

Oct. 6, 1959

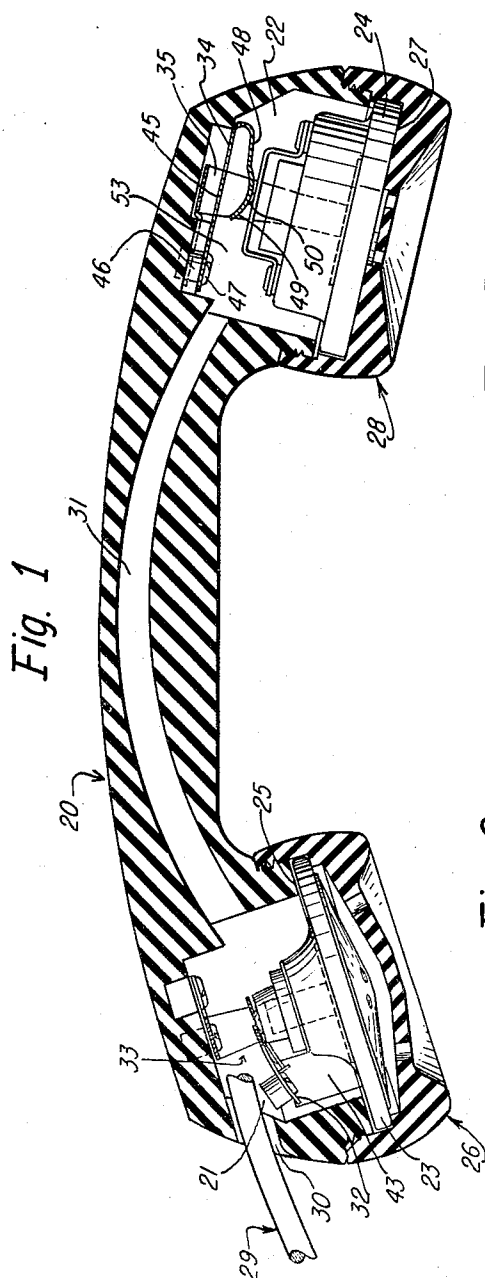
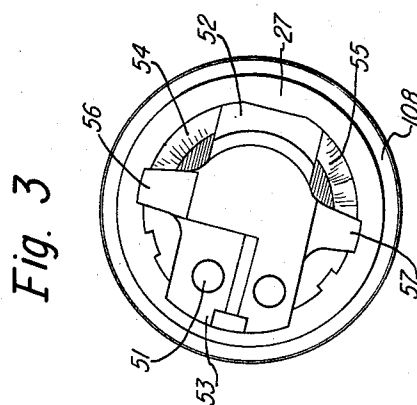
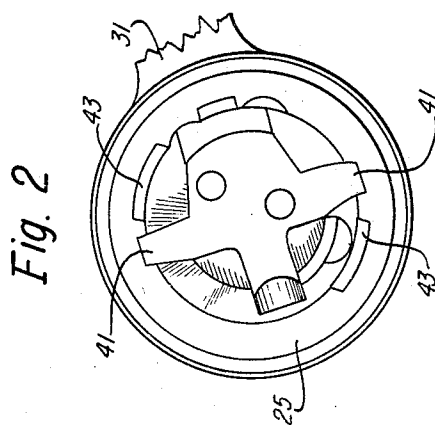
O. W. HENRIKSON ET AL

2,907,836

HANDSET ELECTRICAL TERMINALS

Filed March 16, 1956

2 Sheets-Sheet 1



INVENTORS.
Oscar W. Henrikson
Fredric E. Wood
BY *Walter Owen*

Atty.

Oct. 6, 1959

O. W. HENRIKSON ET AL
HANDSET ELECTRICAL TERMINALS

2,907,836

Filed March 16, 1956

2 Sheets-Sheet 2

Fig. 8

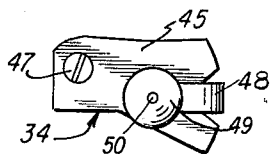


Fig. 4

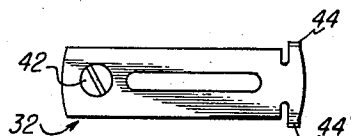


Fig. 9

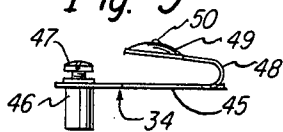


Fig. 5

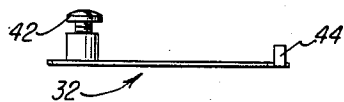


Fig. 10

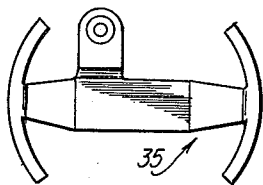


Fig. 6

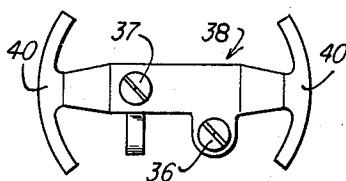


Fig. 11

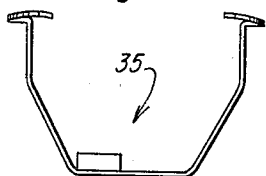


Fig. 7

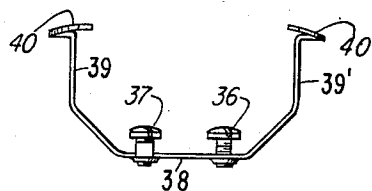
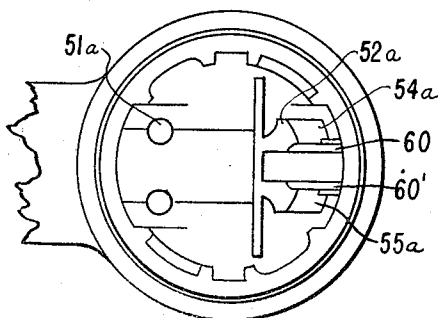


Fig. 12



INVENTORS.
Oscar W. Henrikson
Fredric E. Wood
BY *Wm. Walter Owen*

Atty.

1

2,907,836

HANDSET ELECTRICAL TERMINALS

Oscar W. Henrikson, Chicago, and Fredric E. Wood, McHenry, Ill., assignors to General Telephone Laboratories, Incorporated, a corporation of Delaware

Application March 16, 1956, Serial No. 571,919

10 Claims. (Cl. 179—103)

This invention relates to hand telephones and particularly to improvements in the terminal conductors used to contact the capsule type sound translating units mounted therein.

The conductors of the cord, used to connect the hand telephone to the other telephone components, unless directly connected to the capsule type sound translating units, have some form of intermediate connector. These intermediate connectors usually manifest themselves in the form of springs mounted within the cavity whereby the conductors of the cord are attached to them and an end or some other portion projects to contact the contact surfaces of the encapsulated sound translating units. These contact springs usually require that threaded inserts be provided in the handset cavity for mounting them, or that intermediate cups or plates with similar mountings be used. No inserts or intermediate mountings are required for the contact springs of this invention. The conductors of the cord are attached directly to the contact springs. These contact springs are then positioned in the cavity in the retaining seats provided for them. The primary restraining force for holding them in position is provided by the pressure of the contact surfaces of the capsule type sound translating units pressing them into the mounting seats.

Accordingly an object of this invention is to provide exceedingly simple and rugged terminal contacts which are economical to manufacture and which are efficient in performance.

Another object of this invention is to provide a terminal construction that will facilitate the assembly and maintenance of such hand telephones.

In the illustrated embodiment of the invention a hand telephone is shown as comprising a handle with enlarged ends having cup shaped recesses or cavities therein and cover members adapted to be secured to these end portions to define a chamber therein, with the chambers interconnected by a tunnel through the handle portion. Sound translating devices with external contact surfaces are positioned within each chamber and electrically connected with each other and the external telephone subset by means of wires passing through the tunnel in the handle and an opening in one chamber. The ends of these wires are connected to contact springs for contacting the contact surfaces of the sound translating devices.

A feature of this invention is the positioning of the terminal contact springs in channels of the chamber walls for preventing rotary displacement whereby they are retained primarily by the axial pressure of the translating units.

In accordance with another feature of this invention the contact springs maintain a fixed resilient pressure against the contact surfaces of the sound translating units.

The above and other features of the invention will be understood more clearly and fully from the following detailed description with reference to the accompanying drawings in which:

2

Fig. 1 is a side cross sectional view of a hand telephone with the sound translating units therein.

Fig. 2 is an interior view of the cavity for the transmitter.

Fig. 3 is an interior view of the cavity for the receiver.

Fig. 4 is a top view of the terminal spring for contacting the center terminal of the transmitter.

Fig. 5 is a side view of the spring of Fig. 4.

Fig. 6 is a top view of the terminal spring for contacting the housing terminal of the transmitter.

Fig. 7 is a side view of the spring of Fig. 6.

Fig. 8 is a top view of the terminal spring for contacting the center terminal of the receiver.

Fig. 9 is a side view of the spring of Fig. 8.

Fig. 10 is a top view of the terminal spring for contacting the housing terminal of the receiver.

Fig. 11 is a side view of the spring of Fig. 10.

Fig. 12 is an interior view of an alternate form of the cavity for the receiver.

Referring now to Fig. 1 of the drawings, the handset there illustrated comprises a hollow handle 20 having integrally molded thereto cup shaped cavities 21 and 22 at opposite ends for receiving the transmitter and receiver capsule units 23 and 24 respectively. The transmitter capsule 23, which may be of the construction disclosed in the copending application of H. C. Pye, Serial No. 512,672, filed June 2, 1955, is placed with its flanged portion upon the annular shoulder 25 and is then held against this shoulder by the transmitter cap 26, threaded upon the outer shell of the cup portion 21. The receiver capsule 24, which may be of the construction disclosed in the copending application of H. C. Pye, Serial No. 529,435, filed August 19, 1955, is also placed with its flanged portion upon a similar shoulder 27 of the cup shaped portion 22. It is then held against this shoulder by the receiver cap 28 threaded upon the cup portion 22. An opening 30 is provided in the transmitter end of the handset for a multi-conductor cable 29, which connects the transmitter and receiver capsules 23 and 24 with the other telephone components.

Upon entering the handset the multi-conductor cable 29 is unsheathed exposing its component conductors. Two of these conductors are connected to terminal springs 32 and 33 in the transmitter cavity 21, a multiple of one of these conductors plus another conductor pass through the tunnel 31 of the handle to the receiver cavity 22, where they are connected to terminal springs 34 and 35. The terminal springs 32 and 33 for the transmitter cavity are shown in Figs. 4 and 5 and 6 and 7 respectively and the springs 34 and 35 for the receiver cavity are shown in Figs. 8 and 9 and, 10 and 11 respectively. The cable 29 is anchored to spring 33 by screw 36, while the conductor is connected to this spring by screw 37. The spring 33 is substantially U-shaped and comprises a base portion 38 and two legs 39 and 39'. Each of the legs 39 and 39' carries at its outer extremity a bent-over portion 40 and 40' which is arcuately shaped to conform to the contour of the inner wall of the transmitter cap 26 and the annular shoulder 25. These arcuately shaped portions 40 and 40' comprise two oppositely extending fingers, which are bent up away from the annular shoulder 25 at their extremities to press against the annular flange of the transmitter when the instrument is assembled. The vertical legs 39 and 39' of the spring 33 slide into the cavity into two shallow vertical slots 41 which are adapted to receive them. The vertical legs 39 and 39' exert a slight pressure against the innermost walls of the slots 41 to aid in retaining the spring 33 in position during the assembly or maintenance operations.

The other conductor of the cable 29 which is to contact the transmitter unit is connected to spring 32 by

screw 42. The spring 32 comprises a flat longitudinally slotted plate, spanning the cavity between two diametrically opposed shoulders located at the bottom of two channels 43 and 43'. To keep this spring 32 from moving out of position during the assembly operation, two arms 44 and 44' project out from the sides of the plate near the end away from the screw 42 and are bent up and outwardly to press against the sides of the channel. The transmitter unit makes contact with the spring 32 at approximately its center with an axial pressure that causes the spring to bear down firmly into its seat.

The terminal spring 35 in the receiver cavity 22 is substantially similar to the spring 33 described for the transmitter cavity above. The spring for contacting the center terminal of the receiver is spring 34. It consists of a flat plate portion 45 with a tapped bushing 46 staked onto it. The cable conductor is attached to this spring by means of screw 47 threaded into the bushing 46. The end of this plate away from the bushing 46 is fanned out and rounded to conform to the contour of the cavity. From approximately the center of this fanned out portion there is an arm 48 bent up and over the base portion of the plate. The end of this arm 48 has a dome shaped end 49 with a still smaller dome 50 on top of the first one, this second dome 50 comprises the contact surface for contacting the receiver unit. This contact spring 34 is positioned in the receiver cavity with its bushing 46 fitting into the hole 51 and its base plate portion resting on shelves 52 and 53, the raised portions 54 and 55 of the shell aiding to keep one end properly positioned on shelf 52. The spring 35 is positioned in the two vertical slots 56 and 57 of the cavity with its arcuately shaped fingers resting upon the shoulder 27 so that the receiver, when placed in the cavity contacts the fingers of spring 35.

In a modified form of receiver cavity as shown in Fig. 12, the spring 34 is again positioned with its bushing 46 fitting into the hole 51a, but in this case the depth of this hole is such that the end of the bushing rests upon the bottom of the hole, thus supporting its associated end at the proper level without the need for a shelf such as 53 in the first form of cavity. At the other end the cavity still retains a shelf 52a to support the spring at the proper level. Rising above the level of this shelf 52a are two shoulders 54a and 55a unlike shoulders 54 and 55 in that they serve to retain the spring in position without preventing the springs rotational movement. The spring end bears against them with a radially directed pressure diametrically away from the hole 51a against whose side the bushing 46 bears. Thus serving to frictionally retain the spring to facilitate assembly and maintenance operations. To prevent the spring from rotating two fins 60 and 60' rise from each of the shoulders 54a and 55a respectively at the adjacent sides. These fins rise up from the shoulders and are arced back to terminate in the wall of the cavity. They reach into the notches on each side of the arm 48 thus keeping the arm in its proper position.

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 claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A sound translating assembly comprising a cup shaped casing, a sound translating unit, a cover, a plurality of terminal elements, recess means within said casing removably positioning each said terminal element separately and independently within said casing to allow perpendicular displacement with respect to said casing and prevent rotary displacement thereof, means for securing said cover to said casing after placement of said sound translating unit in said casing, a corresponding plurality of terminals on said sound translating unit engaging said terminal elements in response to the place-

ment of said sound translating unit in said casing and the securing of said cover to said casing, and means for preventing perpendicular displacement of said terminal elements solely by the resultant pressure engagement of said sound translating unit terminals against said terminal elements in response to securing said cover to said casing to thereby hold said terminal elements in said recesses in fixed relation with said casing.

2. A sound translating assembly comprising a cup shaped casing, a sound translating unit, a cover, a plurality of terminal elements, an individual recess in said casing for each said terminal element, each said terminal element being unfastened in its individual recess to allow perpendicular displacement with respect to said casing and prevent rotary displacement thereof, means for securing said cover to said casing after placement of said sound translating unit in said casing, a plurality of terminals on said sound translating unit individually corresponding to said terminal elements, said terminals individually engaging their corresponding terminal elements and applying pressure thereto in response to the placement of said sound translating unit in said casing and the securing of said cover to said casing, and means for preventing perpendicular displacement of said terminal elements solely by the resultant pressure engagement of said sound translating unit terminals against said terminal elements in response to securing said cover to said casing to thereby hold said terminal elements in their individual recesses in fixed relation with said casing.

3. In a handset telephone having a cavity therein and a sound translating unit mounted therein, means for making contact with the unit comprising a pair of spring elements, a pair of grooves in said cavity, another pair of grooves in the cavity angularly displaced from the first pair of grooves, one of said elements having a pair of legs fitting into said first pair of grooves and resiliently held therein solely by the outward tension of the legs fitted in said first pair of grooves, the other element comprising a flat plate with its ends fitting into the other pair of grooves, said other element having a pair of prongs bent upwardly therefrom and tensioned outwardly against the walls of said grooves and acting as the sole means to resiliently hold said second element in its grooves.

4. A sound translating assembly comprising in combination a cup shaped casing, a sound translating unit, a cover, recesses in said casing, a first terminal element comprising a pair of legs tensioned outwardly and acting as the sole means to hold said element removably positioned in said recesses to allow perpendicular displacement and prevent rotary displacement thereof, other recesses in said casing, shelves terminating said other recesses in said casing, a second terminal element comprising a flat slotted spring contact plate with its two ends removably positioned in said other recesses on said shelves to allow perpendicular displacement and prevent rotary displacement thereof, one of said ends having two arms extending upwardly from the sides of said contact plate and bent outwardly to frictionally engage the side walls of one of said other recesses, the sound translating unit having a portion engaging said contact plate at the edge of said slot in said plate, thus providing a contact plate with a twin contact surface that also contributes to the centering of said sound translating unit, means for securing said cover to said casing, a first terminal on said sound translating unit engaging and applying pressure to said first terminal legs and said portion of said sound translating unit engaging and applying pressure to said contact plate at said edges in response to securing said cover to said casing after placement of said sound translating unit in said casing, said first and second terminal elements thereby prevented from perpendicular displacement by the resultant pressure engagement of said sound translating unit terminal against said first and second terminal elements in response to securing said cover to said casing.

5. A sound translating assembly comprising in combi-

5

nation a cup shaped casing, a sound translating unit, a cover, a pair of recesses in said casing, a first terminal element comprising a pair of legs that are joined at their bottom end and are tensioned outwardly and resiliently restrained in said pair of recesses to allow perpendicular displacement and prevent rotary displacement thereof, a pair of shelves on a plane above the bottom of said casing, a single recess in one of said shelves, shoulders on said casing extending above and defining side limits for the other of said pair of shelves, a second terminal element comprising a flat plate extending across said casing and removably positioned on top of said pair of shelves, a downwardly projecting portion at one end of said second terminal element, said second terminal element prevented from rotary displacement by said downwardly projecting portion at said one end fitting into said single recess in said shelf and by said shoulders at the side of the other of said pair of shelves, a cantilever arm projecting from one end of said second terminal element, bent up to lie in a plane above the main flat plate portion and to reach over the center of said cavity, means for securing said cover to said casing, a first terminal on said sound translating unit engaging and applying pressure to said first terminal legs and a second terminal on said sound translating unit engaging and applying pressure to said cantilever arm spring member in response to securing said cover to said casing after placement of said sound translating unit in said casing, and means for preventing perpendicular displacement of said second terminal element solely by the pressure resulting from the placement of said sound translating unit in said cup shaped cavity.

6. A sound translating assembly comprising in combination a cup shaped casing, a sound translating unit, a cover, a pair of recesses in said casing, a first terminal element comprising a pair of legs that are joined at their bottom ends and are tensioned outwardly and resiliently restrained in said pair of recesses to allow perpendicular displacement and prevent rotary displacement thereof, first raised portions on the bottom within said casing having flat shelf like top surfaces, a single recess in one of said first raised portions, a second terminal element comprising a spring member extending across said casing and removably positioned on top of said first raised portions, a downwardly projecting portion of one end of said second terminal element, second raised portions on said casing extending above and defining side limits for said first raised portions, said second terminal element prevented from rotary displacement by said downwardly projecting portion of said one end fitting into said single recess in one of said first raised portions and by said second raised portions defining the side limits of the other of said first raised portions, a cantilever arm projecting from one end of said second terminal element reaching up and over the center of said cavity, means for securing said cover to said casing, a first terminal on said sound translating unit engaging and applying pressure to said first terminal legs and a second terminal on said sound translating unit engaging and applying pressure to said cantilever arm spring member in response to securing said cover to said casing after placement of said sound translating unit in said casing, whereby the sole means for preventing perpendicular displacement of said first and second terminal elements is the resultant pressure engagement of said sound translating unit terminals against said first and second terminal elements in response to securing said cover to said casing to thereby hold said first and second terminal elements in fixed relation with said casing.

7. In a hand telephone transducer cavity, a sound transducer, a terminal for resiliently contacting said transducer, said terminal resiliently fastened in said cavity, said cavity having a cylindrical recess near one side of its bottom surface and a pair of parallel perpendicular fins on the other side of the bottom, a shelf above said bottom

6

surface and adjacent said fins, two shoulders outside of and adjacent said fins and also adjacent and above said shelf, said terminal comprising a flat plate with a cylindrical downwardly projecting portion at one end, a cantilever arm projecting from the other end, said arm bent up to lie in a plane above the main flat plate portion and to reach over the center of said cavity, said flat plate portion projecting beyond the junction with said arm on both sides of said junction, forming two V-shaped notches on both sides of said arm, said terminal so positioned in said cavity that the downwardly projecting cylindrical portion enters said cylindrical recess near the one side of the bottom surface and the other end of said terminal resting on said shelf with said fins fitting into said notches on both sides of said arm and said projecting portions of said flat plate portion resiliently pressing against said shoulders alongside said fins, whereby said terminal element is prevented from rotary displacement by said fins restraining said arm at one end of said terminal and said cylindrical recess restraining said downwardly projecting portion, said terminal prevented from accidental perpendicular displacement by said resilient pressure exerted by the two projecting portions against said shoulders at the one end and by said downwardly projecting portion against said cylindrical recess at the other end.

8. In a hand telephone comprising a handle interconnecting a first and second cavity constituting housings for sound translating units, first and second sound translating units mounted therein, a pair of caps for said cavities, a multi-conductor cable for connecting said units with the exterior, first and second terminal elements for connecting said cable conductors to said units in each of said cavities, a first pair of grooves in each cavity, a first terminal in each of said cavities having a pair of legs fitting into said first pair of grooves and held therein solely by the outward tension of the legs, said second terminal in said first cavity comprising a flat plate spanning the cavity with its ends fitting into another pair of grooves angularly displaced from said first pair of grooves, said second terminal in said second cavity comprising a spring member extending across said casing and removably positioned on top of a first pair of raised portions near the bottom of said cavity, a downwardly projecting portion at one end of said second terminal element, second raised portions on said casing extending above and defining side limits for said first raised portions, said second terminal element prevented from rotary displacement by said downwardly projecting portion of said one end fitting into said single recess in one of said first raised portions and by said second raised portions defining the side limits of the other of said first raised portions, a cantilever arm projecting from one end of said second terminal element reaching up and over the center of said cavity, means for securing said caps to said housings, first terminals on said sound translating units engaging and applying pressure to said first terminal legs in each cavity and second terminals on said sound translating units engaging and applying pressure to the center of said flat plate center terminal in said first cavity and to the end of the cantilever arm of said second terminal in said second cavity, in response to securing said caps to said housings after placement of said sound translating units in said cavities, whereby the sole means for preventing perpendicular displacement of said first and second terminal elements in each cavity is the pressure engagement of said sound translating unit terminals against said first and second terminal elements in response to securing said cover to said casing to thereby hold said first and second terminal elements in fixed relation with said casing.

9. In a hand telephone comprising a handle interconnecting a first and second cavity for housing sound translating units, first and second sound translating units mounted therein, a multi-conductor cable for connecting said units with the exterior, first and second terminals

on each of said sound translating units, caps for each of said cavities, first and second terminal elements for connecting said cable conductors to said units in each of said cavities, a first pair of grooves in the walls of each cavity, a first terminal in each of said cavities having a pair of legs fitting into said first pair of grooves and held therein from perpendicular displacement solely by the outward tension of the legs, said second terminal in said first cavity comprising a flat plate spanning the cavity with its ends fitting into another pair of grooves in the side walls angularly displaced from said first pair of grooves, said second terminal having a pair of prongs bent upwardly therefrom and tensioned outwardly and acting as the sole means to resiliently hold said second element in its grooves, said second terminal in said second cavity comprising a spring member extending across said casing and removably positioned on top of said second terminal in said second cavity comprising a flat plate portion extending across said casing with a cylindrical downwardly projecting portion at one end, a cantilever arm projecting from the other end, said arm bent up to lie in a plane above the main flat plate portion and to reach over the center of said cavity, said flat plate portion projecting beyond the junction with said arm on both sides of said arm with two V-shaped notches on both sides of said arm, said terminal so positioned in said cavity that the downwardly projecting cylindrical portion enters a shallow cylindrical recess near one side of the bottom surface, and the other end of said terminal resting on a shelf at the other side of said cavity, a pair of perpendicular fins rising above said shelf, two shoulders outside of and adjacent said fins and above said shelf, said fins fitting into said notches on both sides of said arm and said projecting portions of said flat plate portion resiliently pressing against said shoulders alongside said fins, whereby said terminal elements are pre-

vented from accidental perpendicular displacement by said resilient pressures exerted against the interior surfaces of said cavity.

10. A sound translating assembly comprising in combination a cup shaped casing, a sound translating unit and a cover, said sound translating unit mounted within said casing and retained by said cover, recesses in the walls of said casing, a first terminal element comprising a pair of legs tensioned outwardly into said recesses whereby said legs act as the sole means to resiliently hold said element removably positioned in said recesses to allow perpendicular displacement and prevent rotary displacement thereof, other recesses in the bottom of said casing, shelves terminating said other recesses in said casing, a second terminal element comprising a spring member extending across said casing with its ends removably positioned in said other recesses on said shelves whereby perpendicular displacement thereof is permitted and rotary displacement prevented, means for securing said cover to said casing, said cover applying a restraining pressure to retain said sound translating unit in said casing, a first terminal on said sound translating unit engaging and applying pressure to said first terminal legs and a second terminal on said sound translating unit engaging and applying pressure to said spring member, said first and second terminal elements prevented from perpendicular displacement by the pressure engagement of said sound translating unit terminals against said first and second terminal elements in response to securing said cover to said casing to thereby hold said first and second terminal elements in fixed relation with said casing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,123,177 Blount July 12, 1938