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2,901,751

NOISE ATTENUATOR

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Fig. 1

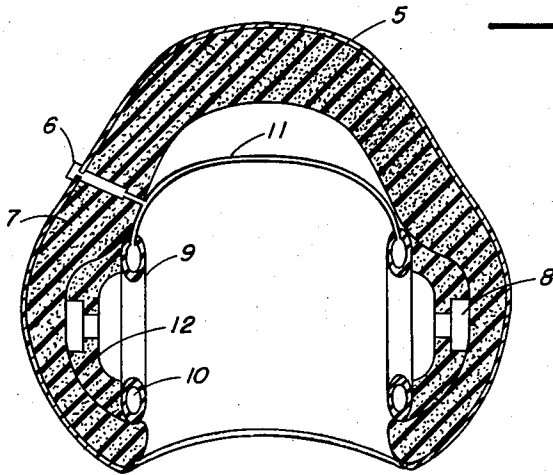
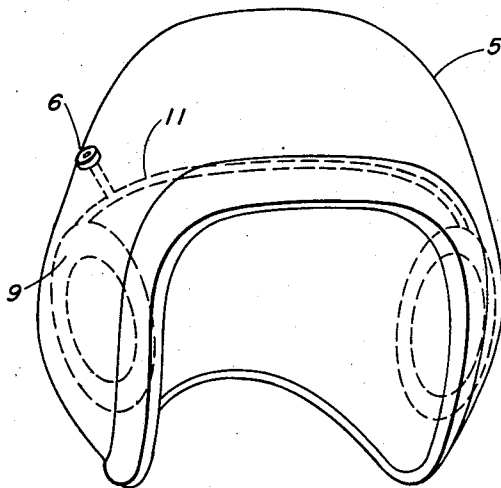


Fig. 2



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NOISE ATTENUATOR

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1 Claim. (Cl. 2—6)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to noise attenuators and more particularly to noise attenuators for the human ears having excellent attenuating characteristics and being comfortable to wear.

Noise attenuating apparatus for the human ears generally known in the art do not provide adequate noise attenuation with a minimum standard of comfort to the wearer of the apparatus. This is especially true where noise attenuating apparatus is incorporated in helmets which are required to fit snugly against the head and neck with sufficient pressure to prevent audio noise from reaching the ears. For example, helmets of the "hard hat" type have a rigid outer shell with an inner lining of acoustic attenuating material such as foam rubber or the like. This type of helmet is required to be of a certain size and shape for a certain size head, in order that the inner lining will press tightly around the head, neck, and ears to facilitate attenuation of noise to the ear. With the shape of human heads being as they are, shell type helmets capable of furnishing the aforementioned adequate seal are obviously very difficult to put on and remove. Further, the constant pressure of the sound absorbing lining on the head and ears is oppressive to the wearer. Also in the course of their use, the constant putting on and removing of the helmet tends to expand the lower portion of the helmet causing their later inability to obtain a tight seal and adequately attenuate noise to the ears.

The purpose of this invention is to provide an enclosure of sound absorbing material that encloses the human ears and has an edge portion that surrounds the ears and seats against the head. The edge portion is inflated with a fluid such as air or a suitable liquid to produce a pressure to ensure a comfortable seal around the ears. This pressure can be regulated by a valve arrangement that is easily accessible to the wearer. Thus the wearer can adjust it to correspond with his own likes relative to comfort and desired noise attenuation. With the use of the inflated member a more assured uniform distribution of seating pressure over the irregularities of the surface of the head is obtained.

The noise attenuator of this invention is capable of use with any type of headgear that will operatively position it relative to the ear. The headgear may pass under the chin or over the head, as long as it holds the attenuator against the head without too large a degree of lateral displacement.

This invention has specific advantages when used in combination with a rigid type headgear such as, for example, a "shell type" helmet as illustrated in the specific embodiment. The attenuating apparatus can be positioned within the "hard hat" helmet and while in its deflated condition, the helmet may be put on by the wearer with minimal interference by the inflatable mem-

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bers, whereupon the inflatable members may be inflated through the valve arrangement thereby sealing the ears from outside noise. During its use, should the wearer not desire to attenuate outside noise to his ears in favor of more comfort or when he might wish to carry on an ordinary conversation, he may release the pressure in the inflated portion through the valve arrangement breaking the seal around his ears. Later, the inflated members can be reinflated, thus returning the apparatus to the attenuating condition.

An object of this invention is the provision of apparatus for attenuating noise to the human ear having excellent noise attenuating characteristics and being comfortable to wear.

Another object is to provide apparatus for attenuating noise to the human ear having an adjustment for varying the degree of attenuation of the noise.

A further object is to provide apparatus for attenuating noise to the human ear having an inflated edge portion with external controllability of the pressure therein.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

Fig. 1 shows a sectional view of a preferred embodiment of the noise attenuator mounted in a helmet; and

Fig. 2 illustrates a perspective view of a part of the noise attenuator shown in phantom.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figs. 1 and 2, which illustrate a preferred embodiment, a "hard hat" personnel protection helmet having a shell 5 of fiberglass or the like. Mounted in shell 5 is a lining 7 of sound absorbing material, such as foam rubber or the like. Secured to lining 7 by cement or other known securing means is retaining member 12, which is also of sound absorbing material and serves to provide a recess 8 for mounting a standard set of headphones. Toroidal shaped member 9 is in turn secured to retaining member 12 in any well known manner and is constructed of rubber or plastic material. Member 9 is capable of being inflated by a suitable fluid through valve 6 which may be of any type suitable for controlling the flow of the fluid, such as a plastic valve or an ordinary inner tube valve. The valve's pressure releasing structure is located on the outside of the helmet in a position where it is easily accessible to the wearer when the helmet is being worn. Member 9 may be inflated through the valve 6 by any means known in the art such as a hand pump, a CO₂ capsule, a master brake cylinder, or the like. The valve serves as an easy and accessible means for varying the pressure in member 9 and may also take the form of a general Y shape arrangement in which one leg is for controlling the release of pressure in the toroidal member 9 and the other leg is for controlling the admitting of pressure to member 9, while the remaining leg connects to line 11. Line 11 provides a connecting and pressure equalizing means between the two inflated members 9 and valve 6.

In an example of use of the invention, the toroidal shaped member 9 may be initially deflated through valve 6. The helmet is then mounted upon the head in normal wearing position. Member 9 is reinflated causing it to expand and seat against the head in a position completely surrounding the ear and sealing the ear from direct contact with outside noise. The possible degree of inflation of member 9 would depend upon the desires of the wearer as to the amount of noise attenuation he wants consistent with his comfort relative to the pressure against his head. When wearing the helmet for

long time periods, the pressure in the inflated members can be selectively released, increasing wearing comfort at times when noise attenuation is not desired or when the wearer wants to carry on a normal conversation with others. Member 9 can then be reinflated at instances when outside noise attenuation is desired.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed is:

A noise attenuating helmet comprising in combination, an outer shell adapted to be worn on a human head having a pair of aural members, a lining of acoustic attenuating material attached to the entire inner surface of said shell and conforming to the contour thereof, a portion of said lining being disposed for supporting contact with at least a part of said human head, a first pair of recesses oppositely disposed on the inside of said lining at locations in proximity with said aural members, removable, cup-shaped, sound-absorbing, retaining means seated in said first pair of recesses, a second pair of recesses disposed in said retaining means adapted to receive said aural members in spaced relationship with the inner surfaces thereof, headphones mounted in said retaining means between the outer extremities thereof and the inner surfaces of said lining opposite said aural members for audio communication therewith, hollow, inflatable, toroidal-shaped members connected to the rims of

said cup-shaped retaining means adapted to abut and seat against said human head at areas in the immediate vicinity of said aural members forming sealed chambers completely surrounding same, means connected to said toroidal-shaped members for pressurization thereof with a fluid including a valve extending through said lining and said shell, adjustable means coupled to said valve on the outside of said shell for manual regulation thereof, and fluid transmission means interconnecting said toroidal-shaped members for equalizing the pressure therein, whereby unwanted noise will be substantially attenuated by said sealed chambers before reaching said aural members while leaving a portion of said head comfortably exposed to the air currents of the ambient atmosphere and, at the same time, being protected by said shell.

References Cited in the file of this patent

UNITED STATES PATENTS

2,340,872	Flynn et al. _____	Feb. 8, 1944
2,593,892	Kindel _____	Apr. 22, 1952
2,619,639	Hendler _____	Dec. 2, 1952
2,625,683	Roth et al. _____	Jan. 20, 1953
2,763,005	Richter _____	Sept. 18, 1956
2,805,419	Finken _____	Sept. 10, 1957
2,867,813	Miller _____	Jan. 13, 1959

FOREIGN PATENTS

336,286	Great Britain _____	Oct. 13, 1930
449,905	Great Britain _____	July 6, 1936