

Nov. 2, 1943.

G. DEAKIN

2,333,299

TELEPHONE SUBSCRIBER'S SET

Filed Oct. 30, 1941

5 Sheets-Sheet 1

FIG. 1.

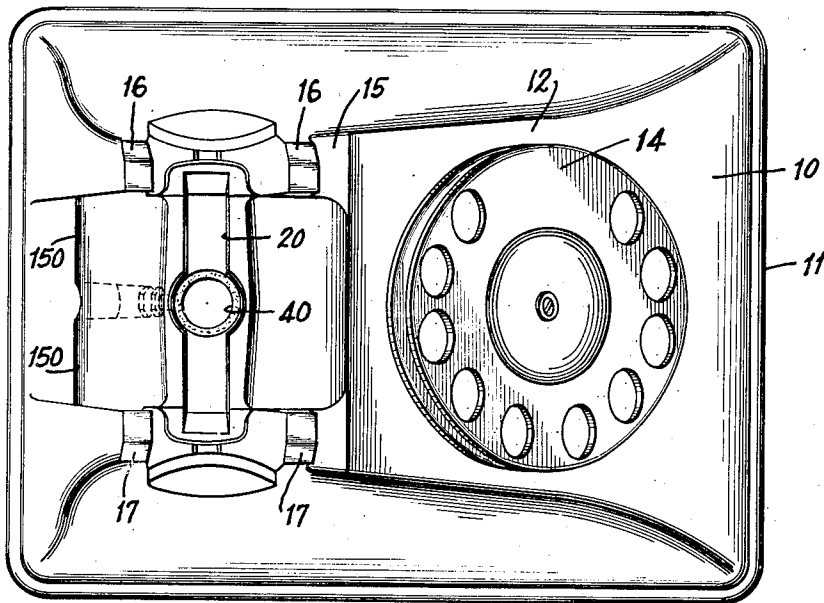
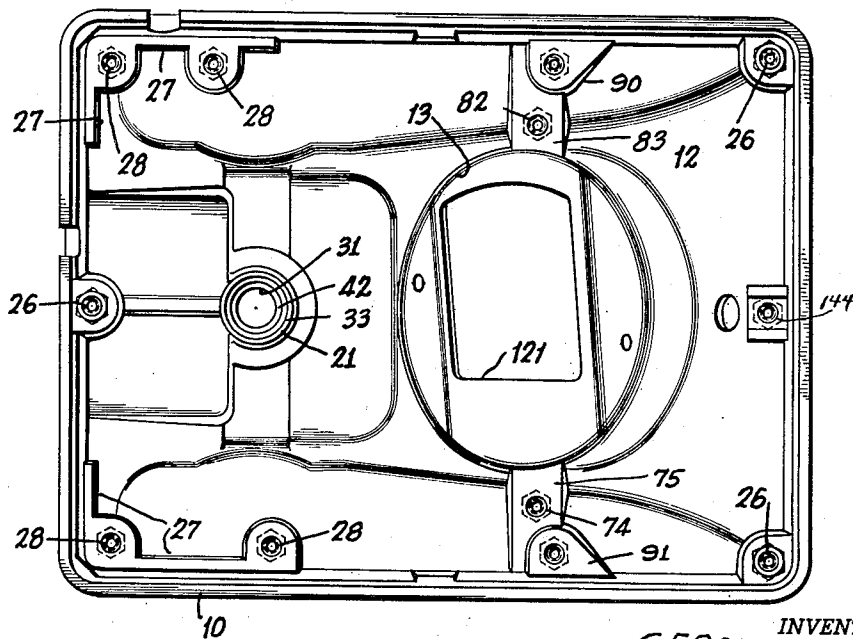


FIG. 2.



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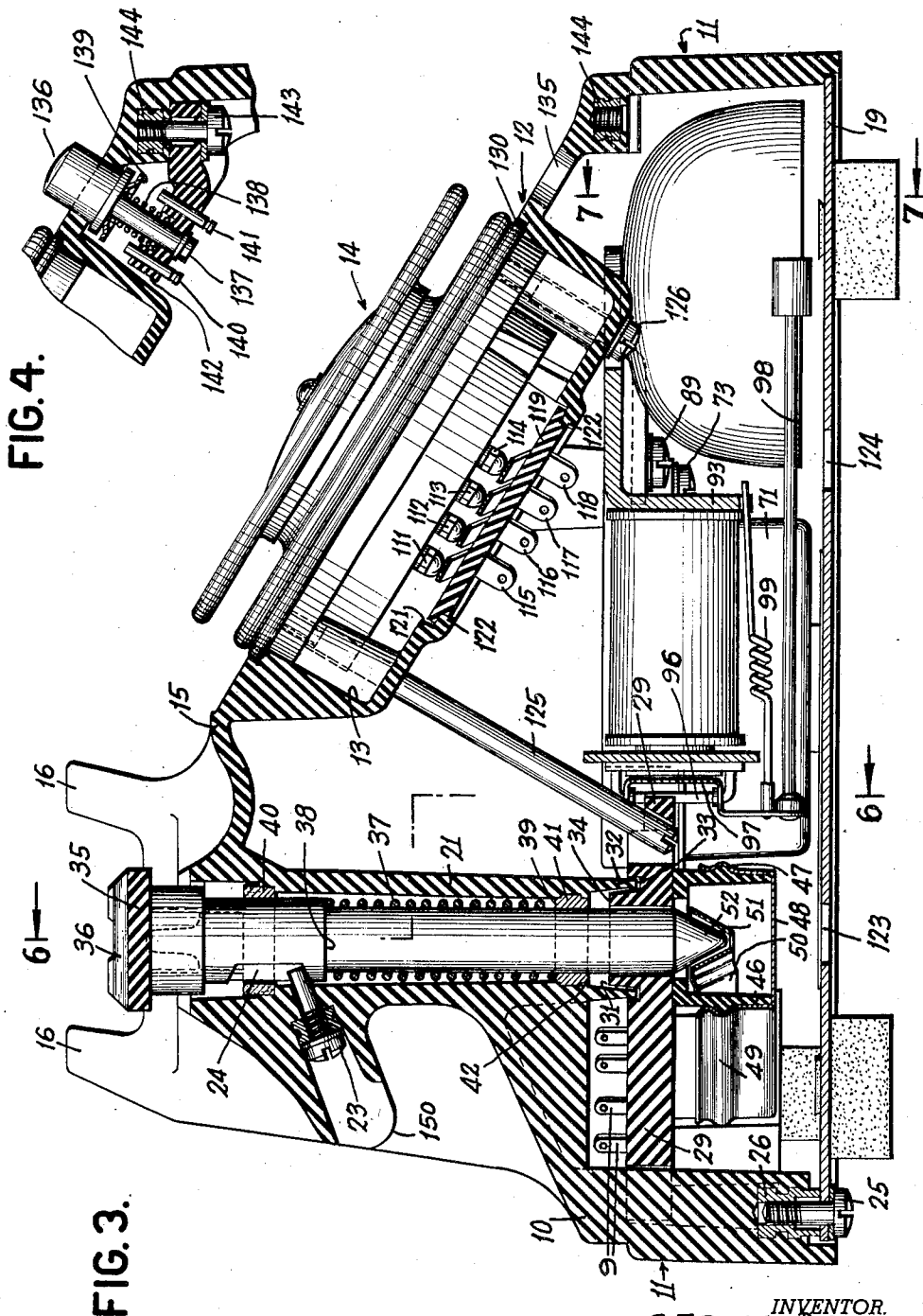
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Nov. 2, 1943.

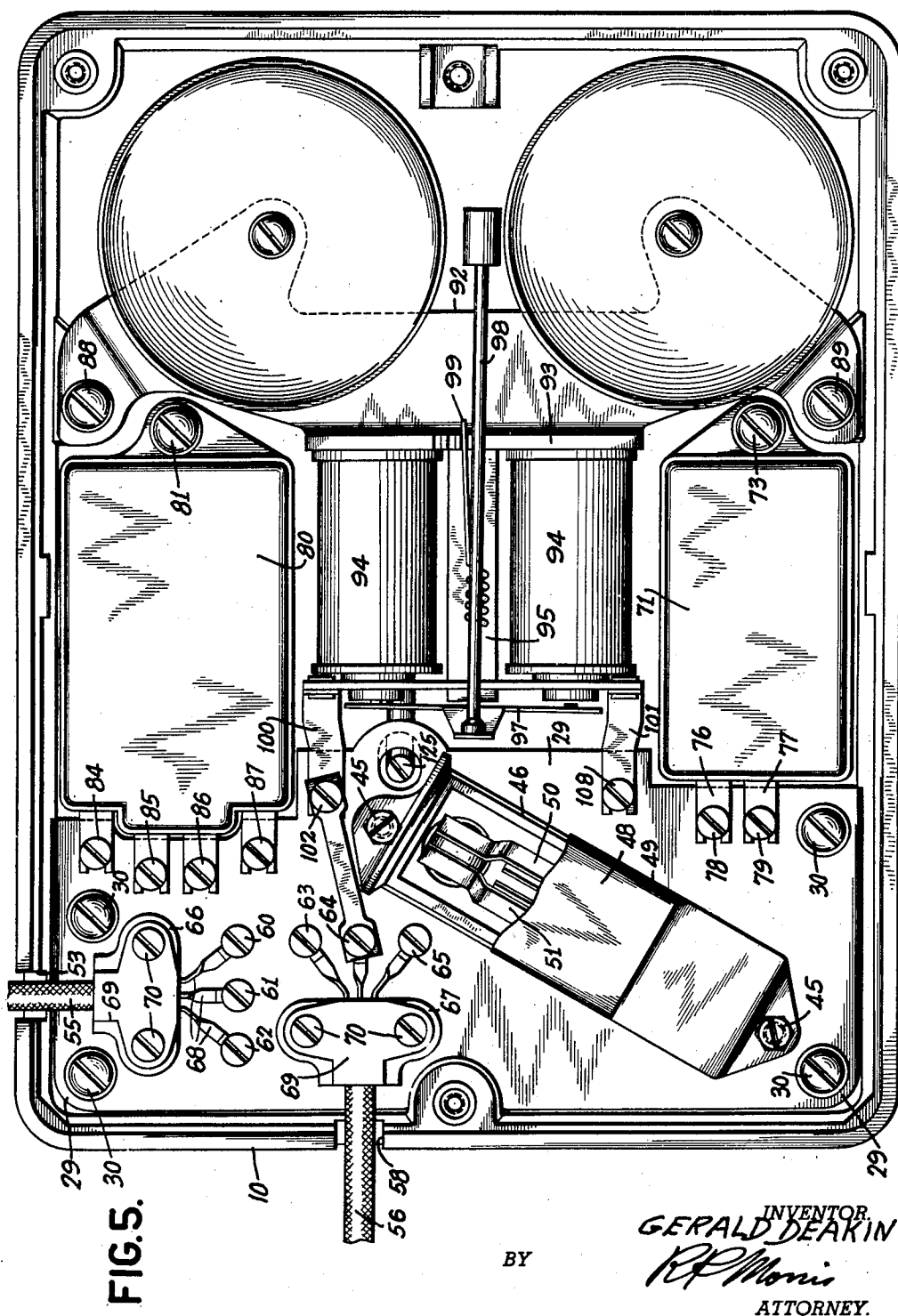
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FIG. 6.

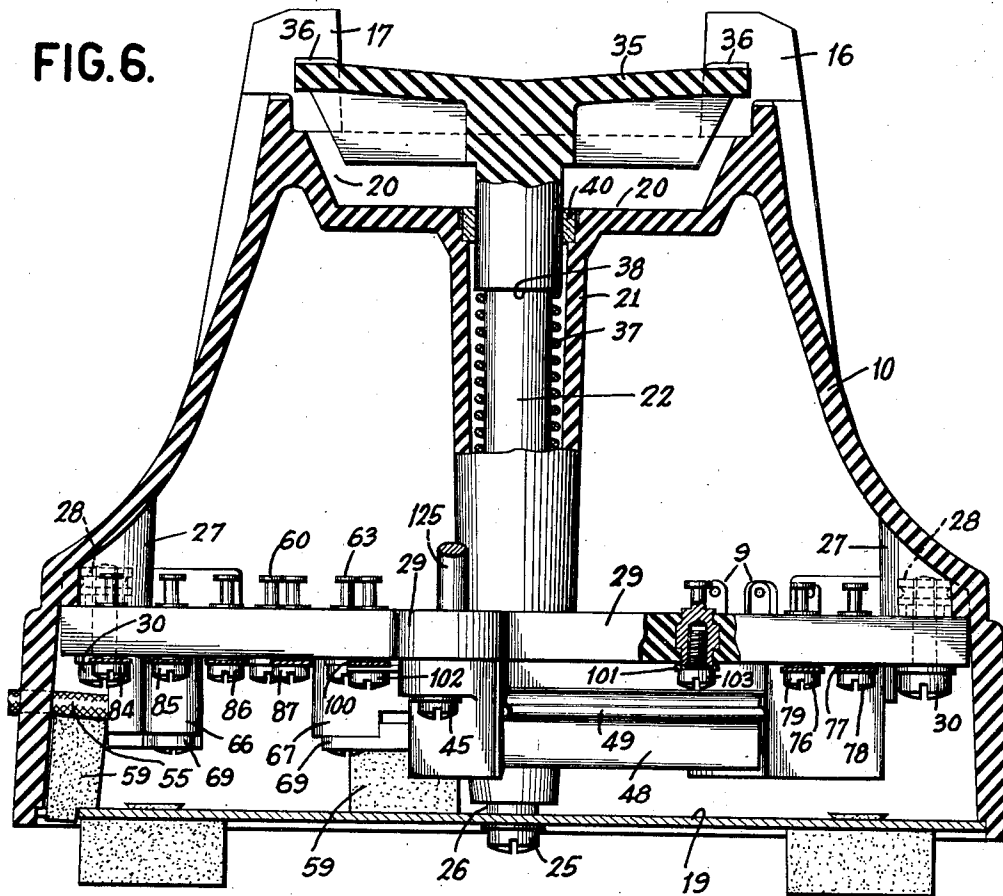
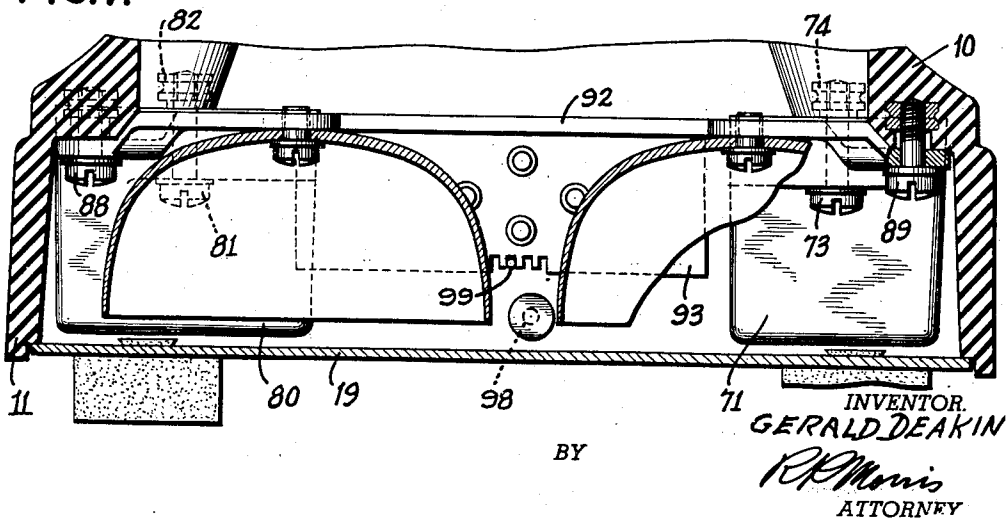


FIG. 7.



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FIG. 10.

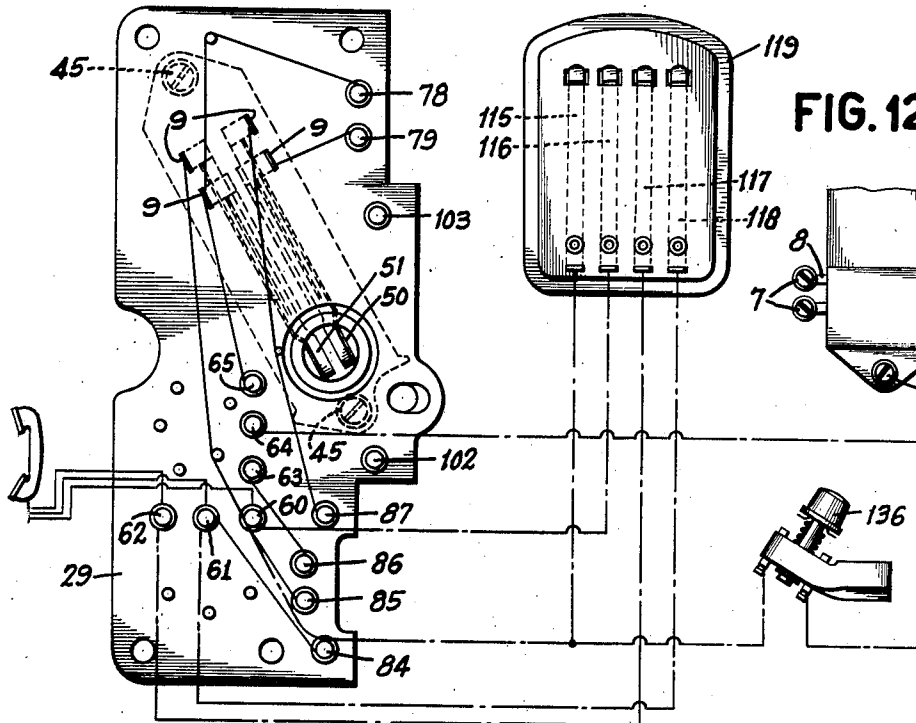


FIG. 12.

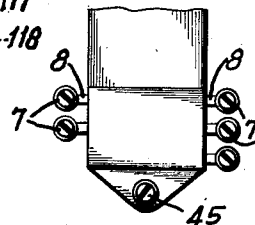


FIG. 8.

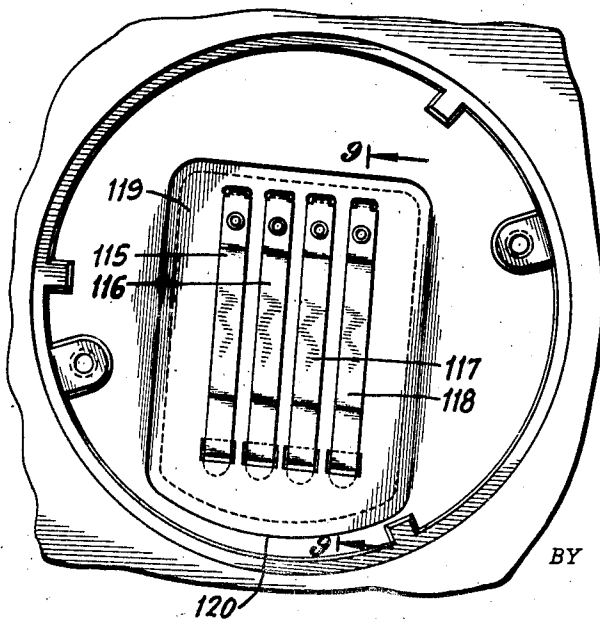
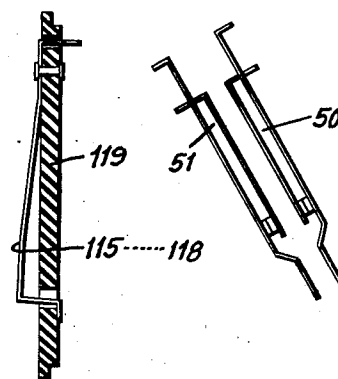


FIG. 9. FIG. 11.



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TELEPHONE SUBSCRIBER'S SET

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Application October 30, 1941, Serial No. 417,105
In Belgium November 13, 1940

3 Claims. (Cl. 179-100)

The present invention relates to telephone subscriber's sets and particularly that type of subscriber set which includes within a single unit the ringer, the induction coil, and the condenser and a cradle for reception of a handset unit. The invention still more particularly relates to such handsets which are suitable for use as desk sets.

It is an object of the present invention to provide such a subscriber's set wherein the interconnections between separate electric circuit components are made with a minimum number of wires.

It is another object to provide such subscriber's set wherein substantially all of the interconnections are made with the aid of a cross-connection block to which the terminals of the separate circuit components are connected without intervening wires.

In particular, it is an object to provide such subscriber set wherein the connections between the cradle operated spring assembly and substantially all of the following components: condenser, induction coil, ringer, line cord, and handset cord, are effected by the aid of a rigid interconnection block to which said spring assembly and substantially all of said other components are rigidly attached.

It has already been proposed to interconnect the cradle operated contact spring assembly and the several other electric components above referred to by the aid of an interconnection block which is secured to the base-plate of a telephone subscriber's set and to which in turn the spring assembly and the other components were rigidly attached, thus attaining in a more or less satisfactory manner the above listed objects of the present invention. In such proposed arrangement, however, the attachment of the spring assembly to the interconnecting block, which in turn was attached to the base-plate, necessitated the separation of this spring assembly from the main housing of the subscriber's set whenever the base-plate was removed for inspection of the interior. To avoid separation of the spring assembly from the cradle plunger mechanism which normally actuated it, it was therefore necessary to support at least the moving parts of the cradle mechanism from the base independently of the housing of the subscriber's set. This was accomplished in the previously proposed arrangement by constructing the cradle mechanism separate from the outer casing or housing and supporting this mechanism on a bracket from the base-plate. In similar fashion, the dial which is required

in subscriber's sets for use in automatic exchanges, was arranged to be supported by a bracket from the base-plate and to extend up to the housing without any mechanical connection to the latter.

The present invention is intended to be an improvement upon the previously proposed arrangement and is intended to provide an alternative improved type of telephone subscriber's set wherein the objects heretofore mentioned shall be attained without the necessity of supporting cradle mechanism independently of the housing or casing while still retaining the advantage that the cooperation between the cradle mechanism and the cradle operated springs may be readily inspected and checked when the base-plate and covered mechanism have been separated to allow ready access to the interior equipment.

It is also an object of the present invention to provide a subset containing all of the above-mentioned advantages but in addition being of exceedingly dust proof construction.

It is a further object to obtain all of the above advantages in a subset wherein all of the principal component parts shall be supported from the housing or casing of the subset.

It is a further object to provide a subset having all of the advantages hereinbefore mentioned while at the same time insuring a cheap and simple construction of the casing itself so that in the event of breakage of such casing only a minimum part of the total value of the subset will be scrapped.

It is a further object to provide such subset wherein, in the event of a breakage of the casing, all of the circuit components may be transferred to another subset casing without need for soldering or unsoldering any connections.

It is a further object to provide such a casing wherein such advantages can be obtained even when a dial and/or a PBX button is provided.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawings wherein

Fig. 1 shows a plan view of a telephone instrument, according to the present invention;

Fig. 2 is a view showing the configuration of the interior of the casing for the instrument;

Fig. 3 is a vertical section;

Fig. 4 is a sectional showing of the arrangement for attaching a PBX button to the instrument;

Fig. 5 is a view of the interior of the instrument with the base plate removed;

Fig. 6 is a vertical section taken through 6—6 of Fig. 3;

Fig. 7 is a vertical section taken through 7—7 of Fig. 3;

Fig. 8 shows the dial receptacle;

Fig. 9 is a sectional showing of a spring connector for the dial unit;

Fig. 10 shows a circuit arrangement, and

Fig. 11 is a schematic drawing of the contacts operated by the cradle;

Fig. 12 shows a modification of the connecting means for the spring nest.

The casing 10 as shown in the various figures of the drawings, particularly Figures 1 and 2 is made of a suitable plastic material or a metal preferably molded into form. The casing comprises a base portion 11, above a forward part of which is a slanting surface 12 having a recess 13 for dial mechanism 14. Over the rear portion of the base is a cradle supporting part 15 projecting upwardly above the dial mechanism provided with two pairs of arms 16 and 17 which serve as a cradle for a telephone handset.

Between the cradle arms, the casing has a substantially oblong recess 20, connecting with a depending tube 21, the rear part of the upper portion of the tube, Fig. 3 forming part of a wall of the casing.

The casing is provided in a number of places with threaded studs which are put into the casing during the molding process. The various components making up the telephone set are secured, except in the case of the dial mechanism, to the casing by means of such threaded members.

Referring to Figs. 2, 3 and 5. The bottom of the casing is closed by a base plate 19, preferably of metal, secured by screws 25, one of which is shown in the drawings, to three threaded studs 26 molded into the casing.

On opposite sides of the casing and within the base portion, a pair of moldings 27 are formed provided with four threaded studs 28. An approximately oblong-shaped shelf or interconnecting block 29 is secured to studs 28 by screws 30.

An opening 31 for a cradle operated plunger 22 is provided in interconnecting block 29 which is in register with the opening in plunger tube 21. In Fig. 3 the end 32 of the tube is shown projecting into a co-axial circular recess 33 formed on the upper surface of the interconnecting block, while a flange 34 projects upwardly from the block a short distance into the tapered interior of the tube. This arrangement provides a dust trap between these parts.

A cross member 35 is formed at the top of cradle plunger 22 and is free to move up and down in recess 20, the plunger member being retained in the casing by a screw 23 which enters a longitudinal slot 24 in the plunger. Spring 37 disposed between shoulder 38 on the plunger and a ring 39 formed on the interior of tube 21 is effective to raise the plunger when the handset is removed from the cradle, but normally the spring is compressed by the weight of the handset while resting in the cradle, and then the plunger projects beyond the lower surface of the interconnecting block operating a contact arrangement soon to be described. The upper part of the plunger passes through a soft washer 40 of felt or the like, and the lower part thereof passes through a similar washer 41 held between rings 39 and 42. This arrangement keeps out dust and serves to guide plunger 22 independently of the opening in the interconnecting block 29.

Secured to the under surface of interconnecting block 29 by screws 45 is an oblong casing 46 on opposite outer surfaces of which are ridges 47 which serve to retain a removable metal cover 48 provided with beaded surfaces 49 which snap over ridges 47. Within the casing are disposed two sets of contacts 50 and 51 mounted so that the ends thereof are engaged by the tapered end 52 of plunger 22, the contacts being mounted at an angle corresponding approximately to the angle of taper of the end of the plunger. With this arrangement, the tongue members of the respective sets are moved to one side or the other according to whether the plunger is depressed or elevated. The contacts are shown schematically in Fig. 11.

The contact members in one form of the spring members are shaped so that connecting lugs 9, Fig. 6 project substantially at right angles therefrom, the lugs being sufficiently long to project upward through openings in interconnecting block 29 beyond the upper surface thereof where soldered connections may be made to the lugs. Another embodiment is shown in Fig. 12 where connections 8 from the contact groups are brought out from the spring nest casing and secured by screws 7 to studs imbedded in block 29 having connecting terminals on the upper surface of the block. With the latter arrangement the spring nest may be removed or replaced without disconnecting wires.

Telephone cords 55 and 56 pass through openings 57 and 58, respectively, near the bottom of the casing. Dust is excluded from these openings by means of blocks 59, Fig. 6, of soft rubber or the like which fit snugly around the cord secured by upright strips, not shown, to the base plate. The holes are large enough for a pair of cords, required by certain telephone administrations, and in this case a suitable amount of the rubber block may be cut off to permit the insertion of a second cord. The cord may be provided with tips, in which case the terminals may be connected directly to the proper circuits by means of the appropriate screws 60—65 which are screwed into threaded studs molded into interconnecting block 29, having connecting terminals on the upper surface of the interconnecting block bearing the same reference characters, to more easily trace the circuit arrangement.

In the event that the so-called untipped cords are to be connected, connecting blocks 66 and 67 may be used. These blocks are provided with a channel to receive the ends of the cords. The channel is made with three grooves in each of which is a member having teeth that project upwardly into the channel, there being one member in each channel. Said members are formed with extensions 68 which can be secured by screws 60—65 to the telephone circuits. Each block is provided with a clamping member 69 which is pressed down on the toothed members by screws 70 to cause the teeth thereof to penetrate the insulation of the cord and engage the conductors thereof and also to clamp the cord securely in the connecting block.

A condenser provided with a casing 71 filled with sealing compound is secured at one end by screw 73 to tapped stud 74 imbedded in molding 75 formed on the casing, while the opposite end of the condenser structure is secured by condenser terminal lugs 76 and 77 and screws 78 and 79, respectively, to tapped studs imbedded in block 29. These studs are provided with connec-

tions on the upper surface of block 29 which bear the same reference characters as the screws.

An induction coil is contained in a casing 80 also sealed with a suitable sealing compound. One end of the casing is secured by screw 81 to a threaded stud 82 imbedded in molding 83 in the casing while four terminals projecting from the opposite end of the casing are fastened to threaded studs imbedded in block 29 by screws 84, 85, 86 and 87.

A ringer assembly is supported by screws 88 and 89 fastened to threaded studs in moldings 90 and 91, respectively. The ringer is supported by a plate 92 having a depending flange 93 supporting magnets 94. A bar 95 projecting from flange 93 carries a pivot 96 on which armature 97 and striker arm 98 are pivotally supported. Armature spring 99 is connected between the armature and one of a series of notches in flange 93 by which the spring is adjusted. The magnets are provided with connecting lugs 100 and 101 connected by screws 102 and 103 to studs imbedded in interconnecting block 29. The studs bear the same reference characters as the corresponding screws.

A preferred form of dial mechanism 14 for use with a telephone set according to the present invention is provided with a series of contact studs 111 to 114 by means of which the dial mechanism may be removably connected to external circuits without the necessity of unfastening wires. The contact studs engage corresponding contact springs 115 to 118, respectively, mounted on a plaque 119, Figs. 8 and 9, of insulating material. The plaque has an approximately oblong shape, one end, 120 being slightly curved to insure that the plaque will always be put in its receptacle in the proper position.

At the bottom of recess 13 is an opening 121 shaped to receive the plaque, the flanged edge of the plaque resting on a flange 122 around the edge of opening 121. This arrangement aids in excluding dust and also holds the plaque in position. As shown in Fig. 3, dial contacts 111-114 engage plaque contacts 115-118 and the dial is retained in the recess by means of screws 125 and 126, the heads of which are accessible from the bottom of the instrument. With this arrangement the dial assembly can be removed without disconnecting any wires, by unscrewing the two screws referred to. Small holes 123 and 124 are provided optionally in plate 19 located so that a screw driver may be inserted to remove these screws and with this arrangement the dial can be removed without first removing base plate 19.

A ring 130 of synthetic rubber is provided between an edge of the dial assembly and the edge of the casing to exclude dust.

Where required the instrument may be provided with a PBX button which is also removably secured to casing 10. For this purpose a hole 135 is provided in the front of the casing below the dial from which projects a PBX button 136, Fig. 4. The button comprises a plunger 137 on which is disposed compression spring 138. A contact disc 139 is secured on the plunger and when the button is depressed the contact disc engages and closes a circuit between two contact pins 140 and 141 imbedded in a bracket 142 of insulating material which supports the button assembly, the bracket being secured by means of screw 143 to a threaded stud imbedded in the casing.

Figure 10 shows how the various components are connected in a conventional telephone circuit which includes the PBX button 136. The circuit

is obvious to those skilled in the art and, therefore, it is not thought necessary to describe the same since it is not part of the present invention. It will be noted that with the exception of those for the dial and the PBX button which is not regular equipment, all circuits are interconnected on the top surface interconnecting block 29 and that all components can be attached or removed with the aid of a screwdriver. The latter statement applies when a spring nest of the kind shown in Fig. 12 is used. The circuits are interconnected by any suitable means for establishing connections from stud to stud, such as by wires or bus bars imbedded in the interconnecting block.

Contacts 115-118 on plaque 119 are connected to the interconnecting block circuits by flexible insulated wires of sufficient length to permit the plaque to be partially lifted out of its seat and then dropped end ways through opening 121 into the interior of the casing. This feature makes it possible to remove all elements from the casing without interfering with wire connections, because the plaque and the interconnecting block may be removed together with or without detaching other components from the casing by removing the various screws securing the interconnecting block.

A prime advantage of the invention resides in that by removing base plate 19 and spring nest cover 48, spring assemblies 50 and 51 may be inspected while all parts are in their normal working position. Other elements may be replaced with the aid of a screw driver, and the respective elements are so disposed that one element may be removed without disturbing the other elements.

The exterior of the casing is so shaped that the instrument cannot readily be lifted by one hand unless the fingers of either hand are closed around a slanting ridge 150 formed as a grip at the back of the instrument. In so doing, the thumb naturally closes down over the handset in the cradle holding the same in position. This feature is designed to reduce the amount of breakage of handsets which is largely due to their falling out of the cradle when the instrument is moved.

In order not to muffle the sound of the ringer, perforations, not shown, covered with a suitable thin fabric to exclude dust may be provided in base plate 19.

Although but one form of the present invention is shown and described, it will be understood that other embodiments thereof will suggest themselves to those skilled in the art without departing from the spirit and scope of the invention as described in the following claims.

What is claimed is:

1. In a telephone subset, a casing, comprising a hollow shell formed with an open base portion, a plurality of moldings formed on the interior of said shell, threaded stud means formed in the respective moldings, a shelf comprising an interconnecting block extending but part way across said base portion and secured by screws from the under side thereof to the threaded stud means in moldings on opposite sides of said shell, a plurality of subset components comprising a ringer, an induction coil and a condenser, each component being provided with connecting lugs secured by screws passing through said lugs into threaded studs connected to appropriate circuits on said connecting block and by means of other screws extending upwardly into the lug means in individual ones of said moldings, a plunger

operated from a handset cradle and extending through said shelf and a spring nest disposed on the under side of said shelf controlled by the operation of said plunger.

2. An arrangement for dial circuits in a telephone subset comprising a casing, a recess formed in said casing to hold a telephone dial, an opening in said recess, a plate of insulating material shaped so as to be retained in said opening disposed therein, a plurality of contact members mounted on said plate, flexible circuit means from within said casing connected to said contact members, said plate being detachable from said casing while said flexible circuit means are connected to said contact members by lifting said plate from said opening and dropping it there-through into the interior of the casing.

3. An arrangement according to claim 2 including a dial mechanism disposed in said recess, contacts on said mechanism engaging the contact members on said plate, said mechanism serving to hold said plate firmly in said opening.

4. An arrangement for dial circuits according to claim 2 including a dial mechanism disposed in said recess, contacts on said mechanism en-

gaging the contact members on said plate, and means to hold said dial mechanism in a fixed predetermined position in said recess.

5. An arrangement for dial circuits according to claim 2 in which said plate is shaped to fit said opening in but one position.

6. An arrangement for dial circuits according to claim 2 in which said plate and said opening are provided with overlapping flanges to retain the plate in position.

7. An arrangement for dial circuits according to claim 2 including a dial mechanism provided with contacts on the casing thereof disposed in said recess, and means for detachably holding said contacts against the contacts on said plate comprising screws extending upwardly through the casing and fastened to said dial mechanism.

8. A telephone subset according to claim 1, also comprising a tube in said casing in which said plunger slides, the end of said tube being formed with a projection which fits into a circular recess formed in the upper surface of the said shelf in order to prevent the entry of dust into the casing through said tube.

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