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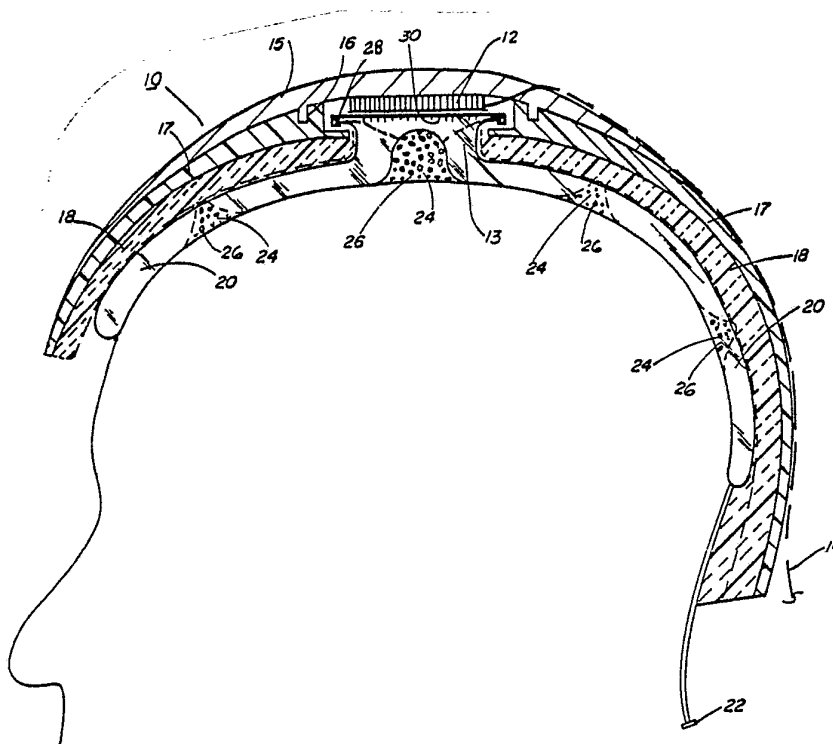
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(54) Title: THERMO-ELECTRIC COOLED MOTORCYCLE HELMET

(57) Abstract

A motorcycle helmet (10) defines a cavity (13) in a hard fiber shell (17). A thermo-electric heat pump (12) is mounted in the cavity, and a light metal radiator (15) is bonded to both shell (17) and pump (12). One way conductors (14) energize the heat pump (12) from a motorcycle battery source to pump heat from the hard fiber shell (17) to the radiator (15). A flexible bladder (20) filled with heat transfer liquid is mounted in the hard fiber shell (17) and below the heat pump (12) and in thermal contact with a wearer's head and the heat pump (12), for conducting head heat to the pump (12) to electrically pump to the radiator (15) for radiation to the atmosphere.



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THERMO-ELECTRIC COOLED MOTORCYCLE HELMET

BACKGROUND OF THE INVENTION

The invention generally comprises temperature or air conditioned safety helmets and more particularly thermo-electric cooled motorcycle helmets.

The prior art discloses air conditioning a safety helmet by evaporation of liquid, such as in Waters US patent 3,548,415 and the use of a small electrically energized fan. Thermo-electric cooling is taught by Lefferts, US patent 3,314,242 for use in scientific laboratories and in exothermic reactions.

The present invention teaches cooling a safety helmet with a thermo-electric heat pump adapted to and installed in said safety helmet in accordance with Federal Motor Vehicle Standards.

SUMMARY OF THE INVENTION

It is an object of the invention to adapt the teaching of a natural law, as disclosed by the Seebeck, Peltier, and Thomson effects, to the cooling of a motorcycle helmet as Lefferts did to the heating and cooling of portable heating and cooling devices for laboratory use.

Another object of the invention is to cool a motor cycle safety helmet with electrical means and without moving parts.

The foregoing and other objects of the invention will be apparent from the following disclosure, drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view of a motorcycle safety helmet with thermo-electric heat pump and connecting wires in dashed lines indicating interior mounting;

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Figure 2 is a three dimensional drawing of a thermo-electric heat pump;

Figure 3 is a longitudinal cross-sectional view of the helmet of Figure 1;

5 Figure 4 is a three dimensional view of a bladder top.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Figures 1-4, a safety motorcycle helmet 10 completely encloses the head of a wearer and is very hot to wear. A heat pump 12, having upper hot and lower cold plates, is mounted in a cavity 13 defined in the top of helmet 10. Insulated electrical conductors 14 connect heat pump 12 to a motorcycle battery (not shown). A radiator shell 15 is fixed by anchor pins 16 and bonded to a hard fiber helmet shell 17 for the double purpose of closing said cavity 13 and for radiating heat from heat pump 12 upper hot plate. A hard foam helmet liner 18, defining a continuation of cavity 13, is bonded to the inner surface of hard fiber shell 17. An elastic bladder 20 is bonded to foam liner 18 and extends upwardly into the cavity 13. The bladder 20 has a filler tube 22 extending downwardly in helmet 10 for filling said bladder 20 with a heat transfer liquid, preferably water in temperate climes. Bladder 20 is also attached to foam liner 18 to form dimples 24 along bladder centerline without blocking passage on either side of the dimples of heat transfer liquid convection currents. Sponges 26 are pressed into dimples 24 and into cavity 13 below bladder 20 to respectively maintain said dimples' shapes, and to support bladder 20 in the cavity. A square metal top or cover 28, having depending fins 30, closes the upwardly extending opening of the bladder 20. Cover 28 is dimensioned to conform with the bottom

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of heat pump 12 to which it is bonded making heat transfer liquid to metal to metal contacts for the more efficient transfer of heat thereby.

In operation, electrical conductors 14, one of which includes a diode for restricting a flow of current to one direction only, is engaged through a connector (not shown) to said motorcycle battery for the one way current to flow to cool the lower plate side of heat pump 12 that is bonded to bladder square top 28. Helmet wearer's head heat is transferred by direct contact to bladder 20 to heat transfer liquid contained therein, to bladder top cover 28 to said cooled lower plate and is electrically pumped to said upper hot plate and transferred by contact with radiator shell 15 to ambient atmosphere, and dispersed therefrom by airflow around helmet 10.

The helmet of the invention conforms to all Federal Motor Vehicle Safety Standards and Regulations FMVSS No. 218 Motorcycle Helmets, and particularly with restrictions of projections above and below said hard fiber shell 17.

Electro-thermal pumps are obtainable from Marlow Industries Inc., 1021 S. Jupiter Road, Garland, Texas 75042.

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What is claimed is:

1. A thermo-electric cooled motorcycle helmet, having a hard fiber shell, for wear when riding a motorcycle, and comprising:

a) a cavity defined in and through the top of said hard fiber shell;

b) thermo electric heat pump means mounted in said cavity flush with the top of said hard fiber shell;

c) thermal radiation means for closing the top of said cavity and bonding to said flush side of said heat pump means to transfer and radiate heat therefrom;

d) insulated electrical conduction means, operationally fixed to said heat pump means and connectable to a motorcycle direct current electrical power source for one way energizing said heat pump to electrically pump heat out of said hard fiber shell to said radiator; and

e) liquid heat transfer means mounted in said helmet and below said heat pump for transferring heat from inside said hard fiber shell to said heat pump.

2. A thermo-electric cooled motorcycle helmet as described in claim 1 wherein said thermal radiation means comprises:

a) a hardened light metal radiation shell for fixing to the top of said hard fiber shell by bonding and press-engaging pins into said hard fiber shell.

3. A thermo-electric cooled motorcycle helmet as described in claim 1 wherein said electrical conduction means comprises

a) a one way flow diode connected therein.

4. A thermo-electric cooled motorcycle helmet as described in claim 1 wherein said liquid heat transfer means comprises:

a) a flexible blatter, fillable with a heat transfer liquid, and mountable below said heat pump means for blatter contact with a wearer's head and liquid and metal contact with said heat pump.



AMENDED CLAIMS

[received by the International Bureau on 24 October 1983 (24.10.83);
original claims 1 to 4 replaced by amended claims 1 to 4 , new claims 5 to 7 added]

1. Thermo-electric cooled headgear comprising:
 - a) a hard shell having a cavity defined in and through said hard shell;
 - b) thermo-electric heat pump means mounted
5 in said cavity;
 - c) thermal radiation means closing said cavity and bonded to said heat pump means to transfer and radiate heat therefrom;
 - d) insulated electrical conduction means
10 operationally connected to said heat pump means and connectable to an electrical power source for energizing said heat pump to electrically pump heat to said radiation means; and,
 - e) liquid heat transfer means mounted in
15 said headgear for transferring heat between a wearer's head and said heat pump.

2. The headgear of claim claim 1 wherein said thermal radiation means comprises:
 - a) a hardened, light-metal radiation member
20 secured to said hard shell by bonding and press-engaging pins into said hard shell.

3. The headgear of claim 1 wherein said electrical conduction means comprises:
 - a) a oneway flow diode connected therein.

- 25 4. The headgear of claim 1 wherein said liquid heat transfer means comprises:
 - a) a flexible bladder fillable with a heat transfer liquid and connected to said heat pump means for bladder contact with a wearer's head and with said
30 heat pump.



5. The headgear of claim 1 wherein said cavity is through the top of said shell, wherein said thermo-electric heat pump means is mounted in said cavity flush with the top of said shell, and wherein said
5 thermal radiation means closes said cavity at the top of said shell.
6. The headgear of claim 1 wherein said headgear is for wear when riding a motorcycle, and wherein said insulated electrical conduction means is connectable to
10 a motorcycle direct current electrical power source.
7. The headgear of claim 4 wherein said flexible bladder is mountable below said heat pump means.



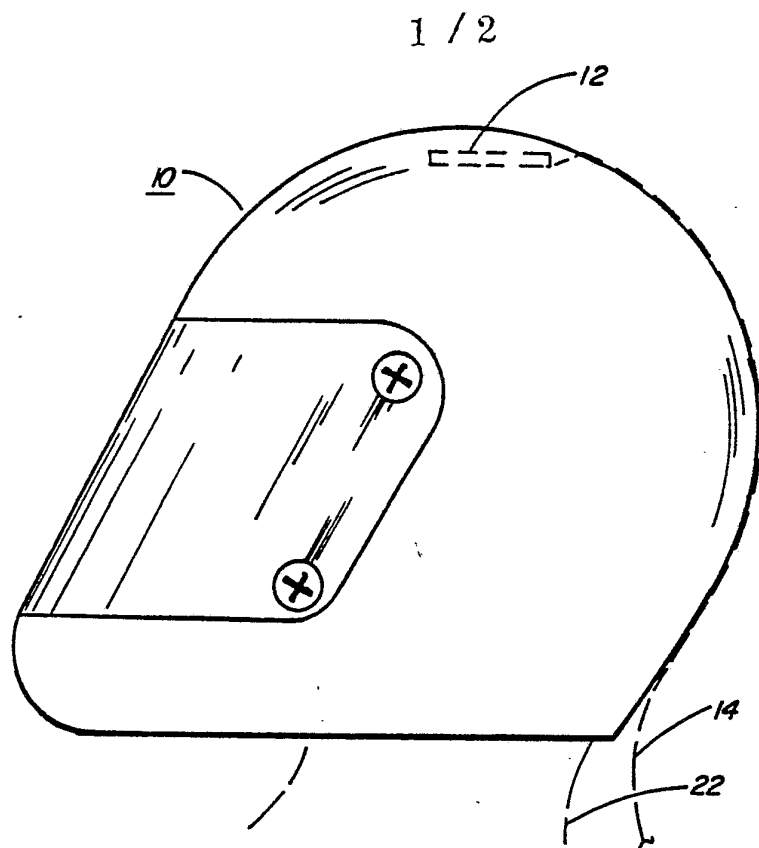


FIG. 1

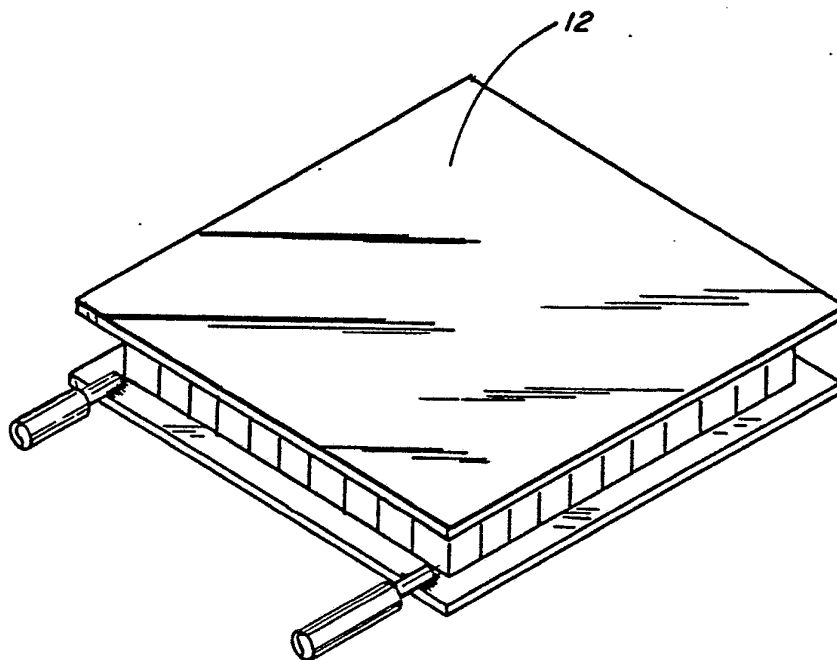


FIG. 2

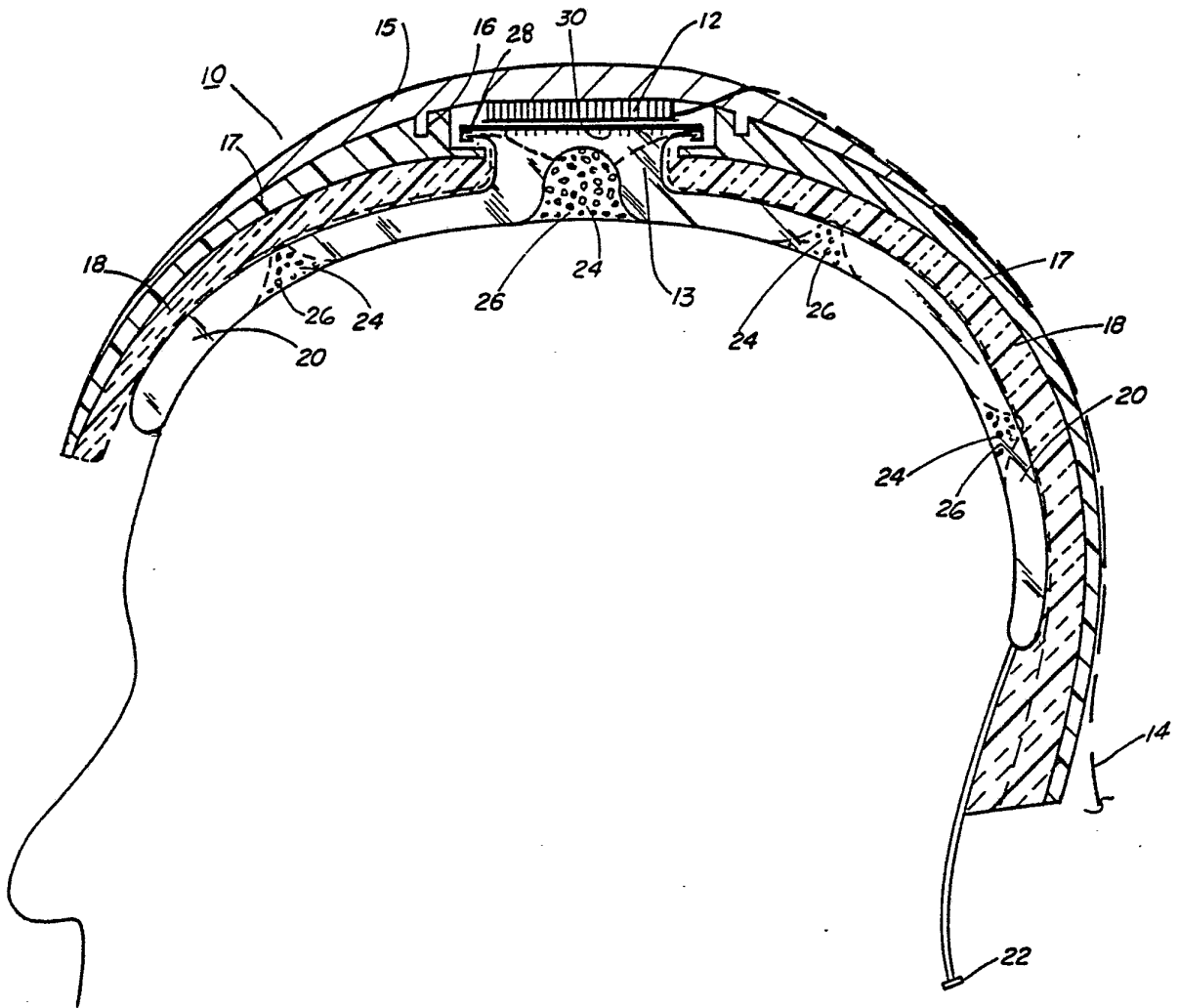


FIG. 3

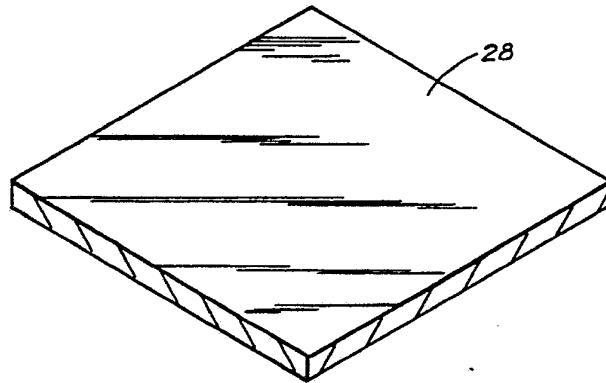


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No **PCT/US 83/00957**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC		
INT. CL. 3 A42B 3/02		
U.S. CL. 2/7		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
U.S.	2/7, 410, 422, 424, 425, 10, 171.3 62/3, 259.3 128/399, 400, 402	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁴		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category ⁹	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	EP, A, 0050473, (Lehovec et al) 28 April 1982	1-4
Y	US, A, 3,391,407, (Waters) 09 July 1968	1-4
A	US, A, 3,295,522, (Johnson), 03 January 1967	1-4
A	US, A, 4,172,495, (Zebuhr et al,) 30 October 1979	1-4
A	US, A, 4,338,944, (Arkans), 13 July 1982	1-4
A	US, A, 4,115,874, (Hasegawa), 26 September 1978	1-4
<p>⁹ Special categories of cited documents: ¹⁵</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report ²	
29 August 1983	20 SEP 1983	
International Searching Authority ¹	Signature of Authorized Officer ²⁰	
ISA/US	Peter Nerbun 