

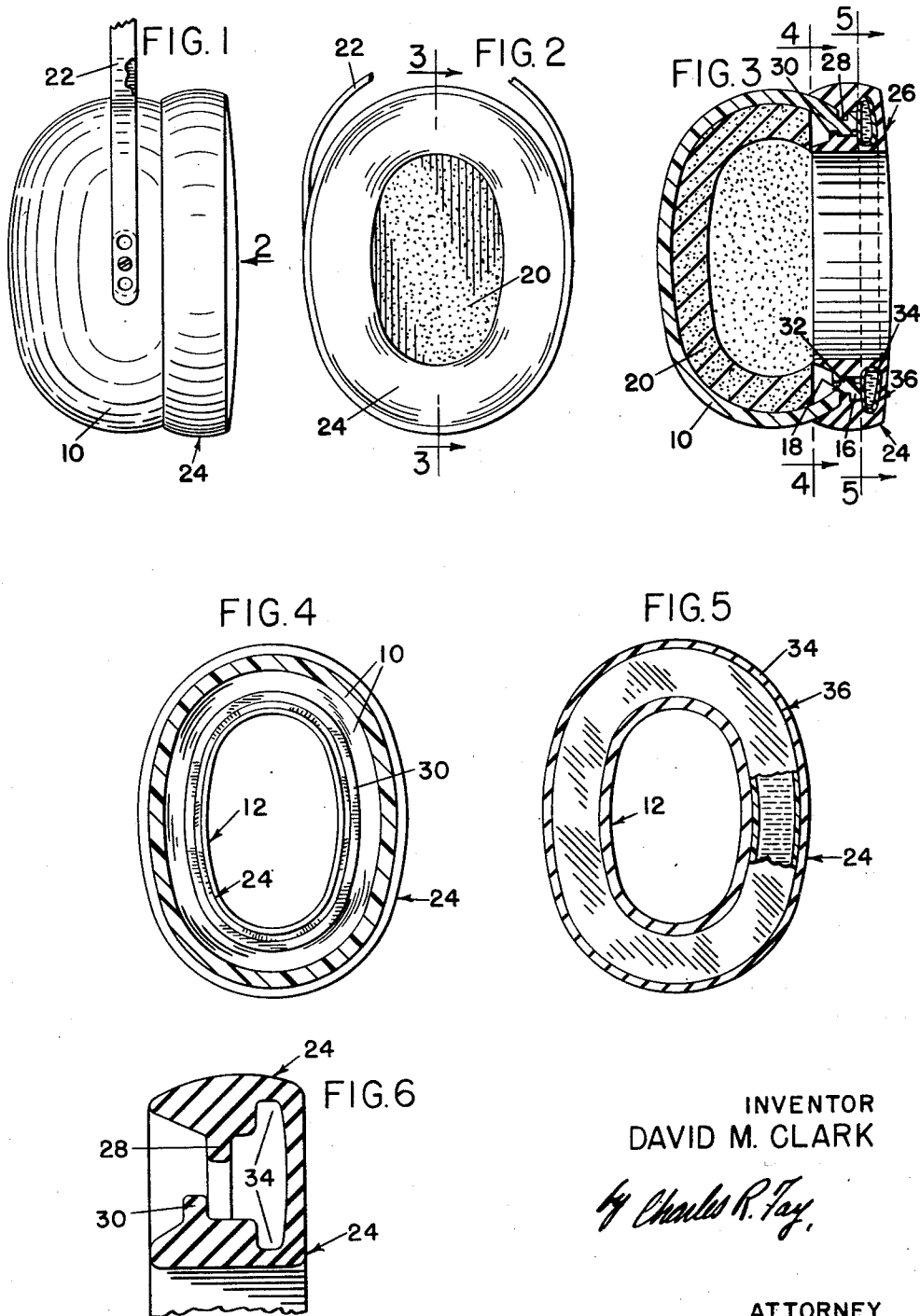
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EAR PROTECTOR AND SEAL THEREFOR

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EAR PROTECTOR AND SEAL THEREFOR
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This invention relates generally to a new and improved ear protector of the type shown and described in Patent No. 2,899,683 issued June 5, 1959, and the principal object of the invention is to provide a novel seal having an improved conformation to the head surrounding the ear and consequently having improved sound attenuation and comfort. The new seal is detachably mounted on the rigid shell of the ear protector and extends about the auricle, being pressed closely to the head of the user to conform to the surfaces about the ear, to seal the shell from circumambient sound, providing for improved comfort and safety as well as better conformance and attenuation.

The manner in which the objects of the invention are carried out resides in the provision of a soft cellular flexible foam rubber or plastic ring or cover member which is specially made and formed to be detachably connected to a rim extending about the opening in the main body of the ear protector shell, and at the same time said soft flexible cover member contains a separate liquid seal device which is simply an endless tubular member having a shape substantially according to the shape of the rim on the shell, this invention contemplating a special new and improved cooperation in combination, between the liquid seal and the cover member, the latter being provided with a special conformation to receive, hold, conceal and protect said liquid seal.

Further objects of the invention include the provision of a special new and improved combination of a separate liquid seal and rubber or plastic cover and protecting member as aforesaid, whereby in the event that as sometimes happens the liquid seal becomes punctured, the liquid will be more or less retained within the rubber ring cover member which acts as a receptacle therefor and the liquid thus does not run down the body of the user; and the provision of the combination as above described so that the rubber cover member still acts as a conforming means and sound attenuation seal, even though the liquid seal is lost or broken, so that the device is still serviceable contrary to prior art liquid seal devices which contact the head itself without the intermediary of the new and improved soft flexible cover member described herein.

The invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly set forth in the appended claims.

Reference is to be had to the accompanying drawings, in which

FIG. 1 is a view in side elevation of the ear protector with the novel combined seal thereon;

FIG. 2 is a view in front elevation thereof, looking in the direction of arrow 2 in FIG. 1;

FIG. 3 is a section on line 3—3 of FIG. 2;

FIGS. 4 and 5 are sections respectively on the lines 4—4 and 5—5 in FIG. 3; and

FIG. 6 is an enlarged section illustrating the shape of the seal.

In describing the present invention, attention is directed to the above identified Patent No. 2,899,683 issued August 18, 1959, in which the general theory of operation and sound attenuation are fully described. In the present case, there is provided a substantially rigid shell 10 which may be of plastic or other suitable material and which is provided with an opening at one side thereof, this opening

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being shown at 12 in FIGS. 4 and 5. This opening is defined by an outwardly extending rim as 16, see FIG. 3, this rim including or defining an inwardly directed undercut groove 18 which extends completely about the opening. It will be observed that the opening at 12 is relatively small as compared with the volume of the interior of the shell which may be provided with soft cushioning material 20 if desired.

There are of course two shells 10 utilized and these are mounted on the usual yoke or the like 22 and are applied to the head with the ear extending substantially through the opening into the interior of the shell.

The present invention relates to the combination of the surrounding seal which is mounted temporarily and detachably on the rim 16. This seal comprises essentially a relatively large, very soft and flexible outer cover member generally indicated by the reference numeral 24. This member may be made of foam rubber, plastic, etc. and is shown in section in FIG. 6. This part of the seal is seen to provide at one side, as indicated at 26, a head-engaging surface which is easily depressible, soft and comfortable. Member 24 is ring-like in shape, being open at the center to communicate with the interior of the shell for the reception of the auricle of the ear. It is made in section in a general channel shape forming a side-opening groove and which provides circumferential inwardly directed endless ridge-like members at 28 and 30, and these are utilized to temporarily hold the member 24 to the rim 16. The inwardly directed ridge 28 is adapted to enter into the groove at 18, and the outwardly directed ridge at 30 is located to engage a shoulder at 32, this shoulder forming the inner edge of the rim surrounding the opening 12 of the shell 10. It will thus be seen that the soft foam rubber-like member is easily indented to conform to the structure of the head surrounding the ear and is temporarily mounted and may be easily removed and replaced on the rim at 16.

Also, the channel-shaped section of the member 24 includes an enlarged undercut opening at the bottom thereof, this being indicated at 34. The undercut enlargement at 34 receives a separate liquid seal which is generally indicated by the reference numeral 36. This liquid seal is essentially a thin-walled tubular plastic flexible member of the shape shown in FIG. 5, and it is concealed in the cover member 24. The liquid seal is in the form of a ring and is not quite filled with a liquid such as for instance glycerine which retains at least some of its flowability at low temperatures. This liquid seal is shown in section in FIG. 3 and it will be seen that due to the very great flexibility and resilience of the rubber-like member 24, the liquid seal 36 may be easily inserted in the groove at 34 and removed therefrom. The foamy cellular member 24 is so flexible that it is capable of being turned inside out. With the liquid seal in place in the cover member 24, then the combined device may be quickly and easily applied to the shell 10, as shown in FIG. 3.

This invention will be seen to provide puncture protection for the liquid seal. If the rubber-like cover member were not present, and the seal were punctured, then the sound attenuation as well as comfort would be lost because the flat empty liquid seal 36 would be useless for either purpose. Cold weather comfort is also provided because the cellular flexible resilient rubber-like member 24 does not appear cold to the touch as does the liquid seal. If the liquid seal should be punctured, the fluid is more or less retained in the foam rubber cover.

Furthermore, it will be clear that two cushion members are better than one, both as to sound attenuation and comfort for the user. Ear protectors of the class described are ordinarily held fairly tightly to the head and it therefore is important to have a good soft effective comfort

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medium which will conform closely to the skull or the surface of the head surrounding the ear so as to provide the maximum of comfort and attenuation. If the liquid seal breaks, the comfort and attenuation of the rubber-like cover member are still present and usable and thus in an emergency, the new ear protector still clearly functions, providing a great factor of safety.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. An ear protector comprising a rigid shell having a rim and a seal for detachable connection to said rim, said seal comprising a soft flexible resilient member formed in the general shape of the rim and having an endless channel therein, a deformable liquid seal detachably held in said channel, and means for holding the soft flexible member to the rim of the shell.

2. The ear protector of claim 1 wherein the soft flexible member is a cover for the liquid seal.

3. An ear protector comprising a shell having a rim and a seal for detachable connection to said rim, said seal comprising a soft flexible resilient member formed in the general shape of the rim and having an endless channel therein, a deformable liquid seal detachably held in said channel, and means for holding the soft flexible member to the rim of the shell, said means including interengaging tongues and grooves on said rim and said soft flexible member.

4. A seal for an ear protector comprising a thick soft flexible resilient member in the form of a ring which is open at one side thereof providing a groove in said member, said groove facing to one side only thereof, an undercut in the bottom of said groove, and a liquid seal temporarily held in said undercut.

5. A seal for an ear protector comprising a thick soft flexible resilient member in the form of a ring which is open at one side thereof providing a groove in said member, said groove facing to one side only thereof, an undercut in the bottom of said groove, and a liquid seal temporarily held in said undercut, said liquid seal comprising a thin flexible deformable impervious ring-like member containing a fluid.

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6. The seal of claim 5 including a support and means in the groove to mount the resilient member on the support with the liquid seal concealed by the resilient member.

7. A seal for an ear protector including a shell having a rim, said seal comprising a liquid seal member in the form of a flexible ring which is impervious and contains a fluid, and means for holding said liquid seal member to the shell, said means including a soft cellular flexible resilient member also in the form of a ring but having a side opening groove therein, said groove being undercut in the bottom thereof adjacent the side of the ring opposite the opening of the groove, said liquid seal member being temporarily held in said undercut portion, and means on said soft cellular flexible member for temporarily attaching the same to the rim of the ear protector shell.

8. An ear protector comprising a rigid shell having an opening therein, a rim about the opening, a seal for detachable securement to the rim about the opening, said seal comprising a flexible ring which is impervious and contains a fluid, and means for holding said liquid seal member to the ear protector shell, said means including a soft cellular flexible resilient member also in the form of a ring but having a side opening groove therein, said groove being undercut in the bottom thereof adjacent the side of the ring opposite the opening of the groove, said liquid seal member being temporarily held in said undercut portion, and means on said soft cellular flexible member for temporarily attaching the same to the rim of the ear protector shell.

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