Feb. 10, 1942. H. F. OBERGFELL 2,272,474

TELEPHONE SUBSTATION APPARATUS

Filed July 22, 1938 3 Sheets-Sheet 1

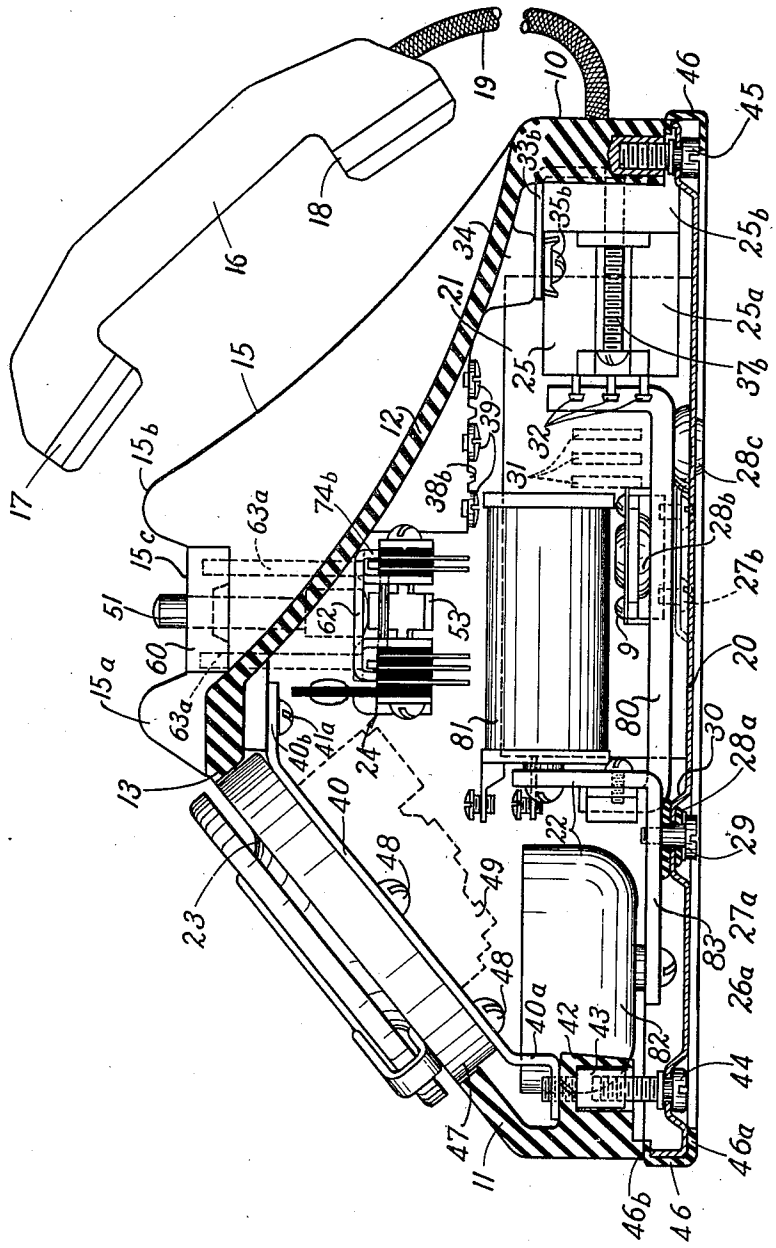


Fig. 1

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Filed July 22, 1938 3 Sheets-Sheet 2

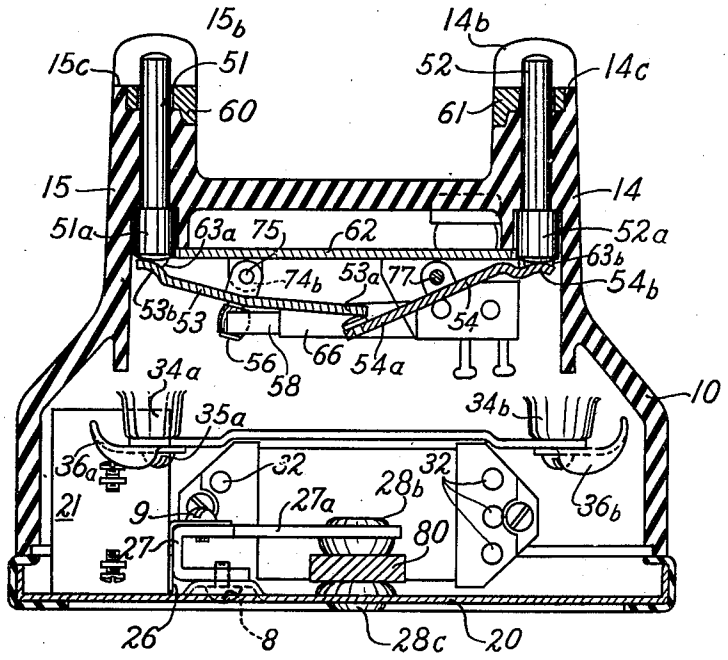


Fig. 2

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Filed July 22, 1938 3 Sheets-Sheet 3

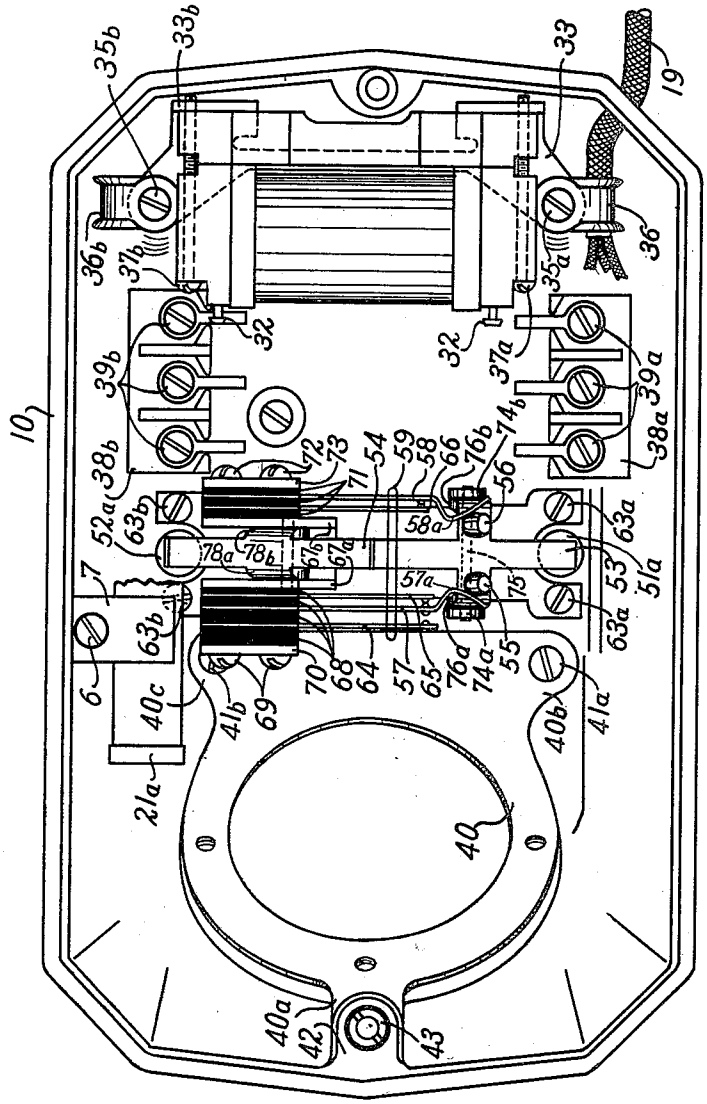


Fig. 3

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UNITED STATES PATENT OFFICE

2,272,474

TELEPHONE SUBSTATION APPARATUS

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Application July 22, 1938, Serial No. 220,735

1 Claim. (Cl. 179—164)

The present invention relates to telephone substation apparatus and more particularly to improvements in telephone desk or table sets of the hand set type.

In modern telephone instruments of the character mentioned, the substation equipment is usually housed within the base which carries the hand set supporting cradle. This equipment includes the substation ringer, the induction coil, the cradle switch and the terminal block to which connection is made with the conductors of the cord extending to the set. Usually, the dialing mechanism, when provided, is mounted upon a wall of the base so that the operating parts thereof are enclosed by the base and the dial is conveniently located for use. In the older forms of this type of instrument, a cradle switch including a single operating plunger or button extending exteriorly of the base and arranged to control the switch contact springs mounted within the base has been used. In the sets of more recent design, on the other hand, the cradle switch utilized is provided with two operating plungers which are positioned between the prongs forming a part of the cradle for supporting the hand set. With this latter type of cradle switch, it is desirable to provide an arrangement such that the switching mechanism mounted within the base of the set is operated when either or both of the operating plungers are depressed.

It is an object of the present invention to provide an improved, exceedingly simple and compact cradle switch for use in a telephone set of the character described which includes two operating members extending through the base of the set and is so arranged that operation of either of the two members results in the operation of the switch.

The invention is illustrated in its embodiment in a telephone set which comprises a base provided with a cradle portion and an inclined surface having an opening therein through which the dial mechanism is adapted to extend. The frame of the dial mechanism is secured to a bracket member mounted within the base and extending substantially parallel to the opening, the arrangement being such that the frame of the dialing mechanism is supported out of engagement with the walls of the opening when mounted upon the bracket member. The improved cradle switch assembly comprises a pair of operating members, each extending through the base and each operable in response to removal of the hand set from the cradle portion of the structure and also in response to replacement of the hand set upon the supporting cradle. This switch further comprises a switching mechanism mounted within the base structure and including one operating lever operative in response to operation of one of the operating members and a second operating lever operative in response to operation of the other of the operating members and independently of the first-mentioned lever. More particularly, the two operating levers are each pivotally mounted intermediate their ends within the base and have overlapping end portions whereby one of the levers is pivoted about its axis in response to a predetermined pivotal movement of the other lever. One of the levers includes an end portion biased to engage one of the plungers and is pivoted about its axis in response to operation of the associated operating member or plunger. The other of the levers has an end portion biased to engage the other of the operating members and is pivoted about its axis in response to operation of the said other operating member. A contact spring assembly, including movable contact springs arranged to be actuated in response to movement of a finger carried by one of the operating levers, is provided for performing the usual circuit switching operations.

The novel features believed to be characteristic of the invention are set forth with particularity in the appended claim. The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the specification taken in connection with the accompanying drawings, in which Figure 1 is a view, partially in section, of an improved telephone set having embodied therein the features of the invention as outlined above, Fig. 2 is an end view, partially in section, of the telephone set illustrated in Fig. 1, and Fig. 3 is a bottom view of the telephone set illustrated in Fig. 1 with the bottom cover removed therefrom.

Referring now to the drawings, the telephone set there illustrated comprises a mounting or base 10 provided with four substantially perpendicular lower walls and two inclined upper walls 11 and 12 which converge and terminate in a substantially flat ledge portion 13. The base 10 also includes a cradle portion which comprises two side ribs 14 and 15 extending upwardly from the inclined wall 12 and each provided with two upstanding prongs definining a recess within which the hand set of the instrument is adapted to be supported. Thus, the side rib 15 is provided with a pair of upwardly extending prongs 15a

and 15b connected by a ledge 15c which, in cooperation with the prongs, define a recess for receiving the handle of the hand set. The configuration of the side rib 14 is identical with the configuration of the side rib 15 shown in Fig. 1. The hand set of the instrument is indicated at 16 as comprising a receiver 17 and a transmitter 18 interconnected with the other elements of the substation circuit by means of the conductors embodied in a connecting cord 19. It will be noted that, when the hand set 16 is supported upon the cradle portion of the base 10, the lower surface of the handle thereof is displaced from the outer surface of the inclined wall 12 so that a finger receiving recess is provided therebetween which facilitates easy removal of the hand set from the cradle.

The base 10 is formed of an insulating material, such, for example, as Bakelite, and is preferably moulded in one piece. In moulding the base 10, the bottom thereof is left open in order to facilitate the mounting of the various elements of the substation apparatus within the chamber defined by the above-described wall structure, a cover plate 20 being provided for closing the chamber defined by the walls of the base. A portion of the substation apparatus is mounted directly upon the walls of the base 10 and the remaining elements of the set are mounted upon the cover plate 20. More particularly, this apparatus comprises a condenser 21 and a ringer 22 mounted upon the cover plate 20, and a dialing mechanism 23, a cradle switch 24, a second condenser 21a and an induction coil 25 mounted directly upon the inner walls of the base 10. The mounting arrangement for the condenser 21 comprises a bracket member secured to the side of the condenser housing and having an outwardly extending projection secured to a bracket piece 27 by means of screws 9. The U-shaped bracket piece 27 is mounted upon the cover plate 20 by means of screws 8 extending through the cover plate and threaded into tapped openings provided in the bracket piece 27, the heads of the screws 8 being effectively countersunk in raised wells formed in the cover plate in the manner illustrated.

The ringer 22 comprises a field structure including a polarizing permanent magnet 80 and a pair of windings, one of which is indicated at 81. Also embodied in the ringer are a pair of bells, one of which is shown at 82, carried by a bracket piece 83, and a striker assembly, not shown, of conventional arrangement. For the purpose of preventing the cover plate 20 and any other solid structure mechanically connected thereto from exerting a damping influence upon the bells of the ringer 22 during operation of the ringer, a mounting assembly of the cushion type is used for supporting the ringer upon the cover plate 20. This mounting assembly comprises four soft rubber grummets three of which are shown at 28a, 28b and 28c and mounting screws 29. More specifically, the annular recess provided in the soft rubber grummet 28a snugly engages the adjacent surfaces of an opening formed in a raised portion 30 of the cover plate 20, and the mounting screw 29 extends through a central opening provided in the grummet 28a and is threaded into a tapped opening provided in the bracket piece 83 of the ringer 22. The second grummet 28b is carried by the outer end of a projecting portion 27a of the bracket piece 27 which extends over the magnet bar 80, so that the lower side of this grummet 28b engages the upper surface of the magnet bar to prevent the right end of the ringer assembly from tilting upward. The third grummet 28c is mounted in an opening provided in the cover plate 29 so that the enlarged upper portion thereof supports the right end of the magnet bar 80 as viewed in Fig. 1. By providing the described resilient mounting arrangement for the ringer, vibrations of the ringer bells developed during operation of the device are not transmitted to the cover plate 20, the base 10, or to the object upon which the telephone set is supported and, hence, the sound output of the device is materially greater than the output obtained when the ringer is rigidly secured to one of the members of the base structure. For the purpose of permitting sound waves developed during operation of the ringer 22 to be transmitted to the outside of the base 10, a plurality of rectangularly shaped slits 31 are provided in evenly spaced-apart relation around the lower perpendicular side walls of the base 10.

The induction coil 25 is illustrated as being of the closed magnetic circuit type, having two sections 25a and 25b. The section 25a, upon which the windings of the coil are wound, is preferably formed of moulded Bakelite having the core laminations embedded therein and is provided with two oppositely disposed winding heads within which the terminal inserts 32 are partially embedded. It will be understood that the terminals of the induction coil windings are brought out and connected to the terminal inserts 32 in the usual manner. The core section 25b is also formed of moulded Bakelite having the core laminations embedded therein and extending throughout the length thereof. This core section is provided with enlarged heads of substantially the same contour as the winding heads of the core section 25a and, in the assembled position of the coil, the adjacent flat surfaces of the heads of the two sections 25a and 25b are brought into engagement so that the ends of the two core halves are separated only by a narrow gap to provide a substantially closed magnetic circuit for the coil. The induction coil 25 is mounted upon a bracket piece 33 which is rigidly supported upon downwardly extending projections 34a and 34b, formed integrally with the base 10, by means of screws 35a and 35b. The assembly screws 35a and 35b also function to anchor cable clamps 36a and 36b, the first of which is arranged to clamp the cable 19 against the inner wall of the base 10 and the second of which serves to clamp the line conductor cord, not shown, against the inner wall of the base 10. The two core sections 25a and 25b of the induction coil 25 are mounted upon downwardly extending portions of the bracket piece 33 by means of assembly screws 37a and 37b extending through registering openings provided in the adjacent heads of the core sections and threaded into tapped openings provided in the bracket piece 33. The terminal blocks for the telephone set are formed integrally with the base 10 and comprise projections 38a and 38b extending downwardly from the inclined wall 12 of the base. These projections have embedded therein brass insert pieces, not shown, which are tapped to accommodate terminal screws 39a and 39b. The small condenser 21a is mounted upon the inner wall of the base 10 by means of a clamp 7 anchored to the base 10 by a mounting screw 6.

For the purpose of supporting the dialing mechanism 23, there is provided an annular bracket piece 40 which extends substantially parallel with the inclined wall 11 of the base 10

and is provided with mounting feet 40a, 40b, and 40c, the last two of which are secured to projections extending downwardly from the ledge portion 13 of the base by means of assembly screws 41a and 41b, respectively. The third mounting foot 40a rests upon a ledge formed by a projection 42 extending inwardly from one of the perpendicular end walls of the base 10. This foot is rigidly anchored to the projection 42 by means of an assembly screw 43 having its enlarged head countersunk in the projection 42 and threaded into a tapped drill hole provided in the foot 40a. The enlarged head of the screw 43 is drilled and tapped to receive the threaded portion of an assembly screw 44 which, in combination with a second assembly screw 45, is utilized to secure the cover plate 20 to the base 10. The two screws 44 and 45 are locked to the cover plate 20 and the heads thereof are effectively countersunk in raised wells provided in the cover plate in the manner illustrated. The screw 45 is threaded into a tapped drill hole provided in a metal insert piece embedded in the right perpendicular wall of the base 10 and, in combination with the other assembly screw 44, serves to clamp the rim of the cover plate against the lower edges of the base walls. For the purpose of preventing the cover plate from contacting the surface of the object upon which it is supported, a flexible cushioning element 46 formed of soft rubber is stretched around the rim of the cover plate 20 so that a portion 46a thereof extends inwardly around the peripheral portion of the cover plate and a portion 46b thereof is clamped between the cover plate and the bottom edges of the base 10 when the cover plate is mounted upon the base by the screws 44 and 45.

As shown, the dialing mechanism 23 is provided with a housing or frame 47 which projects through a circular opening formed in the inclined wall 11 of the base 10 out of contact with the side walls of the opening. This frame is secured to the bracket piece 40 by means of mounting screws 48. As diagrammatically indicated by the dotted line 49, a portion of the operating mechanism of the dialing mechanism projects through the opening provided in the annular bracket piece 40 so that an extremely compact arrangement is obtained.

Referring now in greater detail to the cradle switch 24, this switch comprises a pair of operating members or plungers 51 and 52 which extend through the base 10 and are respectively arranged to be engaged by pivotally mounted operating levers 53 and 54, the first of which carries a pair of fingers 55 and 56 for engaging the movable springs 57 and 58, respectively, of a switch spring assembly 59. More particularly, the plunger 51 is longitudinally slidable within the bearing surface formed by an opening extending through the base 10 and positioned midway between the prongs 15a and 15b defining one-half of the supporting cradle for the hand set. In order to limit the movement of the plunger 51 in an upward direction this plunger is provided with an enlarged head 51a which is adapted to abut the bottom of an enlarged portion of the opening during vertical movement of the plunger 51. The plunger 52, like the plunger 51, is journaled for longitudinal movement along the bearing surface formed by an opening extending through the base 10 and positioned intermediate the prongs 14a and 14b forming the other half of the hand set supporting cradle. This plunger is also provided with an enlarged head 52a which is adapted to engage the bottom of an enlarged portion of the opening to limit movement of the plunger in a vertical direction. The springs of the assembly 59 and the two levers 53 and 54 are supported upon a bracket piece 62 which is mounted within the base 10 by means of screws 63a and 63b. More particularly, the screws 63a extend through registering openings provided in the bracket piece 62 and the base 10 and are threaded into a metal insert plate 60 extending between the prongs provided on the side rib 15. Similarly, the screws 63b extend through registering openings provided in the bracket piece 62 and the base 10 and are threaded into a metal insert piece 61 extending between the prongs 14a and 14b of the side rib 14. The spring assembly 59 comprises, in addition to the movable springs 57 and 58, a pair of springs 64 and 65 associated with the movable spring 57 and a spring 66 associated with the movable spring 58. For the purpose of mounting the spring assembly upon the bracket piece 62, this bracket piece is provided with downwardly projecting extensions 67a and 67b. The springs 57, 64 and 65 are insulated from each other and from the bracket piece 62 by means of insulating pieces 68 and are mounted upon the bracket piece extension 67a by means of mounting screws extending through openings provided in a face plate 70 and registering openings provided in the insulating pieces 68 and the enumerated contact springs. These assembly screws are threaded into tapped drill holes provided in the extension 67a at appropriately spaced points. In a similar manner, the springs 58 and 66 are insulated from each other and from the bracket piece 62 by means of insulating pieces 71, and are mounted upon the bracket piece extension 67b by means of assembly screws 72 extending through openings provided in a face plate 73 and registering openings provided in the insulating pieces 71 and the springs 58 and 66. The assembly screws 72 are threaded into appropriately spaced tapped openings provided in the bracket piece extension 67b.

As indicated above, each of the operating levers 53 and 54 is pivoted intermediate its two ends, the arrangement being such that the inner end 54a of the lever 54 is arranged to overlap the inner end 53a of the lever 53. More particularly, the bracket piece 62 is provided with two depending portions 74a and 74b having extending therebetween a pivot rod 75 which extends through openings provided in bent over positions 76a and 76b of the lever 53, thereby pivotally to support this lever intermediate its two ends. The left end of the lever 53 is provided with a curved portion 53b which is adapted to be engaged by the rounded lower end of the plunger 51. The pivotal mounting for the lever 54 comprises a rod 77 extending between and mounted upon the bracket piece extensions 67a and 67b and also through openings formed in the overturned portions 78a and 78b of the lever 54. The right end of the lever 54 is provided with a curved portion 54b which is adapted to be engaged by the rounded lower end of the plunger 52. As illustrated in the drawings, the movable spring 57 is provided at its free end with a cam shaped portion 57a which is adapted to engage a roller formed of insulating material and mounted upon the operating finger 55. Similarly, the movable spring 58 is provided at its free extremity with a cam shaped portion 58a which is adapted to engage a roller formed of insulating material and

mounted upon the finger 56. The two movable contact springs 57 and 58 of the spring assembly 59 are biased toward each other so that the cam portions 57_a and 58_a thereof exert forces on the fingers 55 and 56 tending to pivot the lever 53 about the rod 75 in a clockwise direction as viewed in Fig. 2.

When the hand set 16 is supported upon the cradle portion of the base 10, the two plungers 51 and 52 are depressed downwardly from the position shown in Fig. 2 so that the lever 53 is pivoted in a counterclockwise direction and the lever 54 is pivoted in a clockwise direction. During the downward movement of the plungers occasioned by replacement of the hand set 16 upon the cradle portion of the base 10 and the consequent counterclockwise movement of the lever 53, the fingers 55 and 56, in cooperation with the cam portions 57_a and 58_a of the movable springs 57 and 58, move the two enumerated springs apart so that the spring 57 is moved out of engagement with its associated spring 65 and into engagement with its other associated spring 64, and the spring 58 is moved out of engagement with the spring 66. When the hand set is removed from the cradle for use, the biasing force exerted by the springs 57 and 58 on the fingers 55 and 56 causes the lever 53 to be pivoted in a clockwise direction to move the plunger 51 upward. Due to the engagement of the inner end 53_a of the spring 53 with the inner end 54_a of the spring 54, the last-mentioned spring is pivoted in a counterclockwise direction to move the plunger 52 upward. With the hand set removed from the cradle, the switch 24 is restored to its normal position when either of the two plungers 51 and 52 is depressed. Thus, if the plunger 51 is depressed, the lever 53 is pivoted in a counterclockwise direction and the fingers 55 and 56 thereof, in cooperation with the cam portions 57_a and 58_a of the springs 57 and 58, cause the two last-mentioned springs to be moved to their respective normal positions. Due to the weight of the plunger 52, the lever 54 is caused to follow the movement of the lever 53 when the plunger 51 is depressed. Alternatively, if the plunger 52 is depressed to the exclusion of the plunger 51, the lever 54 is positively moved in a clockwise direction and, due to the engagement between the two overlapping ends 54_a and 53_a of the two levers, the lever 53 is caused to move in a counterclockwise direction to return the switch 24 to its normal position. During such movement, the plunger 51, due to its weight, follows the movement of the lever 53. Obviously, when either of the two plungers 51 and 52 is depressed and then released, the cradle switch 24 is restored to the off-normal position illustrated in the drawings.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claim all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

A mounting for a hand telephone comprising a base provided with a cradle adapted to receive and support the hand telephone, first and second laterally spaced-apart plungers extending through said base and associated with said cradle, each of said plungers being independently operable in response to removal of the hand telephone from said cradle and to replacement of the hand telephone upon said cradle, a bracket mounted within said base, first and second laterally extending and aligned levers arranged within said base and mounted upon said bracket for pivotal movement about two laterally spaced-apart and longitudinally extending axes, each of said levers being mounted intermediate its ends upon said bracket, the outer ends of said first and second levers respectively cooperating with said first and second plungers, whereby said first and second levers are respectively operative in response to operation of said first and second plungers, the inner end of said first lever overlying the inner end of said second lever, whereby said first lever is operative independently of said second lever and also in response to operation of said second lever, a contact set arranged within said base and carried by said bracket, and means including an operative connection between said first lever and said contact set for governing the circuit controlling positions of said contact set.

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