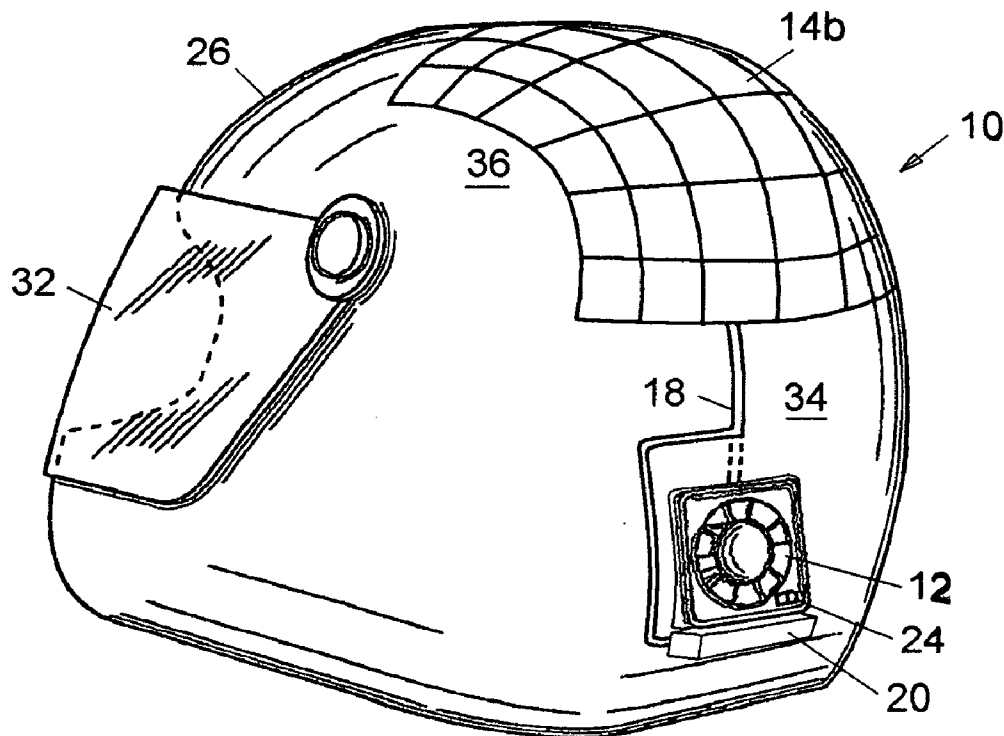


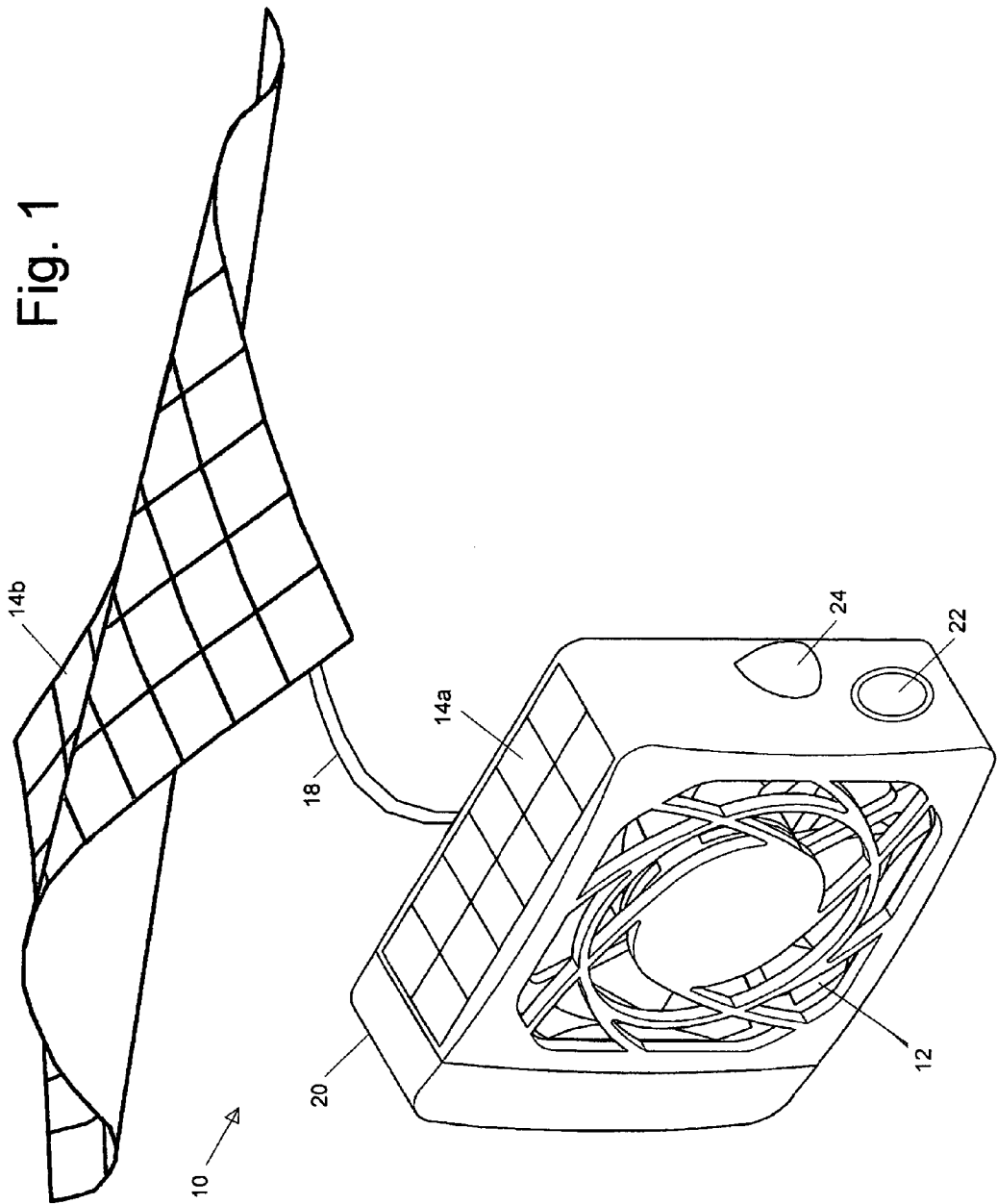


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Rupnick et al.(10) **Pub. No.: US 2011/0231977 A1**(43) **Pub. Date: Sep. 29, 2011**(54) **HELMET COOLING DEVICE****Publication Classification**(76) Inventors: **Charles J. Rupnick**, Seattle, WA
(US); **Daniel Bacon**, Tacoma, WA
(US); **Jesse Harrison**, Gig Harbor,
WA (US)(51) **Int. Cl.**
A42B 3/28 (2006.01)
F24F 7/007 (2006.01)
F24F 11/053 (2006.01)
(52) **U.S. Cl.** **2/7; 454/251; 454/239**(21) Appl. No.: **13/065,111**(22) Filed: **Mar. 14, 2011****Related U.S. Application Data**(63) Continuation-in-part of application No. 12/958,459,
filed on Dec. 2, 2010.(60) Provisional application No. 61/284,029, filed on Dec.
11, 2009.**ABSTRACT**

A helmet air conditioning unit configured for operation with a helmet having air flow spaces within an interior space thereof, the helmet air conditioning unit including an electrical ventilating fan with a housing portion having one or more exhaust ports positionable in fluid communication with the air flow spaces within the interior space of the helmet; a battery power supply connected to energize the fan; a solar power supply coupled to recharge the power battery supply; and a fan controller coupled for actuating the fan for generating a pressurized air flow at the one or more exhaust ports of the housing portion of the fan, whereby the pressurized air flow is directed through the one or more exhaust ports of the housing portion of the fan when the fan is actuated.





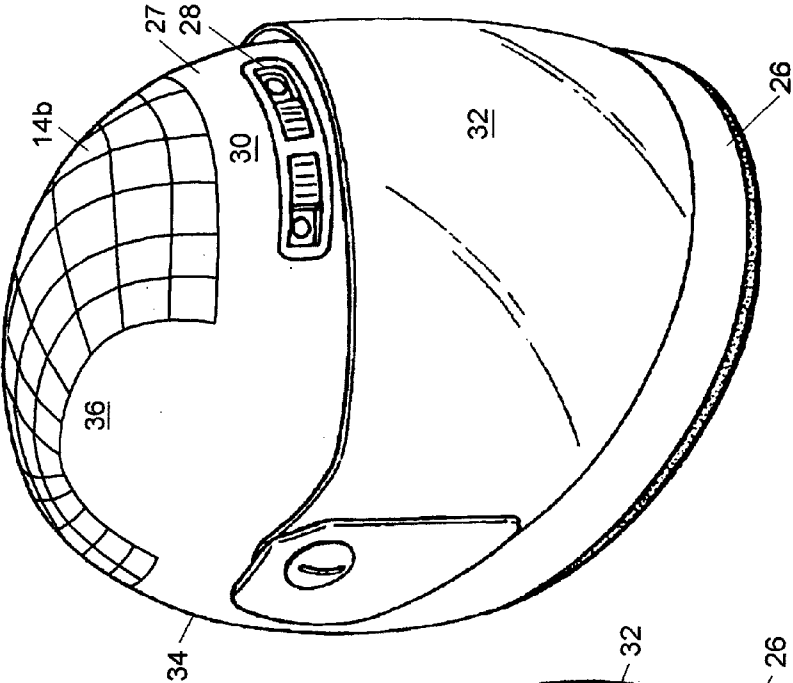


Fig. 2

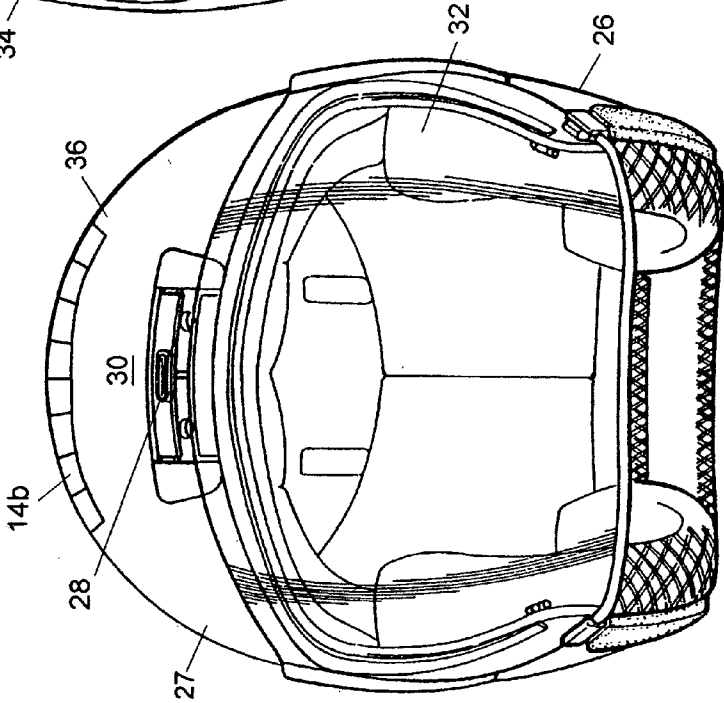


Fig. 3

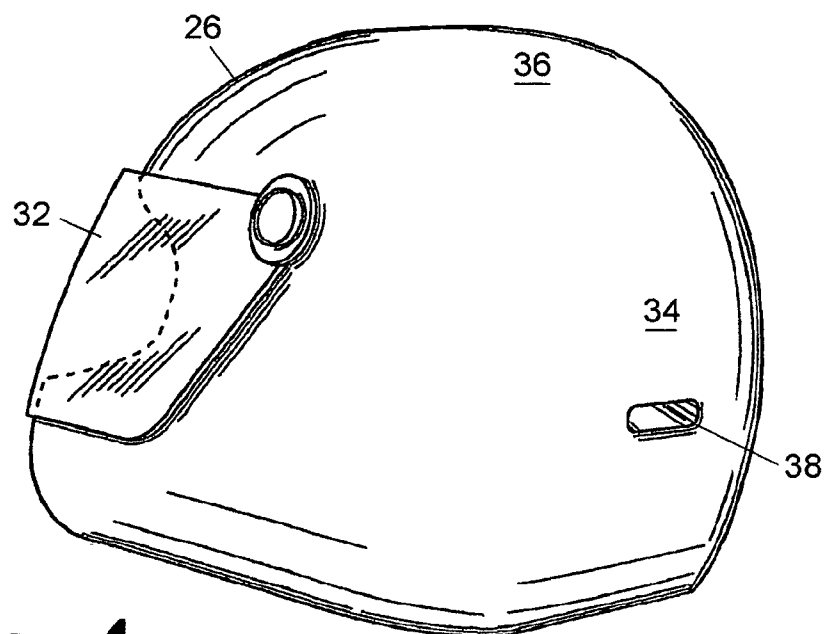


Fig. 4
(Prior Art)

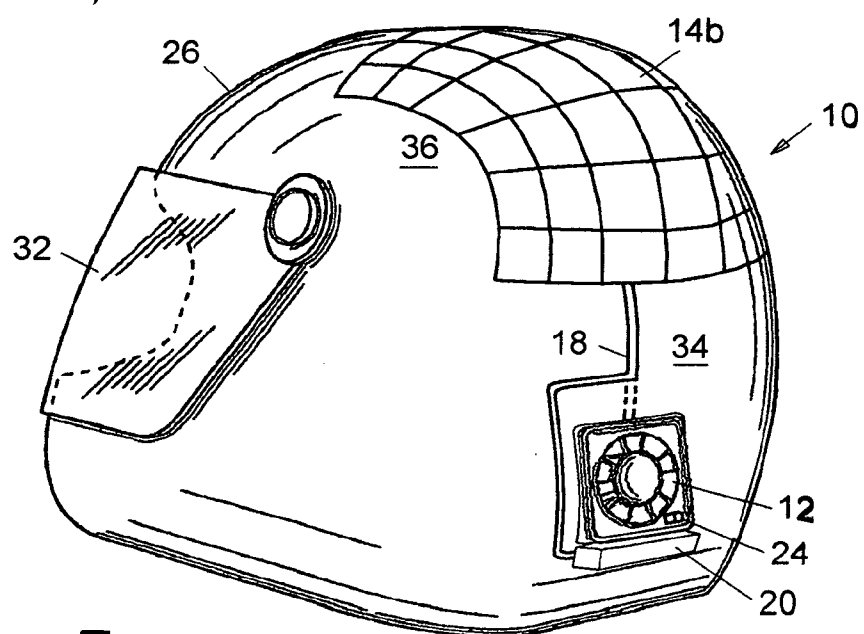


Fig. 5

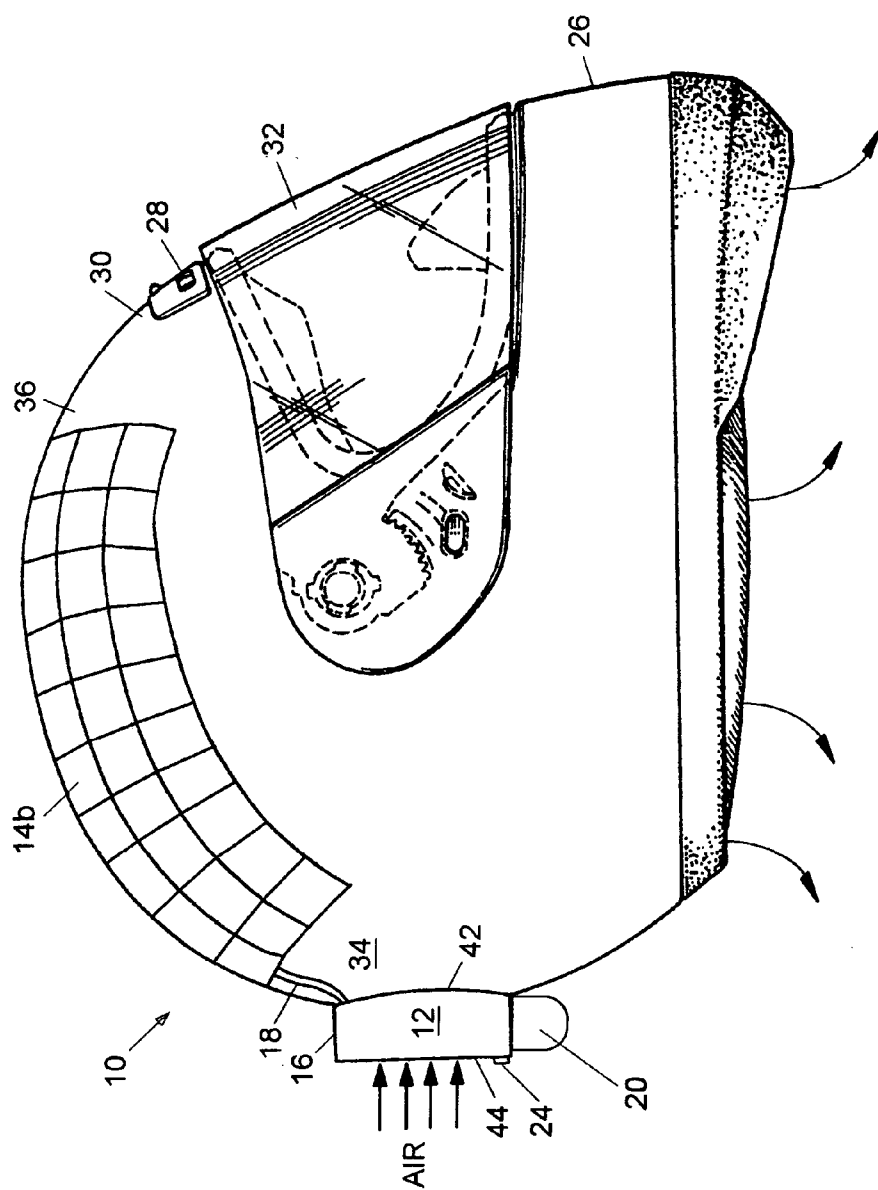


Fig. 6

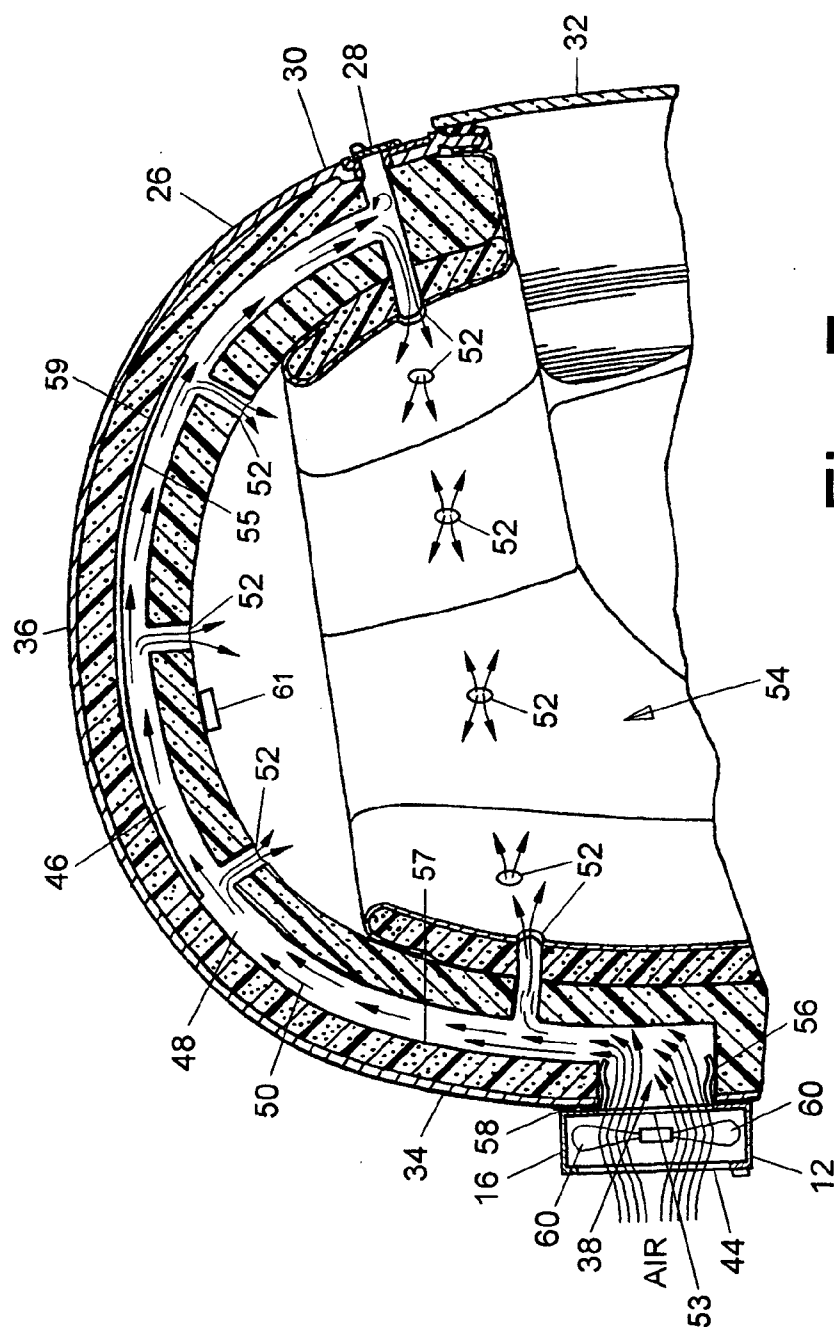


Fig. 7

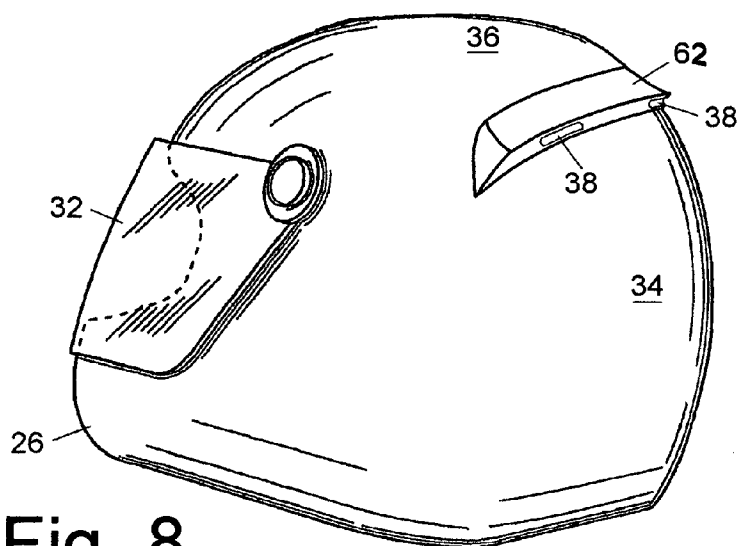


Fig. 8
(Prior Art)

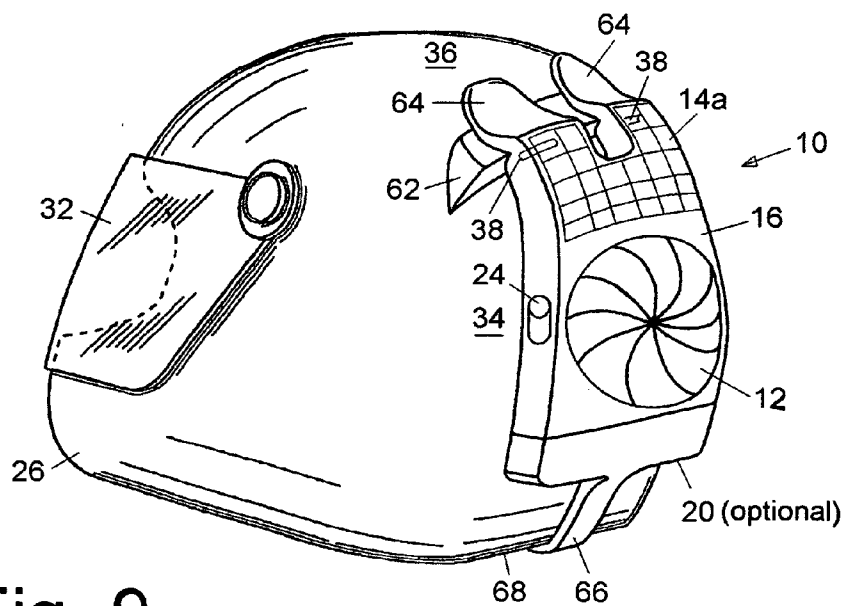


Fig. 9

Fig. 10

(Prior Art)

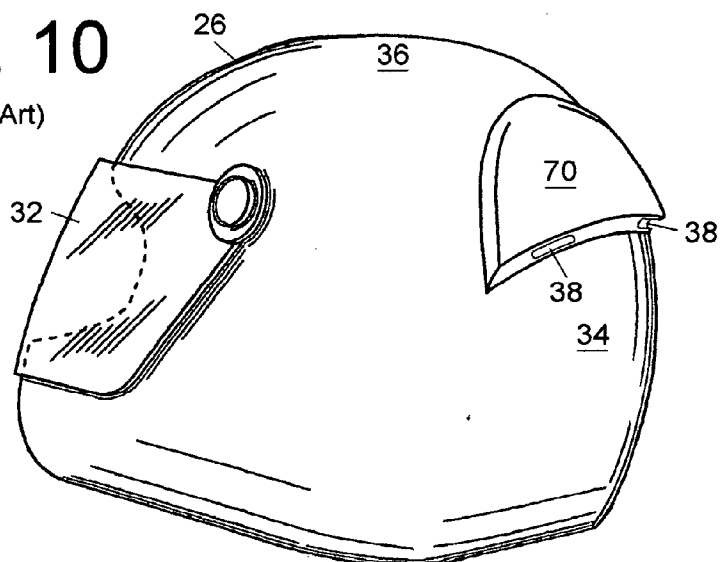
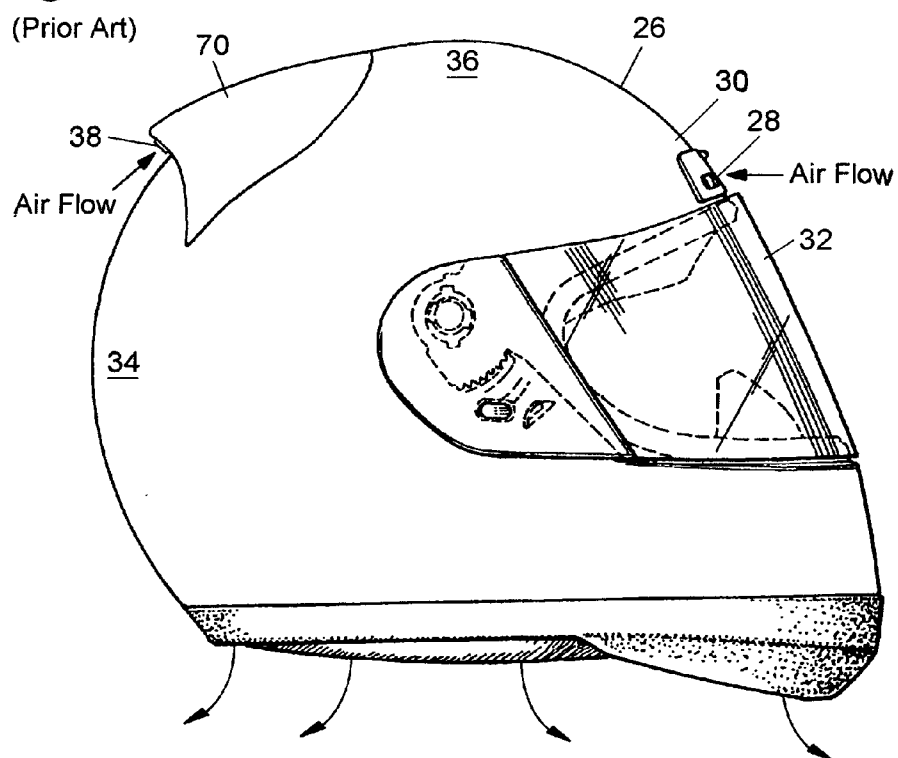


Fig. 11

(Prior Art)



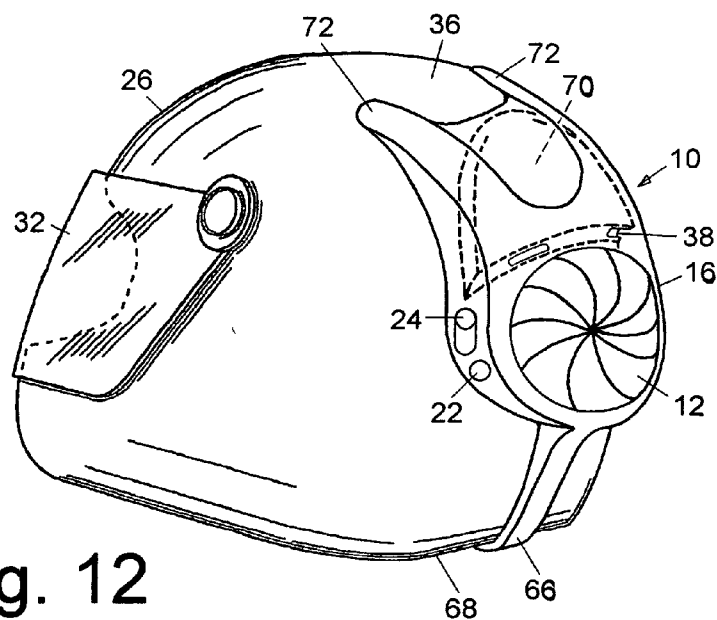


Fig. 12

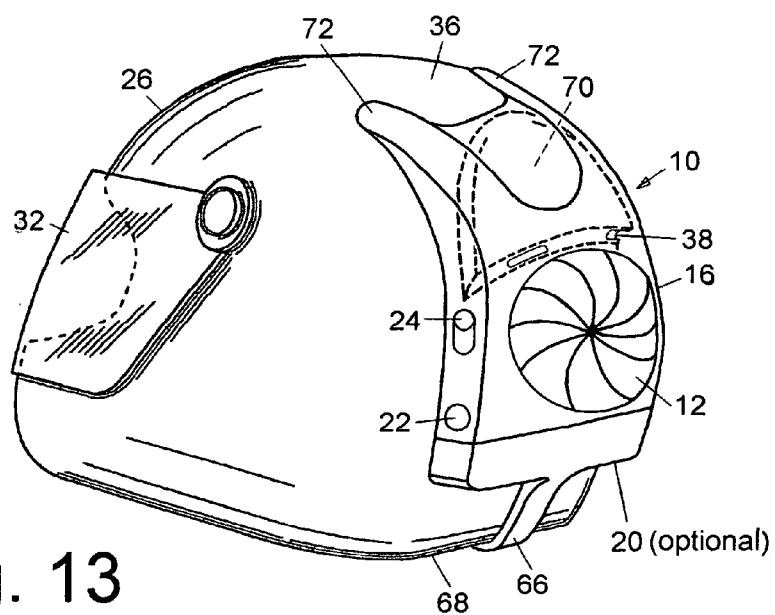
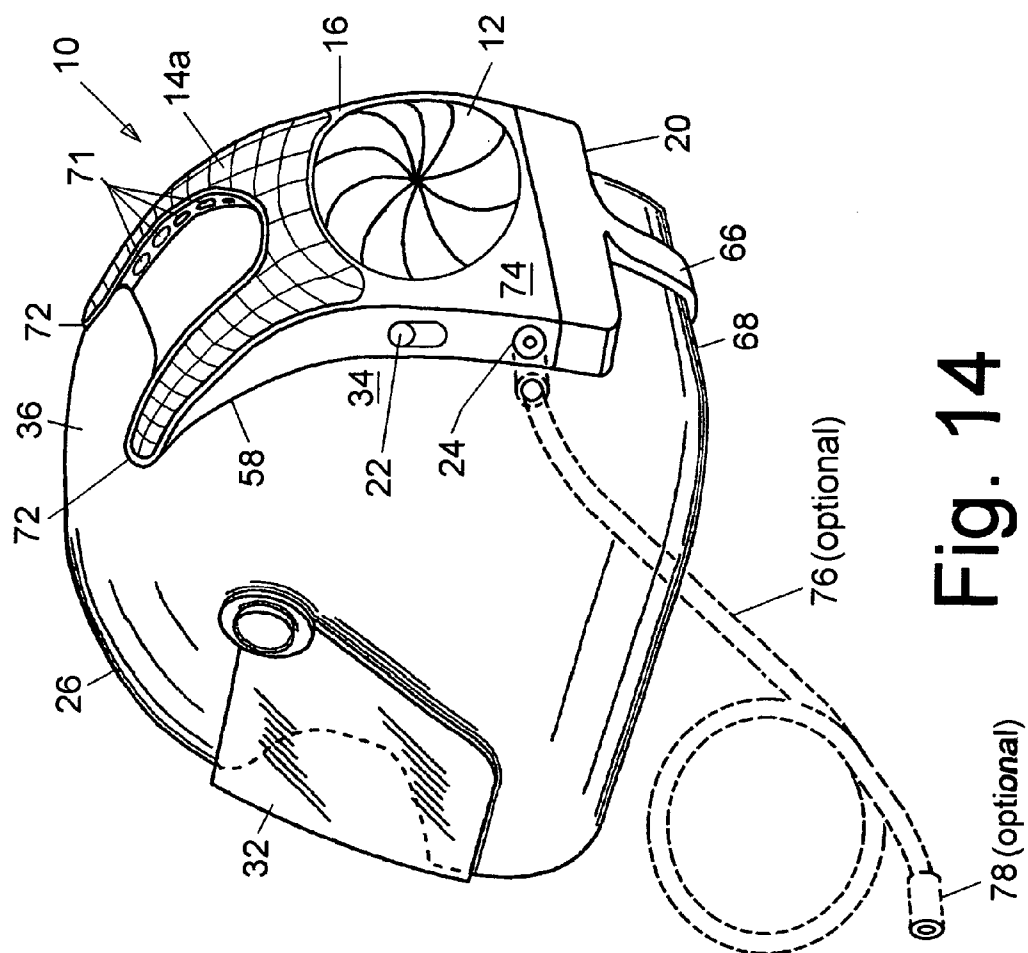


Fig. 13



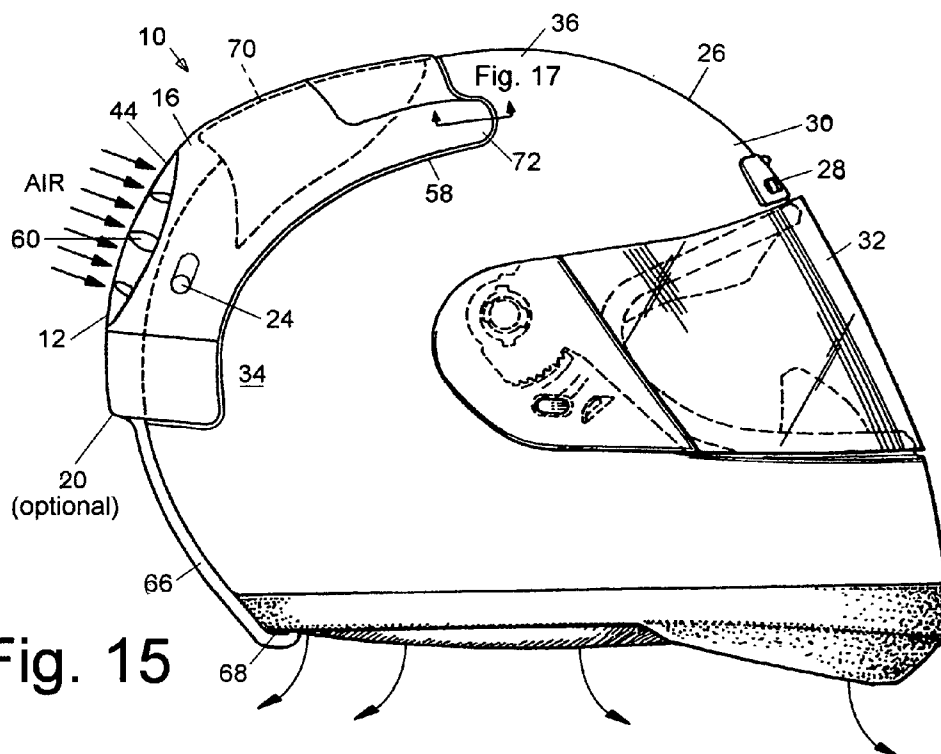


Fig. 15

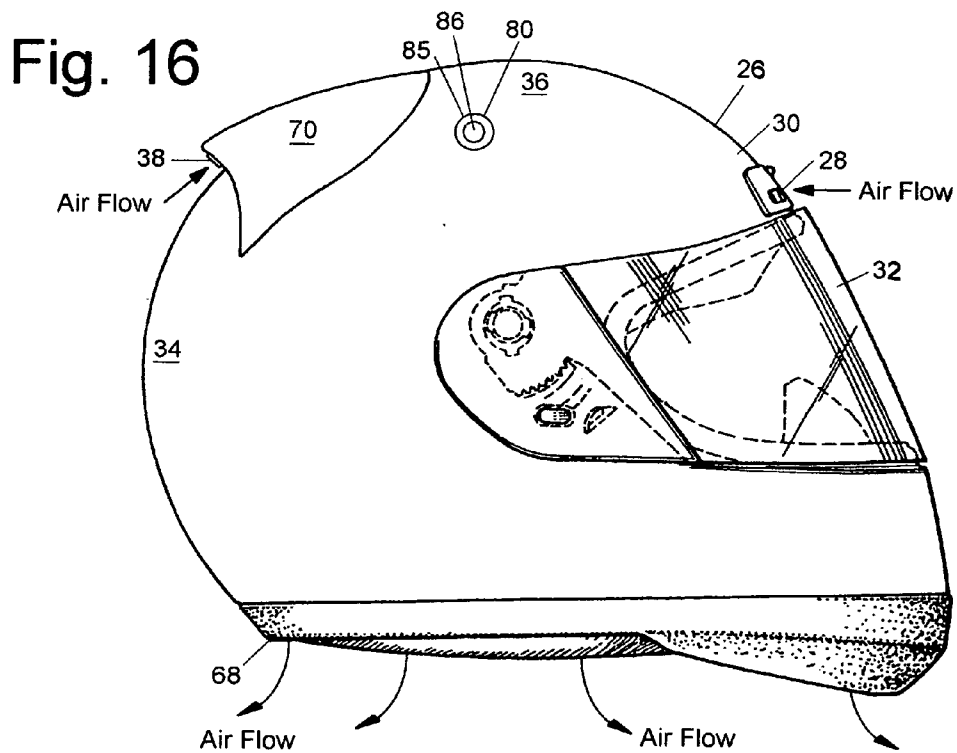


Fig. 16

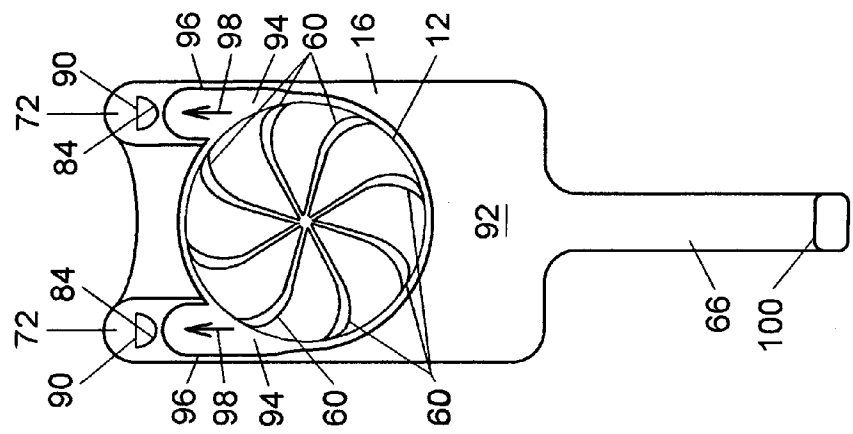


Fig. 17

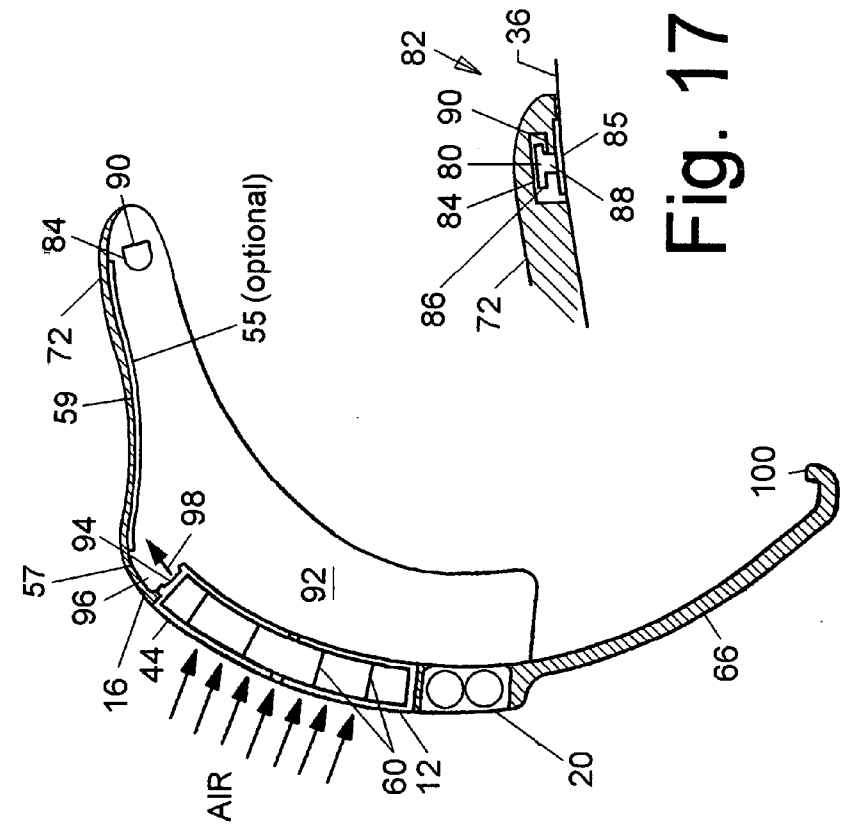
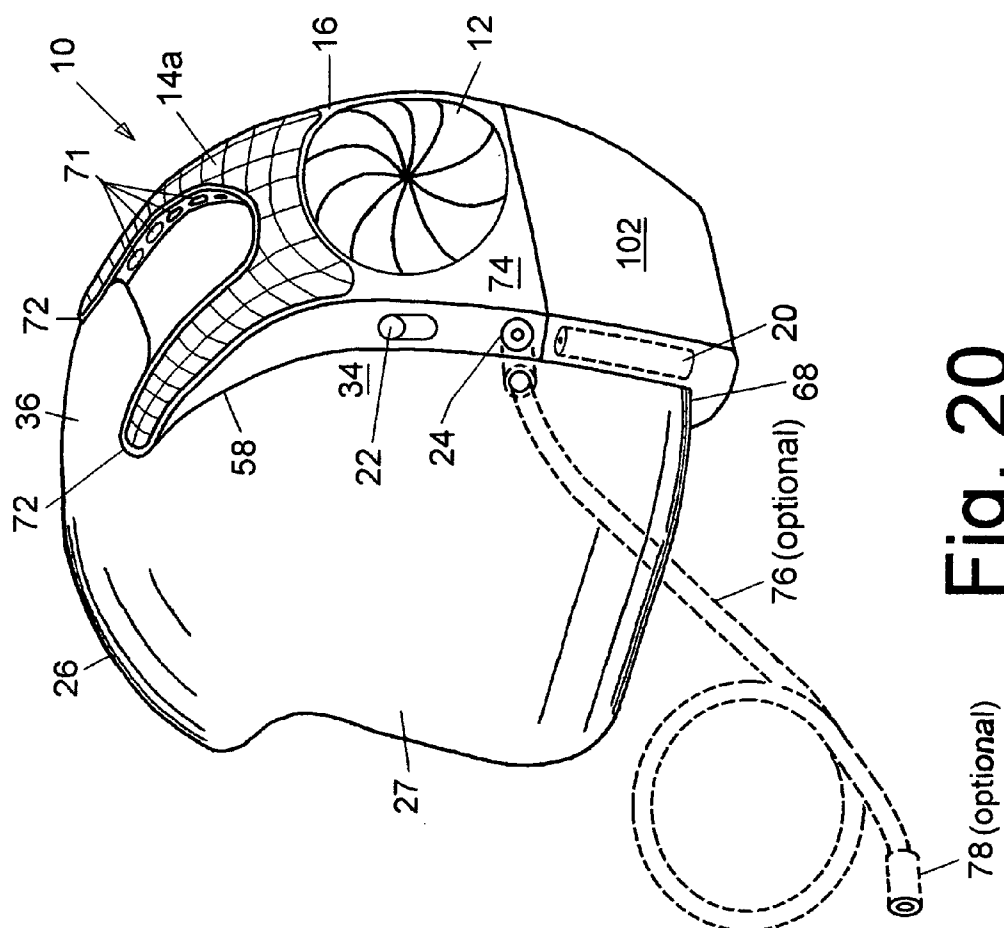


Fig. 18



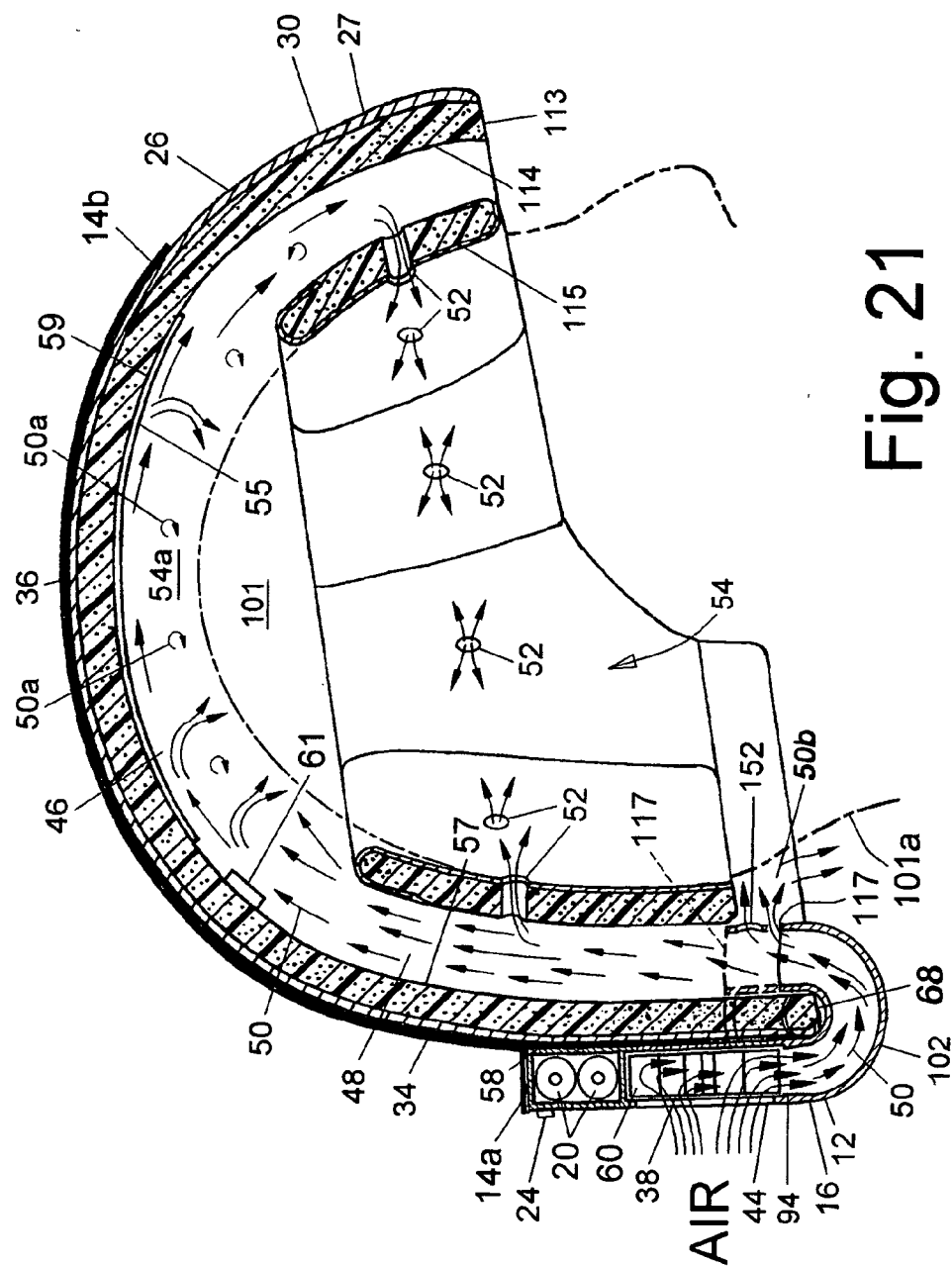


Fig. 21

Fig. 22

HELMET COOLING DEVICE

[0001] This application claims priority benefit of copending U.S. patent application Ser. No. 12/958,459 filed in the names of Daniel Bacon and Jesse Harrison on Dec. 10, 2010, the complete disclosure of which is incorporated herein by reference, which claims priority benefit of U.S. Provisional Patent Application Ser. No. 61/284,029 filed in the names of Daniel Bacon and Jesse Harrison on Dec. 11, 2009, the complete disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to a helmet cooling device, and in particular to a light-weight, portable and self-contained device for providing air circulation about the head and face of the wearer.

BACKGROUND OF THE INVENTION

[0003] A variety of “crash” type helmets are generally well-known in the prior art for use in a variety of different industries or avocations. Generally speaking, the helmet is used to protect the head of the wearer by preventing major impacts, thereby safeguarding the head and face of the wearer. For example, such helmets are commonly used by motorcycle enthusiasts and stock car and race car drivers, as well as construction workers and sports players. There are many situations, both work and sport, in which the wearing of a helmet is necessary or desirable. However, considerable discomfort can result from wearing a helmet, especially the full-face variety, for even a short period of time particularly in warm or humid weather.

[0004] Various styles of helmets are commercially available. All helmets tend to cover the entire head with a non-porous shell made of a plastic acrylic or other suitable synthetic type material. Since the wearer’s head emits heat, this non-porous shell often causes discomfort or even unsafe wearing conditions. For example, heat trapped within the helmet interior can cause the visor to fog and obscure vision. Sweat dripping down in the wearer’s face can also be distracting and obstruct vision.

[0005] Helmet manufacturers generally provide vents or air intake openings in helmets, typically in the front portion of the helmet facing the oncoming air flow while driving. Canadian Patent Application No. 2,171,265, entitled “Motor Cycle Helmet,” by Tsai, discusses this type helmet design and alternative designs. The previously described air intake openings can allow water to enter the helmet when it is raining outside. Even if a movable closure plate is present, closing the intake vent causes the interior to steam up and create a stuffy, hot feeling. Tsai also describes alternative designs utilizing “conducting devices” and “opening and closing regulating heat sinks.” However, these alternative designs suffered from various shortcomings such as poor interior circulation, and allowing rain and water to seep in. Certain of the designs were complicated to implement, requiring the assembly of many parts.

[0006] The prior art addresses the problem of interior helmet heating by providing “ventilating” systems. For example, exhaust and intake fans have been provided on the rear of the helmet that work in conjunction with an intake port on the front of the helmet. The intake and exhaust fans may draw incoming air across a thermoelectric cooling element with the

cooled air being circulated through ventilating ducts to the helmet interior. All these ventilating systems require large amounts of power to operate. Accordingly, helmets utilizing prior art ventilating systems limit the wearer’s movements by an electrical cord connecting the helmet to an external power supply required just to power the ventilating system.

[0007] Furthermore, every prior art “ventilating” system has required such extreme modification of the helmet, that the helmet must be specially designed to accommodate the ventilating system, and even manufactured with the ventilating system in situ.

SUMMARY OF THE INVENTION

[0008] The present invention is a light-weight, portable and self-contained helmet air conditioning unit configured with a ventilating fan device for providing air circulation in a helmet, without external power cords connecting the air conditioning unit to an external power supply and restricting the wearer’s movements. Additionally, the air conditioning unit is structured to work with pre-existing ventilation ducts and air flow spaces within the helmet to provide air circulation. Accordingly, the air conditioning unit can be connected to any helmet with or without ventilation ducts, without modifying the helmet. The air conditioning unit can be removably anchored to the helmet, or permanently attached as a matter of preference.

[0009] According to one aspect of the invention the helmet air conditioning unit is configured for operation with a helmet having air flow spaces within an interior space thereof, the helmet air conditioning unit including an electrical ventilating fan with a housing portion having one or more exhaust ports positionable in fluid communication with the air flow spaces within the interior space of the helmet; a battery power supply connected to energize the fan; a solar power supply coupled to recharge the power battery supply; and a fan controller coupled for actuating the fan for generating a pressurized air flow at the one or more exhaust ports of the housing portion of the fan, whereby the pressurized air flow is directed through the one or more exhaust ports of the housing portion of the fan when the fan is actuated.

[0010] According to one aspect of the helmet air conditioning unit, the one or more exhaust ports of the housing portion of the fan are further positioned in fluid communication with the air flow spaces within the interior space of the helmet; and the pressurized air flow is further directed through the one or more exhaust ports of the housing portion of the fan into the air flow spaces within the interior space of the helmet when the fan is actuated.

[0011] According to one aspect of the helmet air conditioning unit, the helmet air conditioning unit further includes a cooling element that is positionable within the pressurized air flow generated by the fan.

[0012] Other aspects of the invention are detailed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same becomes better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

[0014] FIG. 1 is a perspective view showing an example of a helmet air conditioning unit embodied as a ventilating fan device having an electrical fan with a flexible conformable remote solar collector;

[0015] FIG. 2 is a front perspective view of the conformable remote solar collector of the helmet air conditioning unit in combination with one conventional helmet of a type that is commercially available;

[0016] FIG. 3 is a front elevational view of the helmet showing the flexible remote solar collector of the helmet air conditioning unit conformed to the helmet crown surface;

[0017] FIG. 4 is a rear view of the helmet which includes one or more ventilation duct rear intake port on the helmet rear surface;

[0018] FIG. 5 illustrates the ventilating fan device of the helmet air conditioning unit in combination with the helmet, wherein the fan is mounted on the helmet's rear surface over the ventilation duct rear intake port;

[0019] FIG. 6 is a side elevational view of the helmet with the ventilating fan device of the helmet air conditioning unit having the fan positioned over the ventilation duct rear intake port, and the fan housing is conformed to the helmet surface for forming an air seal between the fan and the helmet surface;

[0020] FIG. 7 is a cross-section view of the helmet that illustrates one embodiment of the helmet air conditioning unit in combination with one exemplary helmet ventilation duct system, the helmet air conditioning unit shown here including an optional remote electrically powered cooling element and an optionally thermostat controller mounted inside the helmet;

[0021] FIG. 8 illustrates the helmet of a conventional type having one embodiment of a fin-type spoiler positioned on the helmet crown surface near the rear surface;

[0022] FIG. 9 illustrates another embodiment of the helmet air conditioning unit in combination with the helmet having the fin-type spoiler, wherein the fan is mounted on the helmet's rear surface;

[0023] FIG. 10 illustrates the helmet of a conventional type having one embodiment of a hood-type spoiler positioned on the helmet crown surface near the rear surface;

[0024] FIG. 11 is a side view of the helmet having the hood-type spoiler formed with the rear intake ports in combination with one or more of the ventilation duct forward intake ports on the helmet front surface;

[0025] FIG. 12 illustrates another embodiment of the ventilating fan device of the helmet air conditioning unit in combination with the helmet having the hood-type spoiler;

[0026] FIG. 13 illustrates the embodiment of the helmet air conditioning unit in combination with the helmet having the hood-type spoiler, wherein the helmet air conditioning unit further includes the battery pack power supply on-board the ventilating fan device and also optionally includes either the on-board solar collector or the conformable remote solar collector for recharging the battery;

[0027] FIG. 14 illustrates the ventilating fan device of the helmet air conditioning unit in combination with the helmet having the hood-type spoiler with the fan housing having the extensions fit over the hood-type spoiler and the rear intake ports helmet ventilation duct system;

[0028] FIG. 15 is a side view of the ventilating fan device of the helmet air conditioning unit in combination with the helmet having the hood-type spoiler, wherein the extensions of the fan housing are fitted over the hood-type spoiler with the blades of the centrifugal squirrel cage blower-type fan con-

formed to the helmet surface and positioned in close proximity to the rear intake ports of the helmet;

[0029] FIG. 16 illustrates the helmet having anchors of the helmet air conditioning unit attached to the crown surface for mounting the ventilating fan device;

[0030] FIG. 17 is a cross-section view of one alternative anchor mechanism that includes both the anchors and mating anchor receivers provided on the fan housing;

[0031] FIG. 18 is a section view through the fan and fan housing of the ventilating fan device of the helmet air conditioning unit that is contoured to mate with the helmet's rear surface, wherein the fan is the squirrel cage blower having the blower-type fan blades that are conformed to the curvature of the helmet's rear surface and further illustrates the internal ducting of the fan housing that is structured to direct the pressurized air flow generated by the squirrel cage blower fan over an optional on-board electrically powered cooling element and substantially directly into the rear intake ports of the helmet's ventilation duct system;

[0032] FIG. 19 illustrates the inner surface of the fan and housing of the ventilating fan device.

[0033] FIG. 20 illustrates the ventilating fan device of the helmet air conditioning unit in combination with a conventional helmet, such as a conventional hardhat or military combat helmet, having neither forward intake nor rear air intake ports, wherein positive air flow is provided via ducting that directs the air flow around the neck lip of the helmet to the interior of the helmet and the helmet's ventilation duct system;

[0034] FIG. 21 is a cross-section view of the helmet that illustrates one embodiment of the helmet air conditioning unit having the ducting that directs the air flow around the neck lip of the helmet to the interior of the helmet and the helmet's ventilation duct system, the helmet air conditioning unit being illustrated in combination with one exemplary helmet ventilation duct system, the helmet air conditioning unit shown here including an optional remote electrically powered cooling element and an optionally thermostat controller mounted inside the helmet; and

[0035] FIG. 22 illustrates the ventilating fan device of the helmet air conditioning unit in combination with a conventional helmet, such as a conventional hardhat or military combat helmet, having neither forward intake nor rear air intake ports, wherein positive air flow is provided via ducting that takes air in through side air vents and directs the air flow around the neck lip of the helmet to the interior of the helmet and the helmet's ventilation duct system.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0036] In the Figures, like numerals indicate like elements.

[0037] For purposes of the present discussion, the ventilating fan device is described in connection with a motorcycle helmet. However, it will be understood that other type crash helmets can also benefit from the ventilating fan device disclosed herein.

[0038] FIG. 1 illustrates the helmet air conditioning unit 10 embodied as a ventilating fan device having an electrical ventilating fan 12, such as a 6 or 12 volt DC fan. The ventilating fan 12 is powered by a solar power supply which is either an on-board solar collector 14a mounted directly on a plastic housing portion 16 of the fan 12, or is a remote solar collector 14b connected to the fan 12 by an electrical cord 18. For example, the remote solar collector 14b is of the known

flexible variety that can be conformed to an external surface that is normally exposed to the sun, such as the top portion of a helmet, as disclosed herein. Optionally, a battery pack power supply **20** may provide operating power to the fan **12**. The battery pack **20** may be carried on-board (shown) being connected to the housing portion **16** of the fan **12**, or carried remotely and connected by an electrical cable. The helmet air conditioning unit **10** may be configured to include either or both of the solar or battery power supplies for energizing the ventilating fan **12**. When the air conditioning unit **10** is configured to include both the solar and battery power supplies, the battery power supply may be coupled to power the electrical fan **12**, while the solar power supply is coupled to recharge the power battery supply. In this configuration, the battery **20** assures a constant power supply to the fan **12**, even when exposure to sunlight is interrupted by overhead obstructions, and the solar collector **14a** or **14b** recharges the battery **20** when exposure to sunlight is resumed.

[0039] FIG. 1 also illustrates the air conditioning unit **10** having an optional auxiliary power port **22** that accepts an electrical cord for connection to an external power supply, whereby the battery **20** can be recharged.

[0040] A fan controller **24** is provided for actuating the ventilating fan **12**. By example and without limitation, the fan controller **24** is a multi-position switch that provides, for example, high, medium and low settings for the fan **12**, as well as an OFF position setting for cutting power and stopping the fan **12**. The switch fan controller **24** may also include an AUTO position setting coupled for controlling the operation of the fan **12** for automatically adjusting an internal temperature of the helmet to a desirable level, for example, as a function of a thermostat positioned within either the helmet ventilating ducts or the helmet interior.

[0041] FIG. 2 is a front perspective view of one conventional helmet **26** of a type that is commercially available. Helmet **26** includes a rigid outer protective shell **27** having one or more ventilation duct forward intake ports **28** on the helmet front surface **30**, for example above the face plate **32**, in fluid communication with air flow spaces within the helmet **26**. In normal operation of the helmet's ventilation system, the forward intake ports **28** are configured in an open position and air is received into the air flow spaces of the helmet's ventilation system under pressure when the wearer is, for example, riding a motorcycle when the helmet **26** is a motorcycle helmet. When the motorcycle is stationary, no air is received into the forward intake ports **28** because the necessary pressure is only created by forward motion of the motorcycle.

[0042] Here, the fan **12** is mounted on the rear surface **34** of the helmet **26** with the flexible remote solar collector **14b** conformed to the helmet crown surface **36** and connected to the fan **12** by the electrical cord **18**. Thus positioned on the crown **36** of the helmet **26**, the remote solar collector **14b** is ideally positioned to receive a maximum amount of the sun's rays for most efficiently recharging the battery **20** and ensuring that power is constantly available to the fan **12**.

[0043] FIG. 3 is a front elevational view of the helmet **26** showing the flexible remote solar collector **14b** conformed to the helmet crown surface **36**. As illustrated, the solar collector **14b** is sufficiently conformed to the helmet crown surface **36** as to create little or no windage in addition to that normally created by the helmet **26**.

[0044] FIG. 4 is a rear view of the helmet **26** which includes one or more ventilation duct rear intake ports **38** on the helmet rear surface **34** and in fluid communication with air flow

spaces within the helmet **26**. In normal operation of the helmet's ventilation system, air received into the air flow spaces within the helmet's ventilation system through either the forward intake ports **28** or rear intake ports **38**.

[0045] FIG. 5 illustrates the air conditioning unit **10** in combination with the helmet **26**. Here, the fan **12** is mounted on the helmet's rear surface **34** over the ventilation duct rear intake port **38**. Thus positioned over the ventilation duct rear intake port **38**, the fan **12** is ideally positioned to force air into the air flow spaces within the helmet's ventilation duct system for most efficiently pressurizing the ventilation system and ensuring that air flow is constantly available to the interior of the helmet **26** to cool the wearer's head.

[0046] Here, by example, the air conditioning unit **10** is illustrated having the optional battery pack **20** carried on-board the housing portion **16** of the fan **12**. The flexible remote solar collector **14b** is conformed to the helmet crown surface **36** and connected to the fan **12** by the electrical cord **18**.

[0047] FIG. 6 is a side elevational view of the helmet **26** with the air conditioning unit **10** having the fan **12** positioned over the ventilation duct rear intake port **38**. As illustrated here, the fan housing **16** is conformed to the helmet surface **34** for forming an air seal **42** between the fan **12** and the helmet surface **34**. FIG. 6 illustrates the air flow (arrows) at the fan air intake **44** into the fan **12** for pressurizing the air flow spaces within the helmet's ventilation system.

[0048] FIG. 7 is a cross-section view of the helmet **26** that illustrates one embodiment of an exemplary helmet's ventilation duct system **46**. For example, the helmet ventilation duct system **46** includes air flow spaces **48** formed as air ducts that carry pressurized air flow **50** throughout the helmet **26**. The air flow spaces **48** communicate with multiple duct vents **52** where pressurized air flows into the interior space **54** of the helmet **26** to cool the wearer's head.

[0049] According to the invention, the ventilating fan **12** of the air conditioning unit **10** is operated to receive ambient air flow (arrows) at the fan air intake **44** and generate the pressurized air flow **50**. As illustrated, an exhaust port **53** of the housing portion **16** of the fan **12** is positioned in fluid communication with the rear intake port **38** which, in turn, is in fluid communication with the air flow spaces **48** of the ventilation duct system **46**. Thus positioned, the pressurized air flow **50** generated by the fan **12** is communicated to the air flow spaces **48** of the ventilation duct system **46** through the rear intake port **38**. The pressurized air flow **50** is delivered into the interior space **54** of the helmet **26** through the duct vents **52**.

[0050] The helmet's forward intake ports **28**, when present, also communicate with the ventilation duct system **46**, but are normally closed during operation of the air conditioning unit **10** so that pressure through the forward intake ports **28** does not interfere with the pressurized air flow **50** generated by the fan **12**.

[0051] Optionally, the helmet air conditioning unit **10** also includes a cooling pad refrigeration element **55** situated in a position for cooling the air flow **50** before being delivered into the interior space **54** of the helmet **26**. By example and without limitation, the refrigeration element **55** is a gel-type cooling pad of a type that is commercially available for use with notebook computers and other computer for use with a mini-refrigerator box, wherein the cooling pad is energized through a power cable connected for power to the computer through a USB (universal serial bus) connector. Such cooling

pad refrigeration elements **55** are generally well-known, as shown for example by Cheng Yu Huang in United States Patent Application Publication 20100219729, Ser. No. 12/394,663, filed Feb. 27, 2009, the complete disclosure of which is incorporated herein by reference. Also, see, United States Patent Application Publication 20100126695, Ser. No. 12/276,457, by Steve Gara filed Nov. 24, 2008, the complete disclosure of which is incorporated herein by reference, which teaches a portable device/appliance that operates via battery power for cooling and heating beverages on a center circular metallic object/pad. The appliance body is of square shape made of hard plastic with a circular metallic pad that includes an assembly that heats and cools beverages with the help of a switch. It has an electrical means by plug/adaptor for connecting to a source of direct current and for enabling the polarity of the direct current provided to be reversed so that the device can either heat or cool the beverage container that is placed on the circular metallic object/pad. It also has the ability to heat and cool beverages by battery and by USB cable connected to a PC/Computer with a USB outlet. Here, a power cable **57** connects the refrigeration element **55** to either one of the remote solar collectors **14a**, **14b** or the battery pack power supply **20**, if present, for power. For example, the power cable **57** is connected through a USB port on the air conditioning unit **10**.

[0052] Additionally, the refrigeration element **55** is optionally conformed to the interior surface of the helmet **26** within the air flow spaces **48** of the helmet ventilation duct system **46**, as shown. For example, the refrigeration element **55** is optionally mounted to the interior surface of the helmet **26** by a bonding agent **59** such as by a coating of a conventional pressure sensitive adhesive (PSA) or an adhesive gasket such that the refrigeration element **55** sticks to the helmet interior surface by temporary application of pressure.

[0053] Optionally, the refrigeration element **55** is of a flexible gel-type cooling element, whereby the refrigeration element **55** is optionally conformable to the interior surface of the helmet **26** within the air flow spaces **48** of the helmet ventilation duct system **46**, as shown. For example, the refrigeration element **55** is optionally mounted to the interior surface of the helmet **26** by the bonding agent **59**.

[0054] Here, the pressurized air flow **50** is directed over the refrigeration element **55** for super-cooling the air being directed into the helmet's interior space **54**. Accordingly, the refrigerantly cooled pressurized air flow **50** cools the helmet's interior space **54** more effectively than the uncooled ambient pressurized air flow **50** provided by the ventilating fan **12** alone. Furthermore, the air conditioning unit **10** optionally includes a thermal sensor **61**, such as but not limited to a thermostat or thermocouple, for controlling the operation of either or both of the fan **12** and/or the refrigeration element **55** for controlling a temperature at a comfortable level within the interior space **54** of the helmet **26**. Accordingly, the thermal sensor **61** is situated in an appropriate position within the interior space **54** of the helmet **26** for measuring temperature therein.

[0055] The thermal sensor **61**, if present, controls the fan **12** and/or the refrigeration element **55** either individually or concurrently. When controlled concurrently, the ventilating fan **12** and refrigeration element **55** are both activated or deactivated concurrently as a function of the operation of the thermal sensor **61** in response to sensing a temperature within the interior space **54** of the helmet **26**. When alternatively controlled individually, the ventilating fan **12** and refrigera-

tion element **55** are separately activated or deactivated concurrently as a function of the operation of the thermal sensor **61**, whereby the refrigeration element **55** can be activated and deactivated as a function of the operation of the thermal sensor **61** in response to sensing a temperature within the interior space **54** of the helmet **26**, while the ventilating fan **12** can be separately controlled to continue operation until the helmet interior space **54** reaches a different lower temperature as sensed by the thermal sensor **61**. Alternatively, the thermal sensor **61** is optionally configured to control activation and deactivation only of the refrigeration element **55**, as disclosed herein, while activation and deactivation of the ventilating fan **12** can be separately controlled, as by the fan controller **24**, such that the wearer can operate the ventilating fan **12** as desired for comfort.

[0056] When the thermal sensor **61** is a thermostat, the sensed temperature for activation and deactivation of the refrigeration element **55** and/or ventilating fan **12** is optionally adjustable by the wearer of the helmet **26**. When, in the alternative, the thermal sensor **61** is a thermocouple, the sensed temperature for activation and deactivation of the refrigeration element **55** and/or ventilating fan **12** is fixed to maintain the helmet interior space **54** at a standard operating temperature. Optionally, the thermocouple can be replaceable for fixedly maintaining the helmet interior space **54** at different standard operating temperatures for different ambient conditions.

[0057] Here, the fan housing **16** is illustrated having an anchor **56** adapted for securing the fan **12** to the helmet **26**. For example, the anchor **56** couples the exhaust port **53** of the fan housing **16** to the rear intake port **38** of the helmet ventilation duct system **46** at the rear surface **34** of the helmet **26**. Accordingly, the fan **12** is removably coupled to the helmet **26** by the anchor **56** without modifying the helmet **26**. A gasket **58** is optionally seated between the fan housing **16** and the helmet surface **34** for sealing the exhaust port **53** of the fan housing **16** with the rear intake port **38**. The gasket **58** ensures that the pressurized air flow **50** generated by the fan **12** is applied to the helmet ventilation duct system **46** through the rear intake port **38**. Alternatively, the gasket **58** is an adhesive gasket that is substituted for the anchor **56**. The adhesive gasket **58** operates for both sealing any air gap between the exhaust port **53** of the housing portion **16** of the fan **12** and the rear intake port **38**, and substitutes for the anchor **56** for adhering the fan housing **16** to the helmet surface **34**. For example, the adhesive gasket **58** is coated with a conventional pressure sensitive adhesive (PSA) so the adhesive gasket **58** sticks to the helmet surface **34** by temporary application of pressure.

[0058] FIG. 7 also illustrates the fan **12** being of a conventional rotary structure having multiple fan blades **60** that may be curved in a manner that conforms to the helmet surface **34**. The surface conforming blades **60** provide the fan **12** with a low-profile while simultaneously maximizing the pressure of the air flow **50** into the ventilation duct system **46**.

[0059] FIG. 8 illustrates the helmet **26** of a conventional type having one embodiment of a fin-type spoiler **62** positioned on the helmet crown surface **36** near the rear surface **34**. The fin spoiler **62** is normally configured having one or more of the ventilation duct rear intake ports **38** which communicate with air flow spaces **48** of the ventilation duct system **46** and the duct vents **52**.

[0060] FIG. 9 illustrates another embodiment of the air conditioning unit **10** in combination with the helmet **26** hav-

ing the fin-type spoiler 62. Here, the fan 12 is mounted on the helmet's rear surface 34. The fan housing 16 is conformed to the contours of the helmet's rear surface 34 and includes one or more extensions 64 that fit over the fin spoiler 62 and the rear intake ports 38. Ducting within the fan housing 16 carries the air flow 50 pressurized by the fan 12 to the rear intake ports 38 for introduction into the ventilation duct system 46. The fan housing 16 includes a flexible clip 66 that secures the fan 12 to the helmet 26. For example, the clip 66 extends to the neck lip 68 of the helmet 26 adjacent to the rear surface 34, and is sufficiently flexible to snap around the neck lip 68 of the helmet 26.

[0061] According to the embodiment illustrated here, the helmet air conditioning unit 10 includes the optional battery pack 20 carried on-board the fan housing 16 for providing constant operating power to the fan 12, which is controlled by the multi-position switch fan controller 24. The exemplary air conditioning unit 10 also includes the on-board solar collector 14a mounted directly on the fan housing 16 for recharging the battery 20.

[0062] FIG. 10 illustrates the helmet 26 of a conventional type having one embodiment of a hood-type spoiler 70 positioned on the helmet crown surface 36 near the rear surface 34. The hood spoiler 70 is also normally configured having one or more of the ventilation duct rear intake ports 38 which communicate with air flow spaces 48 of the ventilation duct system 46 and the duct vents 52. However, the hood spoiler 70 lower profile than the fin spoiler 62 and more aerodynamic.

[0063] FIG. 11 is a side view of the helmet 26 having the hood-type spoiler 70 formed with the rear intake ports 38. As illustrated here, the hood-type spoiler 70 may be provided in combination with one or more of the ventilation duct forward intake ports 28 on the helmet front surface 30.

[0064] FIG. 12 illustrates another embodiment of the air conditioning unit 10 in combination with the helmet 26 having the hood-type spoiler 70. Here, the fan 12 is again mounted on the helmet's rear surface 34. The fan housing 16 is again conformed to the contours of the helmet's rear surface 34. The fan housing 16 includes one or more crown extensions 72 that fit over the hood-type spoiler 70 and the rear intake ports 38. Again, ducting within the fan housing 16 carries the air flow 50 pressurized by the fan 12 to the rear intake ports 38 for introduction into the ventilation duct system 46.

[0065] By example, the fan 12 is illustrated here as being a conventional centrifugal squirrel cage blower that may be curved in a manner that conforms to the helmet surface 34. The centrifugal squirrel cage blower-type fan 12 has a low-profile that conforms to the helmet surface 34 while simultaneously maximizing the pressure of the air flow 50 into the ventilation duct system 46. The fan housing 16 again includes the clip 66 that secures the fan 12 to the helmet 26. Again, the clip 66 extends to and around the neck lip 68 of the helmet 26 adjacent to the rear surface 34.

[0066] FIG. 13 illustrates the embodiment of the air conditioning unit 10 in combination with the helmet 26 having the hood-type spoiler 70. Here, the helmet air conditioning unit 10 further includes the on-board battery pack power supply 20 carried on the fan housing 16 for providing constant operating power to the fan 12, which is controlled by the multi-position switch fan controller 24. The air conditioning unit 10 also optionally includes either the on-board solar collector 14a or the conformable remote solar collector 14b for recharging the battery 20.

[0067] FIG. 14 illustrates the air conditioning unit 10 in combination with the helmet 26 having the hood-type spoiler 70. The fan housing 16 is illustrated having the extensions 72 that fit over the hood-type spoiler 70 and the rear intake ports 38. The fan housing 16 includes, for example, one or more forward fan air intake ports 71 to receive ambient air flow to the fan 12 for generating the pressurized air flow 50. The fan housing clip 66 secures the fan 12 to the helmet 26 by snapping around the neck lip 68 of the helmet 26 adjacent to the rear surface 34. The gasket 58 is optionally seated between the fan housing 16 and the helmet surface 34 for sealing the fan 12 with the rear intake port 38 maximizing the pressurized air flow 50 that is applied to the helmet ventilation duct system 46 through the rear intake port 38. As disclosed herein, the gasket 58 may be an adhesive gasket that is substituted for the anchor 56 and operates for both sealing any air gap between the fan 12 and the rear intake port 38 adhering the fan housing 16 to the helmet surface 34.

[0068] The fan 12 is controlled by the multi-position switch fan controller 24. The on-board battery pack power supply 20 is carried on the fan housing 16 for providing constant operating power to the fan 12. Either the on-board solar collector 14a or the conformable remote solar collector 14b is included for recharging the battery 20. When present, the on-board solar collector 14a is configured to fit available space on the surface 74 of the fan housing 16.

[0069] The battery 20 also can be recharged via an optional power cord 76 (shown in phantom) connected to the optional auxiliary power port 22, when present. An auxiliary power adaptor 78 (shown in phantom) couples the power cord 76 into an external power supply, such as a motorcycle battery charging system via a charging outlet, i.e., cigarette lighter.

[0070] FIG. 15 is a side view of the air conditioning unit 10 in combination with the helmet 26 having the hood-type spoiler 70. The extensions 72 of the fan housing 16 are fitted over the hood-type spoiler 70 with the blades 60 of the centrifugal squirrel cage blower-type fan 12 positioned in close proximity to the rear intake ports 38. The blower-type fan blades 60 conform to the helmet surface 34, which permits the fan housing 16 to have a sleek, low-profile contour while simultaneously maximizing the pressure of the air flow 50 into the ventilation duct system 46. The air flow (arrows) into the fan 12 is shown at the fan air intake 44. Pressurized air flow 50 generated by the fan 12 is applied substantially directly to rear intake ports 38.

[0071] The fan 12 is optionally adhered to the helmet crown surface 36 and rear surface 34 by the adhesive-type gasket 58 which also operates for sealing any air gap between the fan 12 and the helmet 26.

[0072] Alternatively, the fan 12 is removably coupled to the helmet 26 by the anchor 56 without modifying the helmet 26 and the non-adhesive gasket 58 seals any air gaps. The clip 66 extends from the fan housing 16 and is snapped around the neck lip 68 of the helmet 26 for securing the fan 12 to the rear surface 34 of the helmet 26. Additionally, the crown extensions 72 of the fan housing 16 are anchored to the helmet crown surface 36, as detailed herein.

[0073] FIG. 16 illustrates the helmet 26 having anchors 80 attached to the crown surface 36. The anchors 80 are of any type of receiver capable of releasable connection with mating anchors provided on the fan housing 16. For example, the anchors 80 may be male or female portions of a snap, with the mating snap portion of the anchor being provided on the fan housing 16.

[0074] FIG. 17 is a cross-section view of one alternative anchor mechanism 82 that includes both the anchors 80 and mating anchor receivers 84 provided on the fan housing 16. For example, bonds 86 securely adhere a pair of the anchors 80 to the helmet crown surface 36. The crown extensions 72 of the fan housing 16 are formed with mating anchor receivers 84 that fit into and mate with the anchors 80 on the helmet 26. In one embodiment, the anchors 80 have a button head 86 shaped like a mushroom on a stem 88 projected slightly above the helmet surface 36, while the mating anchor receivers 84 each have a lip 90 positioned to slip under the button head 86. When the fan housing clip 66 is snapped around the neck lip 68 of the helmet 26, the lips 90 of the receivers 84 are drawn backwardly against the under the button heads 86 and seated against the stems 88 of the anchors 80. The fan housing clip 66 thus prevents the anchor receivers 84 from disengaging from the anchors 80 and effectively secures the alternative anchor mechanism 82. The gasket 58 is compressed between the fan housing 16 and the helmet surfaces 34, 36 for sealing potential air gaps.

[0075] FIG. 18 is a section view through the fan 12 and fan housing 16 of the helmet air conditioning unit 10. As illustrated, the inner surface 92 of the fan 12 and housing 16 that is contoured to mate with the helmet 26.

[0076] For example, the fan 12 is contoured to match the helmet rear surface 34, with remainder of the fan housing 16 contoured to match the helmet surfaces 34, 36. The fan 12 is illustrated as a centrifugal squirrel cage blower having the blower-type fan blades 60 conformed to the curvature of the helmet surface 34, whereby the fan housing 16 has a sleek, low-profile contour when fitted on the helmet 26.

[0077] The fan housing 16 is configured having one or more exhaust ports 94 positioned in direct fluid communication with the squirrel cage blower fan 12. The fan housing 16 is further configured to position the one or more exhaust ports 94 of the squirrel cage blower fan 12 substantially directly opposite from rear intake ports 38 of the helmet's ventilation duct system 46 when coupled to the helmet 26. Furthermore, the fan housing 16 is configured with internal ducting 96 that is structured to position the one or more exhaust ports 94 in direct fluid communication with the squirrel cage blower fan 12 and to further direct the pressurized air flow 50 generated by the squirrel cage blower fan 12 substantially directly into the rear intake ports 38 of the helmet's ventilation duct system 46, as illustrated by arrows 98.

[0078] Optionally, the helmet air conditioning unit 10 includes the refrigeration element 55 mounted in the fan housing 16 situated in a position for cooling the air flow 50 before being delivered into the interior space 54 of the helmet 26. For example, the refrigeration element 55 is mounted within the internal ducting 96 of the fan housing 16 in a position adjacent to the one or more exhaust ports 94 of the ventilating fan 12, for example, by means of the bonding agent 59, with the power cable 57 connecting the refrigeration element 55 to either one of the remote solar collectors 14a, 14b or the battery pack power supply 20, if present, for power. The flexible clip 66 is further detailed to show a finger 100 adjacent to its extreme end distal from the fan housing 16 with the finger 100 being configured to snap around the neck lip 68 of the helmet 26.

[0079] FIG. 19 illustrates the inner surface 92 of the fan 12 and housing 16 that is contoured to mate with the helmet rear surface 34. Here, the fan 12 is the squirrel cage blower having the blower-type fan blades 60 that are conformed to the cur-

vature of the helmet surface 34. The internal ducting 96 of the fan housing 16 is structured to direct the pressurized air flow 50 generated by the squirrel cage blower fan 12 substantially directly into the rear intake ports 38 of the helmet's ventilation duct system 46 (arrows 98).

[0080] FIG. 20 illustrates an embodiment of the air conditioning unit 10 structured for operation with the helmet 26 being of a type, such as a hardhat that is commercially available, or a conventional military combat helmet. The helmet 26 includes the rigid outer protective shell 27 of a type having neither forward intake ports 28 nor rear intake ports 38. Positive air flow is provided to the interior space 54 of the helmet 26 via output air ducting 102 of the fan housing 16 that directs the air flow around the neck lip 68 of the helmet 26 adjacent to the rear surface 34. The fan housing 16 has The fan housing 16 includes, for example, the one or more forward fan air intake ports 71 to receive ambient air flow to the fan 12 for generating the pressurized air flow 50. Battery 20 may be situated with the neck lip air ducting 102, as shown, or elsewhere according to designer's preference or as a function of design constraints. The neck lip air ducting 102 is positioned adjacent to its extreme end distal from the fan housing 16 and configured to wrap around the neck lip 68 of the helmet 26. Optionally, the neck lip air ducting 102 is flexible and configured to snap around the neck lip 68 for clipping to the helmet 26.

[0081] FIG. 21 illustrates the air conditioning unit 10 having neck lip air ducting 102 in combination with the helmet 26 having neither forward intake ports 28 nor rear intake ports 38. The helmet 26 is shown with the on-board battery pack power supply 20 carried on the fan housing 16. Either the on-board solar collector 14a and/or the conformable remote solar collector 14b (shown) is included for recharging the battery 20. Of course, the on-board solar collector 14a may also be the conformable type for conforming to the fan housing 16.

[0082] As shown for illustration only, the helmet 26 includes a relatively thick liner 113 of a suitable cushioning material. Else, the liner 113 is formed of a suitable anti-ballistic protective material, such as Kevlar®. A relatively thin inner cover 114 covers the interior of the liner 113. The marginal edge of the helmet 26 is mounted on the user's head 101 (phantom lines) by an arcuate mounting band 115 surrounding the helmet interior space 54. As shown here, the mounting band 115 is formed of a thick cushioning pad surrounding the helmet interior 154 and suspended therein in a position spaced circumferentially inwardly away from the liner 113. The helmet ventilation duct system 46 is formed substantially between the helmet liner 113 and the mounting band 115, which form therebetween the air flow spaces 48 that carry pressurized air flow 50 throughout the helmet 26. The pressurized air flows (arrows) through the air flow spaces 48 into the interior space 54 of the helmet 26 to cool the wearer's head 101.

[0083] The neck lip air ducting 102 is coupled in fluid communication with the exhaust port 94 of the fan housing 16 and the ventilating fan 12 such that the positive air flow is directed via the air ducting 102 around the neck lip 68 and through an exhaust port 117 thereof into the interior space 54 of the helmet 26 adjacent to its rear surface 34.

[0084] According to one embodiment, the terminal exhaust port 117 is positioned adjacent to the neck lip 68 of the helmet 26 adjacent to the rear surface 34. According to this embodiment, upon exiting the terminal exhaust port 117, the pres-

surized air flow 50 is directed by the neck lip air ducting 102 upwardly along the helmet liner 113 adjacent to the helmet's rear surface 34 toward the air flow spaces 48 between the helmet liner 113 and the mounting band 115, thence into the helmet interior space 54 over the wearer's head 101. The pressurized air flow 50 freely swirls (arrows 50a) in the space 54a above wearer's head 101 to more effectively circulate within the helmet interior space 54 and cool the wearer's head 101. As further illustrated here, a portion 50b of the pressurized air flow 50 is allowed to exit the terminal exhaust port 117 adjacent to the helmet's neck lip 68 before reaching the air flow spaces 48 to blow against the back of the wearer's neck 101a.

[0085] Alternatively, the neck lip air ducting 102 is extended (dashed) along the helmet liner 113 adjacent to the helmet's rear surface 34 into communication with the air flow spaces 48 between the helmet liner 113 and the mounting band 115. Accordingly, the terminal exhaust port 117 of the neck lip air ducting 102 is inserted directly into the air flow spaces 48 between the helmet liner 113 and the mounting band 115, whereby the pressurized air flow 50 is forced into the air flow spaces 48, thence into the helmet interior space 54 over the wearer's head 101. The extended neck lip air ducting 102 optionally includes one or a plurality of neck duct vents 152 wherethrough pressurized air flows into the interior space 54 of the helmet 26 to cool the wearer's neck 101a.

[0086] The mounting band 115 may include a plurality of the duct vents 52 communicating between the air flow spaces 48 and the helmet interior space 54. In either the shortened configuration having the neck lip air ducting 102 terminated in an exhaust port 117 adjacent to the neck lip 68 of the helmet 26, or the extended configuration having the neck lip air ducting 102 extended to position the terminal exhaust port 117 in communication with the air flow spaces 48, the pressurized air flows through the duct vents 52 into the interior space 54 of the helmet 26 to cool the wearer's head 101.

[0087] Optionally, the helmet air conditioning unit 10 having the neck lip air ducting 102 also includes the cooling pad refrigeration element 55 situated in a position for cooling the air flow 50 before being delivered into the interior space 54 of the helmet 26. Again, as disclosed herein by example and without limitation, the refrigeration element 55 is a gel-type cooling pad of a type that is commercially available for use with notebook computers and other computer for use with a mini-refrigerator box, wherein the cooling pad is energized through a power cable connected for power to the computer through a USB (universal serial bus) connector. As further disclosed herein, a power cable 57 connects the refrigeration element 55 for power to either one of the remote solar collectors 14a, 14b or the battery pack power supply 20, if present, such as being connected through a USB port on the air conditioning unit 10.

[0088] As further disclosed herein, the refrigeration element 55 is optionally conformed to the interior surface of the helmet 26 within the air flow spaces 48 of the helmet ventilation duct system 46, as shown. For example, the refrigeration element 55 is optionally mounted to the interior surface of the helmet 26 by the bonding agent 59 such as a coating of a conventional pressure sensitive adhesive (PSA) or an adhesive gasket such that the refrigeration element 55 sticks to the helmet interior surface by temporary application of pressure.

[0089] As further disclosed herein, the refrigeration element 55 is optionally a flexible gel-type cooling element, whereby the refrigeration element 55 is optionally conform-

able to the interior surface of the helmet 26 within the air flow spaces 48 of the helmet ventilation duct system 46, as shown. For example, the refrigeration element 55 is optionally mounted to the interior surface of the helmet 26 by the bonding agent 59.

[0090] As further disclosed herein, the pressurized air flow 50 is directed over the refrigeration element 55 for super-cooling the air being directed into the helmet's interior space 54.

[0091] Accordingly, the refrigerantly cooled pressurized air flow 50 cools the helmet's interior space 54 more effectively than the uncooled ambient pressurized air flow 50 provided by the ventilating fan 12 alone.

[0092] As further disclosed herein, the air conditioning unit 10 optionally includes the thermal sensor 61, such as but not limited to a thermostat or thermocouple, for controlling the operation of either or both of the fan 12 and/or the refrigeration element 55, either individually or concurrently, for controlling a temperature at a comfortable level within the interior space 54 of the helmet 26. Accordingly, as further disclosed herein, the thermal sensor 61 is situated in an appropriate position within the interior space 54 of the helmet 26 for measuring temperature therein.

[0093] FIG. 22 illustrates the air conditioning unit 10 having neck lip air ducting 102 in combination with the helmet 26 having neither forward intake ports 28 nor rear intake ports 38. The helmet 26 is shown with the on-board battery pack power supply 20 carried on the fan housing 16. Either the on-board solar collector 14a (shown) and/or the conformable remote solar collector 14b is included for recharging the battery 20. Of course, when present, the remote solar collector 14b may also be the conformable type for conforming to the fan housing 16.

[0094] As shown in FIG. 21 for illustration only, the helmet 26 includes a relatively thick liner 113 of a suitable cushioning material. Else, the liner 113 is formed of a suitable antiballistic protective material, such as Kevlar®. A relatively thin inner cover 114 covers the interior of the liner 113. The marginal edge of the helmet 26 is mounted on the user's head 101 (phantom lines) by an arcuate mounting band 115 surrounding the helmet interior space 54. As shown here, the mounting band 115 is formed of a thick cushioning pad surrounding the helmet interior 154 and suspended therein in a position spaced circumferentially inwardly away from the liner 113. The helmet ventilation duct system 46 is formed substantially between the helmet liner 113 and the mounting band 115, which form therebetween the air flow spaces 48 that carry pressurized air flow 50 throughout the helmet 26. The pressurized air flows (arrows) through the air flow spaces 48 into the interior space 54 of the helmet 26 to cool the wearer's head 101.

[0095] As shown in FIG. 21, the neck lip air ducting 102 is coupled in fluid communication with the exhaust port 94 of the fan housing 16 and the ventilating fan 12 such that the positive air flow is directed via the air ducting 102 around the neck lip 68 and through an exhaust port 117 thereof into the interior space 54 of the helmet 26 adjacent to its rear surface 34.

[0096] Here, the fan housing 16 includes, for example, the one or more side fan air intake ports 104 to receive ambient air flow to the fan 12 for generating the pressurized air flow 50. The neck lip air ducting 102 is coupled in fluid communication with one or two (shown) of the side fan air intake ports 104 situated on opposite sides of the ventilating fan 12 and

adjacent to the terminal exhaust port 117 (shown in FIG. 21) that is positioned adjacent to the neck lip 68 of the helmet 26 adjacent to the rear surface 34. This close proximity of the side fan air intake ports 104 to the terminal exhaust port 117 of neck lip air ducting 102 operates more effectively delivers intake air near the termination port 117 so that the air conditioning unit 10 operates more efficiently.

[0097] As shown in FIG. 21, upon exiting the terminal exhaust port 117, the pressurized air flow 50 is directed by the neck lip air ducting 102 upwardly along the helmet liner 113 adjacent to the helmet's rear surface 34 toward the air flow spaces 48 between the helmet liner 113 and the mounting band 115, thence into the helmet interior space 54 over the wearer's head 101. The pressurized air flow 50 freely swirls (arrows 50a) in the space 54a above wearer's head 101 to more effectively circulate within the helmet interior space 54 and cool the wearer's head 101. As further illustrated here, a portion 50b of the pressurized air flow 50 is allowed to exit the terminal exhaust port 117 adjacent to the helmet's neck lip 68 before reaching the air flow spaces 48 to blow against the back of the wearer's neck 101a.

[0098] While the preferred and additional alternative embodiments of the invention have been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention. Therefore, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention. Accordingly, the inventor makes the following claims.

What is claimed is:

1: A helmet air conditioning unit configured for operation with a helmet having air flow spaces within an interior space thereof, the helmet air conditioning unit comprising:

an electrical ventilating fan comprising a housing portion comprising one or more exhaust ports positionable in fluid communication with the air flow spaces within the interior space of the helmet;

a battery power supply connected to energize the fan;

a solar power supply coupled to recharge the power battery supply; and

a fan controller coupled for actuating the fan for generating a pressurized air flow at the one or more exhaust ports of the housing portion of the fan, whereby the pressurized air flow is directed through the one or more exhaust ports of the housing portion of the fan when the fan is actuated.

2: The helmet air conditioning unit of claim 1, wherein the one or more exhaust ports of the housing portion of the fan are further positioned in fluid communication with the air flow spaces within the interior space of the helmet; and

the pressurized air flow is further directed through the one or more exhaust ports of the housing portion of the fan into the air flow spaces within the interior space of the helmet when the fan is actuated.

3: The helmet air conditioning unit of claim 2, wherein the housing portion further comprises one or more side fan air intake ports in fluid communication with the fan.

4: The helmet air conditioning unit of claim 1, further comprising a cooling element that is positionable within the pressurized air flow generated by the fan.

5: The helmet air conditioning unit of claim 1, further comprising means for releasably coupling the housing portion to the helmet with the one or more exhaust ports being coupled in fluid communication with the air flow spaces within the interior space of the helmet.

6: The helmet air conditioning unit of claim 1, further comprising means for coupling the one or more exhaust ports of the housing portion of the fan in fluid communication with a ventilation duct system resident in the helmet.

7: The helmet air conditioning unit of claim 6, wherein the means for coupling the one or more exhaust ports of the housing portion of the fan in fluid communication with a ventilation duct system resident in the helmet further comprises a means for coupling the one or more exhaust ports of the housing portion of the fan in fluid communication with one or more intake ports resident on the helmet and in fluid communication with the ventilation duct system resident in the helmet.

8: The helmet air conditioning unit of claim 6, wherein the means for coupling the one or more exhaust ports of the housing portion of the fan in fluid communication with a ventilation duct system resident in the helmet further comprises a means for ducting the pressurized air flow around a neck lip of the helmet and into the interior space of the helmet.

9: The helmet air conditioning unit of claim 1, further comprising a thermal control unit coupled for controlling the fan as a function of a sensed temperature.

10: A helmet air conditioning unit configured for operation with a helmet having a ventilation duct system resident in the helmet and communicating with an interior space of the helmet, the helmet air conditioning unit comprising:

an electrical ventilating fan comprising a housing portion structured for coupling to a helmet and further comprising: one or more fan air intake ports in fluid communication with the fan, and one or more exhaust ports positionable in fluid communication with one or more intake ports resident on the helmet and the ventilation duct system resident in the helmet;

a rechargeable battery power supply connected to energize the fan;

a solar power supply coupled to recharge the power battery supply; and

a fan controller coupled for actuating the fan for generating a pressurized air flow at the one or more exhaust ports of the housing portion of the fan, whereby the pressurized air flow is directed through the one or more exhaust ports of the housing portion of the fan when the fan is actuated.

11: The helmet air conditioning unit of claim 10, further comprising a cooling pad refrigeration element positioned for cooling the pressurized air flow.

12: The helmet air conditioning unit of claim 11, further comprising a thermal control unit coupled for controlling the cooling pad refrigeration element as a function of a sensed temperature.

13: The helmet air conditioning unit of claim 10, further comprising an anchor mechanism structured for releasably anchoring the housing portion to the helmet with the one or more exhaust ports being coupled in fluid communication with the ventilation duct system resident in the helmet.

14: The helmet air conditioning unit of claim 13, further comprising a flexible clip structured for securing the fan housing to a neck lip of the helmet adjacent to a rear surface thereof.

15: The helmet air conditioning unit of claim 14, further comprising a thermal sensor positioned for controlling the actuating of the fan as a function of a temperature sensed within the helmet.

16: A helmet air conditioning unit configured for operation with a helmet having air flow spaces within an interior space thereof, the helmet air conditioning unit comprising:

an electrical ventilating fan comprising a housing portion structured for removably coupling to a helmet and further comprising: one or more fan air intake ports in fluid communication with the fan, and neck lip output air ducting structured for wrapping around a neck lip of the helmet, and the neck lip output air ducting further comprising one or more exhaust ports positionable in fluid communication with the air flow spaces within an interior space of the helmet;

a rechargeable battery power supply connected to energize the fan;

a solar power supply coupled to recharge the power battery supply; and

a fan controller coupled for actuating the fan for generating a pressurized air flow at the one or more exhaust ports of the neck lip output air ducting of the housing portion of the fan, whereby the pressurized air flow is directed through the neck lip output air ducting of the housing

portion of the fan and the one or more exhaust ports thereof when the fan is actuated.

17: The helmet air conditioning unit of claim **16**, further comprising a cooling pad refrigeration element positioned for cooling a portion of the pressurized air flow.

18: The helmet air conditioning unit of claim **17**, further comprising a thermal control unit coupled for controlling the cooling pad refrigeration element as a function of a sensed temperature.

19: The helmet air conditioning unit of claim **16**, further comprising one or more anchors structured for releasably anchoring the housing portion to the helmet with the neck lip output air ducting being wrapped around a neck lip of the helmet, and the one or more exhaust ports being coupled in fluid communication with the air flow spaces within an interior space of the helmet.

20: The helmet air conditioning unit of claim **19**, further comprising a thermal sensor positioned for controlling the actuating of the fan as a function of a sensed temperature.

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