

[54] **PROTECTIVE HELMET**

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[73] Assignee: The United States of America as represented by the Secretary of the Navy

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[52] U.S. Cl. 2/3 R

[51] Int. Cl. A42b 3/00

[58] Field of Search 2/3, 5, 6

[56] **References Cited**

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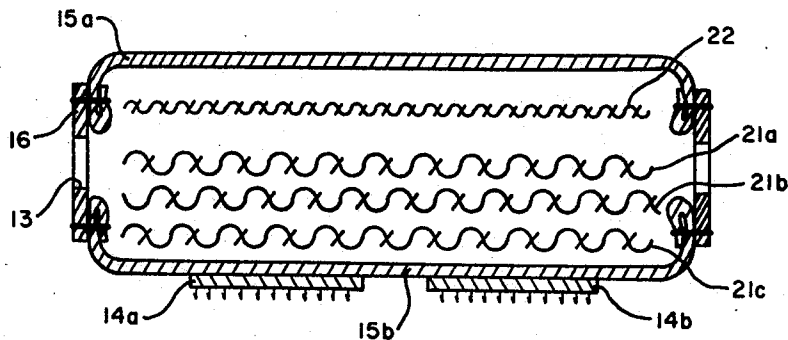
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[57] **ABSTRACT**

A protective helmet having pads disposed therein for distributing and cushioning the head of a wearer from impacts to the outside of the helmet. The pads are formed from spacer cloth arranged in layers having resilient properties for energy absorption of the impact, each pad having segments of nylon fastener tape attached to one side and an open weave cloth covering on the other side allowing free permeability of air. The nylon fastener tape attaches to felt strips contiguously attached within the helmet, by which the pads are mounted in the helmet, allowing for easy replacement.

8 Claims, 4 Drawing Figures



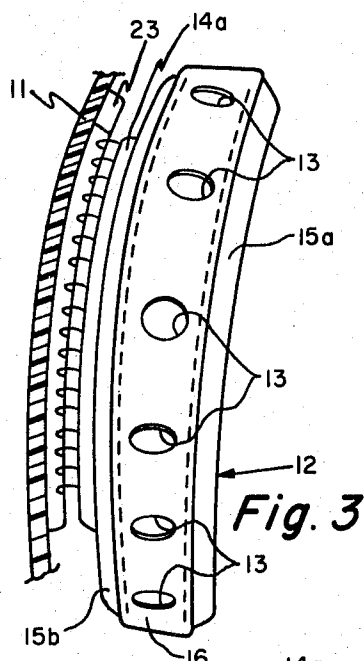


Fig. 3

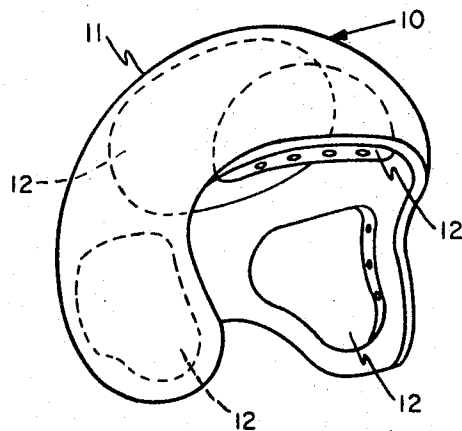


Fig. 1

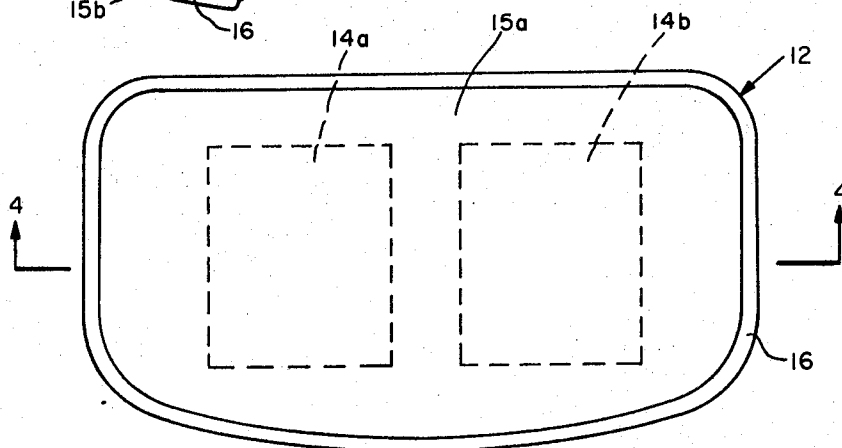


Fig. 2

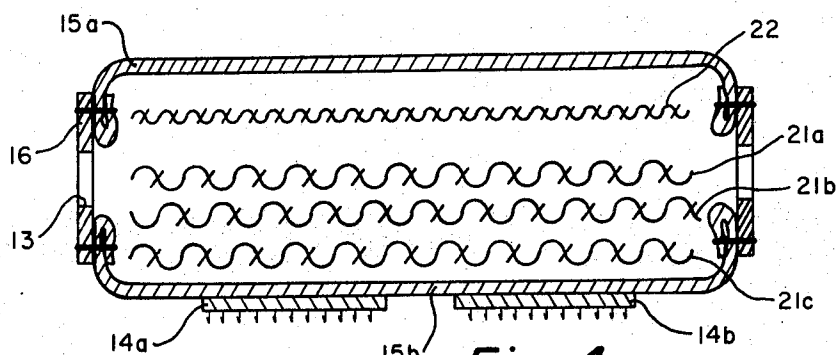


Fig. 4

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PROTECTIVE HELMET

STATEMENT OF GOVERNMENT INTEREST

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.

BACKGROUND OF THE INVENTION

The present invention relates to protective head gear, and more particularly to a helmet liner in combination with a helmet to form an impact absorbing device.

In present and past helmet designs leather-covered urethane or other type of foam material was typically used as a means of adjusting the size and providing load distribution between the head of the wearer and the outside helmet shell. These foam pads cover a major portion of the head and, since they are good insulators, heat generated by the wearer builds up in the area in contact with his head causing discomfort. In addition, due to continuous contact with the wearer's head and continuous saturation with perspiration, the foam padding disposed within the helmet deteriorates, becomes soiled, and loses much of its energy absorption capabilities. In order to alleviate these problems, some helmets provide holes through the pads thereby allowing for circulation and partly alleviating the heat build-up; however, since the function of the pad is to distribute load at impact a major portion of head area is still necessarily in contact with the leather-covered foam and deterioration of the foam still occurs. Accordingly, it is necessary that the padding be periodically changed. This adds to field supply problems so convenience often takes precedence resulting in a condition where the pads are worn beyond their useful life.

SUMMARY OF THE INVENTION

Accordingly, it is the general purpose and object of this invention to provide a protective helmet having a padded lining which allows free flow of air at contact areas of the head for preventing heat build-up. Other objects of the invention are to provide helmet liner pads which have an unlimited service life, and which are easily removable and launderable.

These and other objects are accomplished according to the present invention by providing removable liner pads disposed within the helmet wherein the pads are constructed of multiple layers of plastic spacer cloth, the number of layers determining the thickness of the pad and therefore the required size accommodation. The pads are disposed within the helmet by nylon fastener tapes, such as Velcro (tradename) tape, allowing for easy removal and exchange. Since the pad is to provide both comfort and impact force distribution the use of the nylon fastener tape is adequate as the pads primarily function in compression. The spacer fabric layers are of an open-weave type allowing for free flow of air thereby avoiding heat build-up and the attendant deterioration of the pad. Also the pad area is no longer restricted by consideration of air circulation thus full protection of the head can be accommodated. The spacer fabric layers themselves are constructed in such a manner as to elastically resist deforming forces and recover to their original thickness when the force is removed, thus providing shock attenuation by elastic deformation and at the same time distributing the attenuated shock load over a wide area of the head.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents an angular view of a helmet having lining pads disposed therein constructed according to the invention;

FIG. 2 represents a typical lining pad as viewed from within the helmet of FIG. 1;

FIG. 3 represents an edge view of the pad as mounted in the helmet of FIG. 1;

FIG. 4 is a cross sectional view of the pad taken along the line 4-4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1 a protective helmet assembly 10 is illustrated as comprising a helmet shell 11 and liner pads 12 disposed at critical pressure points therein for protecting the head of the wearer. Pads 12 form a resiliently deformable interface between shell 11 and the head of the wearer attenuating any impacts by maximizing local load distribution. Thus pads 12 are constructed according to the invention in a manner described hereinafter allowing maximum air circulation while providing the necessary resiliency against impact load.

As shown in more detail in FIGS. 2, 3 and 4, each pad 12 comprises inner and outer coverings 15a and 15b shaped to conform to a desired pad configuration as determined by the head area to be protected and the helmet design. Covering 15a is preferably of a porous weave type for allowing free permeability of air. The peripheral edges of coverings 15a and 15b are respectively joined to opposite parallel edges of a continuous nylon tape 16, whereby an external enclosure is formed. Tape 16 is perforated by a number of vent holes 13 along its length allowing for free circulation of air within the pad 12. Between coverings 15a and 15b are disposed layers of spacer cloth 21a, 21b and 21c which can be in the form of continuous undulated filament matting or of a coarse weave type such as Uniroyal Style No. 6012. A layer of spacer cloth 22 of a fine weave type, such as Uniroyal Style No. 6009, is disposed intermediate cloth 21a and inner covering 15a for providing a fine grid interface for distributing the load to the head. All materials comprising pad 12 are preferably of a relatively inert group, such as nylon, retaining their properties after extensive exposure to body heat and perspiration.

Each pad 12 is attached to shell 11 by segments of nylon fastener tape 14 contiguously attached to the outer surface of covering 15b and disposed to align with mating strips of fastener pile 23, contiguously attached within helmet shell 11, when the respective pads 12 are placed in their desired position.

Accordingly easy removal and replacement of pads 12 is accommodated with the attendant facility of adjusting for variations in head size by selecting an appropriate combination of pad 12 thicknesses.

As described above a typical pad 12 is shown including three layers of coarse spacer cloth 21a, 21b and 21c, and one layer of fine cloth 22, these being shown for descriptive purposes only as it is contemplated within this invention that various pad thicknesses be made available by variously combining fine cloth layers with coarse cloth layers. It is further contemplated that the various pad thicknesses be so designated thus providing a repeatable head fitting upon pad exchange.

In operation the wearer initially selects the appropriate combination of pads 12 resulting in a best fit, and attaches the pads 12 by fastener tape 14 to corresponding strips of pile 23 disposed within shell 11. Upon any accumulation of dirt, pads 12 can be replaced according to their designators with clean pads while they are laundered. The selection of inert materials allows for easily cleaning of the pads and the construction thereof allows for free circulation of air thus they are not restricted in their maximum size by the heat build-up constraint that such an appropriate fit can be obtained within the whole helmet shell 11.

Some of the many advantages of the invention should now be readily apparent. The invention provides a means of distributing impact loads between the helmet shell and a wearer's head which is both comfortable and cleanable. At the same time the invention provides load distribution pads which are highly permeable to air allowing for large area coverage. All various accommodations of head shape are contemplated within this invention by selecting pad thicknesses permitting maximum comfort.

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

What is claimed is:

1. A protective device for attenuating impacts to the wearer comprising, in combination:
protective shell means formed to surround vulnerable areas of the wearer for distributing a concentrated impact;
resilient attenuation means disposed within said shell means intermediate said shell means and the wearer for attenuating said impact and including a plurality of resilient cloth layers the areas thereof formed to cover the desired area, each layer formed of continuous undulated filaments and in combination with other layers forming a compliant area, first and second coverings respectively adjacent the uppermost and lowermost surfaces of said layers, an endless tape joined at the respective edges thereof to the respective peripheries of said coverings, said second covering formed to be attached on the outside thereof to said fastener tape; and
separable attachment means affixed to said attenuation means and operatively connected to said shell means.
2. A protective device according to claim 1, further comprising:
said first covering forming a porous weave permeable to air.
3. A protective device according to claim 2, further comprising:
said endless tape including a multiplicity of vent openings for permitting air to permeate therethrough.
4. A protective device according to claim 1 wherein:
the one of said layers adjacent to said first covering being

- formed of continuous undulated filaments woven in a tight weave relative to the other of said layers for providing a fine grid interface.
5. A resilient force attenuation pad for attenuating force applied to a wearer comprising, in combination:
a plurality of resilient cloth layers the areas thereof formed to cover the desired area, each layer formed of continuous undulated filaments and in combination with the other layers forming a compliant area, first and second coverings respectively adjacent the uppermost and lowermost surfaces of said layers, an endless tape joined at the respective edges thereof to the respective peripheries of said coverings and fastener tape attached on the outside surface of said second covering formed to attach to any fibrous material.
6. A resilient pad according to claim 5, further comprising:
said first covering forming a porous weave permeable to air.
7. A resilient pad according to claim 6, further comprising:
said endless tape including a multiplicity of vent openings for permitting air to permeate therethrough.
8. A resilient pad according to claim 7, further comprising:
the one of said layers adjacent to said first covering being formed of continuous undulated filaments woven in a tight weave relative to the other of said layers for providing a fine grid interface.

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