

Dec. 28, 1943.

D. H. KING

2,337,900

TELEPHONE APPARATUS

Filed Nov. 29, 1940

4 Sheets-Sheet 1

FIG. 1

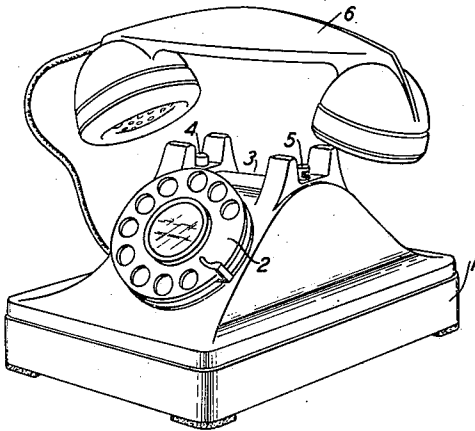


FIG. 7

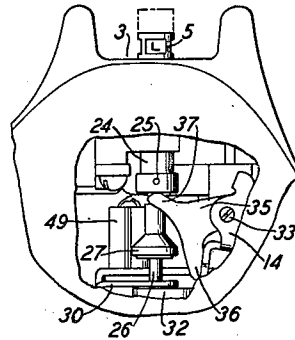


FIG. 3

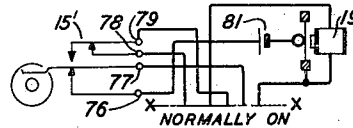
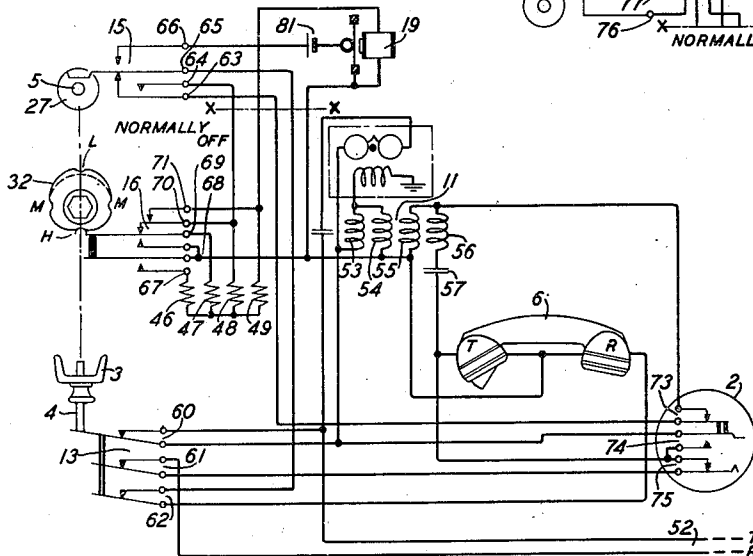


FIG. 2



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FIG. 18

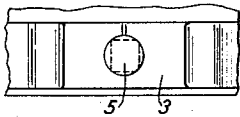


FIG. 4

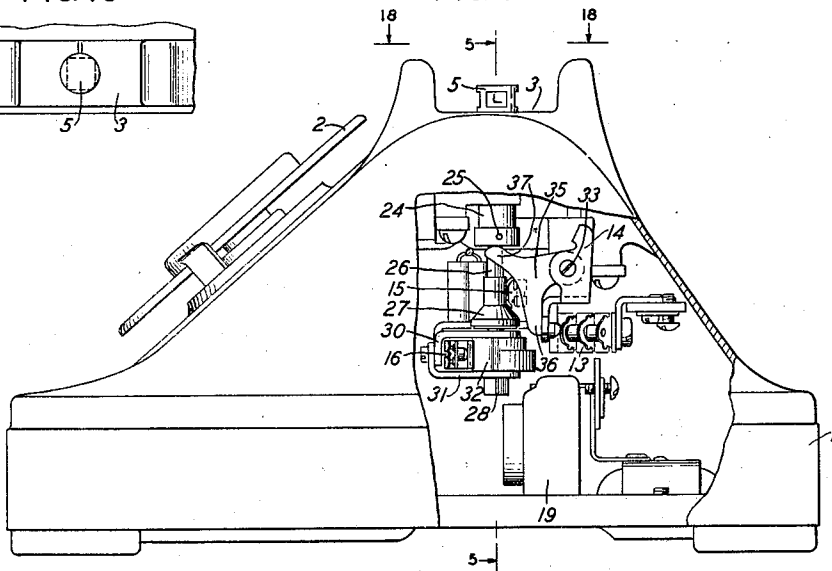
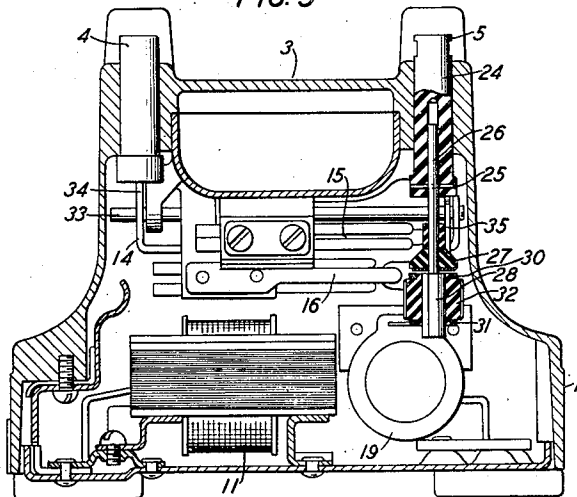


FIG. 5



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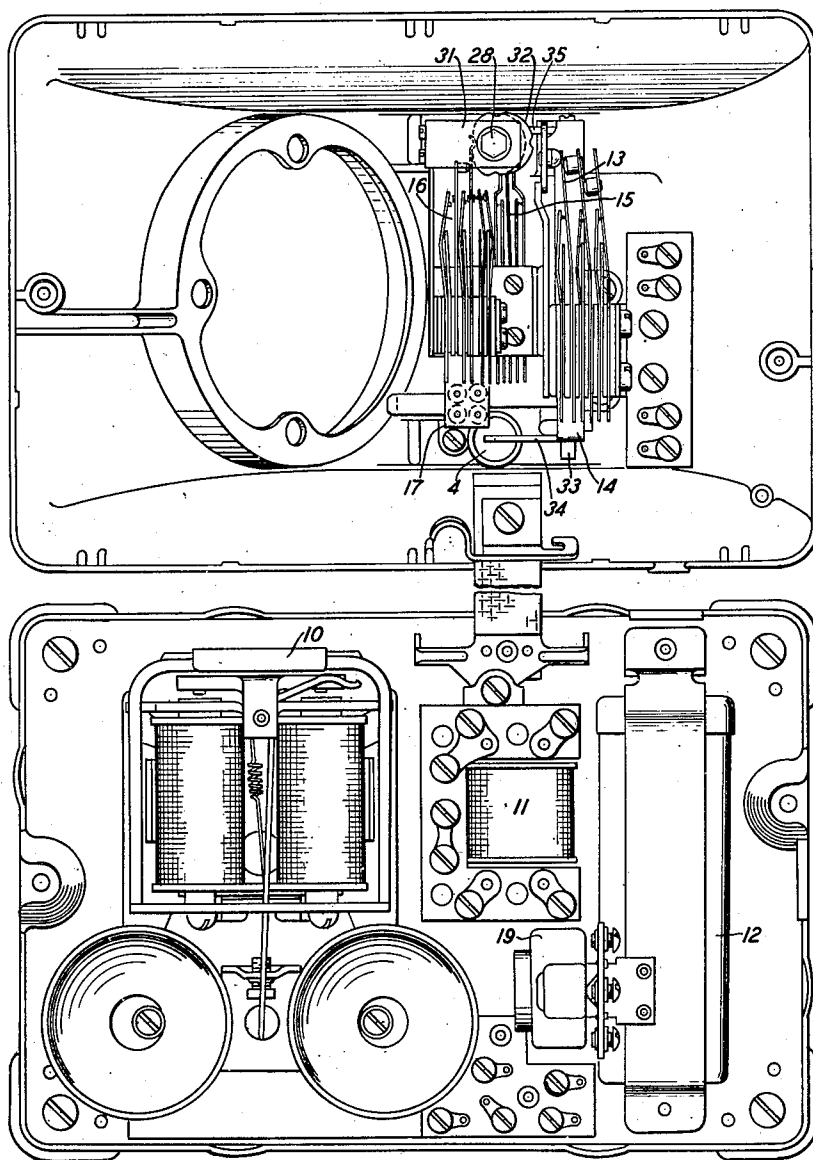
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TELEPHONE APPARATUS

Filed Nov. 29, 1940

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FIG. 6



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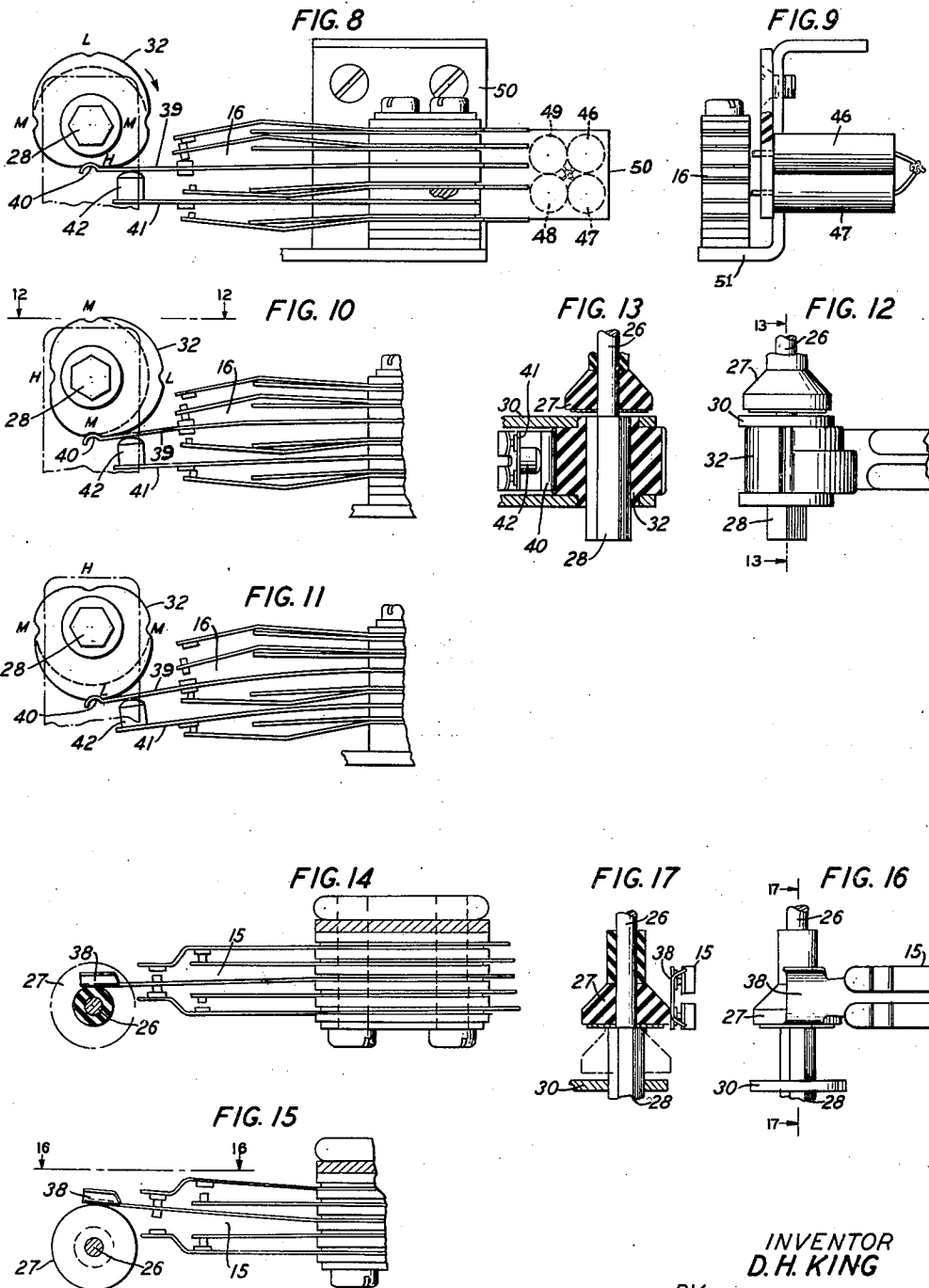
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TELEPHONE APPARATUS

Filed Nov. 29, 1940

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,337,900

TELEPHONE APPARATUS

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Application November 29, 1940, Serial No. 367,679

18 Claims. (Cl. 179—100)

This invention relates to telephone apparatus and particularly to improvements in subscriber telephone sets.

An object of the invention is to increase the usefulness of telephone systems in general and, in particular, to extend the use of such telephone systems to people who are hard of hearing, and to simplify the construction and manipulation of telephone sets for such uses.

Heretofore systems have been employed for amplifying and adjusting at will the acoustic output of telephone apparatus by, for example, coupling receivers to amplifying apparatus whereby the acoustic output of the receiver is amplified by an amplifying equipment and to adjust such equipment to various degrees, as required by the listener, or to provide means whereby the acoustic output of loud-speakers may be variously controlled and amplified, or to provide means for changing at will the intensity of sound of an audiphone to suit sensitive ears.

It is a feature of the present invention to provide in a telephone set instrumentalities for controlling means for amplifying the sound output of receivers including an amplifier and a volume control device. These instrumentalities consist of a plunger mechanism in the cradle of the handset whereby the lifting of the plunger controls spring contact arrangements to cut out or cut in the amplifying device in the telephone circuit, depending on whether it is desired to retain the amplifier in the telephone circuit normally without lifting the plunger and removing it from the telephone circuit when the plunger is lifted or whether it is desired to have the amplifier removed normally from the telephone circuit without lifting the plunger and include it in the telephone circuit when the plunger is lifted, and whereby the rotation of the plunger to different positions controls spring contact arrangements to different contact closing and opening positions to adjust to various corresponding degrees the volume control device to control the effect of the amplifier on the receiver output.

The invention has been illustrated in the accompanying drawings in which:

Fig. 1 shows a telephone desk set in which the handset is shown removed from the cradle and disclosing plungers for manipulation of the set;

Fig. 2 is a typical circuit diagram of circuit connections and contact spring combinations for controlling the amplifier control devices and for the use of the telephone set for establishing connections to a central office;

Fig. 3 is a fragmentary modified circuit diagram of a portion of the telephone circuit shown in Fig. 2;

Fig. 4 is a side view of the telephone set disclosed in Fig. 1 with a portion of the housing removed to show the mechanism relating primarily to the plunger mechanism forming part of the applicant's invention;

Fig. 5 is a cross-section taken on the line 5—5 of Fig. 4 showing said plunger mechanism and various other interior parts of the telephone set;

Fig. 6 is a view of the telephone set with the housing opened to show the location of the various apparatus contained therein;

Fig. 7 is a fragmentary view of the telephone set showing a certain position of the plunger mechanism;

Figs. 8 to 13 show the spring contact arrangements for manipulating the control device to regulate the volume of the amplifier device, in various rotary positions of the plunger and details of the plunger mechanism for this purpose;

Figs. 14 to 17 show the spring combination for cutting in or cutting out the amplifier device from the telephone circuit with the springs in various positions and the plunger mechanism relating to the control of this spring combination; and

Fig. 18 is a top view of a portion of the cradle with a plunger to show the construction in regard to the rotary control of this plunger.

Referring now to the drawings, in Fig. 1 a typical telephone set has been shown comprising a housing 1, a dial 2 mounted thereon, a cradle 3, containing a plunger 4 for control of the switchhook contacts and a plunger 5 which form parts of the applicant's invention with regard to the amplifier and volume control equipments and the handset 6 shown removed from the cradle 3.

In Fig. 6, the various apparatus that are enclosed in the housing 1 have been indicated, such as an ordinary ringer 10, an induction coil 11, condensers 12, switchhook contacts 13, controlled by the plunger 4 through a cradle member 14, contact springs 15, controlled by the plunger assembly 5 for cutting in or cutting out the amplifying device, spring contacts 16 controlled by the rotation of the plunger 5 to control the volume control of the amplifier, resistance elements 17 forming part of the volume control system that may be connected to the contacts 16 for controlling the amplifier output, as will be described hereinafter, and an

amplifying device 19 which may be of the mechanical type well known in the art and comprising in general a coil, a diaphragm and a carbon button, as has been illustrated diagrammatically at 19 in Figs. 2 and 3.

The plunger mechanism for controlling the amplifier and the volume control device may consist of the plunger element 24 which extends through an aperture in the housing 1 to protrude outside of the cradle. This plunger element is connected by means of a pin 25 to a shaft 26. On this shaft 26 is slidably mounted an insulation bushing 27. This bushing 27 has a cone-shaped lower portion for controlling the contact springs 15 which, as stated, control the insertion or removal of the amplifier from the telephone circuit. The shaft 26 at its lower end is enlarged and of a hexagonal cross-section, as shown at 28, and is slidable in a cam 32 which is journaled to rotate in a support comprising the brackets 30 and 31 secured to the housing. Thus the rotation of the shaft 26 will rotate the cam 32, although the shaft 26 may be moved longitudinally in the cam 32. This cam 32 controls the volume control springs 16 in various manners as will be described hereinafter. The bracket 14 which is mounted on a shaft 33 engages, as hereinbefore mentioned, the plunger 4 by means of an extension 34 so that when the plunger is released by the removal of the handset the bracket will operate on the switchhook contacts 13. At the opposite end of this bracket is secured a lever 35 on the shaft 33 which engages the bracket by means of extension 36 and by means of another extension 37 engages a shoulder on the plunger element 24 so that the depression of plunger element 24, that is to say the plunger assembly 5, the switching contacts 13 may be operated to disconnect the telephone set from the line. The purpose of the loose lever 35 is to permit the plunger 4 to operate the contact 13 to flash the operator independent of the operation of the plunger element 5. This lever and bracket arrangement per se does not form part of the applicant's invention.

When the handset is removed from the cradle, the plunger 4 will be slightly raised to the position shown in Fig. 5 and the lever 14 through the projection 34 will be permitted to rotate under control of the switchhook contacts 13 so as to permit these contacts to perform their usual circuit closing function. The movement of this lever 14 will also rotate the lever 35 to slightly raise the plunger element 24 to the position shown in Fig. 5. The raising of the plunger element 24, however, will not raise the contact bushing 27 sufficiently to cause the operation of the springs 15. However, if the plunger element 24 is raised further manually, the bushing 27 will be raised sufficiently to cause the operation of the spring contacts 15. This position of the plunger and bushing 27 is shown in Fig. 17, and, with the bushing 27 in cross-section, it should be noted that the cone-shaped portion thereof has engaged the spring member 38 of the springs 15 towards the right to cause the springs 15 to establish connections as indicated in Fig. 15 from the normal position of the springs 15 as shown in Fig. 14. Fig. 16 shows the spring element 38 and the construction of the same and of the other spring elements of springs 15. Each of these other spring elements may consist of a single spring which is bifurcated at its end and provided with individual contacts in a manner well known in the art. After the plunger element 24

has been raised in this manner, it should be noted that it will return the same distance downwardly until a lowered shoulder of the element 24 comes in contact with the projection 37 of the lever 35 without disturbing the bushing 27 in its operated position as the bushing 27 is slidable on the shaft 26. The position occupied therefore of the plunger element 24, after the bushing 27 has been raised, is indicated in Fig. 7. The dotted line above the top of the plunger element 24 indicates the extent to which the plunger is raised in order to raise the bushing 27 to its operated position. The purpose of having the bushing 27 slidably mounted on the shaft 26 is to permit the return of this bushing to normal when the plunger element 24 is depressed by the replacing of the handset in the cradle and at the same time permits the plunger element 24 to be employed for operating the lever 35 independently of the movement of the bushing 27 in case the subscriber desires to flash by depressing the plunger element 24 while the handset is off the cradle. For this reason also, and for the purpose of permitting the plunger to be raised and lowered, the shaft 26 is slidable in the bushing 27.

In Figs. 8 to 13 the operating characteristics of the plunger element 5 and the cam 32 have been shown. The plunger element 24 may be rotated from a normal position into either of three succeeding positions at right angles thereto and back to the normal position. As indicated by the dotted lines in Figs. 4, 7, 8, 10 and 11, for example, the normal position is marked L, the second position is marked M, the third, H, and the fourth, N to indicate low, medium and high control positions of the volume control device to control the amplification of the amplifier accordingly, as will be described hereinafter in connection with the circuit diagram of Figs. 2 and 3.

The spring element 39 is provided with a hook 40 which engages the cam surfaces of cam 32 at the depressions in the cam to be shifted in various positions to establish corresponding connections between all of the springs in the group 16. The spring element 41 follows the operations of the spring element 39 at all times through a stud 42. The cam may be so constructed that in a normal position, when the connections between the various springs in group 16 are as shown in Fig. 8 (indicated by the letter H), the springs will regulate the volume control device to permit high amplification of the sound output from the receiver; that in a second position when the cam has been rotated 45 degrees in the direction indicated by the arrow the connections and the springs are as shown in Fig. 9 (indicated by the letter M), the springs will regulate the volume control device to permit an intermediate increase in amplification of the sound output from the receiver; that in a third position, when the cam is moved another 45 degrees in the same direction as indicated by the arrow and the springs are as shown in Fig. 11 (indicated by the letter L), the springs will regulate the volume control device to permit a lower increase in the amplification of the sound output of the receiver; that in a fourth position, when the cam is moved another 45 degrees in the same direction and the springs are again as shown in Fig. 9 (indicated by the letter M), the springs will again regulate the volume control device to permit the intermediate amplification of the sound output of the receiver, and that if the cam is then rotated a final 45 degrees in the same direction the springs

will return to their normal position, as shown in Fig. 8.

The above-mentioned resistance elements 17 that form part of the volume control equipment may consist of four resistance elements 46 to 49 mounted on a bracket 50 which in turn is mounted on a bracket 51 on which the contact springs 16 are mounted, as shown in Figs. 8 and 9 in particular, the brackets 51 being secured to the mounting 1 in any suitable manner.

Referring now to the circuit diagram in Figs. 2 and 3, descriptions will be made of the arrangements for cutting in or cutting out the amplifier 19 in circuits with the receiver and to modify, by the volume control equipment, the sound output of the receiver as controlled by the amplifier.

In Fig. 2, if the handset 6 is removed from the cradle 3, the plungers 4 and 5 will be raised a short distance to permit the switching contacts 13 to operate to connect the telephone set to the line 52. In this case the amplifier contacts 15 will be arranged as in Fig. 2 to normally have the amplifier disconnected. The transmitter circuit would then extend from the tip conductor of the line 52, contacts 60 of the switching contacts 13, windings 53 and 54 of the induction coil 11, the transmitter, contacts 73 of dial 2, contact 61 of the switching contacts 13 to the ring conductor, and the receiver circuit will be established through the receiver, contacts 62 of the switching contacts 13, contacts 65 and 66 of the spring contacts 15, contacts 73 of the dial 2, winding 55 of the induction coil 11, back through the receiver and an induction path through the coils 55 and 56 of the induction coil 11, condenser 57 and the transmitter back to the coil 55. Thus, normally, with the plunger 5 in the position it occupies if the handset is removed from the cradle, the amplifier 19 would not be included to effect the output of the receiver. If, however, it is desired to include the amplifier 19 in the receiver circuits, the operator would lift the plunger 5 to operate the contact springs 15 and, if the plunger 5 is not rotated from normal to include any of the resistances 46 to 49 in the receiver circuits, the amplifier would effect the receiver output to amplify it to the full capacity of the amplifier. The circuits for the receiver and the amplifier would then be traced as follows with the springs 16 in normal position as shown in Fig. 8: from the receiver, contacts 62 of the springs 13, contacts 65 and 66 of springs 15, a battery 81, the carbon button and diaphragm of the amplifier 19, back to the receiver and another circuit through the winding of the amplifier 19, contacts 71 and 70 of the springs 16, contacts 64 and 63 of the springs 15, contacts 73 of the dial 2, winding 55 of the induction coil 11, back through the winding of the amplifier 19. Thus the speech currents, as induced in coil 55 of the induction coil 11 from the line 52, would energize the coil of the amplifier 19 accordingly and effect the circuit through the receiver, carbon button and diaphragm of the amplifier 19, over the circuits described to amplify the sound output of the receiver accordingly. As none of the resistances 46 to 49 are included in the circuit for the coil of the amplifier at this time, it would operate at full capacity, that is, a so-called high amplification would be produced in the receiver.

If it is decided to have the amplifier included but with a medium amplification, the plunger 5 may be rotated at an angle of 45 degrees to oper-

ate the springs 16 into the positions shown in Fig. 10. In this case the amplifier circuit will extend from the coil 19, winding 55 of induction coil 11, contacts 73 of dial 2, contacts 63 and 64 of springs 15, resistances 48 and 49 in series, back through the winding 19 with resistance 47 in parallel with resistance 48, through contacts 70 and 69 of springs 16 and resistance 46 in parallel with the coil 19 and resistance 49, through contacts 67 and 68 of springs 16. Thus this arrangement causes the amplifier coil to be effected by speech currents at a medium rate and, consequently, the receiver circuit will be correspondingly effected to amplify the current at a corresponding medium rate.

On the other hand, if it is desired to have the amplifier included but with a lower or minimum amplification, the plunger 5 is rotated another 45 degrees to operate the springs 16 into the positions shown in Fig. 11. In this case the amplifier circuit extends through winding 19, induction coil winding 55, contacts 73 of dial 2, contacts 63 and 64 of springs 16, resistances 48 and 49 in series, back to winding 19 and with the resistances 46 and 47 in parallel through contacts 69, 67 and 68 of springs 16, across the winding 19 and resistance 49. Thus this arrangement causes the amplifier coil to be effected by speech currents at a low rate and correspondingly the receiver circuit will be similarly effected to amplify the speech accordingly. If the plunger 5 is rotated still another 45 degrees, the spring 16 will again be conditioned as shown in Fig. 10 to establish a medium amplification as described and the plunger may then be rotated the remaining 45 degrees back to normal. A person, therefore, who desires to have the speech current amplified can, by lifting the plunger 5 and rotating it from the normal through the other three positions, cause the amplification to be correspondingly modified to suit particular requirements, while other persons, such as secretaries that employ the telephone more frequently and do not require amplification, may use the telephone without any manipulations of the plunger 5.

Under other circumstances when the telephone is to be used more frequently by a person or persons requiring speech amplification, and less frequently by other persons that do not require such amplification, the plunger arrangement may be such that the amplifier is normally included in the receiver circuit. With the plunger 4 in normal position, such persons that use the telephone more frequently may, therefore, merely lift the handset from the cradle and rotate the plunger 5 to modify the amplification to various degrees, while persons using the telephone less frequently may lift the plunger 5 to cut out the amplifier. The circuit arrangement for this type of installation is shown in Fig. 3 which may be substituted for the portion above the line X—X in Fig. 2, that is, the combination of springs 15 shown in Fig. 2 may be arranged in accordance with 15' as shown in Fig. 3. It will be noted, if Figs. 2 and 3 are combined in this manner, that the springs 15' are arranged so that the circuit for the amplifier normally extends from the amplifier winding 19, springs 71 and 70 of the group 16, contacts 73 and 79 of group 15', contacts 73 of the dial 2, winding 55 of the induction coil 11, back to the amplifier winding 19, and the receiver circuit extends from contacts 62 of switching springs 13, contacts 77 and 76 of the springs 15', battery 81, carbon button and diaphragm of the amplifier

19, back to the receiver. Thus, the amplifier will amplify the speech currents at the highest possible rate normally. If it is then desired to modify the amplification to a medium or a lower rate, the plunger 5 may be rotated to corresponding succeeding angular positions of 45 degrees to include resistances in the same manner as hereinbefore described in connection with the Fig. 2 for this purpose.

Other persons who do not require amplification in the circuit may, of course, remove the amplifier by lifting the plunger 5 and thus exclude the amplifier 19 from the receiver circuit which will then extend from the receiver, contacts 62 of the springs 13, contacts 77 and 79 of the springs 15, contacts 73 of the dial 2 back through the receiver.

With these circuit arrangements in mind it is, therefore, readily seen that the applicant's invention may be applied to a number of different service requirements for including or cutting out the amplifier and to modify the amplification to individual needs under different circumstances of use of the telephone instrument.

What is claimed is:

1. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a plunger in said cradle, means for actuating said switching contacts in response to the movement of said plunger when the handset is removed from the cradle, a second set of contacts operable in response to a longitudinal movement of the plunger, a third set of contacts, and a member controlled by rotary movement of the plunger for operating said third set of contacts.

2. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a plunger in said cradle, means for actuating said switching contacts in response to the movement of said plunger when the handset is removed from the cradle, a second set of contacts operable in response to a longitudinal movement of the plunger, a third set of contacts, and a member controlled by a rotary movement of the plunger for operating said third set of contacts in different manners depending on the extent of the rotary movement of said plunger.

3. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a plunger in said cradle operable in a longitudinal movement when the handset is removed from the cradle, means for actuating said set of line switching contacts in response to said longitudinal movement of the plunger, a second set of contacts operable in response to a further longitudinal movement of the plunger, and a third set of contacts operable in response to a rotary movement of the plunger.

4. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a first plunger and a second plunger in said cradle operable in a longitudinal movement when the handset is removed from the cradle, means for actuating said set of line switching contacts in response to said longitudinal movement of said plungers, a second set of contacts operable in response to a further longitudinal movement of the second plunger, and a third set of contacts operable in response to a rotary movement of said second plunger, said

first set of line switching contacts being released on the manual restoring of either of said plungers independently.

5. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a first plunger and a second plunger in said cradle operative in longitudinal movement when the handset is removed from said cradle, means for actuating said set of line switching contacts operable in response to said longitudinal movement to the two plungers, a second set of contacts, means responsive to a further longitudinal movement of said second plunger for actuating said second set of contacts, a third set of contacts, means responsive to a rotary movement of said second plunger for actuating said third set of contacts in certain definite manners depending on the extent of said rotary movement, said first means being operable to restore said first set of line switching contacts in response to the restoring of either of said plungers from its actuated position in regard to its longitudinal movement.

6. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a plunger in said cradle, means including a set of line switching contacts for moving said plunger upwardly and for operating said line switching contacts operable when the handset is removed from said cradle, a second set of contacts, an enlarged portion on said plunger operable to actuate said second set of contacts in response to a further upward movement of said plunger, a third set of contacts, and a cam member operable in response to a rotary movement of the plunger to rotate therewith and to actuate said third set of contacts in different combinations depending on the extent of the rotary movement imparted to said plunger.

7. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a plunger in said cradle, means including a set of line switching contacts for moving said plunger upwardly and for operating said line switching contacts operable when the handset is removed from said cradle, a second set of contacts, a member loosely mounted on said plunger operable to actuate said second set of contacts in response to a further upward movement of said plunger, a third set of contacts, and a cam member operable in response to a rotary movement of the plunger to rotate therewith and to actuate said third set of contacts in different combinations depending on the extent of the rotary movement imparted to said plunger.

8. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a plunger in said cradle, means operable in response to the removal of the handset from the cradle for moving said plunger upwardly and for actuating said set of line switching contacts, a second set of contacts, an enlarged portion of said plunger operable to actuate said second set of contacts in response to a further upward movement of said plunger, a third set of contacts, a cam member operable in response to a rotary movement of the plunger to rotate therewith and to actuate said third set of contacts in different combinations depending on the extent of rotary movement imparted to said plunger.

9. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of contacts, a plunger in said cradle, means operable in response to the removal of the handset from the cradle for moving said plunger upwardly and for actuating said set of contacts, a second set of contacts, a member loosely mounted on said plunger operable to actuate said second set of contacts in response to a further movement of said plunger, a third set of contacts, a cam member operable in response to a rotary movement of the plunger to rotate therewith and to actuate said third set of contacts in different combinations depending on the extent of rotary movement imparted to said plunger, said plunger and its loose member being so arranged that if the plunger has been operated in its further longitudinal movement and is then restored to normal it will first cause said means operable in response to the removal of the handset from the cradle to be operated by the plunger's return to normal to restore said first set of contacts and then cause said loose member to restore said second set of contacts.

10. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a set of line switching contacts, a plunger in said cradle, means operable when the handset is removed from the cradle for moving said plunger upwardly and for actuating said set of line switching contacts, a second set of contacts, a collar on said plunger operable only by a further longitudinal movement of the plunger for actuating said second set of contacts, a third set of contacts, a second collar on said plunger operable only by a rotary movement of said plunger for actuating said third set of contacts, said second collar being shaped to act on said third set of contacts to operate them in different combinations in response to different corresponding degrees of rotary movement of said plunger.

11. In combination, a telephone handset, a stand therefor having a cradle member in which the handset normally rests, a voice amplifying device in said stand, a volume control device for said amplifying device, a plunger in said cradle operable in a longitudinal movement when the handset is removed from the cradle, a set of contacts operable in response to a further longitudinal movement of the plunger, means responsive to the actuation of said set of contacts for connecting the amplifying device in circuit with said handset, a second set of contacts, a member controlled by a rotary movement of the plunger for actuating said second set of contacts, and means responsive to the actuation of said second set of contacts for operating said volume control device.

12. In combination, a telephone handset including a receiver, a stand having a cradle member in which the handset normally rests, sound amplifying means for the receiver in said stand, a plunger operative when the handset is removed from the cradle, and means controllable by said plunger for controlling said amplifying means to regulate the sound output of the receiver to various values.

13. In combination, a telephone handset, a stand therefor in which the handset normally rests, sound amplifying means in said stand, contacting and circuit means, a plunger operable when the handset is removed from the cradle through one kind of manual movement of the

plunger for operating said contacting and circuit means to associate said amplifying means with or disassociate it from said handset and operable through a different kind of manual movement for operating said contacting and circuit means to regulate the effectiveness of said amplifying means.

14. In combination, a telephone handset including a receiver, a stand therefor having a cradle member in which the handset normally rests, a voice amplifying device in said stand, a volume control device for said amplifying device, a plunger in said cradle operable when the handset is removed from the cradle, a set of contacts operable in response to a longitudinal movement of the plunger, means responsive to the actuation of said contacts for connecting the amplifying device in circuit with the receiver, a second set of contacts, a member controlled by a rotary movement of the plunger for actuating said second set of contacts in different combinations depending on the extent of the rotary movement of the plunger, and means responsive to the actuation of said second set of contacts in said different combinations for operating said volume control device to corresponding volume controlling conditions.

15. In combination, a telephone handset including a receiver, a stand therefor having a cradle member in which the handset normally rests, a line, a telephone circuit for said handset connectable to said line, a voice amplifying device in said stand, a circuit connecting said amplifying device with the receiver, a volume control device, a circuit connecting said volume control device with said amplifying device to regulate its volume, a plunger in said cradle, contact means controlled by movements of said plunger operative when the handset is removed from the cradle for connecting said handset, amplifying device, and volume control device to said line, a set of contacts operated in various combinations in response to different movements of the plunger, and means responsive to the operation of said set of contacts in said different combinations for adjusting said volume control device to control said amplifying device to amplify the talking current through the receiver accordingly.

16. In combination, a line, a telephone handset including a receiver, a stand having a cradle member in which the handset normally rests, sound amplifying means for the receiver in said stand, circuit means in said stand including one set of contacts for connecting the handset to the line, a second set of contacts for connecting the sound amplifying means to the receiver and a third set of contacts for controlling said sound amplifying means to regulate the sound output of the receivers to various values, and a plunger mechanism operated in a longitudinal movement when the handset is removed from the cradle for actuating said first set of contacts, operable by a further longitudinal movement for actuating said second set of contacts and operable by a rotary movement for actuating said third set of contacts.

17. In combination, a telephone line, a telephone handset including a receiver, a stand therefor having a cradle member in which the handset normally rests, a voice amplifying device in said stand, a volume control device for said amplifying device, a set of contacts, a first plunger and a second plunger in said cradle operative in a longitudinal movement when the

handset is removed from said cradle, means for actuating said set of contacts to connect said line in circuit with said handset and operative in response to said longitudinal movement of the plungers, a second set of contacts, means including a collar on said second plunger operative only in response to a further longitudinal movement of said second plunger for actuating said second set of contacts to connect the amplifying device in circuit with the receiver in said handset, a third set of contacts and means including a second collar on said second plunger, operative only on a rotary movement of said second plunger for actuating said third set of contacts, in certain definite manners, depending on the extent of said rotary movement, to connect said volume control device with said amplifying device to cause it to control the sound output of said amplifying device in accordance with the different manners of operation of said second collar during the rotary movement of the second plunger.

18. In combination, a line, a telephone handset including a receiver, a stand having a cradle

member in which the handset normally rests, sound amplifying means for the receiver in said stand, circuit means in said stand including one set of contacts for connecting the handset to the line, a second set of contacts for connecting the sound amplifying means to the receiver, and a third set of contacts for controlling said sound amplifying means to regulate the sound output to the receiver to various values, a plunger in said cradle, means operative when the handset is removed from the cradle for moving said plunger upwardly and for actuating said first set of contacts, a collar on said plunger operable only by a further upward movement of the plunger for actuating said second set of contacts, a second collar on said plunger operative only by a rotary movement of the plunger for actuating said third set of contacts to operate them in different combinations in response to corresponding degrees of rotary movement to regulate the sound amplifying means to produce corresponding sound output values in the receiver.

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