

May 1, 1945.

O. A. SHANN

2,374,962

TELEPHONE SET

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2 Sheets-Sheet 1

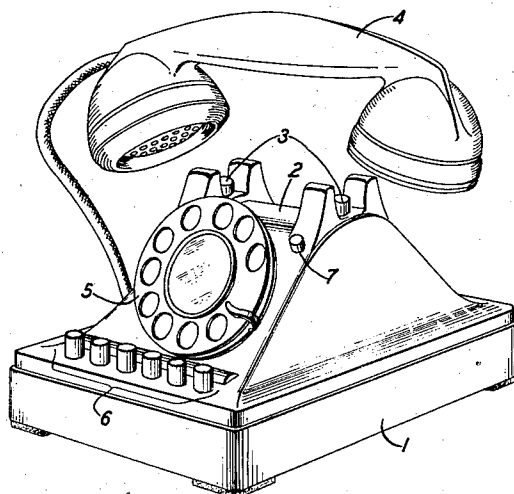


FIG. 1

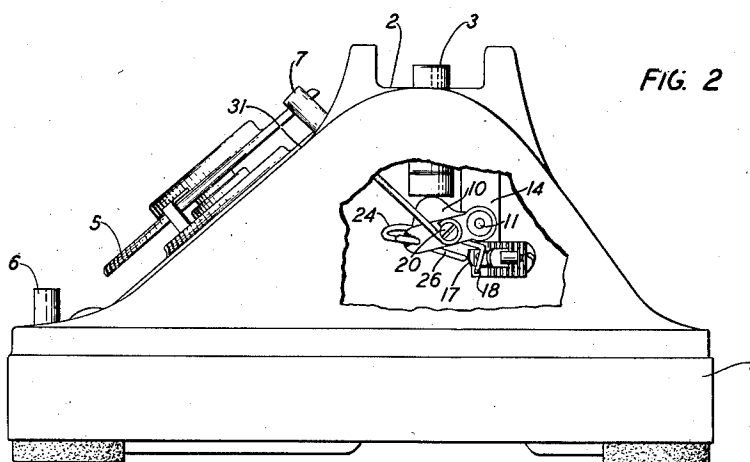


FIG. 2

INVENTOR
O. A. SHANN
BY
M. R. McNamee
ATTORNEY

May 1, 1945.

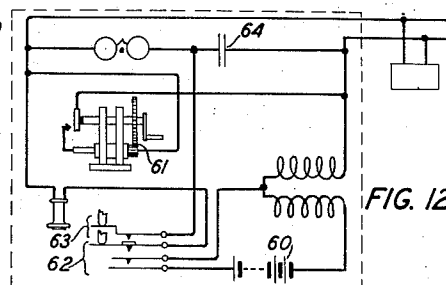
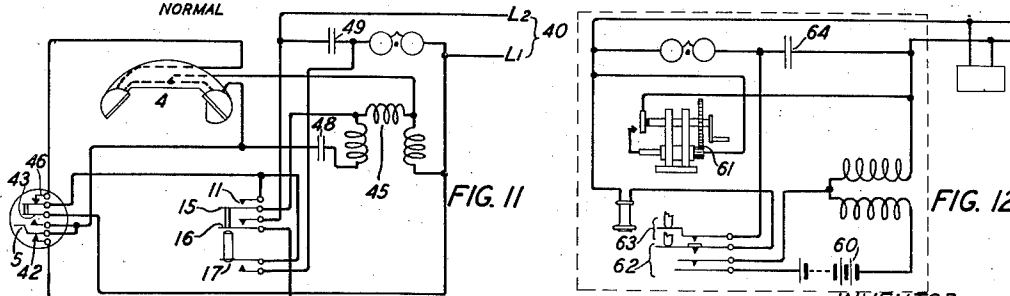
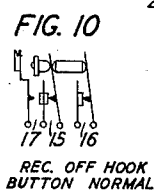
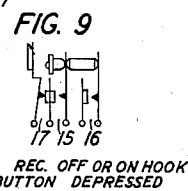
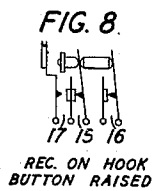
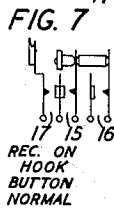
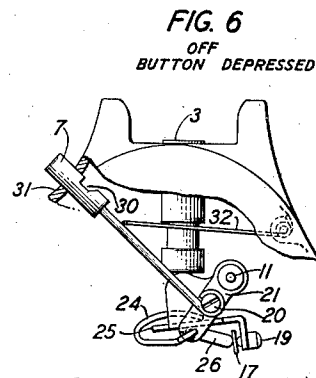
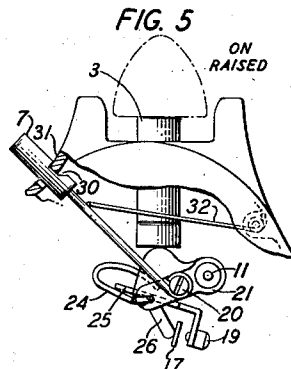
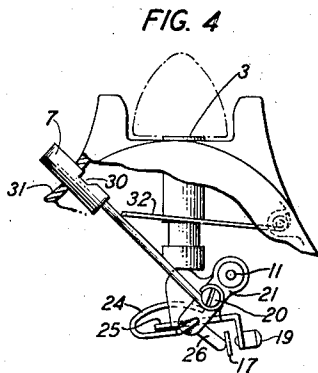
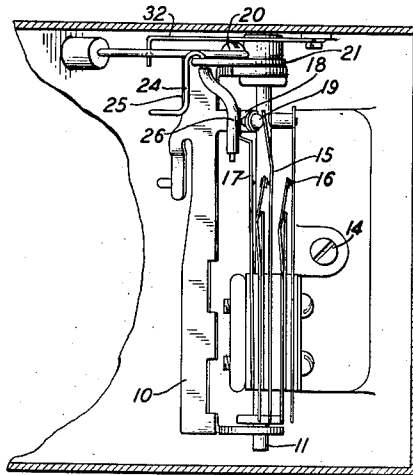
O. A. SHANN

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TELEPHONE SET

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2 Sheets-Sheet 2



INVENTOR
O. A. SHANN
BY
M. R. McFenney
ATTORNEY

UNITED STATES PATENT OFFICE

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TELEPHONE SET

Oscar A. Shann, Short Hills, N. J., assignor to
Bell Telephone Laboratories, Incorporated,
New York, N. Y., a corporation of New York

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10 Claims. (Cl. 179-81)

This invention relates to telephone sets and particularly to switch controlling mechanisms in telephone sets.

An object is to increase the utility and improve and simplify the manipulation of the switch controlling mechanisms in telephone sets.

Another object is to reduce the drain on the central office battery during the operation of a telephone set.

Heretofore telephone sets have been used in which plungers were located in the cradle and controlled by the handset to close the line circuit contacts when the handset was removed, while other plungers outside the cradle were controlled manually for the establishing of various changes in the telephone circuits of the sets, as shown, for example in the applicant's Patent 1,762,745 of June 10, 1930, where a lever outside the cradle may be set to raise the handset sufficiently to release a plunger in the cradle to permit the line contacts to close so that dialing may be done without having to manually remove the handset.

The present invention relates to improvements in telephone sets of this type and a feature thereof is the provision of a special plunger outside of the cradle which may be mechanically associated with the line switching contacts and the usual plunger in the cradle mechanisms controlling these contacts so that when this plunger is raised, it will close the line switching contacts and raise the cradle plungers and then locked in this raised position and held locked by the downward pressure of the handset on the cradle plungers and unlocked when the handset is removed. The purpose of closing the line switching contacts in this manner is to permit dialing over the line without removing the handset.

Another feature is an arrangement of the special plunger with a special set of contacts in the telephone circuit and with the line switching contacts so that if the handset has been removed from the cradle to close the line switching contacts the depression of this special plunger will open these contacts and close the special contacts, the line switching contacts functioning to open the direct current path through the telephone circuit across the line conductors and the special contacts functioning to close a connection across the two line conductors including the receiver and the ringing condenser only. This arrangement may be used in cases where, for example, a subscriber has removed his handset from the cradle, dialed a desired number and encountered a busy tone on the line. In such cases he may depress the special plunger to clear

the busy tone, instead of replacing the handset for this purpose, and thereby continue to listen in on the line to determine when it is again free for his use. Also in some systems a connection extended from the subscriber's line to an operator is held until the operator disconnects. Here too the subscriber may, if he wishes, set up the special listening circuit and listen until the operator frees his line. This arrangement may also be used in the case of a party line subscriber system using dialing equipment where the subscriber at one station may listen in on the line without disturbing the dialing or talking from another station. In this case the listening subscriber may depress the special plunger first and then remove the handset for listening. Should the party line be of the local battery type the listening may be done by a subscriber without drain on his own battery as the direct current path is opened by the depression of the special plunger and the listening path includes only the receiver and a condenser.

The invention has been illustrated in the accompanying drawings in which

Fig. 1 shows a perspective of the usual telephone set with the handset lifted from the cradle in the stand;

Fig. 2 shows a side view of this telephone set with a part of the housing removed to expose parts of the applicant's invention;

Fig. 3 shows a part of the inside of the stand viewed from the bottom exposing parts of the applicant's invention;

Figs. 4, 5 and 6 are fragmentary views showing various positions of the special plunger in the stand;

Figs. 7 to 10 show various positions of the line switching contacts and the special contacts during the manipulation of the telephone set;

Fig. 11 shows a circuit diagram of a dial equipped telephone set to which the applicant's invention has been applied; and

Fig. 12 shows a circuit diagram of a local battery telephone set to which the applicant's invention has been applied.

The telephone set shown in these figures consists of a housing 1 having a cradle 2 in which two plungers 3 are located and in which may rest the handset 4 shown in Fig. 1. On the front face of the housing 1 is the usual dial 5 and the particular set shown also includes a number of push-buttons 6 that may be used for various purposes. On the front face of this housing on the right-hand side near the cradle is shown protruding a special plunger 7 that may be operated according

to the applicant's invention. The usual plungers 3 extend through the cradle 2 and engage a lever 10 pivoted on the shaft 11 as shown in Figs. 2 and 3 in particular. This pin 11 is mounted on ears on a special bracket 14 on which is also mounted a series of contact springs such as the two sets of line switching springs 15 and 16 and the special spring 17 which when operated may make contact with one of the springs 15. The circuit conditions with which these contact springs are to be used are such that one of the springs 15 serves both as a line switching contact spring and a special contact spring in connection with spring 17. In the circuit diagram Fig. 11 the sets of springs have been shown as three separate sets, the line switching sets marked 15 and 16, respectively and the special set marked 17 for the sake of convenience. When the handset 4 is on the cradle, the plungers 3 are depressed and operate on the lever 10 which through its extension 18 and insulation bottom 19 maintains the line switching springs 15 and 16 opened, and when the handset is removed, the tension on springs 15 and 16 rotates the lever 10 to raise the plungers 3 so as to open them. The special plunger 7 is shown in Fig. 4 in its normal position, that is, the position it will occupy when the plungers 3 are depressed by the handset 4 in the cradle. This plunger is connected at 20 to lever 21 mounted on the shaft 11 alongside the lever 10. It is held in this normal position by having an extension arm 24 engaging the lever 10 at 25 as it is pressed against the lever 10 at 25 by means of another insulated extension 26 engaging the spring 17 which is tensioned so as to force the plunger and its lever 21 in this position.

In Fig. 5 the plunger 7 is shown in its raised and locked position. That is, it has been pulled out manually a certain distance from the front face of the housing and pushed upward so that a notch 30 thereon engages the edge 31 of the housing. In moving the plunger to this position, it should be observed that the extension 24 thereon will rotate the lever 10 in the clockwise direction to permit the line switching springs 15 and 16 to close their connections. As the lever 10 is rotated, it will also lift the plungers 3 in the cradle upwardly and raise the handset slightly from its normal position in the cradle as shown in Fig. 5. It should be observed that the weight of the handset on the plungers 3 and the associated mechanisms will hold the plunger 7 in the locked position. When the handset 4 is removed from the plungers 3, the springs 15 and 16 will rotate the lever 10 a further distance and thus slightly raise the plunger 7 to permit it to release from its locked position on the side of the housing at 31 under tension of a spring 32 so that when the handset is again replaced on the cradle, this plunger will be restored to its normal position.

If, as shown in Fig. 6, the plunger 7 is depressed, into the housing, it will cause the insulated extension 26 on the lever 21 to engage the spring 17 and move it to engage one of the springs 15 but this engagement will not disturb the condition of the line switching springs so that if the handset has been removed from the cradle, the springs 15 and 16 will remain closed, or if the handset is in the cradle, the springs 15 and 16 will remain opened. In Figs. 7 to 10 the various positions of the contacts have been illustrated diagrammatically. In Fig. 7, for example, it is assumed that the handset is resting in the cradle and the special plunger 7 is in normal position. That is, springs 15 and 16 are open and the con-

nection between the spring 17 and one of the springs 15 is also opened. Fig. 8 shows the condition of the springs when the handset is resting in the cradle and the special plunger 7 is raised. That is, the raising of the plunger 7 will close the springs 15 and 16 while the spring 17 remains disengaged from one of the springs 15. Fig. 9 shows the condition of the springs when the handset is removed from the cradle and the plunger 7 is depressed. That is, the connection between spring 17 and one of the springs 15 is closed and the connections at springs 15 and 16 are open regardless of the fact that the handset is removed from the cradle. Fig. 10 shows the condition of the springs when the handset is removed from the cradle with the plunger 7 in normal position, that is, with the connection between springs 17 and one of the springs 15 open and the connections at springs 15 and 16 closed.

If reference is not made particularly to Fig. 11, and to the positions of the springs in Figs. 7 to 10, the manipulation of the subscriber's set will now be described for the various positions in accordance with the applicant's invention. Normally, of course, the condition of the springs 15, 16, 17 are as shown in Fig. 7. If it is desired to dial without removing the handset from the cradle, the plunger 7 may be raised as shown in Fig. 5 and the springs will then be in the position shown in Fig. 8. That is, springs 15 and 16 will be closed and a connection for the dial will be established over the line conductors through contacts 16 and when the dial is operated, the connection at contacts 42 across the conductors 40 will be alternately opened and closed, while the connection over contacts 43 will remain closed while the dial returns to normal as is the usual practice. When dialing is completed the subscriber naturally will remove the handset from the cradle thus permitting the cradle plungers 3 to rise to maintain the springs 15 and 16 closed to maintain the line connection for the receiver and transmitter circuits in the handset for talking. The usual transmitter circuit extends from one line conductor through springs 16, contacts 42, transmitter, primary winding of induction coil 45 back to the other line conductor. The receiver circuit is completed from the receiver, contacts 46 and springs 15, the middle winding of the induction coil 45 back to the receiver, while the usual anti-side tone circuit extends from the receiver contacts 46, springs 15, the secondary winding of repeating coil 45, condenser 48 back to the receiver. In removing the handset, it will be noted that the plunger 7 will be released from its raised and locked position.

In case the subscriber encounters a busy signal after he has removed the handset, the usual procedure would be to restore the handset to abandon the call. Should he then desire to call another number it may happen, if he removes the handset too soon after having replaced it, that the busy tone has not yet been cleared from the line even though the line switching springs 15 and 16 were momentarily opened to release the previous connection. In order to avoid this condition and simplify the procedure of calling another number, the subscriber may instead as soon as he hears the busy tone depress the special plunger 7 to open the springs 15 and 16 and close the springs 17 and thereby open the regular transmission and receiving circuits and close a circuit for the receiver from one line conductor

through the ringing condenser 49, springs 17, contacts 46 and the receiver, primary winding of the induction coil 45 to the other line conductor and thus the subscriber is enabled to continue to listen to the busy tone and at the same time the line is open until the previous connection is released. Therefore as soon as the busy tone ceases, he may release the plunger 7 to normal and when dial tone is received to proceed with the dialing of the next number.

Should the subscriber's station shown in Fig. 11 be connected to other similar subscribers' stations on a party line, the special plunger 7 may be used for still another purpose, namely, any subscriber on this party line could by depressing his plunger 7 and then remove his handset, listen in on the conversation or the dialing carried on at another subscriber's station without disturbance as he would merely close his circuit across the line through his receiver and the condenser 49. That is, there would be no direct current path established across the line conductors through the springs 15 and 16 at this station that would interfere with the call at said other station.

The subscriber set shown in Fig. 12 may be of the usual local battery type in which the battery 60 is in the transmitter circuit and the magneto ringing apparatus 61 may be used for ringing and with the usual line switching contacts 62 arranged to close the transmitter and receiver circuit to the line conductors by the use of plungers in the cradle when the handset is removed. This set may also be equipped according to the applicant's invention with the special plunger 7 for closing a connection by a special spring contact 63 across the line conductors including the receiver and the ringing condenser 64. If a plurality of local battery stations are connected to a party line, listening by one party to the conversation over the line by any other party may be done without drain on his own battery. In this case the listening subscriber may first depress the special plunger 7 to close the contact 63 and maintain the contacts 62 open and then remove his handset from the cradle to listen. The line circuit through the battery 60 is therefore maintained opened to prevent drain of this battery during listening.

What is claimed is:

1. In a telephone system, a subscriber's telephone stand having a handset and a cradle therefor, ringing, talking and listening circuits, contact springs in said stand, a plunger in said cradle normally operated upon by the handset resting in the cradle to actuate said contact springs to maintain said talking and listening circuits open, and to close said circuits when the handset is removed from the cradle, another plunger in said stand outside of said cradle and operative to actuate said contact springs to open the talking and listening circuits and to shunt the ringing circuit and establish a different listening circuit.

2. In a telephone system, a subscriber's telephone stand having a handset and a cradle therefor, a ringing circuit, a transmitter circuit, two receiver circuits, contact springs in said stand, plungers in said cradle normally operated upon by the handset resting in the cradle for actuating said contact springs to maintain the transmitter circuit and one of said receiver circuits open and operative when the handset is removed from the cradle for actuating said springs to close the transmitter circuit and said last-mentioned receiver circuit, another plunger in said stand out-

side of said cradle manually operative on said contact springs to shunt the ringer, close the other receiver circuit and open the transmitter circuit and said first-mentioned receiver circuit.

3. In a telephone system, a subscriber's telephone set having a handset and a cradle therefor, a ringing circuit, a transmitting circuit, two receiver circuits and contact springs in said stand, plungers in said cradle, a lever controlled by said plungers when said handset is resting in said cradle and engaging said plungers for actuating said contact springs to maintain said transmitter circuit and one of said receiver circuits open and when said handset is removed from the cradle to release said plunger to permit said contact springs to close said open transmitter circuit and said open receiver circuit, another plunger outside of said cradle, a second lever attached to said other plunger, said second lever operating when the associated plunger is manually depressed on said first lever to open the transmitter circuit and said last-mentioned receiver circuit and cause another set of contact springs to shunt the ringer and close the other receiver circuit.

4. In a telephone system, a subscriber's stand having a handset, a ringing circuit, a transmitter circuit and two receiver circuits, plungers in said stand, two of said plungers controlled by the handset and one manually controllable, means responsive to the plungers controlled by said handset for actuating said contact springs to close said transmitter circuit and one of the receiver circuits, and means responsive to said other plunger for opening said last-mentioned circuits and for closing the other receiver circuit in shunt of the ringer.

5. A telephone stand having a handset and a cradle, plungers in said cradle, a manually operable plunger outside of said cradle, contact spring sets in said stand, means for maintaining open two of said contact spring sets by said plungers in the cradle when the handset is resting in the cradle and for causing them to close when the handset is removed, and means responsive to the manual operation of said single plunger for opening said two sets of contact springs and closing another set of contact springs.

6. A telephone subscriber's stand having a handset and a cradle therefor, plungers in said cradle, a manually operable plunger outside of the cradle and contact spring sets inside said stands, means for closing connections at two of said sets of contact springs operating on release of said plungers in the cradle when the handset is removed from the cradle, means operating on said first-mentioned means for opening the connections at said two sets of contact springs and close a connection at another set of contact springs operative on the manual depression of said other plunger while the handset is removed from the cradle and for closing the connection at said two sets of contact springs operative in response to the lifting of said other plunger while the handset remains on the cradle, and means for locking said other plunger in a lifted position while the handset remains in the cradle, and means for unlocking the lifted plunger and cause it to return to a neutral position operative when the handset is removed from the cradle.

7. A telephone subscriber's stand having a handset and a cradle therefor, plungers in said cradle, a manually operable plunger outside of said cradle and contact spring sets inside said stand, means for closing certain contacts in said sets on release of the plungers in the cradle when

the handset is removed, for opening said contacts and closing others on the depression of the other plunger while the handset remains removed, for closing said first-mentioned contacts on the lifting of said other plunger after the handset has been replaced, for locking said other plunger in lifted position, and for releasing it when the handset is again removed.

8. In a telephone system a subscriber's telephone stand having a handset and a cradle therefor, a talking circuit and two listening circuits, contact springs in said stand, a plunger in said cradle normally operated upon by the handset resting in the cradle to actuate said contact springs to maintain said talking circuit and one of said listening circuits open and to close said circuits when the handset is removed from the cradle, and another plunger in said stand outside of said cradle and operative to actuate said contact springs to open the talking circuit and said last-mentioned listening circuit and to close said other listening circuit.

9. In a telephone system, a subscriber's telephone stand having a handset and a cradle therefor, a talking circuit and two listening circuits, contact springs in said stand, a plunger in said cradle normally operated upon by the handset

resting in the cradle to actuate said contact springs to maintain said talking circuit and one of said listening circuits open and to close said circuits when the handset is removed from the cradle, and another plunger in said stand operative to actuate said contact springs to open the talking circuit and said last-mentioned listening circuit and to close said other listening circuit.

10. In a telephone system, a subscriber's telephone stand having a handset and a cradle therefor, ringing and talking circuits, two listening circuits, two sets of contact springs in said stand, a plunger in said cradle normally operated upon by the handset resting in the cradle for actuating one of said sets of contacts to maintain said talking circuit and one of said listening circuits open and to close said circuits when the handset is removed from the cradle, another plunger in said stand outside of said cradle and operative to actuate both said sets of contact springs to open said talking and listening circuits if the handset is removed from the cradle and to shunt the ringing circuit and to close said other listening circuit.

OSCAR A. SHANN.