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BOW FOR A SPECTACLE HEARING AID

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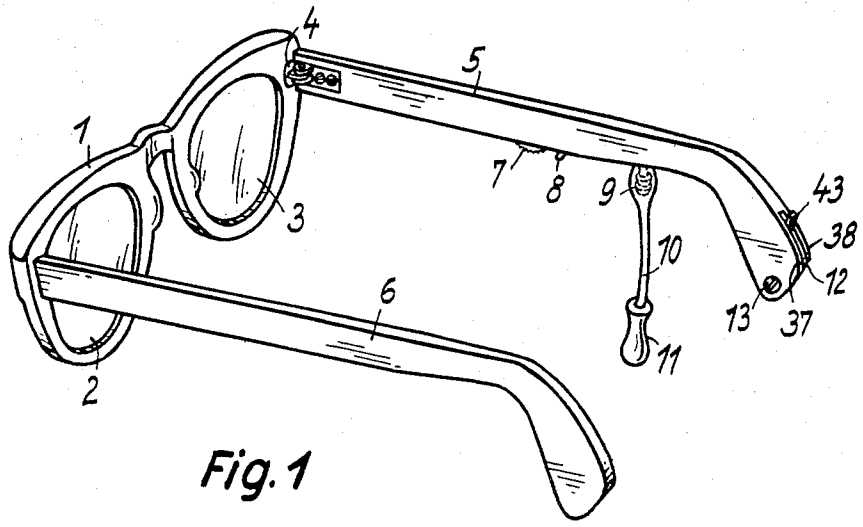


Fig. 1

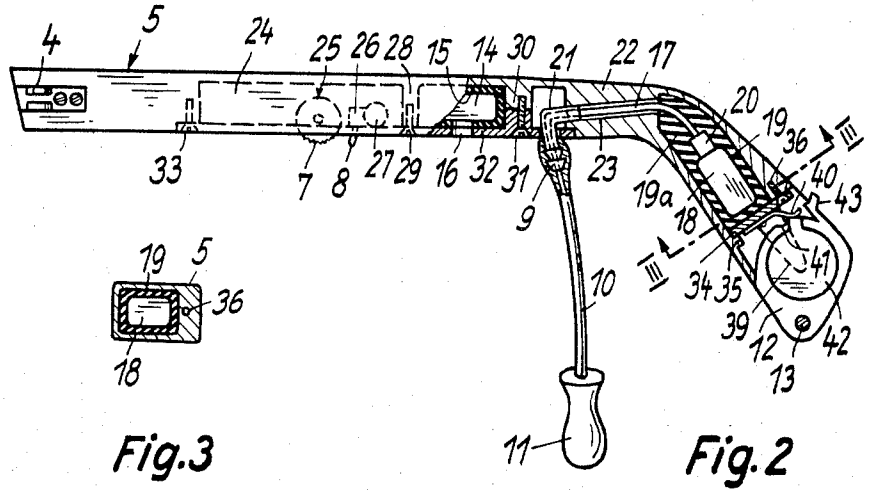


Fig. 3

Fig. 2

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BOW FOR A SPECTACLE HEARING AID

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The invention disclosed herein relates to a hearing aid and is particularly concerned with a spectacle hearing aid comprising parts built into the curved side piece or bow of spectacles, wherein the space for the hearing aid parts is at the transition from the straight portion of the bow to the angular rear portion thereof, subdivided by a part made of solid material throughout, in which is formed a channel for connecting lines.

The cavities, formed in the bow of a spectacle hearing aid, which are utilized for receiving the components of the hearing device, are frequently so arranged that they do not involve the portion of transition from the straight to the angular bow part; that is, such transition portion is free of cavities. This portion, which thus consists of solid material throughout, can therefore be made narrower and thinner than the remaining portions of the bow, without impairing the mechanical stability thereof, so that it can be accommodated in engagement with the region lying back of the auricle above the mastoid process. The portion of the bow made of solid material throughout subdivides the space available for the hearing aid components into two sections between which must be provided connections. Upon disposing the receiver in the angular bow part, there must be provided therein, in addition to the electrical connections, the sound transmission conduit extending from the receiver to the ear, when it is desired to keep this conduit as short and as inconspicuous as possible. This requires provision of a conduit in the portion made of solid material, for accommodating at least this transmission conduit. The electrical connecting lines can be injected into the solid material or likewise provided in conduits formed therein.

The cavities for the various parts are arranged on the inside of the bow in order to obtain simple forms in the fabrication of bows for specatcle hearing aids by the usual injection molding technique. Accordingly, the openings for the cavities, which are ultimately closed by suitable cover means, are disposed along areas which are upon wearing the corresponding spectacles, in engagement with the skin. The cover means must for this reason be carefully arranged so as to be in tight sealing fit, in order to avoid damage to the hearing aid parts by ingress of skin secretions, especially perspiration. It is particularly difficult to obtain a durable and tight sealing of the cavity lying in the angular portion in back of the ear. Another disadvantage in connection with the provision of the cover means on the inside of the bow resides in that the bow assumes so far as its appearance is concerned an unsymmetrical structure, so that it cannot be readily used at one or the other end of a spectacle frame, that is, as a right or left bow, respectively.

In order to avoid, in connection with bows for hearing aids constructed in this manner, further closures which have to be sealed, the conduits for the connecting lines extending between the cavities for the components, which had been formed in the manner of cut-in grooves, were also made as channels wholly extending through the solid material bow portion. In a known spectacle hearing aid bow, these channels are formed as straight channels with the aid of a simple drill. The injection

mold for producing the bow can in such a case be made as a simple and readily manipulated structure.

The above indicated disadvantages are according to the invention avoided, without necessitating a complicated injection mold, by providing the angularly extending part of the bow with a cavity extending from the end thereof up to the elbow portion, with the inner end of such cavity, which borders on the solid material bow part, forming a surface or a wall lying in a plane which extends approximately perpendicularly to the straight portion of the bow, meaning, in the sense of the invention, that the corresponding surface or wall has an inclination facing the solid material portion which extends with respect to the straight bow portion, so that a straight bore, coming from the cavity lying ahead of the angular portion, passes through this surface or wall.

There are no cover means required for the component space or cavity formed in accordance with the invention in the angularly extending bow portion, which would have to be tightly sealed and come into contact with the skin. The corresponding angularly extending bow portion has a tubular profile, that is, it has no laterally open area. Thus results moreover in an at least exteriorly symmetrically constructed angular portion. It is also possible to produce the bow in known manner by injection molding and to form with a simple drill the channel extending rearwardly from the component space in the straight part of the bow. It is merely necessary to dispose in the injection operation the side which holds the component space in the angular portion free, from the lateral plane to the end thereof, and to construct such slide so as to conform to the shape of the corresponding cavity as required by the invention.

The corresponding cavity is according to an embodiment of the invention utilized as a space for the receiver. In order to prevent reaction with respect to the microphone, the receiver is disposed within an oscillation insulating material, which is advantageously also provided within the corresponding space which is free of the receiver. The transmission of oscillations to the bow material is thereby reduced, thus avoiding to a far reaching extent oscillation reaction of the receiver with respect to the microphone.

A structure which particularly favors inconspicuousness of the hearing aid is obtained by arranging the cavity or component space in the angular bow part so that it opens only toward the end thereof and closing such opening by means of a plate, with a battery arranged on the side thereof which faces away from the receiver. There are thus no parts on the outer sides of the bow which would point to the provision therein of a receiver.

The drawing shows by way of example a spectacle hearing aid employing the above indicated features of the invention.

FIG. 1 is a perspective view of a spectacle hearing aid in which the individual electrical parts are provided in a side piece or bow thereof;

FIG. 2 shows on a larger scale in part sectional view details of the electrical parts contained in the bow; and

FIG. 3 represents a sectional view taken along lines III—III of FIG. 2.

FIG. 1 shows the spectacle hearing aid according to the invention, having a frame made of synthetic material and comprising detail parts which correspond substantially to normal spectacles, namely, the frontal part containing the lenses 2 and 3, such frontal part being provided with hinges of which only one hinge 4 is visible, for movably securing in known manner the two bows 5 and 6. These bows are made in injection molding and the spaces required therein for the detail parts of the hearing aid are thereby left vacant in the form of cavities.

The electrical hearing aid is in the illustrated embodiment provided only in the bow 5. The bow 6 is formed similarly as the bow 5 so as to impart to the structure an inconspicuous symmetrical appearance. The form of a bow like the bow 5 which contains the hearing aid parts is indistinguishable from that of the bow 6 and it is therefore readily possible to put in the place of the latter a bow such as 5 in which the hearing aid parts are provided.

Slightly protruding from the underside of the bow 5 is the small volume regulating wheel 7 and adjacent thereto is disposed the lever 8 for the hearing coil switch 26 (FIG. 2). The sound transmission conduit 17 (FIG. 2) extends in back of the lever 8 outwardly in the form of a connection 9 on which is placed the flexible line 10 terminating in the flexible ear piece 11. At the end of the angularly extending portion of the bow 5 is provided the battery container 12 which is held in place by the screw 13, such screw forming at the same time a pivot for the container 12.

It will be seen from FIG. 2 that the microphone 14 is non-rigidly positioned in an oscillation insulating envelope 15, made of rubber, its sound entry opening 16 being disposed ahead of the exit of the sound transmitting conduit 17 at the connection 9. The receiver 18 is for oscillation insulation likewise non-rigidly positioned in an elastic rubber envelope 19, disposed in the component space formed in the angularly extending part of the bow 5, and is over its terminal member 20 connected with the sound transmission conduit 17 which terminates in the connection 9. The connection 9 forms the outwardly extending end of a tubular angle member 21 which is plugged into the straight channel 23 formed by drilling in the straight end 22 of the bow which is made of solid material, the angle member 21 terminating the channel 23 in soundproof manner in the direction of the forwardly directed bow portion.

The remaining parts of the hearing aid are likewise provided within the bow 5, thus leaving the frontal lens frame 1 completely free of all such parts and lines. The amplifier 24 together with the volume regulator 25 as well as the switch 26 for the coil 27 are arranged in the bow ahead of the microphone 14 and separated from the latter by a partition wall 28. The wall 28 which is provided with a threaded hole for the screw 29, and the wall 30 which provides a threaded hole for the screw 31, reinforce and stiffen the bow 5 against torsional deformation. The wall 30 fills the space between the microphone 14 and the space surrounding the angular tubing 21 only for one half the height of such space, in order to give room for the drilling of the channel 23 by a straight drill. The wall 30 is supplemented by an enlargement of the cover 32 at the place of the screw 31. The spaces for disposing the amplifier 24 and the microphone 14 are closed by means of the cover 32 which is fastened in place, from the lower edge of the bow 5, by means of the screws 29, 31, 33.

The receiver 18 together with the sound transmission conduit 17 and its oscillation insulating envelope 19 are inserted from the rear end of the angular part of the bow into the cavity formed therein. The space of such cavity which is free of the receiver 18 is filled with the part 19*a* of the rubber forming the oscillation insulating material 19. The corresponding cavity which is open at the edgewise end of the angular portion of the bow has parallel laterally extending inner walls. The inner wall along the lower edge extends straight and in parallel with the angular direction of the end part of the bow. The inner wall along the upper edge extends for some distance straight from the open end of the cavity in parallel with the lower inner edge wall and then arcuately in the direction of the straight bow portion. The inner end of the cavity forms a wall which extends approximately perpendicularly to the straight bow portion and borders on the rearward end of the portion 22 which is made of solid material. The

manner of extending the cavity for the disposal of the receiver up to the part 22 of the bow 5 makes it possible to form the channel 23 from a point of the straight bow part as a straight bore for the insertion of the sound transmission conduit 17.

The receiver 18 is in view of the configuration of the cavity, which is for the greater part of its length cross-sectionally rectangular, held in place by means of a plate 34. This plate is held at one end thereof by a projection 35, which is cemented to the inner wall, and at its other end by means of a screw 36. The battery container 12 is by means of the screw 13 pivotally fastened at the rearmost end of the bow 5 and is thus positioned ahead of the plate 34 at the side thereof which faces away from the receiver 18. The battery container is in closed position disposed between the two wall portions 37, 38 (FIG. 1) which are merely extensions of the parallel side walls of the angularly directed portion of the bow 5. The plate 34 is on the side thereof which faces away from the receiver provided with the contact springs 39 and 40 which connect the battery with the circuit of the hearing aid.

The battery container is in known manner constructed to operate as an On-and-Off switch. While the contact spring 39 immediately establishes upon closure of the container 12 contact with the battery, the spring 40 first snaps into the notch 41 formed in a part of the container 12 which is made of synthetic material. The spring 40 establishes contact engagement with the metallic part 42, which is electrically connected with the second pole of the battery, only upon complete closure of the container 12. In order to obtain disconnection of the battery, the nipple 43 is pulled outwardly to interrupt the contact engagement between the spring 40 and the metallic part 42. Further pulling of the nipple effects opening of the container for the exchange of the battery.

The electrical connections between the elements of the hearing aid are made in well known manner and therefore have not been illustrated to keep the drawing simple.

The sounds enter the microphone 14 through the opening 16 formed in the lower edge of the bow 5 at a point forwardly of the ear. The sounds are in the microphone 14 converted into electrical signals which are conducted to the amplifier 24. These signals are upon actuation of the switch 26 conducted to the coil 27 in which they are converted into electromagnetic oscillations the energy of which corresponds in its distribution to the sounds received. Such energy is likewise in the form of electrical signals conducted to the amplifier 24, in which these signals are amplified. The amplified signals are extended to the receiver 18 in which they are converted into acoustical signals, that is, into audible sound, such sound being transmitted through the conduit 17 over the angular member 21 and the connection 19 and thence through the flexible tube to the ear piece 11.

Changes may be made within the scope and spirit of the appended claims which define what is believed to be new and desired to have protected by Letters Patent.

We claim:

1. A bow for a spectacle hearing aid, said bow having a straight portion and a portion angularly extending therefrom at the rear end thereof, cavities for receiving hearing aid components being respectively formed in said straight portion and in said angularly extending portion, the part of said bow forming the transition from said straight portion to said angularly extending portion being made of solid material and separating the respective portions having cavities formed therein, a channel being formed in said transition part; wherein the cavity formed in said angularly extending bow portion extends from its edgewise end inwardly throughout the length thereof, said cavity being open and accessible solely from the rearward end of the bow, the inner end of said cavity terminating in a wall bordering on the rearward end of said solid material portion and lying in a plane which extends ap-

proximately perpendicularly to the straight portion of said bow.

2. A bow for a spectacle hearing aid according to claim 1, wherein the cavity formed in said angularly extending bow portion is open at and accessible solely from the edgewise end of the respective bow portion, a receiver disposed in said cavity, a plate for closing the corresponding receiver space, a battery disposed in the remaining space of said cavity on the side of said plate which faces away from said receiver, and battery contact switching means likewise disposed on said side of the plate.

3. A bow for a spectacle hearing aid according to claim 2, comprising oscillation insulating material enveloping said receiver and filling the entire remaining space of said cavity extending inwardly from said plate.

4. A bow for a spectacle hearing aid according to claim 3, wherein said channel projects along a straight line through said solid material bow portion forwardly from said wall which terminates the inner end of the cavity formed in said angularly directed bow portion, a sound transmitting conduit extending from said receiver through said channel, an angular tubular member connected with said conduit at the forwardly facing end of said solid material portion which forms a part of the straight portion of

said bow, one arm of said angular tubular member extending outwardly and downwardly through a part of the lower edge wall of said straight bow portion and being connected with the ear piece of said hearing aid.

5. A bow for a spectacle hearing aid according to claim 4, wherein said part of the lower edge wall of said straight bow portion is formed by a cover member which delimits a rearwardly extending cavity for receiving said angular tubular member, and means for removably securing said part for gaining through said cavity access to said channel projecting through said solid material portion of said bow.

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