A hearing aid switch of the type shown in U.S. Pat. No. 3,475,566 issued Oct. 28, 1969, is provided with additional contact position to add an additional mode of operation without increasing the size of the switch or the structure in which it is contained. The switch has three positions: an "on" position which connects the microphone of the hearing aid unit to the amplifier, a "mid" position which connects an additional transducer in the hearing aid to the amplifier (as for instance a telephone pick-up) and an "off" position.
BATTERY HOLDER AND THREE-POSITION SWITCH FOR HEARING AID UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention
The present invention relates to hearing aid devices and, more particularly, to an improvement over the combined battery holder and ON-OFF switch assembly for such devices as disclosed in U.S. Pat. No. 3,475,566, issued Oct. 28, 1969, and assigned to the same assignee as this instant application.

2. Description of the Prior Art
The prior art is essentially shown in the aforesaid U.S. Pat. No. 3,475,566 which relates to a so-called behind-the-ear hearing aid which may be made as an independent unit or as part of the bow of a spectacle frame.

In accordance with the present invention, the battery holder is provided with a modified detent configuration which permits battery switching not only between ON and OFF positions, but additionally enables a mid-switch position to be attained. To this end, the spring fingers mounted within the battery compartment are modified so that the detent operates as a camming surface while the fingers operate as a lever cam follower. In this manner, the mid-switch position can be used in transferring the hearing aid from a "microphone" mode of operation to an alternative "telephone pick-up" mode.

The primary object of the present invention therefore is the provision of switching between a microphone mode to a telephone mode, that is, to a mode in which a transducer in the hearing aid is connected to the amplifier, thereby by-passing the microphone. The invention is therefore directed to the utilization of the battery carrier switch to effect this operation, to enable the hearing aid switch to be set at an OFF position, an ON (microphone) position, and a MID (telephone) position. This is accomplished by the provision of an additional contact on the rotary switch element connected to the battery and an additional detent stationary contact to engage the additional switch contact. All of this is done without increasing the size of the unit or elements thereof, to maintain the miniature construction required for efficient use and operation.

The foregoing and other objects of the present invention will become apparent in the following description and drawings in which:

FIG. 1 is a side view partly broken away of a hearing aid housing containing a battery and the novel switch arrangement of the present invention. The switch is in the "off" position.

FIG. 2 is a view corresponding to that of FIG. 1 with the switch in the "telephone" position.

FIG. 3 is a view corresponding to that of FIG. 1 with the switch in the "microphone" position.

FIG. 4 is a simplified circuit diagram.

Referring to the drawings, FIGS. 1, 2 and 3 show the hearing aid housing 10 having a battery and switch recess 11 and battery carrier 12 which is rotatable in recess 11 in which the battery 13 is removably mounted. The rotatable carrier 12 has a switch knob extension 14 extending through slot 15 in housing 10 to rotate the battery carrier and switch mechanism from the "off" position of FIG. 1 to either the "telephone" position of FIG. 2, the "microphone" position of FIG. 3, or from the position of FIG. 2 to the position of FIG. 3 and back again, or back to the "off" position of FIG. 1.

The "off" and "microphone" positions have been shown in said U.S. Pat. No. 3,475,566 and the general structure of the battery carrier and the "off" and "microphone" switches are as described in said patent. The entire switch assembly 18 is removable and remountable in the hearing aid as therein described.

The "off" and "microphone" switching is activated as follows:

A first mounting boss 29 is disposed in the bottom portion of narrow enclosure rear wall 27 and contains a recess 31. Recess 31 cooperates with another recess 32 to fixedly receive an elongated carrier 33 for leaf spring 35, which includes battery spring contact 17. A U-shaped portion 34 is provided near one end of the leaf spring carrier 33, so that leaf spring 35 and the contact 17 may be biased in a direction transverse to the length of leaf spring carrier 33 or, for additional flexibility, may be attached to an arm 35 transversely movable with respect to the leaf spring carrier 33. An additional battery spring contact 36 is affixed to the rear wall 27 of the enclosure and contains at its end a forwardly extending contact portion.

The battery 13 is held in a retainor segment 38 and an inner battery housing 43. The outer spring contact 17 bears against segment 38 in the "off" position of FIG. 1. Contact 17 is in register with recess 51 of segment 38 and bears on the outer surface of battery housing 43 which is of insulating material. In the "microphone" position of FIG. 3, the recess 51 of segment 38 is aligned with recess 52 of battery carrier 43 and contact 17 then engages the side of battery 13. These two positions constitute the original on and off positions.

The circuit diagram of FIG. 4 indicates the battery 13, the stationary contact 17 and the connection to an amplifier 60 (which may be connected to a speaker or ear-piece, not shown) and the connection to double throw switch 70 which may select the input from a microphone source 71 or a telephone pick-up source 72. The condition of the circuit is for the "microphone" connection shown in FIG. 3.

The double throw switch 70 comprises a leaf spring member 74 supported in recess 75 of a wall of the housing and biased to engagement with the microphone connecting contact 76 supported in recess 77 of the housing wall. When the leaf spring member 74 is deflected to engage the telephone pick-up contact 80 supported in wall recess 81, then, as seen in the schematic of FIG. 4, the microphone 71 is disconnected and the telephone pick-up contact 72 is connected.

This occurs at the mid-position of contact operating knob 14 as seen in FIG. 2.

The battery carrier 43 is provided with the contact operating boss or extension 85 which, at the mid-position of the operating elements shown in FIG. 2, engages the leaf spring contact 74, disconnects it from microphone contact 76 and connects it to telephone pick-up contact 80.

Since the user must have some indication of feel which will communicate the latter contact position and will releasably fix this position, the battery carrier 43 is also provided with a detent boss 87 which, when the an-
regular position of the contact members is such that contact leaf spring 74 engages telephone pick-up contact 80, releasably engages the detent spring 88. This provides a "feel" for the telephone pick-up contact position and a releasable mechanical engagement for retaining the same.

Obviously, the retainer segment 38 is annularly slotted or otherwise shaped to permit the contact operating boss 85 and the detent boss 87 on the battery cover 43 to extend therethrough and operate angularly. Preferably, the retainer spring 38 is recessed from one edge for this purpose to permit removal and reinsertion of the battery and its cover.

Since many modifications and variations will become evident to those skilled in the art, it is desired that the breadth of the invention not be limited by the specific disclosure herein contained but only by the appended claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. A hearing aid switch mechanism comprising a chamber; a battery cover rotatably mounted in said chamber, said cover having means for retaining a battery; a stationary contact in said chamber engaging a side of said battery; a peripheral contact in said chamber; said contact being biased toward engagement with a periphery of said battery; said cover and said battery being rotatable from an "off" position to a second position and a third position; said cover blocking engagement between said peripheral contact and the periphery of said battery when the cover is in the "off" position; a recess in said cover registering with said peripheral contact and permitting the same to engage the periphery of said battery when the cover is in the second and third position; and an additional contact; a contact operating boss on said cover; the said contact operating boss engaging said additional contact when the rotatable cover is in said second position and disengaging said additional contact when the rotatable cover is in the third position.

2. The hearing aid switch mechanism of claim 1 in which said cover is also provided with a detent boss; a detent member in said chamber; said detent boss and said detent member being interengaged when said contact operating boss is in operating engagement with said additional contact.

3. The hearing aid switch mechanism of claim 1 in which said chamber is provided with two complementary contacts adjacent said additional contact; said additional contact being biased to engagement with one of the two complementary contacts; said contact operating boss moving said additional contact to engagement with the other of the complementary contacts.

4. The hearing aid switch mechanism of claim 3; a hearing aid; said switch mechanism being contained in said hearing aid; said hearing aid having a microphone, a telephone pick-up and an amplifying system; one of said complementary contacts of said switch mechanism being connected to said microphone and the other of said complementary contacts being connected to said telephone pick-up.

5. The hearing aid of claim 4 in which the peripheral contact, the amplifier and the additional contact are in series with each other.

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