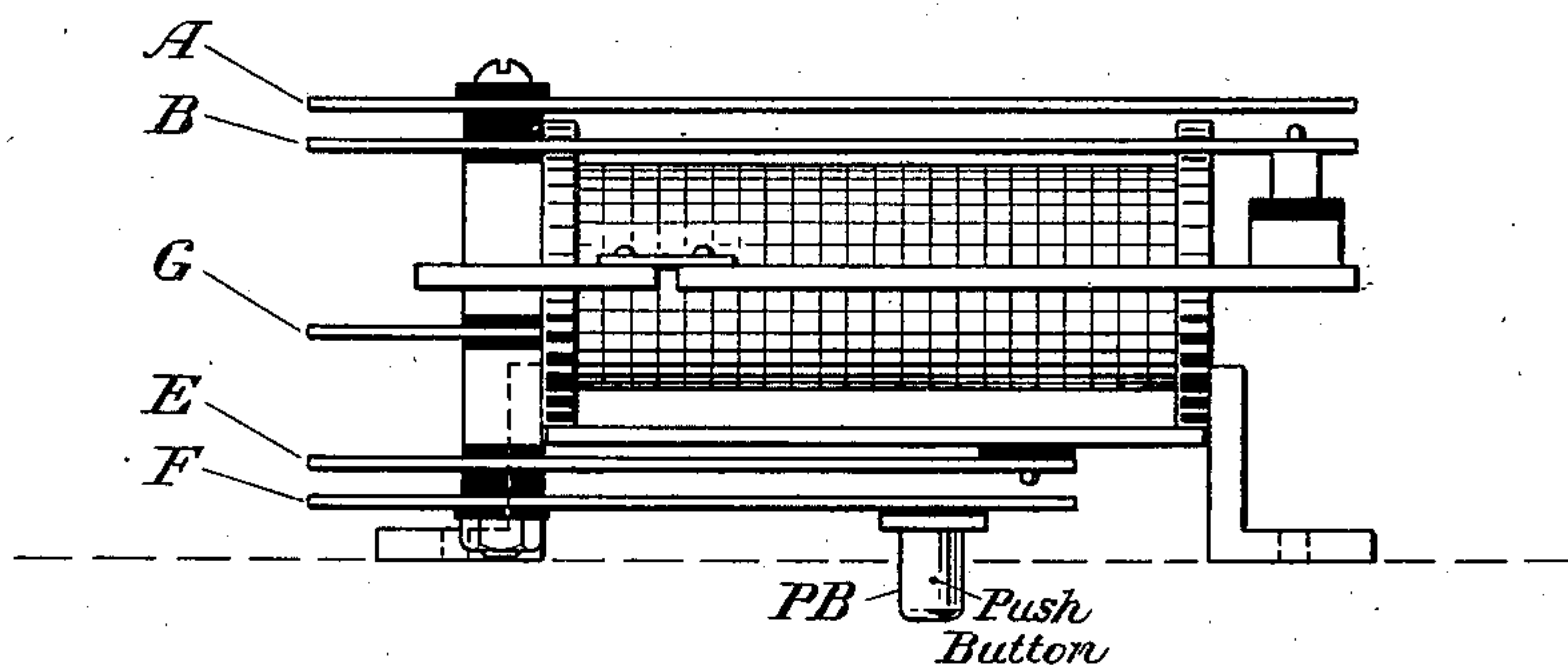


Fig. 2

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HOLDING CIRCUIT FOR SUBSCRIBERS' STATIONS

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5 Claims. (Cl. 179—81)

This invention relates to substation circuits for telephone subscribers.

Where the same telephone is used by a number of people, as is usually the case in the home, and sometimes in offices, it frequently happens that a person other than the one answering the telephone is wanted. While calling the wanted person to the telephone it is necessary to leave the receiver off the hook, or in case of a handset, to leave the handset off the cradle, in order that the operator will not get a disconnect signal. This means that the instrument must be laid down upon some convenient surface, where it may be knocked off and broken. It is therefore desirable to have some arrangement by which the person answering the telephone may at will establish a holding circuit to prevent giving the operator a disconnect signal, thus permitting the receiver to be hung up while some one else is called to the telephone.

It is one of the objects of this invention, therefore, to provide means whereby such an auxiliary holding circuit may be established at will by a person answering the telephone, this holding circuit being in addition to the normal holding circuit which is operated by the mere act of removing the telephone from the switchhook or, in the case of a handset, removing the instrument from the cradle.

Hereinafter it is to be understood that when reference is made to the switchhook or switchhook contacts, these terms are meant to include the corresponding arrangements of a handset. Also where reference is made to removing the receiver from the switchhook or hanging up the receiver, these expressions are meant to include the operation of removing a handset from the cradle or restoring it thereto.

The invention may now be more fully understood from the following detailed description, when read in connection with the accompanying drawing, in which Figure 1 is a circuit diagram showing the improved substation circuit of the invention, and Fig. 2 shows a relay, used in connection with the invention.

Referring to Fig. 1, TR indicates the usual telephone transmitter and RR the usual telephone receiver. These may be mounted together to form a handset or they may be separate instruments as is common in the art. RG represents a ringer, the ringer being bridged across a line comprising conductors L₁ and L₂; and X is a condenser through which ringing current may be transmitted. The usual induction coil IC is connected in the substation circuit

in the usual manner through terminals 1, 2, 3 and 4. Likewise the usual switchhook RH is provided for switching the contacts of the hook switch from ringing position to talking position by merely taking the receiver off the switchhook. Of course, in the case of a handset, the switchhook is replaced by a mechanism in the cradle which operates suitable contacts in response to removing or replacing the handset upon the cradle.

In connection with the holding circuit of the invention, a relay R is provided having contacts A and B controlled by its armature. Associated with this relay is a push button PB controlling contacts E and F. As shown in Fig. 2, the contacts E, F operated by the push button PB may be mounted on the relay itself in a manner similar to the contacts A and B which are controlled by the relay armature.

Normally, with the receiver hanging upon the switchhook RH, the switch spring D will rest upon the contact C, and contacts D, J and P, Q will be opened. The opening of contacts D, J will prevent direct current from flowing through the transmitter TR, and the opening of contacts P, Q breaks the circuit of the receiver RR. With the circuit in this condition, ringing current from the line conductor L₁ will pass through the ringer RG and condenser X to the line conductor L₂.

Upon receiving a ringing signal the subscriber will remove the receiver RR from the switchhook RH (or remove the handset from the cradle), thereby closing contacts D, J and P, Q to complete the direct current circuit for the transmitter and to close the circuit of the receiver. Upon ascertaining that someone else is to be called to the telephone, the subscriber before replacing the receiver on the switchhook, will operate the push button PB and hold the contacts E, F closed until the receiver has been placed upon the switchhook PH and the contacts D, C have been closed. With the receiver off its switchhook, of course, the usual holding circuit for the supervisory signaling equipment at the central office extends from the line conductor L₁ through winding 1, 2 of the induction coil, through transmitter TR and over closed contacts J, D to the line conductor L₂. Closing contacts E, F establishes an independent holding circuit from the line conductor L₁ through the winding 1, 2 to the point M, thence over the heavy line to the terminal G of the relay R, thence through the winding of said relay over the contacts E and F of the push button to con-

tact J of the switchhook, and over contact D (which will be in contact with J when the receiver is off the switchhook) to the line conductor L₂. This operates the relay R to close contacts A and B.

As soon as the receiver is replaced upon the switchhook RH, a new holding circuit is established independently of the push button contacts E, F from line conductor L₁ through winding 1, 2 to point M, over the heavy conductor to point G, through the winding of relay R, contacts B and A of relay R, and contacts C and D of the switchhook to the line L₂. Due to the establishment of this new holding circuit, the push button may be released as soon as the receiver is replaced on the switchhook without giving the operator a release signal. The subscriber may then call the wanted person to the telephone. It should be noted that the relay R is slow to release, so that during the operation of the switchhook in moving the spring D from the spring J to the spring C, the contacts A, B of the relay R will remain closed, thereby insuring that the holding circuit over the contacts A, B will be established upon hanging up the receiver even though the contacts D, J may be opened before the contacts D, C are closed.

While the wanted party is coming to the telephone the normal holding circuit through the transmitter TR will be open at contacts D, J, but the auxiliary holding circuit will be established over the contacts A, B of the relay R of the switchhook. The operator will therefore not receive a disconnect signal. When the wanted subscriber removes the receiver from the switchhook, however, the auxiliary holding circuit over contacts A, B of the relay R and contacts C, D of the switchhook is opened at C, D, and the normal holding circuit is established through the transmitter TR over the contacts D, J. The opening of contacts C, D not only opens the auxiliary holding circuit but breaks the locking connection for the relay R so that its armature falls back and contacts A and B remain open. The auxiliary holding circuit is therefore restored to normal and at the end of the conversation, when the person who is called to the telephone hangs up the receiver, the circuit will be in normal condition and the operator will get a disconnect signal due to the breaking of the contacts D, J.

When the receiver is replaced on the hook there is no danger of the holding circuit becoming established, unless the subscriber accidentally depresses the push button before replacing the receiver. If this should happen, or the subscriber should forget to hang up the receiver at the end of the conversation, the usual dial system alarm would be given or, in the case of a manual system, the failure of the supervisory lamp to be extinguished will notify the operator of the abnormal condition. The auxiliary holding circuit may then be opened from the central office merely by opening the line, which will cause the release of the relay R. As an alternative the operator may ring over the line to attract the subscriber's attention, if the impedance of the relay R be sufficiently great to prevent undue shunting of the ringing current from the ringer RG.

Arrangements such as described will be of great advantage to the subscriber, who will not be subjected to the annoyance of attempting to balance the receiver or handset on tables or ledges. The arrangement will also be of advantage to the operating telephone company as there will be savings in replacements of broken cords and receiver shells, which normally result from the receiver

falling from some position in which it has been hastily placed while the person who answered is calling someone else to the telephone.

What is claimed is:

1. A telephone subscriber's substation circuit including line terminals, a ringer normally bridged across the line, a subscriber's set including a transmitter and receiver, a switchhook having contacts for establishing a direct current holding path across the line terminals through the subscriber's set to permit switchhook control of supervisory signaling apparatus at the central office, a manual control switch, means controlled thereby for establishing a direct current auxiliary holding path across the line terminals independently of the subscriber's set, means to prevent the initial closing of said auxiliary holding path when the receiver is on the switchhook but permitting it to be closed when the receiver is off the hook, and a relay at said subscriber's substation for establishing a locking circuit to maintain an auxiliary holding path independent of said manual control switch.

2. A telephone subscriber's substation circuit including line terminals, a ringer normally bridged across the line, a subscriber's set including a transmitter and receiver, a switchhook having contacts for establishing a direct current holding path across the line terminals through the subscriber's set to permit switchhook control of supervisory signaling apparatus at the central office, a manual control switch, means controlled thereby for establishing a direct current auxiliary holding path across the line terminals independently of the subscriber's set, means to prevent the initial closing of said auxiliary holding path when the receiver is on the switchhook but permitting it to be closed when the receiver is off the hook, and a relay at said subscriber's substation and included in said auxiliary holding path to maintain an auxiliary holding path independently of said manual control switch.

3. A telephone subscriber's substation circuit including line terminals, a ringer normally bridged across the line, a subscriber's set including a transmitter and receiver, a switchhook having contacts for establishing a direct current holding path across the line terminals through the subscriber's set to permit switchhook control of supervisory signaling apparatus at the central office, a manual control switch, means controlled thereby for establishing a direct current auxiliary holding path across the line terminals and through a contact of the switchhook independently of the subscriber's set, and a relay for establishing a locking circuit to maintain an auxiliary holding path through said switchhook contact independently of said manual control switch, said relay being slow to release so as to remain operated during momentary operation of said switchhook contact.

4. A telephone subscriber's substation circuit including line terminals, a ringer normally bridged across the line, a subscriber's set including a transmitter and receiver, a switchhook having contacts for establishing a direct current holding path across the line terminals through the subscriber's set to permit switchhook control of supervisory signaling apparatus at the central office, a manual control switch, means controlled thereby for establishing a direct current auxiliary holding path across the line terminals and through a contact of the switchhook independently of the subscriber's set, and a relay included in said auxiliary path for

establishing a locking circuit to maintain an auxiliary holding path through said switchhook contact independently of said manual control switch, said relay being slow to release so as to remain operated during momentary operation of said switchhook contact.

5. A telephone subscriber's substation circuit including line terminals, a ringer normally bridged across the line, a subscriber's set including a transmitter and receiver, a switchhook having contacts for establishing a direct current holding path across the line terminals through the subscriber's set to permit switchhook control of supervisory signaling apparatus at the

central office, a manual control switch, means controlled thereby for establishing a direct current auxiliary holding path across the line terminals independently of the subscriber's set, means to prevent the initial closing of said auxiliary holding path when the receiver is on the switchhook but permitting it to be closed when the receiver is off the hook, a relay for establishing a locking circuit to maintain an auxiliary holding path independent of said manual control switch, and means to open said locking circuit when the receiver is removed from the hook after the locking circuit has been established.

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