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UNITED STATES PROVISIONAL APPLICATION

of

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for

PROTECTIVE HELMET

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Burton Exhibit 1018 Burton v. Smith Sport Optics

BACKGROUND

1. Field of the Invention

The present invention relates to protective helmets designed to protect the user from potential impacts to the head during bicycling and other sporting adventures. Specifically, the present invention relates to a protective helmet providing improved ambient airflow throughout the interior of the helmet using a unique ported and adjustable fluid airflow system.

2. Background

Athletes and outdoor enthusiasts alike have long recognized the importance of wearing protective head gear or helmets when engaged in sporting events such as bicycling, rollerblading, or various other sporting adventures where there exists a risk of fatal or even minor injury through impacts to the head.

Early protective helmets were bulky and unattractive while providing minimal protection to the user due to the inability of manufacturers to construct a protective helmet having sufficient impact attenuation properties. While better than not wearing any protective helmet at all, these early helmets were subject to hairline fractures and significantly decreased impact attenuation properties upon a first impact, often resulting in the helmet having to be discarded.

In addition, these early protective helmets did not provide any means for ventilation, which would cause the user to perspire profusely and to lose critical energy.

Moreover, designers and manufacturers of protective helmets wishing to implement some type of ventilation system into protective helmets were faced with the problem of maintaining the structural integrity of the helmet as it was often necessary to place apertures in the shell of the helmet itself to provide for ambient airflow and ventilation into the interior of the helmet.

As athletes and outdoor enthusiasts become more sophisticated, there is a corresponding increased demand for more sophisticated equipment. Users of protective helmets are continually seeking lighter, more aerodynamically configured helmets that provide maximum comfort and ventilation without sacrificing the ultimate in protective capabilities. In response, the design and manufacturing technology of protective helmets has undergone, and continues to undergo, significant changes. Advanced technology and manufacturing capabilities have led to advanced protective helmets having superior protective qualities and ventilation means or systems. Today's protective helmets are lighter, sleeker in appearance, and equipped with more sophisticated ventilation systems to provide the user greater ambient airflow into the interior of the helmet, all of this without sacrificing the structural integrity of the protective helmet.

For example, United States Patent No. 6,105,176 discloses a bicycle helmet having a configured and situated front intake vent or a configured and situated rear exit port or exit ports, or both, such that the front vent and/or rear port or ports can provide for improved movement of air over the wearer's head while retaining sufficient structural integrity to provide adequate head protection. In one general aspect the invention features a bicycle

helmet that includes a helmet body having a plurality of vents, including a front vent that is wider than high. In another general aspect, the invention features a bicycle helmet that includes a helmet body having a plurality of vents, including at least one rear exit port opening outward onto a surface that is below the most rearward margin of the helmet body.

5 However, no means is provided for wherein the user may adjust the ventilation system to suit environmental needs or user preferences.

In another example, United States Patent No. 6,061,834 discloses an air ventilation helmet having air conducting means formed inside the liner thereof. The air conducting means comprises several air conducting channels directed to the ventilation device. Hence,
10 air can flow through the air ventilation device and into the helmet through the air ducts so as to provide good ventilation. The invention also discloses a device that can be rotated to the back to prevent cold air from flowing into the helmet in winter and to avoid water leakage when it rains. The air ventilation safety helmet comprises a molded helmet body defining a recessed interior for receiving therein the head of the user and an air funnel which
15 is attached to the molded helmet by means of a rubber band, a spring, a screw, or the like. Further, directed to the air funnel, several air ducts are formed inside the liner of the molded helmet to allow air to flow there through. Although providing relatively good ventilation, this invention requires manually attaching an air funnel to the protective helmet to achieve the ventilation. This is cumbersome and time consuming and does not lend itself to
20 adjustment of the ventilation, or specifically the air flow, during the sporting event or activity.

Despite these significant improvements, protective helmets continue to suffer from inadequate and often poor ventilation systems. In addition, prior art helmets consist of multiple pieces that are fitted together to form the helmet, thus contributing to bulk, weight, and discomfort, among other things.

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SUMMARY AND OBJECTS OF THE INVENTION

The present invention provides a lightweight protective helmet having an improved ventilation system and method for manufacturing the same. The protective helmet comprises an outer shell and an inner liner that is directly molded or bonded to the outer shell. Between the outer shell and the inner liner, and encased within the molded inner liner, exists the ventilation system as described in further detail below.

Therefore, an object of the preferred embodiments of the present invention is to provide a protective helmet that consists of a single integrated structure having an improved ventilation system.

Another object of the preferred embodiments of the present invention is to provide a protective helmet with an inner liner directly molded to and bonded to the outer shell and a ventilation system located therein.

Yet another object of the preferred embodiments of the present invention is to provide a ventilation system that is adjustable according to user preference.

To achieve the foregoing objects, and in accordance with the invention as embodied and broadly described herein, the present invention features a protective helmet comprising

an outer shell, an inner liner comprised of impact absorbing material that is directly molded or bonded to the outer shell, and a ventilation system located therein. The ventilation system is comprised of a vent box containing a vent shield that is attached to a fluid airflow actuator located on the outside of the outer shell via an elongated member. The vent box is formed to provide a volume of space wherein the vent shield may reside, thus allowing the vent shield to slide bi-directionally within the vent box. Also located on the vent box is a slotted portion that provides a guide for the elongated member to slide within. The slotted portion of the vent box directly corresponds to and is positioned directly with a slotted portion located on the outer shell. In essence, the fluid airflow actuator, as attached to the outer shell, is capable of sliding bi-directionally within the slotted portion existing on the outer shell. As the fluid airflow actuator is displaced, the elongated member attaching the fluid airflow actuator to the vent shield causes the vent shield to slide or displace accordingly along the slotted portion of the vent box. As one or a plurality of apertures or ventilation ports may exist within the outer shell, displacement of the vent shield functions to open, close, or partially close off the ventilation ports to the ambient air. In a preferred embodiment, the protective helmet contains a plurality of ventilation ports, wherein two are located in the front of the protective helmet and are the only ventilation ports modifiable via the ventilation system as described herein.

To construct the protective helmet, an outer shell is manufactured. Prior to molding the inner liner to the outer shell, the vent box is constructed wherein an upper member is attached to a lower member, thus creating a volume of space sufficient to enclose a vent

shield. The upper member comprises the above-mentioned slotted portion. The vent shield is placed between the upper and lower members prior to their attachment to one another. As mentioned, an elongated member is attached to the vent shield and is inserted into the slotted portion of the upper member. The upper member and lower member are then attached
5 together to create the vent box. The vent shield is slidably coupled to the vent box as described. After correctly positioning the vent box with respect to the outer shell, and the opposing end of the elongated member inserted through the outer shell, the inner liner is then molded to the outer shell, thus enclosing the vent box therein. The elongated member is subsequently attached to the fluid airflow actuator wherein the vent shield may be displaced
10 accordingly.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects and features of the present invention will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict
15 only typical embodiments of the invention and are, therefore, not to be considered limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 illustrates the protective helmet with accompanying plurality of ventilation ports and fluid airflow actuator;

20 Figure 2 illustrates a front view of the protective helmet having a series of symmetrically spaced ventilation ports and a forward facing fluid airflow actuator;

Figure 3 illustrates a rear view of the protective helmet;

Figure 4 illustrates the vent box having the vent shield contained therein, and the vent shields relation to the vent box and ventilation ports; and

Figure 5 illustrates a cut away view of the protective helmet according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It will be readily understood that the components of the present invention, as generally described and illustrated in the figures herein, could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of the embodiments of the system and method of the present invention, and represented in Figures 1 through 5, is not intended to limit the scope of the invention, as claimed, but is merely representative of the presently preferred embodiments of the invention.

The presently preferred embodiments of the invention will be best understood by reference to the drawings, wherein like parts are designated by like numerals throughout.

The present invention features a protective helmet and ventilation control system.

Figure 1 shows the protective helmet 10 having a plurality of ventilation ports 6. Ventilation ports 6 are designed to facilitate ambient air flow to the interior of the protective helmet 10 and are shown as apertures that extend from the outer shell 4 into the interior of protective helmet 10. Protective helmet 10 is comprised of an outer shell 4 and an inner liner 18. Also shown is fluid airflow actuator 12 that is slidably coupled to protective helmet

10 and specifically outer shell 4 wherein the fluid airflow actuator 12 is capable of sliding in a bidirectional manner along slotted portion 14. Slotted portion 14 therefore serves as a guide to fluid airflow actuator 12. As will be discussed in greater detail below, fluid airflow actuator 12 displaces such that ventilation or air flow through ventilation ports 6 may be modified and controlled by the user. Air flow may be total, partial, or blocked. In its current position, as shown in Figure 1, fluid airflow actuator 12 allows ambient air to flow through ventilation port 6. Upon displacing fluid airflow actuator 12 in a downward direction, the ambient air flow is blocked from entering ventilation port 6 using a vent shield, which is not shown in Figure 1, but is described below. Attachment points or rivets 16 are also shown in Figure 1 and are used to attach straps or other accessory items to protective helmet 10.

Figure 2 shows a front view of protective helmet 10 and depicts the preferred embodiment of the present invention wherein ventilation port 6 facilitates ambient air flow to the interior of protective helmet 10 through only the front facing ventilation ports 6. Although the preferred embodiment includes a ventilation system that allows the user to only modify the air flow through the front facing ventilation port 6, this is not meant to be limiting in any way as the ventilation system of the present invention may be designed to modify or adjust air flow through any or all of ventilation port 6 located on protective helmet 10.

Figure 3 shows a rear view of protective helmet 10 having an optional goggle strap holder 30 with an upper mounting point 32 and a lower mounting point 34. Also shown are ventilation ports 6 located as symmetrical locations along outer shell 4.

Figures 4 and 5 serve to illustrate the relationship between each of the components that make up protective helmet 10. Figure 4 shows vent box 22 having a slotted portion 40 therein that is to be positioned and aligned with slotted portion 14 located in outer shell 4 such that elongated member 42, which is attached to vent shield 20, may slide in a
5 bidirectional manner within each respective slotted portion. Elongated member 42 has opposing ends. A first end is attached to vent shield 20 and a second end is attached to fluid airflow actuator 12. Upon displacing fluid airflow actuator 12, vent shield 20 is thereby caused to also displace. This displacement allows the user of protective helmet 10 to lower or raise vent shield 20 over ventilation port 6 as desired. Ventilation port 6 may be totally
10 covered by vent shield 20 or partially or totally uncovered thereby allowing ambient air to flow through ventilation port 6 into the interior of protective helmet 10.

Figure 5 shows vent shield 20 as it is encased within vent box 22 and the volume of space 28 that results from attaching upper member 24 to lower member 26 to form vent box 22. As mentioned above, vent shield 20 is able to slide within vent box 22.

To form protective helmet 10 according to the present invention, outer shell 4 is obtained and inner liner 18 is molded directly to outer shell 4. Inner liner 18 comprises impact absorbing material serving as the protective element for protective helmet 10. Prior to molding inner liner 18 directly to outer shell 4, vent box 22 is created to contain vent shield 20 therein. To form vent box 22, upper member 24 is formed having a specified
15 radius of curvature and lower member 26 is formed having a significantly less radius of curvature such that when upper member 24 and lower member 26 are attached to one
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another, a volume of space 28 is created therein. However, prior to attachment of upper member 24 to lower member 26, vent box 22, also having a radius of curvature between that of upper member 24 and lower member 26, is situated therein such that vent shield 20 may slide in a bidirectional manner within vent box 22. Once vent box 22 is formed, it is positioned within outer shell 4 such that slotted portion 40 in vent box 22 aligns with slotted portion 14 in outer shell 4, with elongated member 42 protruding therefrom. Upon positioning vent box 22 within outer shell 4, inner liner 18 is then molded or bonded directly to outer shell 4 such that vent box 22 is entirely encased within inner liner 18. As mentioned above, inner liner 18 is comprised of an impact resistant material that is injection molded directly to outer shell 4. One ordinarily skilled in the art will recognize and understand that inner liner 18 can consist of any suitable material that is capable of providing sufficient impact attenuation properties to protective helmet 10.

The protective helmet of the present invention may be composed of expanded polystyrene foam (EPS) as a helmet liner to meet the impact attenuation safety requirements. The popularity of EPS as a protective helmet or helmet liner is due to a combination of multiple factors, including its impact attenuation capability, low cost, ease of manufacturing and light weight. However, EPS has a number of drawbacks as a protective helmet liner as well. The mechanism of impact attenuation exhibited by EPS, while highly effective, causes permanent and irreversible damage to the EPS material. The EPS material does not recover significantly after a serious impact, so that repeated impacts at the same location on the helmet do not receive the same degree of impact attenuation.

Alternatively, to provide improved protection and greater or increased impact attenuation, the protective helmet of the present invention may comprise a laminated, dual density, closed-cell, foamed polymeric material, preferably a nitrogen blown, cross-linked, high-density polyethylene foam. An inner layer, or liner, of the helmet may be made of a closed-cell, foamed polymeric material with a relatively low density for comfort, for absorption of minor impacts and for distributing the stress of a major impact over a larger surface of the wearer's skull to lessen the likelihood of injury. The outer layer of the helmet may be made of a closed-cell, foamed polymeric material with a higher density for absorption of major impacts to the helmet and for providing a structurally stable shell to the helmet. Intermediate layers may be included between the inner and outer layers. Additional pads may be added to the inside surface of the helmet for customizing the fit and for spacing the helmet away from the wearer's head to increase ventilation.

In addition, the protective helmet may comprise a rigid plastic insert that serves as the inner liner and impact absorption material.

An alternative embodiment to the present invention include a vent shield plate that allows for airflow modification of every ventilation port. This may be accomplished using a single vent shield plate, or a plurality of vent shield plates and associated fluid airflow actuators.

Another embodiment of the present invention is to provide a ventilation system as taught herein into a hard shell helmet of full size or scale, such as a motorcycle helmet.

Still another embodiment of the present invention is to provide a protective helmet wherein the shell forms one or more plates of the ventilation system or vent box.

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered
5 in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims, rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

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ABSTRACT

The present invention provides a lightweight protective helmet having an improved ventilation system and method for manufacturing the same. The protective helmet comprises an outer shell and an inner liner that is directly molded or bonded to the outer shell. Between the outer shell and the inner liner exists the ventilation system.

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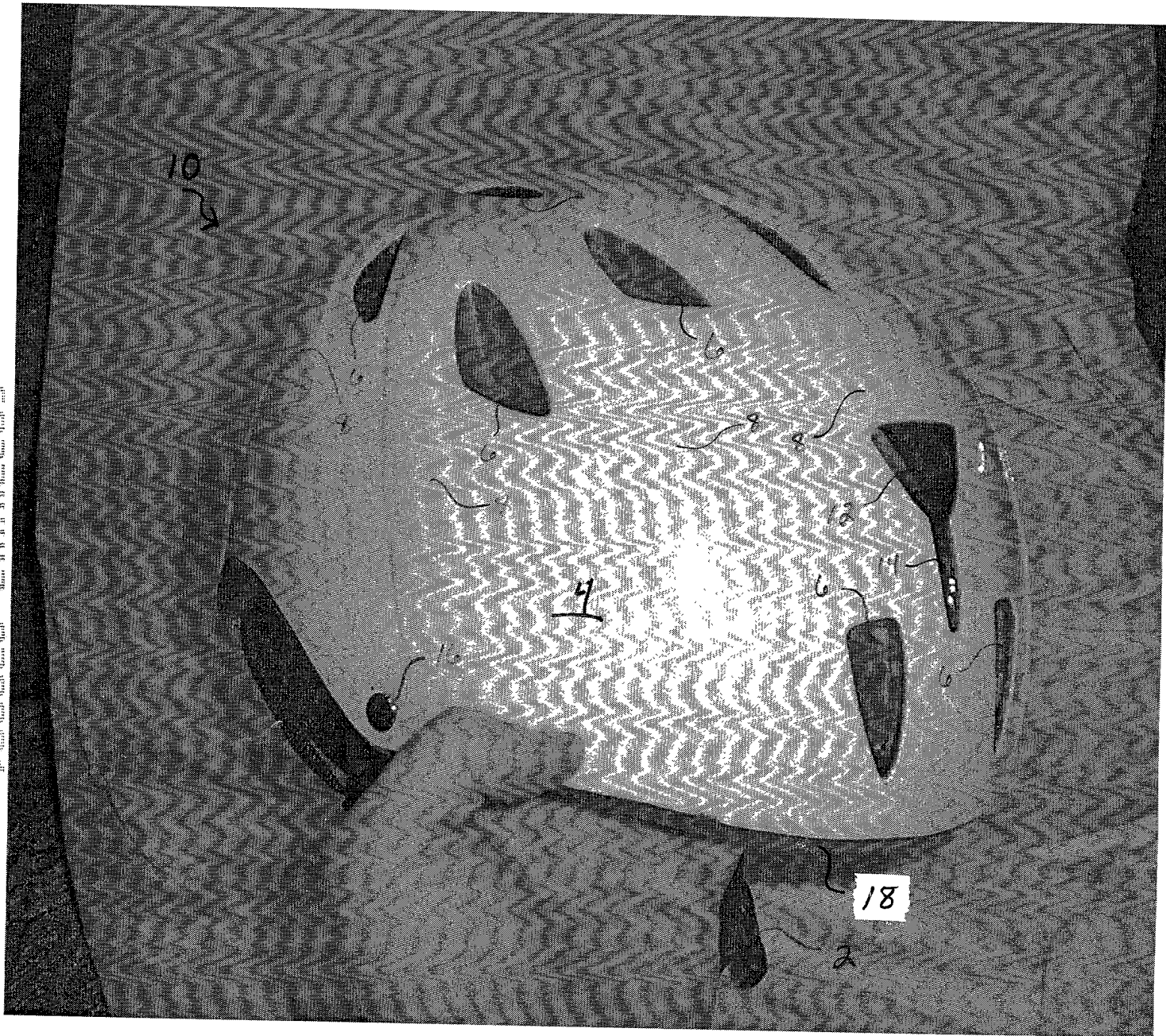


FIG. 1

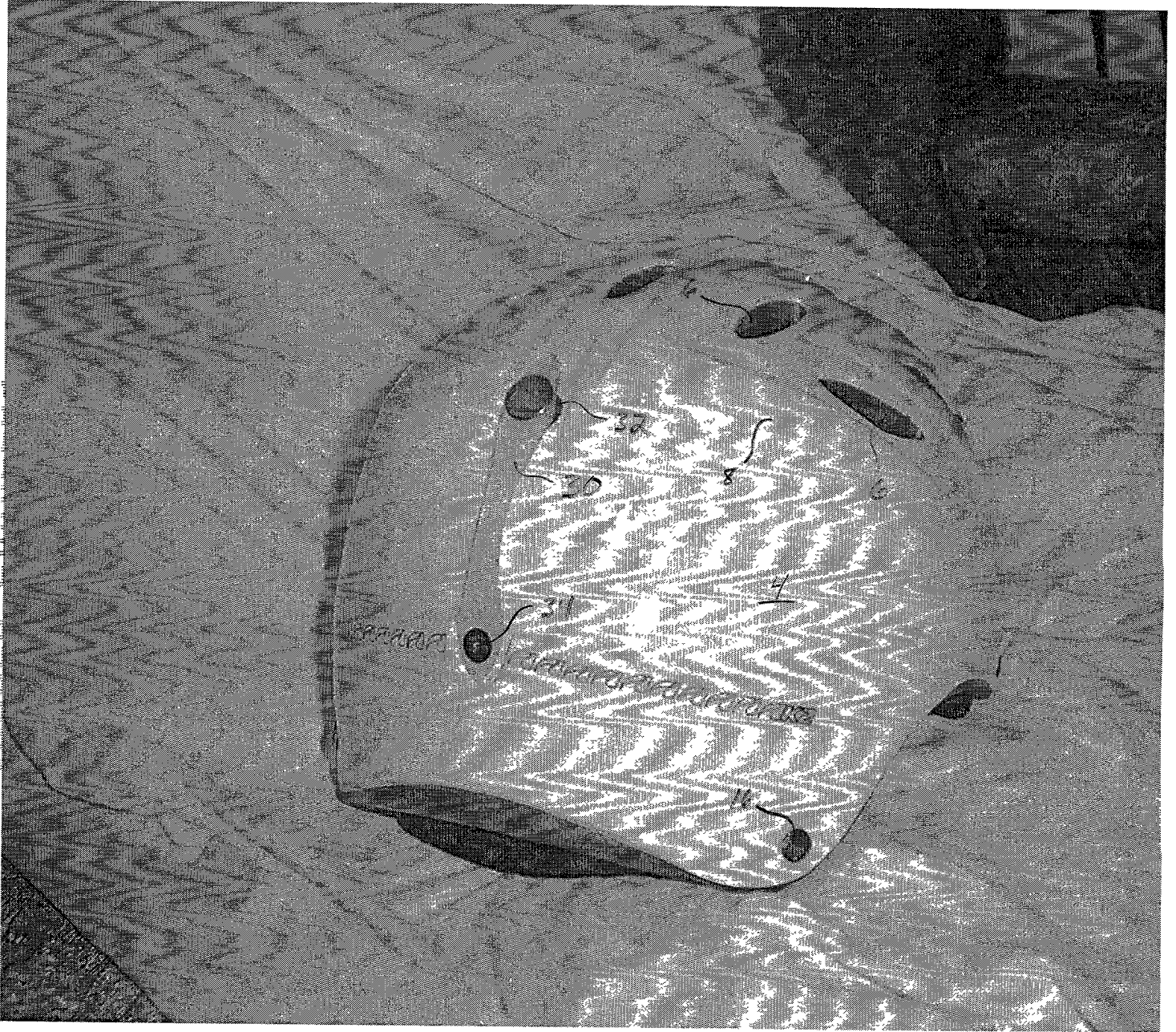
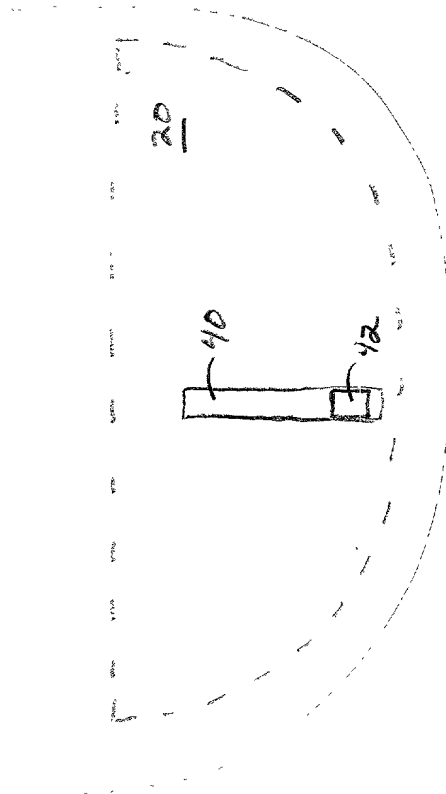


FIG. 3

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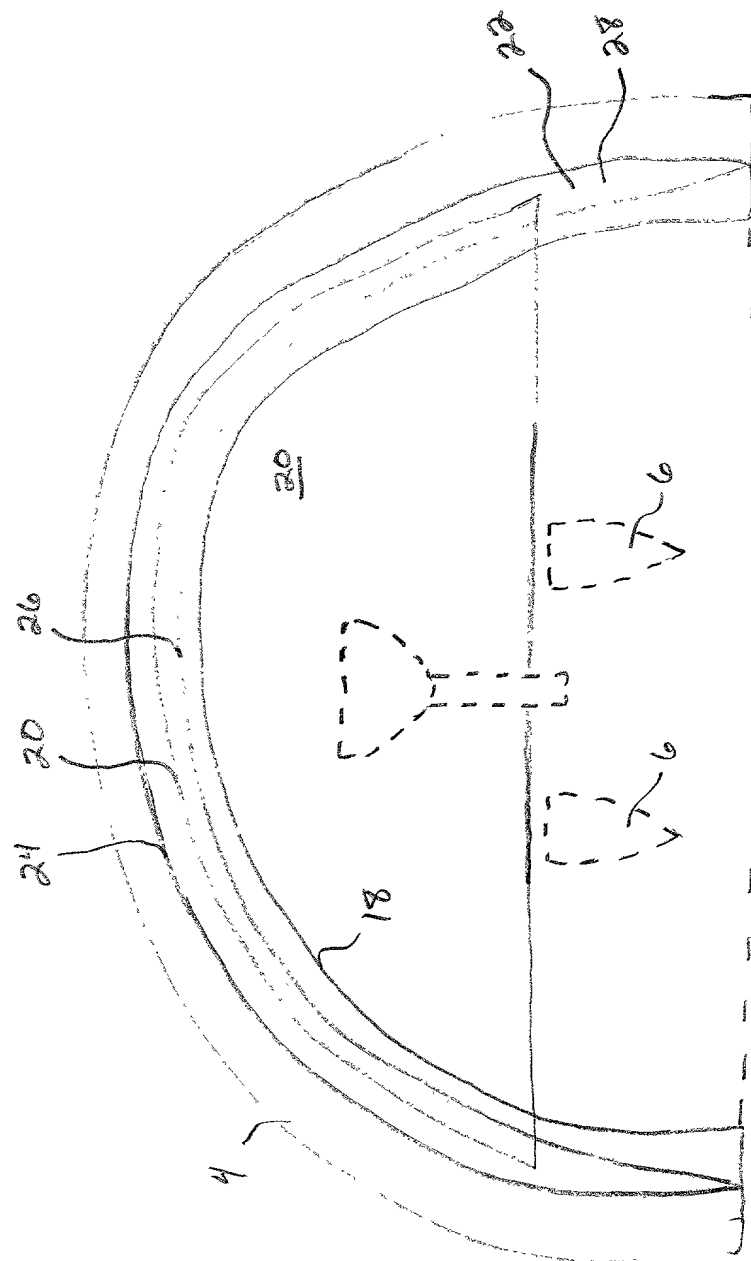


FIG. 5