United States Patent [19]

Yeager

[11] **3,813,696**

[45] **June 4, 1974**

[54] **POWER VENTILATED HELMET**

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[22] Filed: **Nov. 13, 1972**

[21] Appl. No.: **306,005**

[52] **U.S. Cl.** **2/171.3,** 2/183

[51] **Int. Cl.** **A42c 5/04**

[58] **Field of Search** ..... 2/171.3, 182.1, 182.7, 2/183, 3 A, 8; 128/145, 142.3

[56] **References Cited**

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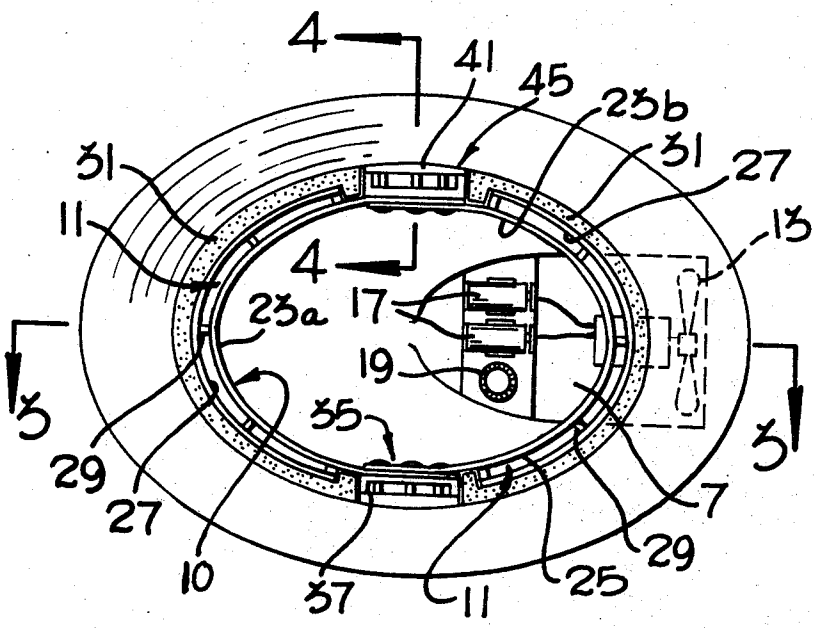
Assistant Examiner—Peter Nerbun

[57] **ABSTRACT**

A power ventilated helmet having an opening in the crown portion thereof for the passage of air therethrough and an adjustable headband for supporting the helmet on the wearer's head. One or more air passages are provided in the space between the inner surface of the headband and the inner surface of the helmet, and compressible foam material is disposed between the headband and the helmet for substantially blocking the flow of air between the helmet and the headband. The helmet further includes a blower operable either to draw air in through the wearer's head and to exhaust the air downwardly through the air passages over the wearer's head, or to draw air in through the air passages up over the wearer's face and head, to draw it between the inner surface of the helmet and the wearer's head and then to exhaust it from the opening. These air passages are of substantially constant cross sectional area regardless of the size to which the headband is adjusted to insure that the blower forces air through the air passages at a desired rate regardless of the size to which the headband is adjusted.

8 Claims, 7 Drawing Figures



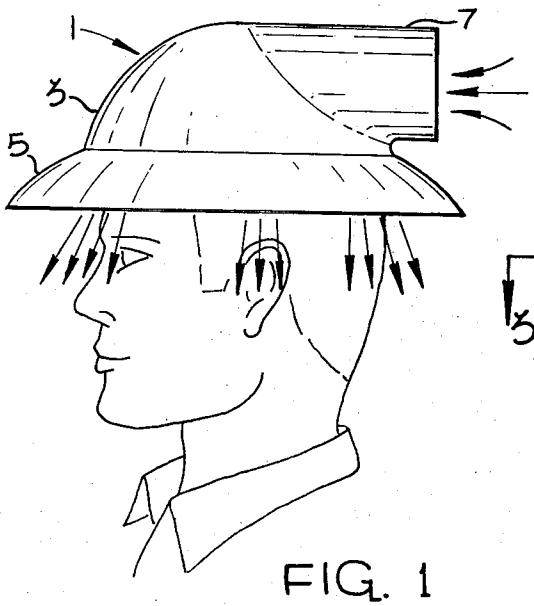


FIG. 1

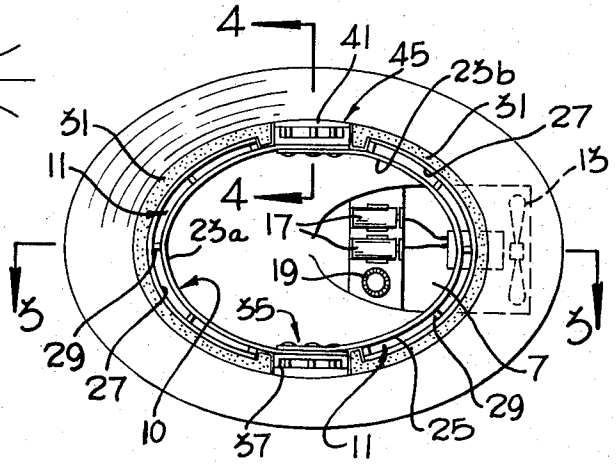


FIG. 2

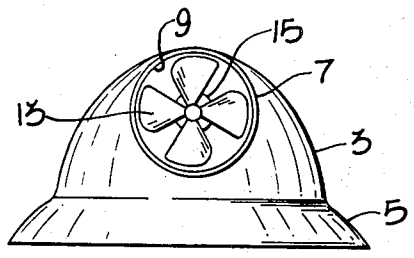


FIG. 5

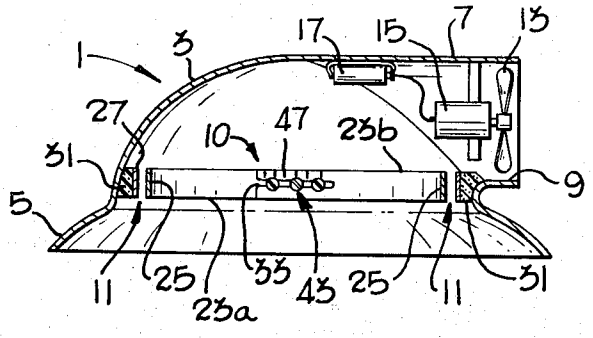


FIG. 3

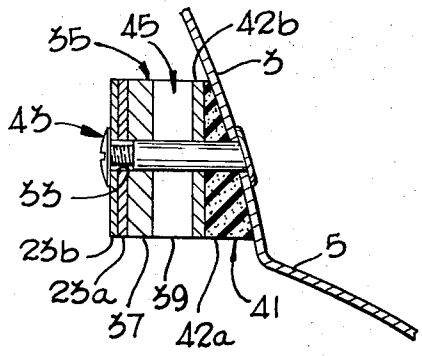


FIG. 4

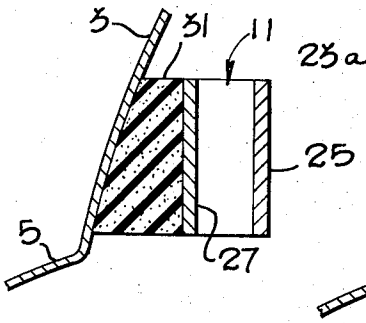


FIG. 6

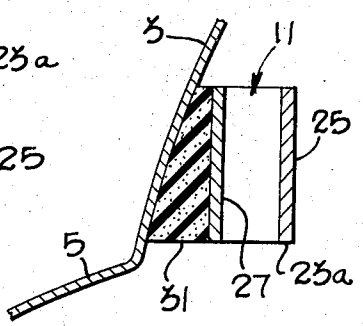


FIG. 7

POWER VENTILATED HELMET

BACKGROUND OF THE INVENTION

This invention relates to ventilated wearing apparel, and is especially concerned with a power ventilated helmet.

More particularly, this invention is concerned with a helmet in which air is blown over the wearer's head for cooling purposes. Reference may be made to such U.S. Pat. Nos. as 735,970, 3,168,746, 3,391,407 and 3,548,415 showing power ventilated helmets in the same general field as this invention.

More generally, workmen, such as stevedores and warehousemen, sometimes must work in enclosed areas with little or no ventilation and with accompanying high humidity and ambient temperature. Under these conditions, even a small amount of ventilation is a welcome comfort to the workman. A power ventilated helmet appears to be an attractive way in which to provide ventilation because the workman carries it with him and it is relatively inexpensive as compared to other ventilating systems (e.g., portable fans). However, none of the power ventilated helmets known has been a commercial success, primarily, it is believed, because of complicated and heavy evaporative cooling systems incorporated in the helmet, or because of changes in the air flow pattern over the head as the headband is adjusted to fit wearers having different head sizes.

SUMMARY OF THE INVENTION

Among the several objects of this invention may be noted the provision of a power ventilated helmet which moves air over the wearer's head substantially in a predetermined pattern regardless of the size to which the headband of the helmet is adjusted; the provision of such a power ventilated helmet which may also serve as a safety helmet (i.e., a hard hat); the provision of such a power ventilated helmet which is of light weight and which is comfortable to wear; and the provision of such a helmet which is of simple and economical construction. Other objects and features of this invention will be in part apparent and in part pointed out hereinafter.

In general, a power ventilated helmet of this invention has a crown portion, an opening in the crown portion for passage of air therethrough, means for supporting the helmet on the wearer's head including a generally horizonal headband encircling the head and being adjustable within a limited range to fit most wearers. Means defining one or more air passages in the space between the inner surface of the headband and the inner surface of the crown portion of the helmet is provided, and compressible material is disposed between the headband and the crown portion of the helmet for substantially blocking the flow of air in the space between the headband and the inner surface of the crown portion. Power operated blower means is carried by the helmet operable either to draw air in through the opening, to blow it between the inner surface of the crown portion of the helmet and the wearer's head, and to exhaust the air downwardly through the air passages over the wearer's head, or to draw air in through the air passages up over the wearer's head, to draw it between the inner surface of the crown portion of the helmet and the wearer's head and to exhaust it from the opening.

These air passages are of substantially constant cross sectional area regardless of the size to which the headband is adjusted, thus insuring that the blower forces air through the air passages in a predetermined pattern regardless of the size to which the headband is adjusted as it is worn by the wearer.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a power ventilated helmet of this invention as it is worn on the head;

FIG. 2 is a bottom view of the helmet;

FIG. 3 is a longitudinal vertical section of the helmet taken on line 3—3 of FIG. 2 showing details of the helmet headband and fan unit;

FIG. 4 is an enlarged vertical cross section taken on line 4—4 of FIG. 2 showing details of the member securing the headband to the helmet;

FIG. 5 is a rear elevation view of the helmet;

FIG. 6 is an enlarged partial view of FIG. 3 illustrating an air passage of fixed cross sectional area and compressible foam material between the headband and the helmet with the headband adjusted for a relatively small head size; and

FIG. 7 is a view similar to FIG. 6 showing the headband adjusted for a relatively large head size with the foam material compressed between the headband and the helmet.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, a power ventilated helmet of this invention, indicated in its entirety at 1, is shown to comprise a crown portion 3 and a brim 5 of molded plastic or other suitable material. However, it will be understood that other helmet styles may be used. A duct 7 extends rearwardly from the crown portion, and it has an opening 9 therein for the passage of air therethrough into and out of the interior of the helmet. A generally horizontally disposed headband 10 is provided to support the helmet on the wearer's head. Air passages, generally indicated at 11, are provided between the inside surface of the headband and the inner surface of the crown of the helmet. A fan 13 driven by a reversible motor 15 is mounted in the duct either for drawing air in through the duct, blowing it between the inner surface of the crown portion of the helmet and the wearer's head, and exhausting it downwardly through air passages 11 over the wearer's face and head (as shown in FIG. 1), or for drawing air in through passages 11 up over the wearer's face and head, drawing it between the inner surface of the crown portion and the wearer's head, and exhausting it from duct 7. Motor 15 is shown to be energized by batteries 17 carried within the helmet. However, other portable energy sources, such as a rechargeable battery carried on the wearer's belt (not shown), may be used. A combination on-off and speed control switch 19 (see FIG. 2) is provided to control the motor.

More particularly, headband 10 is adjustable within a limited range to accommodate most wearers and it includes a front headband portion 23*a* and a rear headband portion 23*b* movable relative to one another for adjustment purposes. Each of these headband portions includes a semicircular head-engaging band 25 (see

FIG. 2) and an outer band 27 with the outer band secured to and spaced from the outer face of the head-engaging band intermediate the ends of the head-engaging band by spacers 29 which thereby form vertically disposed air passages 11 at the front and rear of the helmet.

A layer of compressible resilient foam material 31 (e.g., polyurethane foam) is bonded to the outer face of each outer band 27 and is free of the outer surface of head-engaging band 25 at the ends thereof to facilitate movement of the headband portions relative to one another and to the foam for adjustment purposes. As is shown in FIG. 6, with headband 10 adjusted to accommodate a wearer having a relatively small head size, foam material 31 is in engagement with the inner surface of crown 3 so as to block the passage of air between the outer band and the crown portion (except via air passages 11). In FIG. 7, the headband is shown as it is adjusted to accommodate a wearer having a relatively large head size, the foam material being compressed between the inner surface of the crown and the outer band. Thus, the foam material bears against the inner surface of crown 3 and expands or compresses so that it remains in contact with the crown as the headband is adjusted thereby to block the flow of air between the helmet and the outer band regardless of the size to which headband 10 is adjusted. With the outer band 27 spaced from head-engaging band 25 a predetermined distance, as determined by spacers 29, the cross-sectional area of air passages 11 remains substantially constant regardless of the size to which the headband is adjusted, thereby to insure that fan 13 delivers air through the air passages at a desired rate for a given fan speed and in a predetermined flow pattern regardless of the head size to which the headband is adjusted.

Headband portions 23*a*, 23*b* each have an elongate slot 33 in each of the outer ends of its head-engaging band 25 (see FIG. 3) and the ends of the head-engaging band of the back portion overlap the ends of the head-engaging band of the front portion with slots 33 in register with one another. The headband portions are movable relative to one another to effect adjustment of the headband, and the ends of these head-engaging bands are releasably secured to a mounting block 35 at each side of the helmet. As is shown in FIGS. 2 and 4, this mounting block is a channel-shaped member with its open side facing outwardly and having a central mounting portion 37 corresponding to its web and spacer legs 39 corresponding to its flanges. A shim assembly 41 is provided between the inner surface of the crown portion of the helmet and the ends of the spacer legs. This shim assembly includes a member 42a contoured to fit the inside curvature of the crown portion at the sides of the helmet and one or more shims 42 disposed between the contoured member and spacer legs 39. Threaded fasteners, generally indicated at 43, are provided to releasably secure the ends of the head-engaging bands 25 to the inner face of the mounting member and to secure the mounting member and the shim assembly to the helmet. By loosening the fasteners, the headband portions may be moved relative to one another for adjusting the size of the headband. By varying the thickness and number of shims 42b between spacer legs 39 and contoured member 42a, the width of the headband may be adjusted accordingly. The gap between the central mounting portion 37 of the mounting member and shim 42b forms a generally vertically disposed air passage, as indicated at 45, at each side of the helmet generally above the wearer's ears through which air may be exhausted (as shown in FIG. 1) down over the sides of the wearer's head or drawn up thereover. Side air passages 45 are similar to air passages 11 in that they are of constant cross sectional area so that fan 13 delivers air through these side passages at a desired rate for a given fan speed and in a predetermined flow pattern regardless of the head size to which the headband 10 is adjusted. As shown in FIG. 3, hat size indicia 47 is provided on each of the ends of the head-engaging bands of each of the headband portions 23*a* and 23*b* so that when identical indicia on each of the headband portions (e.g., 7 1/8) are in line with the center fastener 43 (this fastener constituting an index mark) at each side of the helmet, headband 10 will accordingly be adjusted to the indicated hat size (e.g., 7 1/8).

It will be understood that the heads of fasteners 43 may be recessed in headband 10 or they may be covered over with a suitable pad (not shown) to provide a comfortable headband for the wearer. It will be further understood that conventional head suspension means (not shown) may be provided and secured to either the crown portion of the helmet or the headband, this head suspension means being engageable with the top portion of the wearer's head to provide additional support for the helmet and being adjustable to as to insure the head suspension means properly supports the helmet on the wearer's head. With crown 3 and brim 5 made of suitable metal or reinforced plastic, the power ventilated helmet of this invention may serve the double function of a safety helmet (i.e., a hard hat).

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A power ventilated helmet having a crown portion, an opening in the crown portion for the passage of air therethrough, means for supporting the helmet on the wearer's head including a generally horizontal headband encircling the head and being adjustable within a limited range to fit most wearers, said headband being secured to and spaced from the inner surface of the crown portion of said helmet, means secured to the inner surface of the headband and movable with said headband upon adjustment of the headband for defining one or more air passages in the space between the inner surface of said headband and the inner surface of the crown portion of the helmet, compressible material disposed between said means defining said air passages and the crown portion of the helmet for substantially blocking the flow of air in the space between the air passage defining means and the inner surface of said crown portion, and power operated blower means carried by the helmet operable either to draw air in through said opening, to blow it between the inner surface of the crown portion of the helmet and the wearer's head, and to exhaust the air downwardly through said air passages over the wearer's head, or to draw air

in through said air passages up over the wearer's head, to draw it between the inner surface of the crown portion of the helmet and the wearer's head and to exhaust it from said opening, said compressible material being expansible and compressible to block the space between the air passage defining means and the inner surface of the crown portion, said air passages being of substantially constant cross sectional area regardless of the size to which the headband is adjusted thereby to insure that said blower means forces air over the wearer's head in a predetermined pattern regardless of the size to which said headband is adjusted.

2. A power ventilated helmet as set forth in claim 1 wherein said headband has a front portion and a rear portion movable relative to one another for effecting adjustment of the headband within said limited range, at least one of said portions including a head-engaging band and an outer member between said head-engaging band and the inner surface of the crown portion of the helmet, said outer member being spaced from the outer surface of said head-engaging member thereby to form a gap constituting one of said air passages, said compressible material being disposed between the outer surface of said outer member and the inner surface of the crown portion of the helmet.

3. A power ventilated helmet as set forth in claim 2 wherein said compressible material is a resilient foam material bonded to the outer surface of said outer member and in engagement with the inner surface of the crown portion of the helmet so that as said headband is adjusted said foam material expands or compresses thereby substantially to block the flow of air between the headband and the inner surface of the crown portion of the helmet.

4. A power ventilated helmet as set forth in claim 3 wherein said headband portions have indicia thereon to indicate the head size to which the headband is adjusted.

5. A power ventilated helmet as set forth in claim 3 wherein said front and rear headband portions both include a head-engaging band and an outer member spaced therefrom to constitute air passages at the front and rear of the helmet with said foam material bonded to the outer surface of the outer members.

6. A power ventilated helmet as set forth in claim 3 further including means for adjustably securing said headband portions to the inner surface of the crown portion of the helmet at each side of the helmet, said adjustable securing means comprising a member releasably secured to the inner surface of the crown portion of the helmet and extending inwardly therefrom for supporting the headband in spaced relation to the inner surface of the crown portion, said headband portions being releasably secured to said member and being movable relative thereto to effect adjustment of the headband within said limited range.

7. A power ventilated helmet as set forth in claim 6 wherein said adjustable securing means has an opening extending generally vertically therethrough constituting one of said air passages.

8. A power ventilated helmet as set forth in claim 7 wherein said adjustable securing means further comprises shim means contoured to fit the inner surface of the crown portion, said member being channel-shaped with its open side facing said shim means and with portions thereof in engagement with said shim means so that said channel-shaped member and said shim means together form said vertically disposed opening.

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