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(54) **PROTECTIVE HELMET CONFIGURATION WITH INTEGRATED FACE MASK WITH SMOOTH TRANSITION ATTACHMENT**

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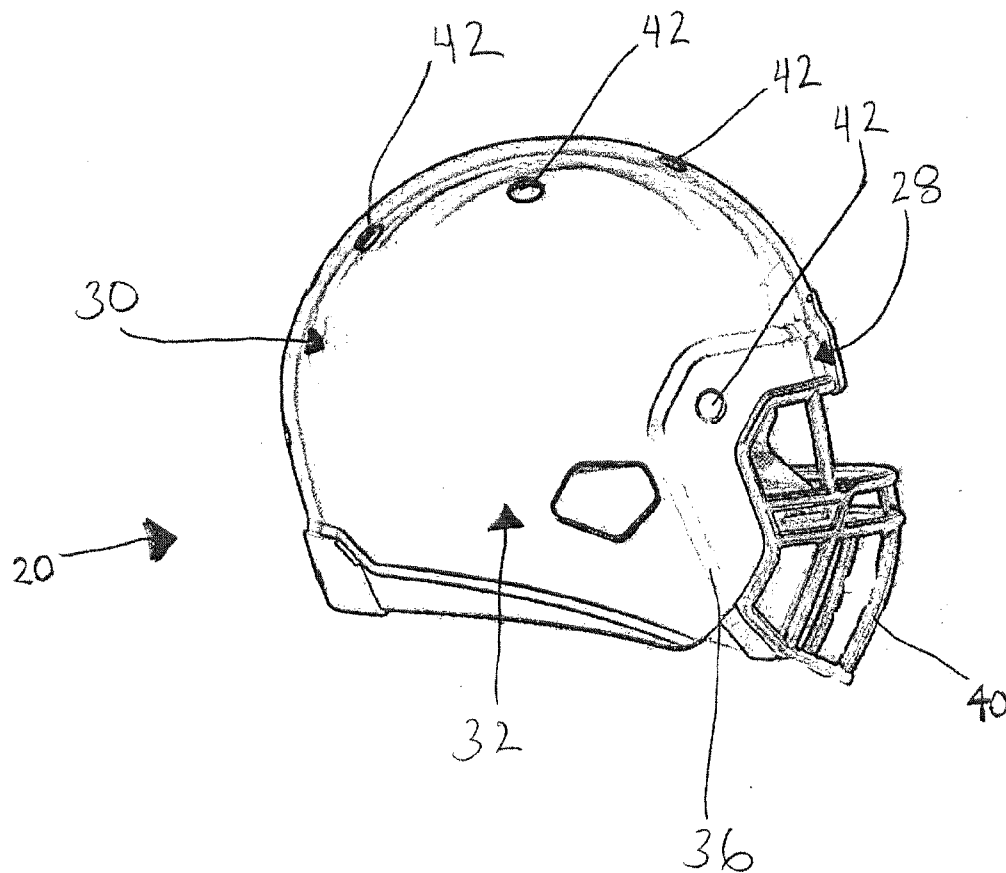
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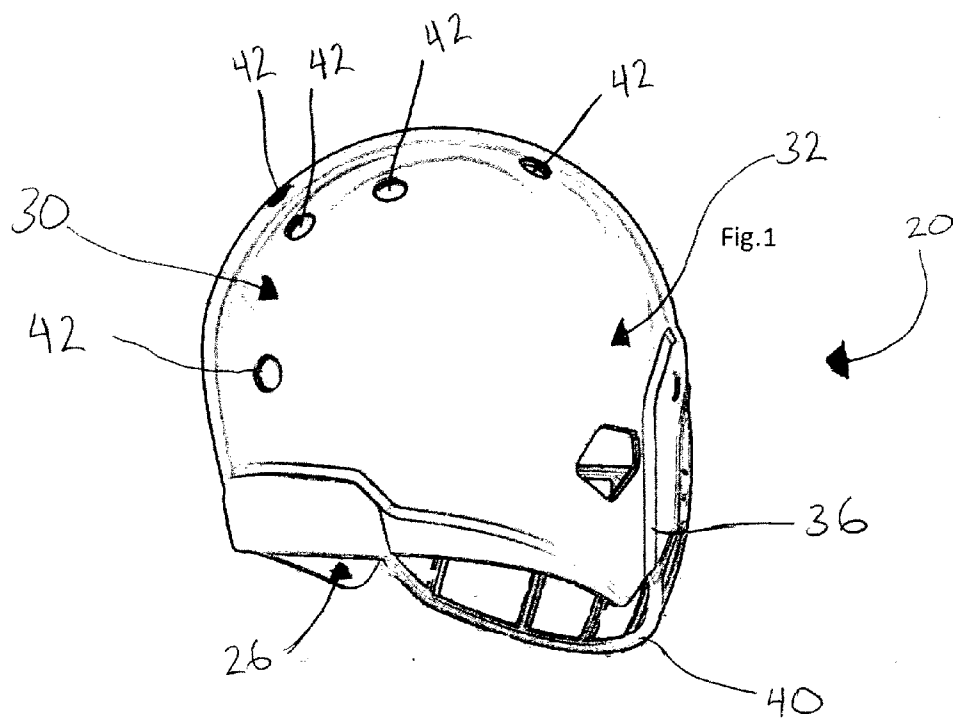
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(57) **ABSTRACT**

A protective helmet including an outer shell, a ridgeline recessed inwardly from the interior compartment of the helmet and protruding outwardly from the exterior surface of the helmet, padding disposed in the interior compartment of the helmet, a facemask made from an ultra-high density high molecular weight polymer coupled to the helmet, and the facemask defines a flat region having a generally planar surface. The flat region of the facemask engages the ridgeline of the interior surface of the helmet to provide a smooth transition from the exterior surface of the helmet to the facemask to reduce snagging, catching, or grabbing another facemask or other protective body gear while the helmet configuration is worn during a contact activity.





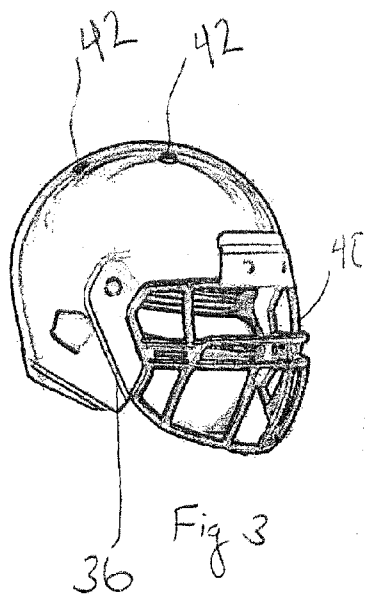
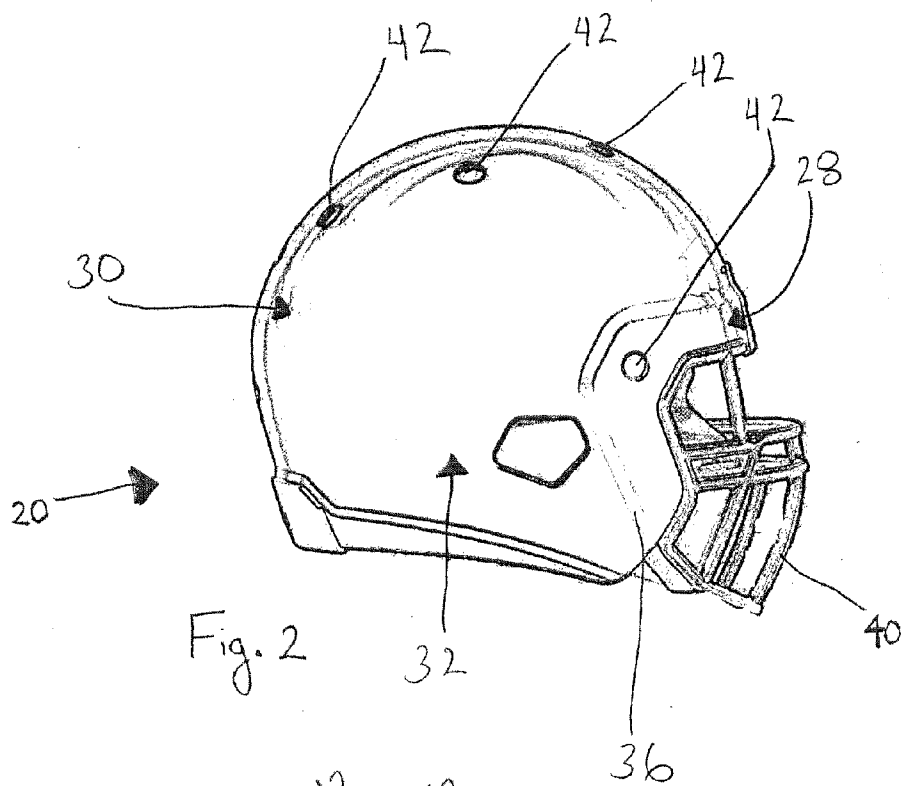
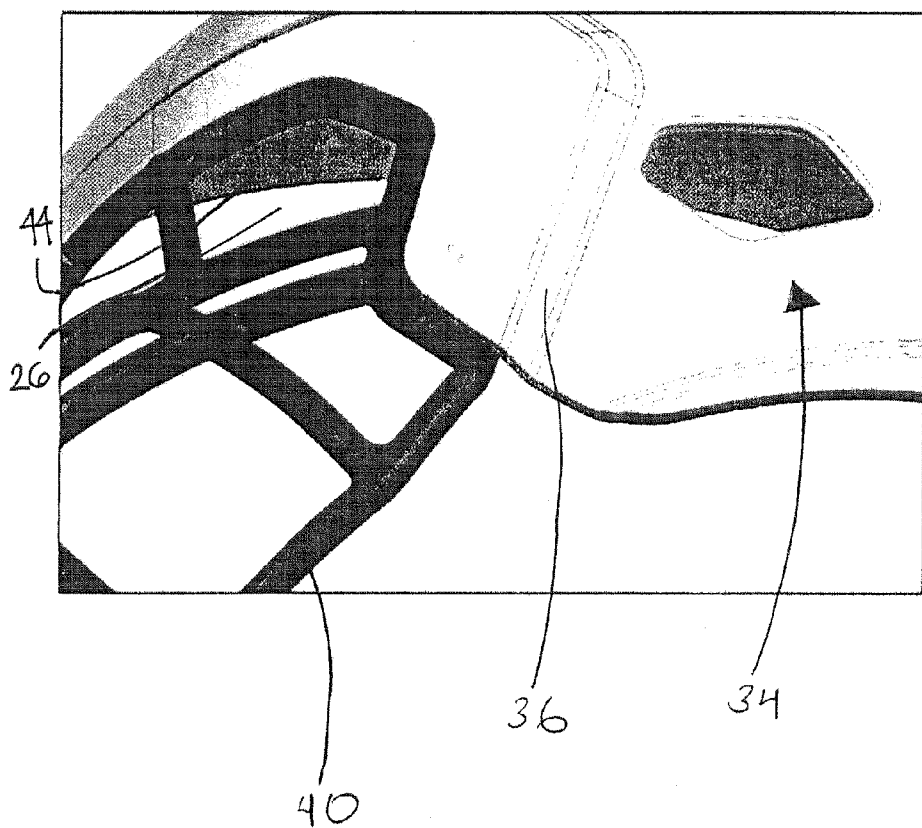


Fig. 4



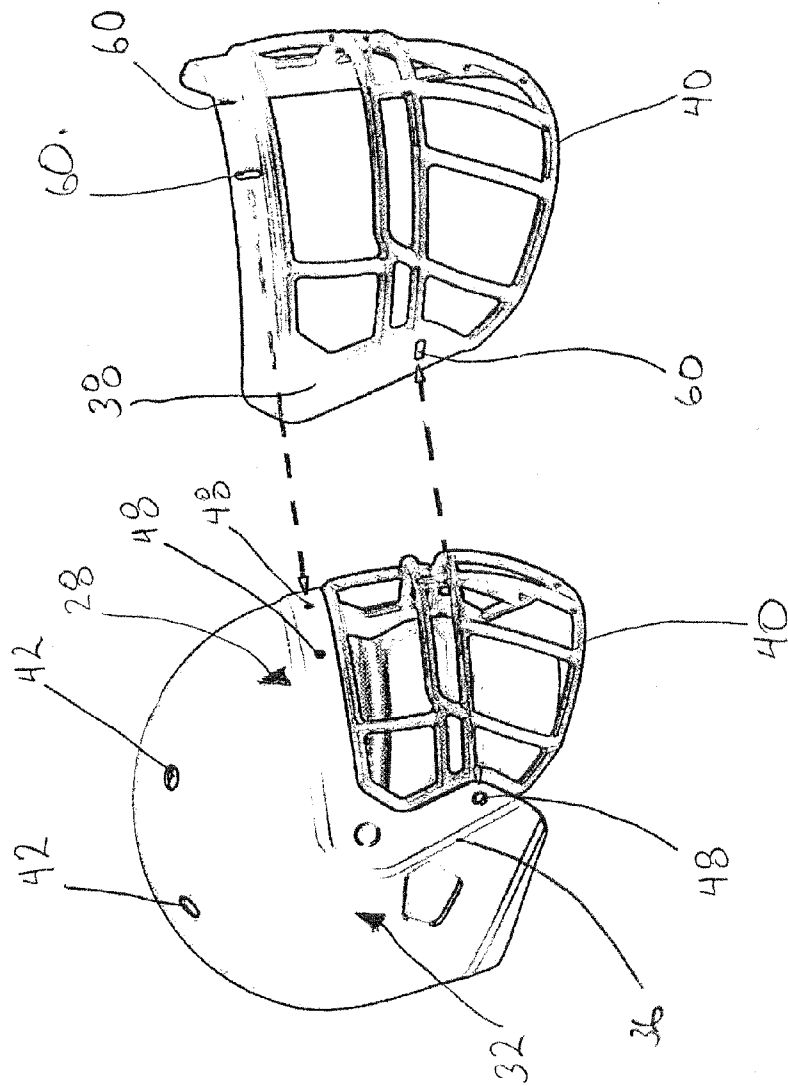


Fig. 5

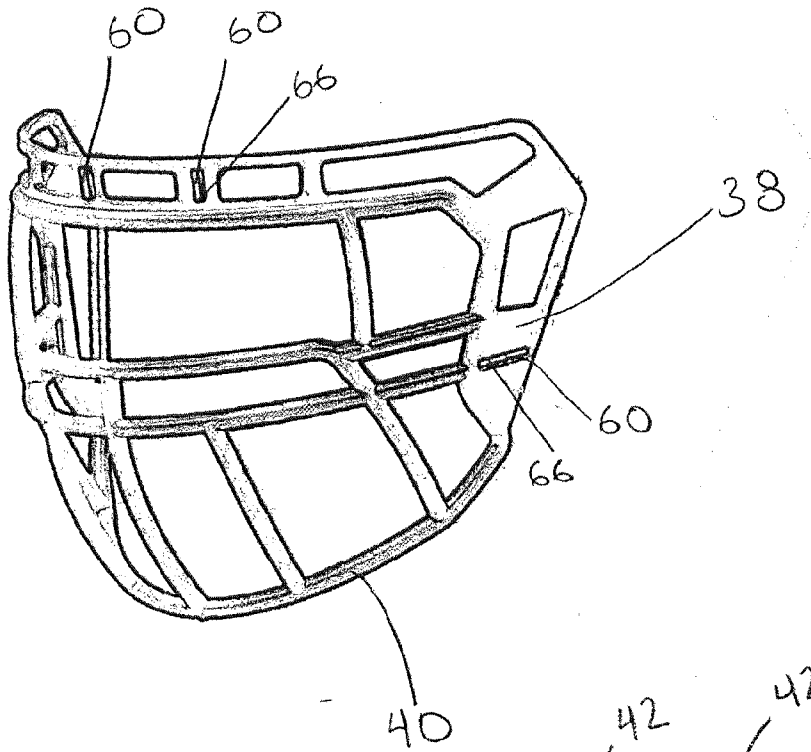


Fig. 6

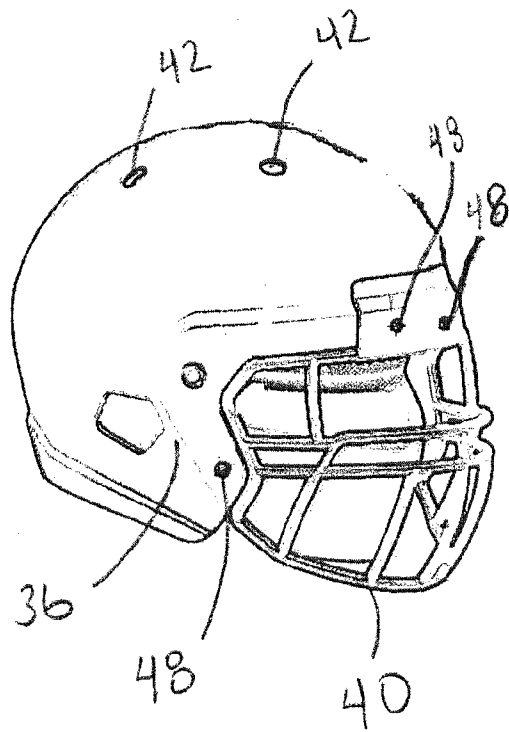


Fig. 7

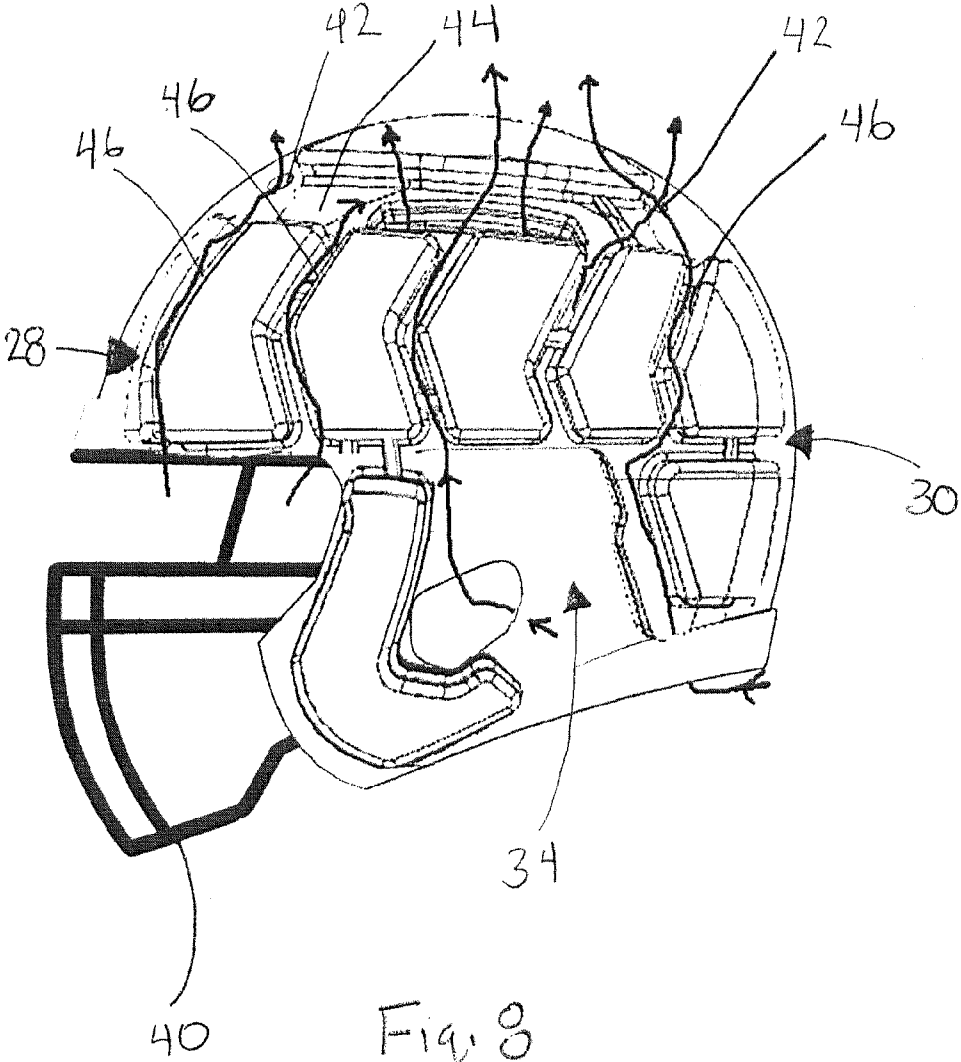


Fig. 8

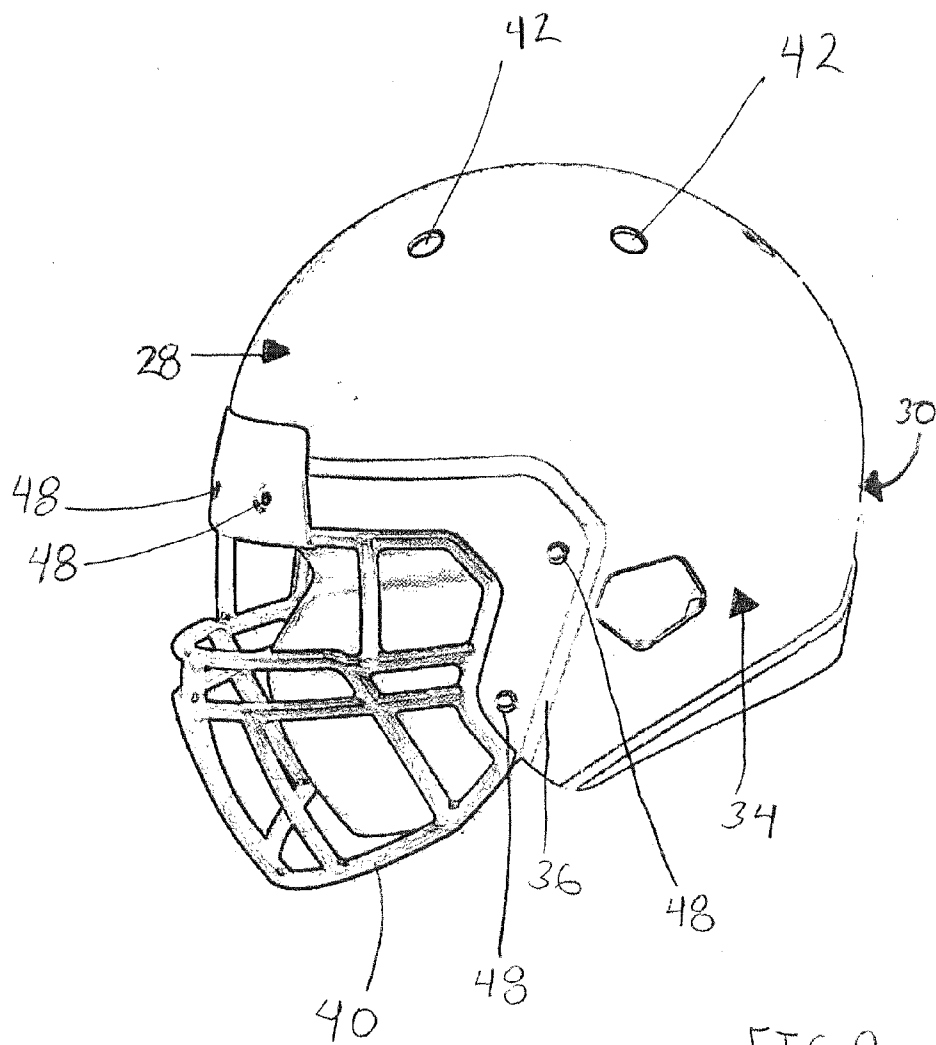
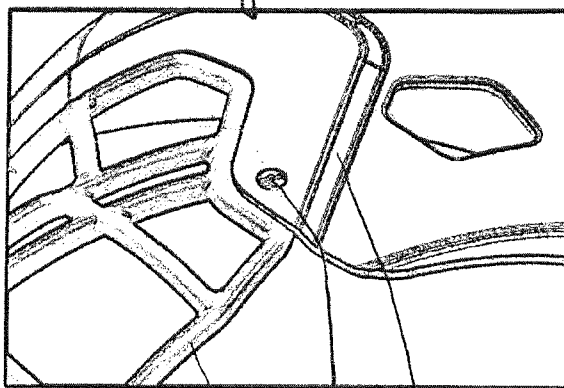


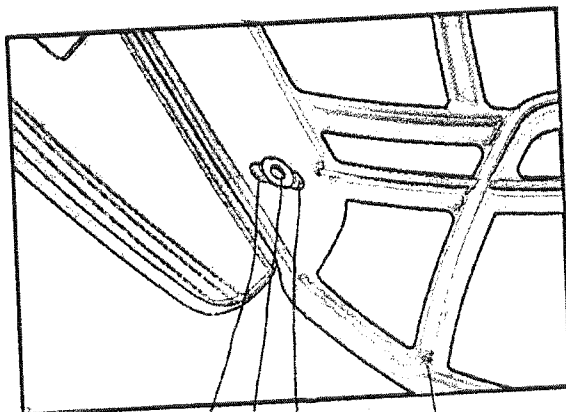
FIG. 9

Fig. 10



40 62 36

Fig. 11



68 62 66 40

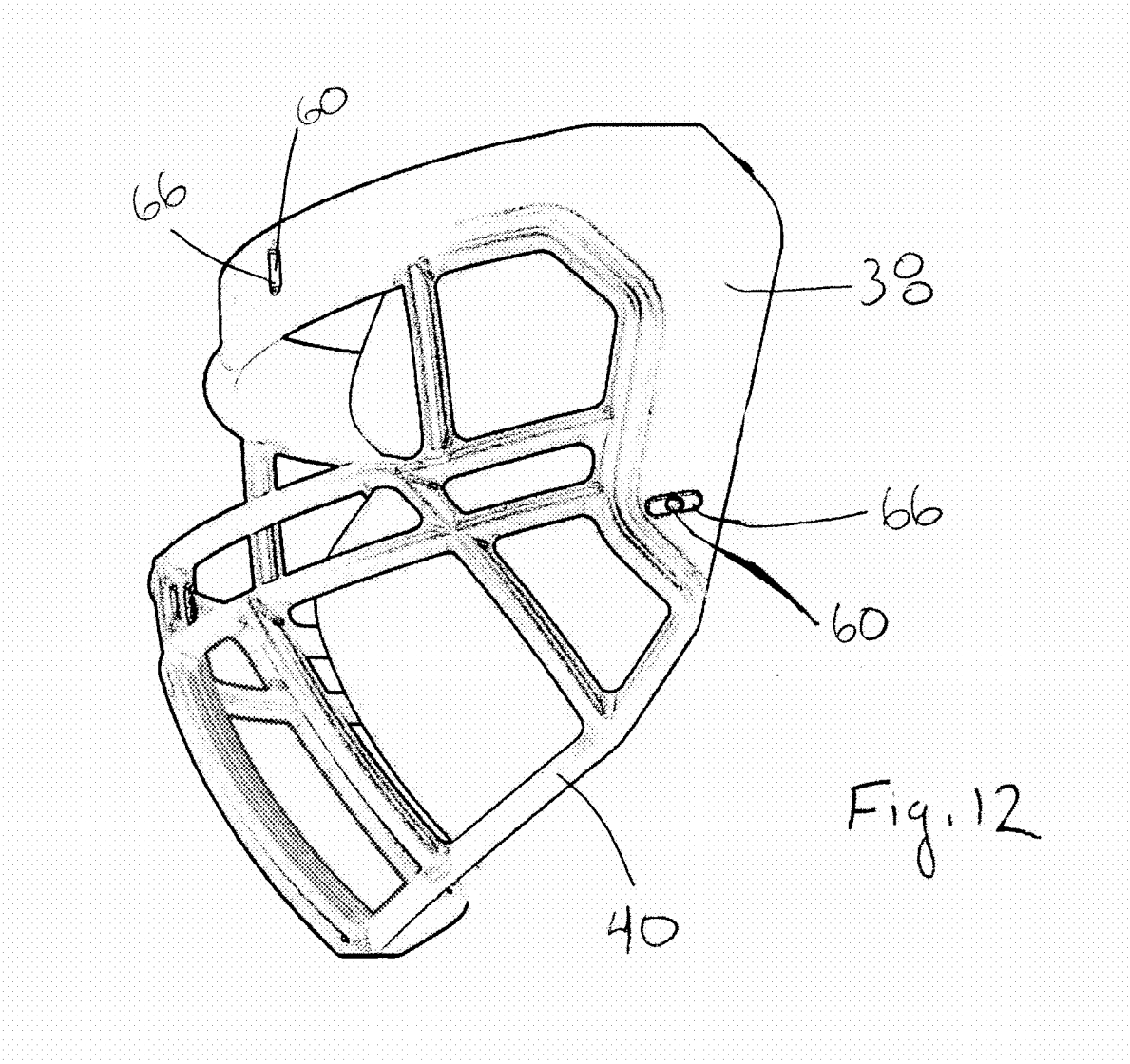


Fig. 12

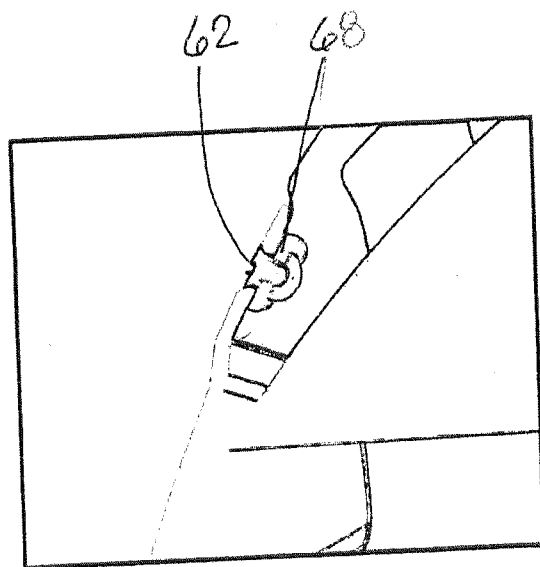
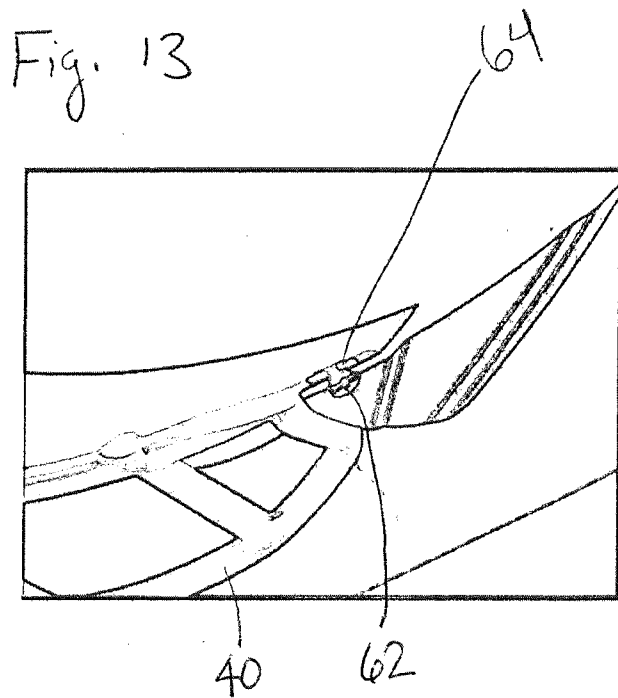


Fig. 14

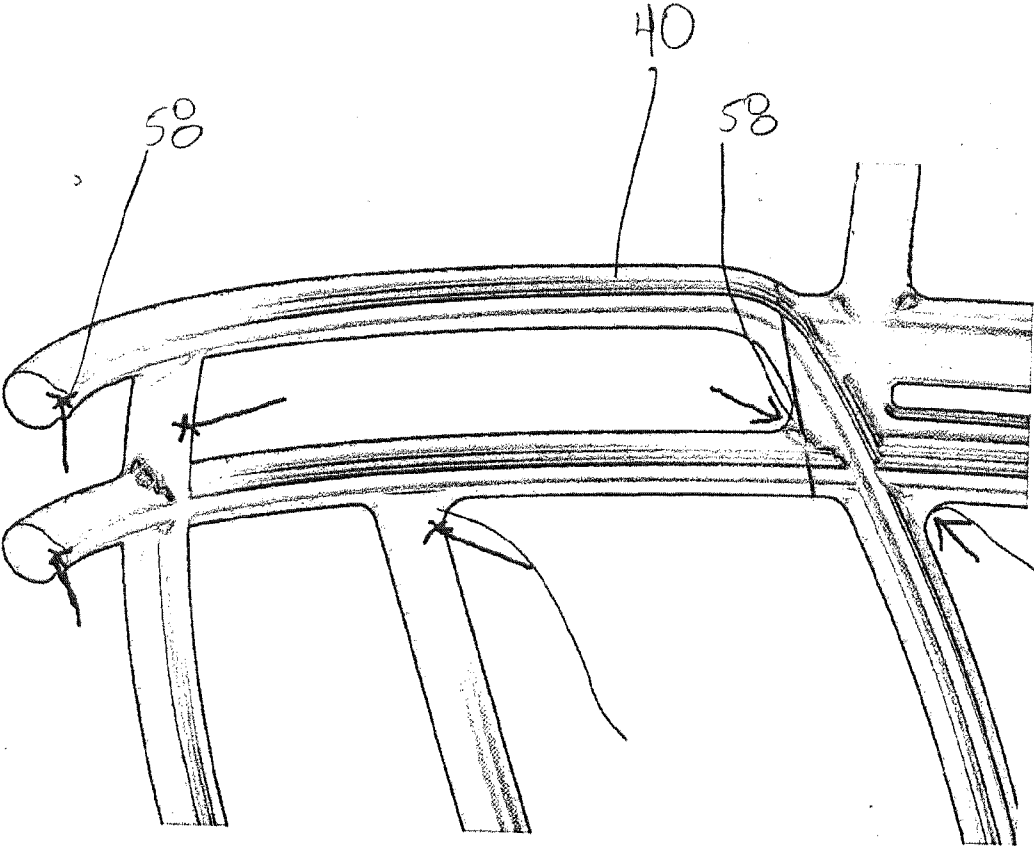


FIG. 15

PROTECTIVE HELMET CONFIGURATION WITH INTEGRATED FACE MASK WITH SMOOTH TRANSITION ATTACHMENT

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/710,728 filed Oct. 7, 2012.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The invention relates generally to a protective helmet configuration with an integrated facemask which attaches on the inside of the helmet's interior compartment along a ridgeline.

[0004] 2. Description of the Prior Art

[0005] Various activities, such as contact sports, and in particular the sports of football, hockey, and lacrosse, require the use of helmets to protect the participants from head injury. Head injury may result due to impact forces that may be sustained during contact activities. Various types of helmets and facemasks, face guards, and face shields have been in use in these sports since the initial attempts to protect participants began.

[0006] Typically, these helmets consist of an outer shell, generally made of a polymer or plastic material, and having the requisite strength and durability characteristics to enable the helmet to offer impact protection. Additionally, the inside of the helmets may contain a padding cushion the participants head during impact and ensure the helmet properly fits the participant.

[0007] Over the years, various improvements have been made to the components of contact sport helmets, but in general, the overall configuration of these components has remained the same. The prior art shows the use of a plastic facemask, but these plastic facemasks were difficult to see through due to their large size which greatly limited visibility. Additionally, the prior art attempts to use plastic facemasks were made with a very dense plastic which required very specialized machinery to mold.

[0008] While such conventional protective helmets perform satisfactorily for their intended purpose, recent awareness regarding the detrimental long-term effects that head impacts may have on athletes, particularly football and hockey players, has led to a need for a continued development of improved impact damping technology. Accordingly, there is a recognized need in the art to design and develop alternative technologies that advance the protection afforded to those wearing a protective helmet. While it is the desire and goal that a protective helmet prevent injuries from occurring, it should be noted that, due to the nature of the sports or activities discussed herein, no helmet or device can completely prevent injuries to those wearing protective helmet during those activities.

SUMMARY OF THE INVENTION

[0009] The invention provides a protective helmet to be worn on the head of a person, the protective helmet comprising, an outer shell defining an exterior surface and an interior compartment, a ridgeline in the interior compartment recessed towards the exterior surface, padding disposed in the interior compartment of the helmet to protect the head of the person, a facemask coupled to the helmet and wherein the

facemask defines a flat region having a generally planar surface, and the flat region of the facemask engaging the ridgeline of the interior compartment to provide a smooth transition from the exterior surface of the helmet to the facemask.

ADVANTAGES OF THE INVENTION

[0010] Thus several advantages of one or more aspects is to transition from the outer shell of the helmet to the facemask without a protrusion which may snag, catch, or grab another facemask or other protective body gear while the present helmet configuration is worn during a contact activity.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Other advantages of the present invention will be readily appreciated, as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0012] FIG. 1 is a rear perspective view showing the protective helmet of the present invention.

[0013] FIG. 2 is a side perspective view of the protective helmet showing the ridgeline.

[0014] FIG. 3 is a side perspective view showing an alternative embodiment of the protective helmet.

[0015] FIG. 4 is bottom perspective view of an alternative embodiment of the protective helmet.

[0016] FIG. 5 is side perspective view of an alternative embodiment of the protective helmet.

[0017] FIG. 6 is a front perspective view of an alternative embodiment of the facemask.

[0018] FIG. 7 is a side perspective view of an alternative embodiment of the helmet.

[0019] FIG. 8 is a side view showing the padding.

[0020] FIG. 9 is a side view of an alternative embodiment of the protective helmet.

[0021] FIG. 10 is a bottom view showing the ridgeline and fastener.

[0022] FIG. 11 is a close up view of an elongated slot.

[0023] FIG. 12 is a side perspective view showing the facemask.

[0024] FIG. 13 is a top view showing the fastener.

[0025] FIG. 14 is a bottom view showing the fastener.

[0026] FIG. 15 is a close up view of the fillets.

DETAILED DESCRIPTION OF THE ENABLING EMBODIMENTS

[0027] Referring to the Figures, wherein like numerals indicate corresponding parts throughout the several views, a protective helmet 20 to be worn on the head of a person, is illustrated. It should be noted that the term protective helmet 20 may be used only as helmet 20 in the foregoing description.

[0028] Referring to FIG. 1, which shows a perspective view of the side of the protective helmet 20, the present invention includes an outer shell 22 which defines an exterior surface 24 and an interior compartment 26. The outer shell 22 further defines a front region 28 and a back region 30 and a first region 32 and a second region 34. The outer shell 22 may be made from a polymer or plastic material having the requisite strength and durability characteristics to enable the helmet 20 to be used in contact sports such as football, hockey, and lacrosse, or for use in military or police applications.

[0029] The helmet 20 may further include a ridgeline 36 recessed in the interior compartment 26 of the front region 28 of the outer shell 22 and protruding outwardly from the outer shell 22 of the helmet 20. The ridgeline 36 may extend from the interior compartment 26 towards the exterior surface 24 and additionally extend between the first region 32 and the second region 34 along the front region 28 of the outer shell 22, as shown in FIG. 2. The ridgeline 36 may house a flat region 38 of the facemask 40, discussed in more detail below.

[0030] As shown in FIG. 2, air holes 42 extend between the exterior surface 24 and the inner compartment of the outer shell 22. The air holes 42 may be specifically placed to permit air to naturally flow from the interior compartment 26 to the exterior surface 24 out through the air holes 42. The air holes 42 may work in conjunction with the padding 44 disposed in the interior compartment 26. The padding 44 may be disposed in the interior compartment 26 of the helmet 20 to protect the head of the person, as shown in FIG. 8. The padding 44 may include a plurality of pathways 46 having channels to direct air from the interior compartment 26 to the plurality of air holes 42. Specifically, the pathways 46 in the padding 44 allow for air within the interior compartment 26 of the helmet 20 to naturally rise and flow out through the air holes 42. The padding 44 may preferably be made from a polymeric cellular material; however, the padding 44 may also be made from any organic or inorganic material having desirable compression resistant properties.

[0031] Allowing air to naturally flow through the pathways 46 in the padding 44 and out through the air holes 42 may facilitate naturally cool the head of the person wearing the helmet 20. Additionally, the air holes 42 may allow ambient fresh air into the helmet 20 to be distributed by the pathways 46 to charge the pad assemblies. It should be noted that the helmet 20 could utilize various padding systems, including a padding system with integrated compression bellows. Such a padding system is shown in commonly owned U.S. patent application Ser. No. 13/721,186 filed Dec. 20, 2012.

[0032] Referring to FIGS. 5 and 10, first fastener holes 48 may be placed through the helmet 20 between the exterior surface 24 and the interior compartment 26 of the outer shell 22. The first fastener holes 48 facilitate securing the facemask 40 to the helmet 20, as discussed in more detail below.

[0033] As shown in FIGS. 5 and 6, a facemask 40 may be coupled to the helmet 20 to provide protection against frontal impacts. The facemask 40 defines a facemask 40 peripheral surface 50 and a facemask 40 interior surface 52 and the facemask 40 further defines a facemask 40 first side 54 and a facemask 40 second side 56. The facemask 40 may also have a flat region 38 with a generally planar surface formed on the facemask 40 peripheral surface 50 which extends between the facemask 40 first side 54 and the facemask 40 second side 56. The flat region 38 may engage the ridgeline 36 of the interior compartment 26 of the outer shell 22 when the facemask 40 is coupled to the helmet 20 to provide a smooth transition from the exterior surface 24 of the helmet 20 to the peripheral surface 50 of the facemask 40, illustrated in FIGS. 3 and 9.

[0034] Providing a smooth transition from the outer shell 22 of the helmet 20 to the peripheral surface 50 of the facemask 40, as shown in FIG. 7, is critical to avoid snagging, catching, and grabbing of the protective body gear of an opponent when the helmet 20 is worn during the sports activity. The smooth transition may increase the chances of frontal impacts becoming glancing blows as the present invention does not include the attaching the facemask 40 to the helmet

20 with external mounting fasteners 62. Glancing blows may reduce the effect of rotational acceleration being exerted on the head of the person wearing the helmet 20 and are thereby a desirable feature of the current invention.

[0035] As shown in FIG. 15, the facemask 40 may include specifically placed fillets 58 which may be concave in shape to provide strength to the compression function of the facemask 40. The facemask 40 may be produced from any suitable material having the requisite strength characteristics, including a polymer, steel, or a steel composite. The steel composite facemask 40 may be lightened in the flat region 38 by specifically placed cutouts, as shown in FIG. 6. Preferably, the facemask 40 may be made from a form of plastic known as high density polyethylene. (HDP) Specifically, an ultra-high molecular weight HDP may be used. If an ultra-high weight HDP is used, it may preferably have a molecular weight of between 4.1 million and 6.1 million Daltons. The flex provided by HDP material facemasks 40 may complement the overall performance of the energy attenuation of the helmet 20. It should also be noted that HDP is a self-lubricating polymer which may provide a slick surface over the facemask 40 to further reduce the effects of frontal impact.

[0036] Various styles of facemask 40 may be used with the helmet 20 of the present invention. The invention should be read to encompass all styles of facemasks 40, whether plastic, steel, or a steel composite, to accommodate different positions in a contact sport and configurations which a wearer of the helmet 20 may choose as a preference to their respective position. It is known that different levels of protection may be desirable depending on the role of the wearer. For example, a football quarterback may need less facemask 40 structure to allow for a greater field of vision whereas a football lineman may require more facemask 40 structure to provide increased protection during gameplay.

[0037] As shown in FIG. 12 second fastener holes 60 may be located in the flat region 38 of the facemask 40. When the facemask 40 is mounted to the helmet 20, the second fastener holes 60 may be adjacent to the first fastener holes 48. Fasteners 62 may be used to couple the facemask 40 to the interior compartment 26 of the helmet 20, shown in FIG. 13. Preferably, steel fasteners 62 having external threads may put through the first fastener holes 48 and the second fastener holes 60 and secured using T-nuts 64 having internal threads matching the external threads of the fasteners 62 to threadably engage the fastener 62. It should be appreciated, however, that other types of fasteners 62 may be used, including bolt-and-nut fasteners 62, rivets, or an adhesive. When the facemask 40 is attached to the helmet 20, the T-nuts 64 may be flush to the inside of the interior chamber of the helmet 20 as well as flush to the flat region 38 of the facemask 40. Flush fasteners 62 may reduce the incidence of snagging the padding 44 within the helmet 20 or the head of the person wearing the helmet 20, as well as the protective gear of an opponent.

[0038] As shown in FIG. 11, elongated slots 66 recessed in the flat region 38 of the peripheral surface 50 of the facemask 40 may extend partially through the flat region 38 of the facemask 40 from the peripheral surface 50 of the facemask 40. Additionally, and as shown in FIG. 14, grommets 68 may be disposed around the fasteners 62 in each of the elongated slots 66. The elongated slots 66 may allow for free lateral or front-to-back movement of the facemask 40 to reduce the effect of impact. The grommets 68 may be made from any organic or inorganic material having the requisite compress-

sion resistant or shock absorbent properties; however, rubber or a rubber like substance may preferably be used.

[0039] Obviously, many modifications and variations of the present invention are possible in light of the above teachings and may be practiced otherwise than as specifically described while within the scope of the appended claims. Furthermore, the foregoing discussion discloses and describes merely exemplary embodiments of the present invention. One skilled in the art will readily recognize from such discussion, and from the accompanying drawings and claims, that various changes, modifications and variations may be made therein without departure from the spirit and scope of the invention as defined in the following claims. The use of the word "said" in the apparatus claims refers to an antecedent that is a positive recitation meant to be included in the coverage of the claims whereas the word "the" precedes a word not meant to be included in the coverage of the claims. In addition, the reference numerals in the claims are merely for convenience and are not to be read in any way as limiting.

What is claimed is:

- 1. A protective helmet to be worn on the head of a person, the protective helmet comprising:
 - an outer shell defining an exterior surface and an interior compartment,
 - a ridgeline in said interior compartment recessed towards said exterior surface and protruding outwardly from said exterior surface,
 - padding disposed in said interior compartment of the helmet to protect the head of the person,
 - a facemask coupled to the helmet and wherein said facemask defines a flat region having a generally planar surface, and
 - said flat region of said facemask engages said ridgeline of said interior compartment to provide a smooth transition from said exterior surface of the helmet to said facemask.
- 2. The protective helmet of claim 1 wherein said facemask further includes at least one fillet of concave shape to provide compression force resistance to said facemask during impact.
- 3. The protective helmet of claim 1 further including at least one air hole extending between said exterior surface and said inner compartment of said outer shell to permit air to flow from said interior compartment to said exterior surface.
- 4. The protective helmet of claim 3 wherein said padding further includes at least one pathway having channels to direct air from said interior compartment towards said at least one air hole.
- 5. The protective helmet of claim 1 wherein said facemask is made from a high density polymer.
- 6. The protective helmet of claim 5 wherein said high density polymer is an ultra-high molecular weight high density polymer.
- 7. The protective helmet of claim 6 wherein said ultra-high molecular weight high density polymer has a molecular weight between . million and. million Daltons.
- 8. The protective helmet of claim 1 wherein said facemask is made from steel.
- 9. The protective helmet of claim 1 further including a plurality of first fastener holes disposed through the helmet between said exterior surface and said interior compartment and a plurality of second fastener holes in said flat region of said facemask and wherein said plurality of second fastener holes are disposed adjacent to said first plurality of fastener holes.

10. The protective helmet of claim 9 further including a plurality of fasteners wherein said plurality of fasteners are disposed through said plurality of second of fastener holes and said first plurality of fastener holes to couple said facemask to the helmet.

11. The protective helmet of claim 10 wherein said plurality of fasteners are externally threaded steel fastening screws and internally threaded T-nuts being threadably engaged to couple said facemask to the helmet.

12. The protective helmet of claim 10 wherein said facemask further includes a plurality of elongated slots recessed in said flat region and over said second plurality of fastener holes to allow lateral movement of said plurality of fasteners within said plurality of elongated slots.

13. The protective helmet of claim 12 wherein said facemask further includes a plurality of grommets disposed around said plurality of fasteners in said plurality of elongated slots to absorb shock from impact.

14. The protective helmet of claim 13 wherein said plurality of grommets are made from of a rubber material.

15. A protective helmet to be worn on the head of a person, the protective helmet comprising;

- an outer shell of polymer material having an exterior surface and an interior compartment and said outer shell further defining a front region and a back region and a first region and a second region,
- a ridgeline recessed in said interior compartment of said front region of said outer shell from said interior compartment towards said exterior surface and protruding outwardly from said outer shell and extending between said first region and said second region along said front region of said outer shell,
- a plurality of air holes extending between said exterior surface and said inner compartment of the said outer shell to permit air to flow from said interior compartment to said exterior surface,
- a plurality of first fastener holes disposed through the helmet between said exterior surface and said interior compartment,
- padding disposed in said interior compartment of the helmet to protect the head of the person,
- a plurality of pathways disposed in said padding having channels to direct air from said interior compartment towards said plurality of air holes,
- a facemask having a facemask peripheral surface and a facemask interior surface and said facemask further defining a facemask first side and a facemask second side,
- a flat region having a generally planar surface formed on said facemask peripheral surface and extending between said facemask first side and said facemask second side and said flat region engaging said ridgeline of said interior compartment of said outer shell,
- a plurality of elongated slots recessed in said flat region of said peripheral surface of said facemask and extending partially through said flat region from said peripheral surface of said facemask,
- a plurality of second fastener holes in said flat region of said facemask disposed adjacent to said plurality of first fastener holes and through each of said elongated slots in said flat region of said facemask between said peripheral surface and said interior surface of said facemask,
- a plurality of steel fasteners having external threads and said plurality of fasteners disposed through said plural-

ity of second of fastener holes and said first plurality of fastener holes to couple said facemask to the helmet, a plurality of T-nuts having internal threads matching said external threads of said steel fasteners disposed in said interior compartment of the helmet adjacent said padding and said plurality of T-nuts threadably engage said external threads on each of said plurality of fasteners, a plurality of grommets of rubber like material disposed around said fasteners in each of said plurality of elongated slots to allow lateral movement of said facemask when said facemask is coupled to the helmet with said plurality of steel fasteners and said plurality of T-nuts, a plurality of fillets being concave in shape disposed on said facemask to provide compression force resistance to said facemask during impact, and said flat region of said facemask engages said ridgeline of the helmet to provide a smooth transition from said exterior surface of the helmet to said peripheral surface of said facemask.

16. The protective helmet of claim **15** wherein said facemask is made from an ultra-high molecular weight high density polymer having a molecular weight between. million and. million Daltons.

17. The protective helmet of claim **15** wherein said facemask is made from steel.

* * * * *