

[54] ELECTRICAL HEARING AID

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[56] References Cited

UNITED STATES PATENTS

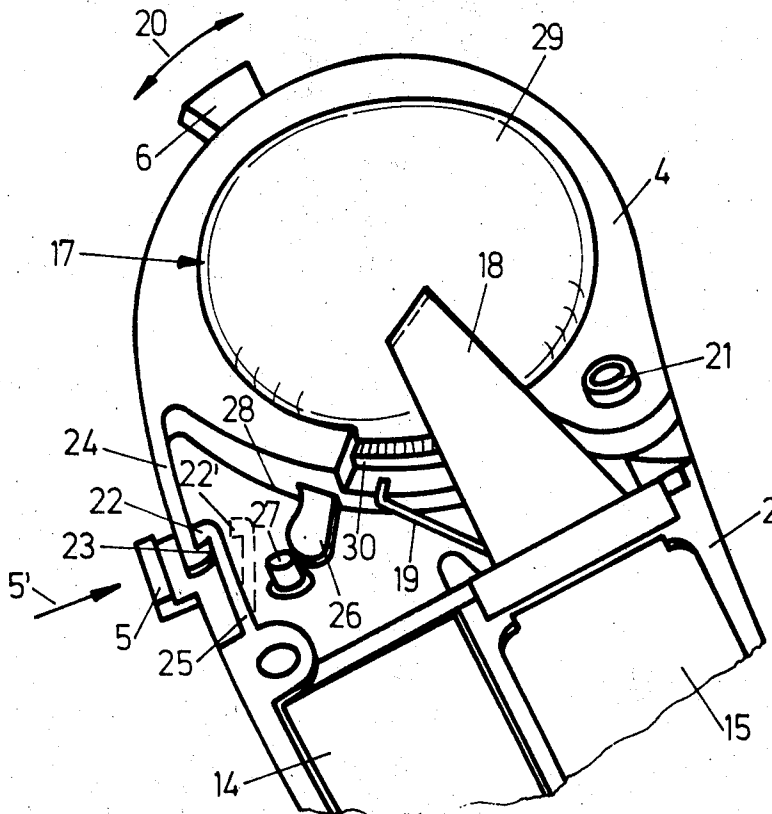
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[57] ABSTRACT

An electrical hearing aid is operated by the current of a current source provided in the casing of the hearing aid in a holder movable therein to exchange the source. The operating current is switched on and off by the movement of the holder and the closing or opening of contacts. An element effective between the holder and the casing snaps in rest locations in the switched on and switched off positions of the holder. The invention is particularly characterized by the provision of a closing device located between the holder and the casing and movable in and out to limit the movement of the holder at most to the switching operation and at least to an opening which just about prevents the removal of the battery.

2 Claims, 4 Drawing Figures



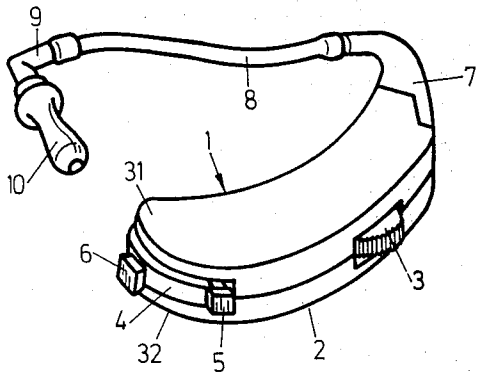


Fig. 1

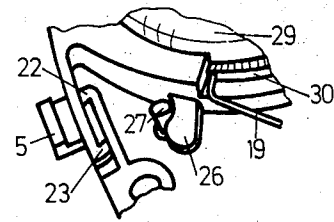


Fig. 4

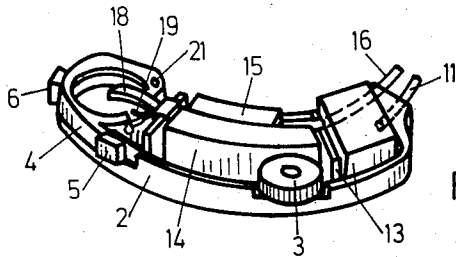


Fig. 2

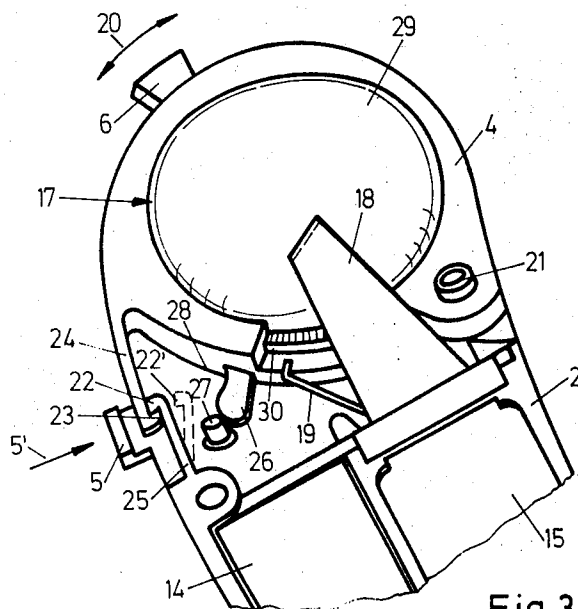


Fig. 3

ELECTRICAL HEARING AID

This invention relates to an electrical hearing aid the operating current of which is taken from a current source located in the casing of the hearing aid upon a holder movable to exchange the source. The operating current is switched on and off relatively to the hearing aid by a movement of the holder and closing or opening of contacts. A resilient element operable between the holder and the casing snaps in rest locations in the switched on and switched off positions of the holder. Such switches are used particularly in hearing aids which are very small and carried on the head, such as, for example, hearing aids carried behind the ears, hearing aids mounted in the ears and hearing aids combined with eyeglasses.

In small hearing aids carried on the head the battery holders consist often of so-called swinging carriers or drawers, namely, holders, which are, for example, ring-shaped and which are swingably or slidably mounted in the casing and into which can be mounted as current source a battery or an accumulator source. The holder is then introduced jointly with the source into the casing. When it is moved in contacts provided in the casing are brought in contact with the polar surfaces of the battery. The switch located in the casing is connected with the source and sound signals received by the microphone are amplified and transmitted through the hearing aid to the user of the device as sound strengthened in its intensity, clang, etc. In order to be able to switch the device on and off in a simple manner and without requiring additional space, a special switch is usually avoided and the disconnection of contacts of the switch from the battery at the opening of the battery container serves as the switching procedure for the operation of the device. To make certain that the switching on and off will always take place properly, rest locations are provided in places wherein it takes place wherein resilient elements are operative between the battery holder and the casing. Then the battery holder is usually held in closed condition sufficiently firmly to guaranty a perfect operation of the device. However, the situation is different in the open condition, namely, when the device is switched off. Then as a rule the actuating member for opening the battery holder moves into a position which is spaced from the container, so that when the user moves it can easily remain hanging and be opened completely, with the result that the battery falls out and can get lost. On the other hand the holding of a battery holder which is somewhat, perhaps half open, is difficult, since the holding upon a spring carrying location which permits movement on both sides, makes possible only a limited stopping possibility. It is therefore easily possible that during the switching off of the device it will open completely and the battery will fall out. Present day batteries are usually so small that they can easily get lost. This difficulty is particularly important since hearing aids are used by elderly persons for whom it is not easy to operate small switching elements.

An object of the present invention is to improve existing hearing aids.

Other objects will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention the battery holder is made without the use of additional space as a proper exchanger and a

safe switch by providing between the holder and the casing a closing device which is movable in and out and which limits the movement of the holder at most to the switching operation and at least to an opening which just about prevents the outgo of the battery. To exchange the battery the lock can be again switched off, so that an exchange of the current source is possible every time.

The advantage of the present invention consists in that the holder of the current source is made secure against unintentional opening.

As locking elements it is possible to use all structural parts which are suitable to provide the above-described limitation of the movement of the current source holder, such as bolts or snapping resilient parts, such as hooks, etc., engaging into recesses and permitting the required switching movement. As an embodiment of the present invention which is preferred due to its simple construction the lock is constructed as a resiliently removable hook connection which snaps when the holder is closed. In order to exchange the current source the opening movement is made free by pushing away the resilient hook. During the switching on and off, wherein the release of the hooks is not actuated, the two hooks form interengaging stops which limit the switching off movements after the release of the contacts before an opening of the holder can take place through which the source could fall out. It is sufficient that the extensions which the hooks carry on their free ends, should have a length corresponding to the switch path, namely, the path along which the holder must be moved to carry out the switching operation.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing showing by way of example only, a preferred embodiment of the inventive idea.

In the drawing:

FIG. 1 is a perspective view of a hearing aid for use behind the ear provided with the holding means for the current source of the present invention.

FIG. 2 shows the device of FIG. 1 when the supporting hook with the sound channel and the upper cover are removed.

FIG. 3 shows on an enlarged scale a battery holder provided with a battery when switched off.

FIG. 4 is a partial view of the device of FIG. 3 in a switched on condition.

FIG. 1 shows a hearing aid 1 for use behind the ear having a casing 2 and a sound regulator 3 extending out of the casing. The battery holder 4 having a grip lug 6 and a releasing key 5, is located at that end of the casing 2 which is opposite the carrying hook 7. The hook 7 has on the one hand, a channel for incoming sound (not shown) and a channel for sound delivery to which a flexible hose 8 is connected. The end of the hose is connected by a hook 9 to an elastic ear insert 10.

The known operation of the device is clearly illustrated in FIG. 2. When the hook 7 is fitted the sound conduit extending through the hook and opening at its front side, is connected to the socket 11. The socket 11 is connected with a microphone 13 which transmits sound signals to the amplifier 14. From there the strengthened signals reach the hearing device 15 and are then transmitted through the conduit 16 and its extension in the hook 7 to the hose 8 and through the hook 9 and insert 10 into the ear of the person carrying

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the hearing aid. In order to make possible the operation of the amplifier 14 the battery 17 shown in FIG. 3 is connected by contacts 18 and 19 with the amplifier 14. In order to provide the on and off switching the holder 4 is caused to carry out a swinging movement about the axle 21 in the direction of the double arrow 21 at the lug 6. The opening of the holder 4 is prevented, however, by interengaging hooks 22 and 23. The hook 23 is the end of the lug 24 at the holder 4 and the hook 22 is the end portion of the extension piece 25 resiliently connected to the casing 2.

When the holder 4 is completely closed, as shown in FIG. 4, it is held by a resilient pin 27 extending over its nose-shaped lug 26. The pin 27 is fixed at one end to the casing 2 and thus is bent when the lug 26 slides past it. It then engages with its side surface a recess 28 of the lug 26 and holds firmly the holder 4. At the same time the contacts 18 and 19 engage the pole surfaces 29 and 30 of the battery 17. The contacts are connected by conduits in the known manner with the amplifier 14. Thus the device is operated when the holder 4 is closed.

To switch off the holder 4 is moved so that the position shown in FIG. 3 is reached. Then surfaces of the hooks 22 and 23 which have been inclined inwardly for greater safety, move into engagement. They prevent a further opening of the holder 4. Thus the battery 17 is prevented from falling out by the parts 31 and 32 (FIG. 1) of the casing 2. Furthermore, the contact 19 is released from the pole surface 30 of the battery 17, so that the amplifier 14 is not supplied with current any more. The device is then switched off.

To replace the battery the key 5 is pressed in the direction of the arrow 5' against the resilient force of the part 25 with which it is connected. Then the hook 22 is brought into the position 22' shown in FIG. 3 by broken lines, so that it is moved out of the path of movement of the hook 23. Thus the hook 23 is freed, so that the holder 4 can be swung about the axle 21 to such

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an extent that the battery 17 can move out sufficiently between the parts 31 and 32 of the casing 2, so as to be removed from the holder 4 and replaced by another one. When the holder 4 is being closed the hook 22 is pressed back by the inwardly inclined front surface of the hook 23. Due to the resilient action of the extension 25 the hook connection will move back into the position shown in FIGS. 3 and 4 during further movement of the holder 4. Unintended opening of the holder 4 is prevented in this position.

I claim:

1. An electric hearing aid, comprising a casing, a holder mounted in said casing and movable between a switching position and an open position, a source of electrical energy carried by said holder, contacts engaging said source in the switching position of said holder, means connected with said contacts for receiving and amplifying sounds, a locking device located between and connected with said holder and said casing for limiting the movement of said holder to one between said switching position and a position adjacent to said open position, but preventing the removal of said source, said locking device comprising a resilient hook, said holder being round and comprising a lug and a hook carried by said lug and directed inwardly relatively to the roundness of said holder, the last-mentioned hook being adapted to engage behind the first-mentioned hook during a closing movement of said holder, a resilient extension piece carried by said casing and carrying the first-mentioned hook, and a pressure key adapted to engage the first-mentioned hook to move it out of the path of movement of the second-mentioned hook.

2. An electrical hearing aid according to claim 1, comprising lugs having ends carrying said hooks, the length of said lugs corresponding to the switching movement of said holder.

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