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HEARING AID CASING

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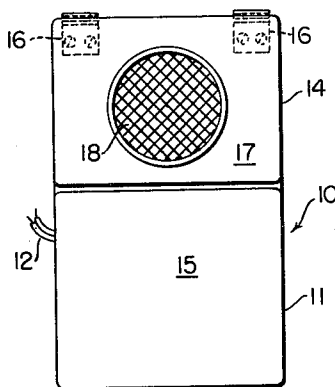
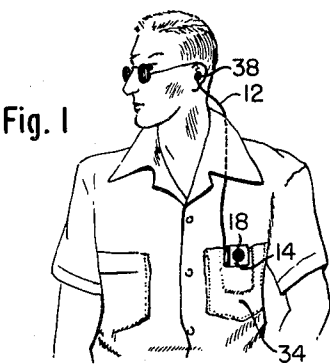


Fig. 2

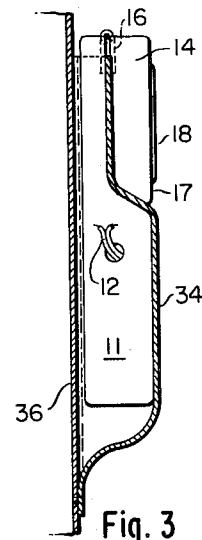


Fig. 3

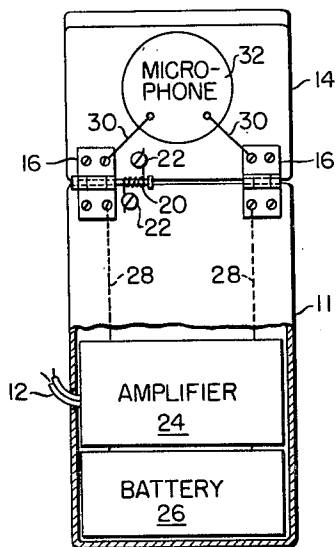
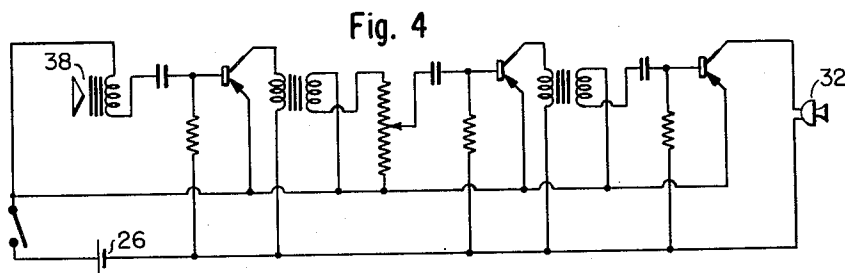


Fig. 5

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## HEARING AID CASING

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My invention pertains to hearing aid devices and provides means for mounting the device on clothing of the user.

Since deaf persons ordinarily attempt to conceal their deafness, it has been necessary for hearing aid manufacturers to devise hearing aids which can be worn concealed within the clothing of the user. Commonly this has been done by designing a hearing aid which fits into the breast pocket, concealing from view both the microphone and amplifier assembly. Various types of clips have been mounted on the face of a casing which houses the assembly to hold the unitary device in the pocket. Though such designs have fulfilled the wishes of users by successfully concealing the mechanism, efficiency of operation of the hearing aid device has been sacrificed, since friction noises occur from contact of the grill of the microphone with the cloth of the pocket, obstructing the clear amplification of the desired signals.

Because of the loss of efficiency in hearing aids of that configuration, other manufacturers have compromised the desire of concealing hearing deficiency by using separate assemblies for the microphone and amplifier. The amplifier in such devices is worn out of view within the clothing, while the microphone in a separate casing is worn externally of the clothing to obviate undesirable friction noises. Such devices have given rise to other disadvantages, e. g. the necessary wire connections between the microphone and amplifier are exposed and susceptible to breakage, while electrical losses occurred in the necessarily long connection. Moreover, the wearer must contend with the added weight and size of two independent casings housing the separate components of the device.

One object of my invention is to do away with interference noise caused by contact of clothing with the grill of a microphone.

Another object of my invention is to eliminate long and exposed connections between an amplifier and microphone.

Another object of my invention is to provide a compact and relatively light hearing aid.

One feature of my invention is the provision of a single casing having a displaceable portion containing a microphone adapted to be secured externally of the clothing, while the remaining portion, housing an amplifier, remains concealed.

Another feature of my invention is the utilization of the displaceable portion of the casing as a clip for mounting the device on clothing of the user.

These and other objects and features of my invention will be best understood and appreciated from the following detailed description of a preferred embodiment of my invention selected for purposes of illustration and shown in the accompanying drawing in which:

Fig. 1 is a pictorial representation of a wearer of the device showing a preferred manner in which the hearing aid embodying my invention may be worn,

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Fig. 2 is a plan view of a microphone and amplifier casing of my invention,

Fig. 3 is a view in side elevation of the casing illustrated in Fig. 2 as it may be worn in the breast pocket of a user of the device,

Fig. 4 is a schematic diagram of an electrical circuit which may be employed in the hearing aid device of my invention, and

Fig. 5 is a top view partly in section of the casing illustrated in Fig. 2 with the displaceable portion of the casing in its displaced position.

The preferred embodiment of my invention herein shown includes in its general organization a casing 10 housing an amplifier 24 and a microphone 32. The amplifier 24 along with a battery 26 are contained in the base portion 11 of the casing 10, while the microphone 32 is mounted in a movable or displaceable portion 14 of the casing.

Coming now to a detailed description of the device, the movable portion 14 housing the microphone 32 is hingedly secured to the base portion 11 of the casing 10 by means of hinges 16. A leaf spring 20 secured at its ends to the respective segments of the casing by screws 22 serves to urge the displaceable portion 14 of the casing 10 to the position illustrated in Figs. 2 and 3, namely, in a non-displaced position.

As clearly illustrated in Fig. 5, the amplifier 24 and the battery 26 are housed in the lower section of the base portion 11. When the displaceable upper portion 14 of the casing 10 is in its normal position under bias of the leaf spring 20, that portion of the casing complements the base 11, together forming a compact single casing having a smooth face 15, 17. In this position, the casing 10 resembles the conventional hearing aid casing housing an amplifier, battery and microphone.

Leading from the microphone 32 are a pair of wires 30 electrically connecting the microphone to the metal hinges 16. Extending from the hinges 16 are a pair of wires 28 completing the electrical connection from the microphone to the amplifier and battery. Note that the wires 30 and 28 are rigidly secured within the casing 10 protected against breakage, flexing, etc. Moreover, as illustrated, the hinges serve as component parts of the electrical connection. It is understood, however, that non-metallic hinges could be employed and unbroken wire connections could be made from the microphone to the amplifier and battery. A flexible tubular protective covering could serve to protect the wires at the hinged portion of the casing. Alternatively, a pair of leaf springs could be employed as component parts of the electrical connection in a manner similar to that illustrated for the hinges.

The amplifier circuit employed in my device forms no part of my invention. The amplifier illustrated in the schematic diagram of Fig. 4 is a simple transistor circuit and is for illustrative purposes only. A circuit employing miniature vacuum tubes or a circuit employing both vacuum tubes and transistors can equally well be used in my casing.

As illustrated in Fig. 1, my device is readily mounted in the breast pocket of a shirt. The base portion 11 of the casing is inserted into the pocket between the shirt 36 and pocket face 34, as clearly seen in Fig. 3. To perform this operation, the displaceable upper portion 14 is pivoted against the bias of the spring 20 permitting the base portion 11 to enter the pocket while the displaceable portion remains outside. When the hinges prevent further insertion, the user merely releases the displaceable portion which then acts as a clip to hold the casing in place. In this manner, the grill 18 of the microphone 32 faces away from the clothing of the user, thereby avoiding contact with the shirt or pocket. A

receiver 38 connected to the amplifier by a pair of leads 12 is then inserted in the ear and the device is ready for use.

It is noted that the pocket face 34 covers the entire base portion 11 of the casing 10. The only exposed portion of the amplifier-microphone assembly is displaceable portion 14. Bulkiness has been avoided by permitting the displaceable portion of the casing to return to a position wherein its front face does not project beyond the face 15 of the base portion 11.

Having thus described a preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a device of the character described, the combination comprising a casing, a portion of said casing being pivotally displaceable from and complementary to the remaining portion of said casing whereby said portions of said casing provide means for clipping said casing to apparel, means operatively associated with said casing for yieldably holding said pivotally displaceable portion in non-displaced position, the displaceable portion and the remaining portion together providing a smooth and continuous front surface for the casing when the displaceable portion is in its nondisplaced position, a microphone mounted in said pivotally displaceable portion of said casing, an amplifier mounted in said remaining portion of said casing below the displaceable portion, and means operatively connecting said microphone to said amplifier.

2. In a device of the character described, the combination comprising a casing having a smooth front face, means permitting a portion of said casing to be pivotally displaced from the front face of the remaining portion of said casing whereby said portions of said casing provide means for clipping said casing to apparel, a spring operatively associated with said casing for yieldably holding said displaceable portion in its non-displaced position, a microphone mounted in the pivotally displaceable portion, an amplifier and a battery mounted in the remaining portion of said casing below the displaceable portion, and means operatively connecting said microphone to said amplifier.

3. In a device of the character described, the combination comprising a casing having a smooth front face, a front upper portion of said casing being displaceable from the remaining portion of said casing, hinge means pivotally securing said front upper portion of said casing to said remaining portion of said casing, resilient means yieldably holding said front upper portion of said casing in its non-displaced position, a microphone mounted in the displaceable portion of said casing, an amplifier mounted in the remaining portion of said casing below the displaceable portion, means including said hinge means for electrically connecting said microphone to said amplifier, whereby said microphone can be placed externally of a pocket and the amplifier internally of a pocket in apparel of a user of said device.

4. In a device of the character described, the combination comprising a casing having a smooth front face, a front upper portion of said casing being displaceable from the remaining portion of said casing, means pivotally securing said front upper portion of said casing to said remaining portion of said casing and yieldably holding said portion in its non-displaced position, a microphone mounted in said displaceable portion of said casing, an amplifier mounted in the remaining portion of said casing below the displaceable front upper portion of the casing and electrically connected through said means to said microphone, whereby said casing can be clipped to a pocket of a user of said device with the microphone outside of said pocket and the amplifier within said pocket, the over-all thickness of the casing being equal to the thickness of the thicker of the two portions of the said casing.

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