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F. A. GABBERT

2,445,425

HEARING AID

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Fig. 1

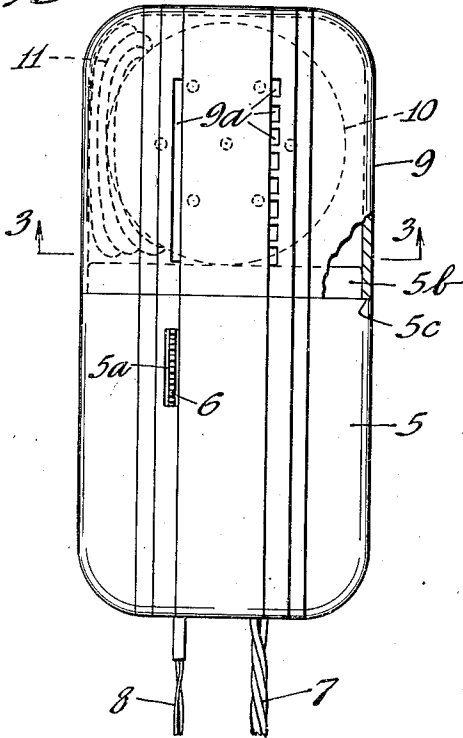


Fig. 3

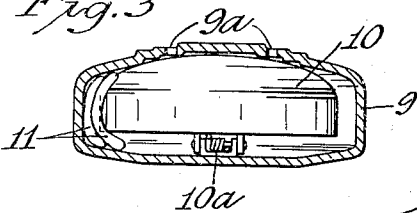


Fig. 2

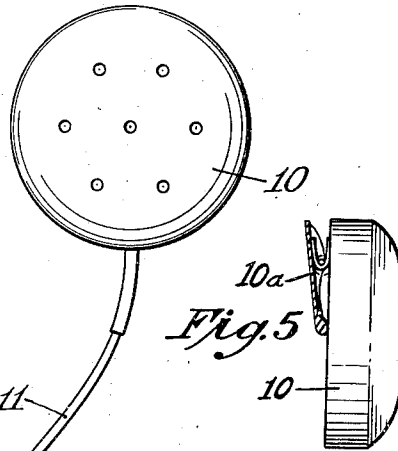
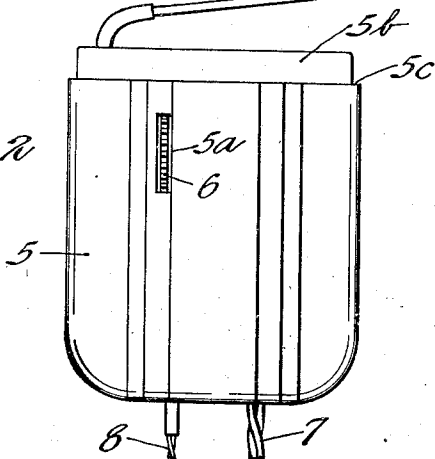
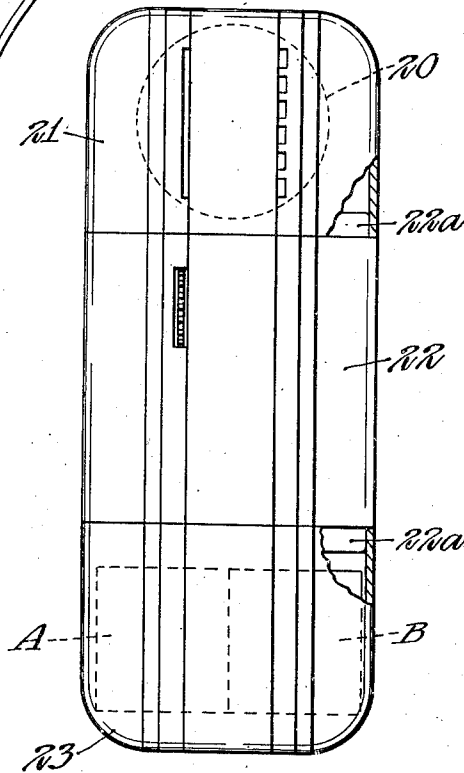


Fig. 5

Fig. 4



Inventor
Ferdinand A. Gabbert
By Williamson & Williamson
Attorneys

UNITED STATES PATENT OFFICE

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HEARING AID

Ferdinand A. Gabbert, Minneapolis, Minn., assignor, by mesne assignments, to William Edward Johnston

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5 Claims. (Cl. 179—107)

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This invention relates to hearing aids and particularly to improvements in compactly housing the thermionic amplifier, microphone and in some instances other equipment associated with the set, such as batteries.

In most of the hearing aids commercially manufactured and sold at this time, the microphone is mounted with the amplifier apparatus in a fixed relationship and encased by a common housing. The entire set in such instances, exclusive of the batteries, and earphone, is thus supported from a pocket or by a clamp from various parts of the clothing of the user. One or two hearing aid sets commercially manufactured have employed an extensible microphone which could be suspended by a clip or other attachment means to the upper portion of the wearer's clothing for most efficient reception, while the electronic amplifier mechanism was encased and could be supported in a pocket or elsewhere on the body or apparel of the user.

It is an object of my present invention to provide a very compact and highly ornate hearing aid device wherein the microphone may be employed in the usual fixed relationship to the amplifier mechanism and wherein the microphone if desired may be readily extended through its connection by the very flexible service cord with the amplifier apparatus and independently supported from a part of the wearer's clothing at a point removed considerably from the suspension of the thermionic amplifier mechanism.

More specifically it is an object to provide a simple but highly efficient hearing aid wherein a thermionic amplifier apparatus is housed within a compact closed casing and wherein the microphone for the set is removably housed and retained in the upper portion of a readily removable cap member fitted to the upper portion of the said casing and forming in effect a continuation of said casing, such combinative structure enabling the microphone to be removed from the casing and separately supported from the wearer's clothing some distance from the amplifier and at a point most effective for receiving the sound vibrations.

A further object is the provision of a multi-part casing having detachable hollow caps or ends forming in conjunction with the main portion of the invention a continuous compact housing and utilizing such cap casing portions for the housing of a microphone and other equipment such as small batteries for supplying the set.

With my improved construction the purchaser of a set, if he prefers, may utilize the set in a

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conventional manner with the microphone mounted in fixed relation to the amplifier or may, if he desires, and which has been found to produce more efficient hearing, remove the microphone from its portion of the housing leaving a complete housing for the amplifier mechanism and mount the microphone in the most effective position for receiving sound waves.

Another object is the provision of the removable housing means for the microphone which frictionally retains the microphone and the service cord when the latter is folded out of sight and is a part of an ornate substantially rectangular case.

These and other objects and advantages of my invention will be more apparent from the following description made in connection with the accompanying drawings, wherein like reference characters refer to the same parts throughout the several views, and in which—

Figure 1 is a front elevation of one form of my hearing aid with the microphone and its service cord housed in fixed relation within the upper cap member of the casing;

Figure 2 is a view of the same hearing aid with the cap member removed and the microphone extended to a point for suspension thereof, removed from the transmitter mechanism;

Figure 3 is a cross section taken on the line 3—3 of Figure 1;

Figure 4 is a view of a somewhat different set having a removable hollow casing portion, or cap, mounted at the bottom end of the main casing and carrying and housing the batteries for supplying the set; and

Fig. 5 is a detail side elevation with some portions shown in vertical section, of the microphone, showing the construction of the retaining clip.

Referring now to Figures 1 to 3 of the drawings, a main, compact casing 5 of substantially rectangular shape and somewhat oval in cross sectional shape is provided having mounted therein preferably on a suitable chassis, the electronic and electrical apparatus constituting the amplifier mechanism for the set. The casing is provided with a vertical slot 5a for accommodating the thumb manipulating disc 6 of the volume control for the amplifier, a small arc of the periphery of said disc projecting through said slot slightly beyond the exterior of the front face of the casing. The casing 5 is closed at its lower end and has extended therethrough, the battery wires 7 and the two small conductors 8 for the earphones (not shown). The upper end of the

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casing 5 is closed and has a reduced peripheral lip 5b with an abutment shoulder 5c disposed at the lower portion thereof, said lip being substantially oval in peripheral shape and being adapted to snugly and frictionally fit the interior peripheral skirt of a hollow cap member 9 made of generally similar shape to the casing 5 and forming, when joined with casing 5, a continuation thereof to provide an elongated symmetrical and highly ornate two-part casing. The microphone 10 utilized is of a shape and size to be nicely accommodated with the upper portion of the hollow cap 9 leaving therein sufficient space for enclosing also the service cord 11, containing the electrical conductors for the microphone when such cord is folded compactly. The microphone 10 preferably snugly fits the interior of the cap member 9 and as shown is provided with a spring clip 10a for attachment to a garment or edge, said spring clip, as shown, having the handle portion of the finger thereof normally urged outwardly in a position oblique to the rear flat surface of the microphone and being yieldable to a position parallel with such surface for frictional retention within the cap. Standard microphones of such structure are available on the American market and the housing and its cap member 9 are constructed and dimensioned to properly fit the selected microphone to be utilized.

The front face of the cap member 9 is preferably provided with an aperture, or apertures 9a, to facilitate transmission of sound waves to the microphone within the cap.

It will be noted that the skirt of the cap member 9 overlies the lip 5b for a considerable distance, forming in conjunction therewith an efficient friction joint to detachably assemble the casing 5 and cap 9 to form an integral housing.

Some purchasers of my improved set prefer to retain the microphone in its fixed relationship to the amplifier mechanism as the set is shipped and to suspend or mount the set, amplifier and microphone from a pocket or edge, or part of the wearer's clothing. A considerable percentage of purchasers prefer to utilize the microphone separated from the amplifier casing which may be readily accomplished by removing and not utilizing the cap member 9, during normal use of the device, the casing 5 being closed at its upper end constituting a complete housing and the microphone being extensible to various positions where it may be suspended for most advantageous receiving of sound vibrations.

In Figure 4 a somewhat different form of my invention is illustrated, some portions being broken away to show the interfitting and connection of the upper and lower cap members. In this form of the invention, a somewhat smaller microphone 20 is utilized and a somewhat smaller upper cap member 21, housing in the manner of the invention first described, the microphone and its service cord in compact relation, all disposed when assembled above the upper end of the main casing 22 wherein the thermionic amplifier apparatus is mounted.

In the lower end of the main portion 22 of the casing a depending lip 22a, similar to the lip 5b is provided, by diminishing the lower peripheral portion of the casing 22. Lip 22a is adapted to receive and frictionally connect with the skirt of an inverted cap member 23, substantially similar in length and shape to the cap member 21 for the microphone. The cross sectional shape and length of cap 23 are properly proportioned to snugly house the supply batteries A and B of

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small size therein. While such batteries are not at present available to any great extent, due to the war emergency, they were made in small size before the World War and in all probability will again be generally available after the present World War.

With the caps 21 and 23 housing their respective pieces of apparatus, they are removably joined with the main casing section 22 to form an integral housing for the entire set. There is adequate clearance between the tops of the batteries A and B and the bottom of the main housing 22 to accommodate the battery connection cords and if desired, the cap member 23 may be made of sufficient depth to also house the earphone and its cord, not shown.

It will, of course, be understood that various changes may be made in the form, details, arrangements and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. In a hearing aid device, thermionic amplifying apparatus, a casing housing said apparatus and having an elongated microphone cord extending therefrom, a microphone electrically connected with the conductors of said cord and a hollow cap member detachably connectable with one end of said casing and when connected constituting substantially a continuation of said casing, the interior of said cap being constructed to snugly receive and detachably house said microphone and its service cord when the latter is folded in compact relation.

2. In a hearing aid device, a compactly arranged electronic amplifying apparatus, a closed substantially rectangular casing housing said apparatus, a flexible microphone cord extending from said casing, a microphone electrically connected with the conductors of said cord, a hollow cap member detachably connectable with one end of said casing, the interior of said cap member being constructed to snugly receive and detachably house said microphone and its service cord and said casing at one end thereof having attachment means for securing said cap thereto with said microphone housed within said cap.

3. The structure set forth in claim 2, wherein said attachment means comprises a flange adapted to interfit with the skirt of said cap member.

4. In a hearing aid device, an electronic amplifying apparatus compactly mounted, a closed casing of substantially rectangular shape housing said amplifying apparatus, a hollow cap member detachably connectable with one end of said casing and when connected constituting substantially a continuation of said casing, a microphone electrically connected with said amplifying apparatus and constructed to be snugly housed within said cap member, a second hollow cap member detachably connectable to the opposite end of said casing and when connected also constituting substantially a continuation of said casing and a plurality of small battery cells snugly housed within said last mentioned cap member and electrically connected with said amplifying apparatus.

5. In a hearing aid device, a compact electronic amplifying apparatus, a closed substantially rectangular casing housing said apparatus, a flexible microphone service cord extending from said casing and having its conductors electrically connected with said apparatus, a microphone electrically connected with the conductors of said cord, a hollow cap member detachably connectable at one end of said casing and when con-

nected constituting substantially a continuation of said casing, said cap member and said microphone being so proportioned and constructed to enable said microphone to be compactly received with its service cord within said cap member, said microphone having an attachment clip thereon, said clip having a dual function of yieldably engaging the interior of said cap to retain said microphone therein.

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