HELMET WITH CHIN GUARD

Abstract

A helmet assembly having a helmet shell to which a chin guard assembly is attached. The chin guard assembly is disposed and configured to protect the underside of the wearer’s chin and jaw and counter rotational acceleration created by impact to the underside of the wearer’s chin.
HELMET WITH CHIN GUARD


FIELD OF INVENTION

[0002] This invention relates to protective head gear.

BACKGROUND OF THE INVENTION

[0003] Conventional protective head gear, such as helmets to safeguard sports participants, military personnel and others engaging in high risk activities, is designed to protect the skull from head trauma by primarily addressing linear acceleration caused by impact to the head by another object. This approach has only been successful to a limited extent, in part because such devices fail to account for the rotational components of an impact to the head, such as is sustained in a hit to the underside of the chin and jaw.

[0004] In general terms, there are two main types of forces at play when an impact to the head occurs: 1) A linear force, which is caused by a straight and direct impact, and 2) a rotational force, which is slightly oblique and causes the head to rotate around its point of articulation, i.e. its neck, at the top of the spine as it is hit. Angular or rotational acceleration of the skull caused by impact with another object is a common, but often under recognized, cause of head trauma and injury. Accordingly, there is a need for a protective device that addresses the rotational impact to the skull as well as direct blunt trauma to the chin and jaw.

SUMMARY OF THE INVENTION

[0005] Embodiments of the invention provide a protective device that may reduce head and facial injuries resulting from forces such as rotational and linear accelerations.

[0006] According to an illustrative embodiment of the invention a helmet assembly is provided that includes a helmet shell to which a chin guard assembly is attached. The chin guard assembly is disposed and configured to protect the underside of the wearer’s chin and jaw and counter rotational acceleration created by impact to the underside of the wearer’s chin or jaw. This supplements protection afforded by traditional helmets that are designed to protect against linear accelerations but fail to address rotational acceleration that can impart angular motion between the brain and brainstem, sufficient to cause concussions. The positioning of the chin guard assembly with respect to the helmet shell, and thus with respect to the wearer’s chin, must be such that it may reduce the possibility of concussion sustained by torque on the brainstem caused by rotational acceleration and blunt force trauma to the chin and jaw. When aligned properly, chin guard assembly 104 accomplishes this goal, provided helmet assembly 100 is secured adequately to the wearer.

[0007] Chin guard assembly 104 includes a rigid expance 106 extending from the helmet shell right side 108 to the helmet shell left side 110 and disposed on the front side of the wearer. “Front side” is used in a general sense and thus, includes rigid expance 106 disposed to protect the underside of the chin and jaw. Rigid expance 106 is attached at a first end to helmet shell right side 108 and attached at a second end to helmet shell left side 110 and disposed to protect against impact to the underside of a wearer’s chin and jaw. Rigid expance 106 may or may not pivot with respect to helmet shell 110 at the attachment locations on the helmet shell right and left sides 108, 110. Preferably chin guard assembly 104 is adjustable with respect to helmet shell 102.

[0008] Preferably rigid expance 106 is shaped to generally follow a wearer’s chin. A preferred shape is that which maximizes a player’s range of motion in lateral flexion and rotation while still providing the desired protection from injury caused by impact to the underside of the chin.

[0009] Rigid expance 106 has a right elongated member 112 attached to the helmet shell right side 108 and a left elongated member 114 attached to the helmet shell left side 110. One or both of the elongated members 112, 114 is
attached by a fastening assembly having a sleeve 116 attached to helmet shell 102 into which a portion of an end of one of elongated members 112, 114 is disposed. A first stop 118 is provided at the end of the elongated member. First stop 118 may be for example, a cap such as shown in FIG. 1, a curved portion 220 of an elongated member 212, such as shown on helmet 200 in FIG. 5, or a cylindrical component 180 with a set screw 182 disposed about an elongated member 184 such as shown in FIG. 8. First stop 118 is designed to inhibit removal of chin guard 104 from sleeve 116. Similarly, first stop 220 is designed to inhibit removal of chin guard 204 from sleeve 216.

[0021] Helmet assembly 100 may include a spring 122 disposed about a portion of the end of elongated member 112, 114 between first stop 118 and sleeve 116. Alternatively, a spring can be omitted such as shown in FIG. 5.

[0022] Helmet assembly 100 may also include a second stop 124 disposed about a portion of the end of elongated member 112, 114 on a side of sleeve 116 opposing first stop 118/120. Second stop 124 can be adjustable along the elongated member. Adjustability may be provided for example by use of a set screw 126. The first stop can also be adjustable along the elongated members.

[0023] The fastening assembly for attaching elongated members 112, 114 as described above allows the chin guard assembly to be pulled away from a wearer’s face to facilitate removal of helmet assembly 100. The fastening assembly may be spring-loaded. Springs 122 draw chin guard assembly back toward the wearer when helmet assembly 100 is in place on the wearer. Second stop 124 can protect against chin guard assembly being pushed into a wearer’s neck.

[0024] The chin guard assembly may also be rotatable with respect to the helmet shell. For example, chin guard assembly 702 shown in FIG. 7 can be rotatable at fastening mechanism 704, by virtue of pivots incorporated therein. Chin guard assembly 702 includes a rigid expanse in the form of a single bar 712 without attachment to face mask 706. A strap 708 with a capped chin portion 710 is proved to secure the helmet assembly to a wearer. Bar 712 is curved at its distal end 714 to reduce the possibility of bar 712 disengaging from helmet shell 716. A stop 718 is provided to further eliminate the possibility of components separating from one another.

[0025] Helmet assembly 100 may include a face mask 128, or not as shown in FIG. 6. If a face mask is provided, chin guard assembly 106 may be attached to face mask 128. In an illustrative embodiment of the invention, chin guard assembly 104 is pivotally attached to face mask 128. An illustrative attachment apparatus includes one or more bars 130, 132 rotatable about a substantially horizontal bar 134 of face mask 128, and/or rotatable about rigid expanse 106. When bars 130, 132 are rotatable about a component of face mask 128, such as horizontal bar 134, and also rotatable about a component of the chin guard assembly such as rigid expanse 106, further protection may be afforded from the chin guard assembly rotating upwards. Bars 130, 132 may also provide further protection from facial trauma. One or more of bars 130, 132 can be releasably attached to horizontal bar 134 or other portion of face mask 128 or rigid expanse 106 to further facilitate removal of helmet assembly 100 from a wearer, or to remove chin guard assembly 104 from helmet assembly 100.

[0026] FIGS. 3 and 4, for example, show spacer components 190, 192, 194, which are provided to hold the position of bars 130, 132 so that the bars remain in a desired position with respect to horizontal bar 134 of face mask 128 and rigid expanse 106 of chin guard assembly 104. This can be particularly beneficial when chin guard assembly 104 is rotated. Other mechanisms to position the components can also be used. A further example includes notches and bumps for example, that inhibit sliding of bars 130, 132 along bars in face mask 128 and/or chin guard assembly 104. Spacer components can also be used in other areas where moveable parts need to retain certain relative positions. Another example of spacer elements are parts 196, 198 shown in FIG. 5.

[0027]spacer components may be for example, coils or springs formed of an elastomer such as silicone elastomers sold under the trademark Silastic®. They can also be made of a compressive material such as a foam or a non-compressive material. Coiled components are advantageous because they may slide easily along a bar, yet keep a preferred relative distance between parts. Spacer components that can be easily cut and put in place can provide a user with the ability to customize the apparatus. Properly spacing various components of the helmet apparatus may reduce head and facial injuries.

[0028] Helmet assembly 100 can have a chin strap assembly 136, as shown in FIGS. 1-4 for example. Chin strap assembly 136 can include one or more straps 138, 140 attached to shell 102. The straps may include a rigid, non-rigid or semi-rigid cupped component 142. The helmet assembly of claim 1 further comprising a chin strap coupled to the helmet shell for securing the helmet assembly in place on a wearer. Chin straps 138, 140 can be used to help keep chin guard assembly 104 in place by, for example engaging strap 138 around elongated members 112, 114.

[0029] Alternatively, as shown in FIG. 6, a strap 144 can be included without a cupped portion 146 attached thereto. The helmet assembly 170 shown in FIG. 6 has a cupped portion 146 incorporated with chin guard assembly 148. Cupped portion 146 fits against a wearer’s chin. Cupped portion 146 is attached to elongated members 150, 152, which in turn are attached to helmet shell 160 by fastening mechanism 154. Elongated members 150, 152 can slide within sleeve 162 to facilitate removal of the helmet assembly and have a stop 156 to keep chin guard assembly 148 from detaching entirely from helmet shell 160. Sleeve 162 may or may not pivot with respect to helmet shell 160. Stop 156 can be removable from the elongated members to fully remove chin guard assembly 148 from helmet shell 170.

[0030] The chin guard assembly can be configured to be an add-on component or accessory to an existing helmet to supplement the protection provided by the helmet protecting the underside of the wearer’s chin against impact thereto. Preferably the chin guard assembly accessory will include fastening mechanisms that can be incorporated into existing parts of the existing helmet. For example, snaps and sleeves can serve to accept complimentary components on the chin guard assembly accessory. Adapter components can be included, for example to space the elongate members from the helmet shell to allow proper movement and securing of the chin guard assembly. An example of which is part 170 as seen in FIGS. 1 and 3.

[0031] A helmet accessory may include elements to attach the chin guard assembly to a face mask that may be present on the existing helmet. For example, bars such as 130, 132 shown in FIG. 3 may be included. Spacer components, such as parts 190, 192, 194 may also be included.

[0032] The helmet shell to which the chin guard is attached should fit firmly and sit squarely on the wearer’s head. The
front of the helmet should be within about one half inch of a wearer's eyebrows to provide protection to the forehead. If a chin strap is used to secure the helmet assembly to the wearer, there should be no or minimal slack. Padding within the helmet shell can afford beneficial protection and aid in a firm, and possibly adjustable fit. If padding is included, it should provide a comfortable amount of pressure on the head.

Rigid components of the helmet assembly can be plastic or metal for example, provided they have the impact resistance desired and are durable enough to withstand the application to which they are applied.

Although specific types of helmets are shown in the figures, the helmet assemblies can be used for and designed for various sports, including for example, football, lacrosse, skateboarding, skiing, snowboarding, motor cross, hockey and cycling. Which specific configuration and combination of components described will depend, at least in part, on the application of the helmet and the materials used to form the chin guard apparatus. The magnitude and direction of the impact expected will require particular configurations and materials to meet the needs of the wearer.

While the invention has been described by illustrative embodiments, additional advantages and modifications will occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to specific details shown and described herein. Modifications may be made without departing from the spirit and scope of the invention. For example, embodiments of the invention may be implemented on helmets of various types, such as those for different sports or other activities. Accordingly, it is intended that the invention not be limited to the specific illustrative embodiments, but be interpreted within the full spirit and scope of the appended claims and their equivalents.

Various embodiments of the invention have been described, each having a different combination of elements. The invention is not limited to the specific embodiments disclosed, and may include different combinations of the elements disclosed or omission of some elements and the equivalents of such structures.

Claimed is:

1. A helmet assembly comprising:
a helmet shell;
a chin guard assembly coupled to the helmet shell, wherein
the chin guard assembly is disposed and configured to
protect the underside of the wearer’s chin and jaw and
counter rotational acceleration created by impact to the
underside of the wearer’s chin or jaw.

2. The helmet assembly of claim 1 wherein the chin guard assembly comprises:
a rigid expanse extending from the helmet shell right side
to the helmet shell left side and disposed on the front side of
the wearer;
the rigid expanse attached at a first end to the helmet shell
right side and attached at a second end to the helmet shell
left side and disposed to protect against impact to the
underside of a wearer’s chin and jaw.

3. The helmet assembly of claim 2 wherein the rigid expanse is shaped to generally follow a wearer’s chin and jaw.

4. The helmet assembly of claim 2 wherein the rigid expanse comprises:
a right elongated member attached to the helmet shell right
side and a left elongated member attached to the helmet
shell left side;

wherein at least one of the right side elongated member and
the left side elongated member is attached by a fastening
assembly comprising:
a sleeve attached to the helmet shell into which a portion of
an end of one of the elongated members is disposed; and
a first stop at the end of the elongated member.

5. The helmet assembly of claim 4 wherein the sleeve is rotatable with respect to the helmet shell.

6. The helmet assembly of claim 4 further comprising a spring disposed about a portion of the end of the elongated member between the first stop and the sleeve.

7. The helmet assembly of claim 4 further comprising:
a second stop disposed about a portion of the end of the
elongated member on a side of the sleeve opposing the
first stop.

8. The helmet assembly of claim 7 wherein the second stop is adjustable along the elongated member.

9. The helmet assembly of claim 4 wherein the end portion of the elongated member is curved at its end to inhibit removal
from the sleeve thereby forming the first stop.

10. The helmet assembly of claim 1 further comprising a face mask.

11. The helmet assembly of claim 9 wherein the chin guard assembly is attached to the face mask.

12. The helmet assembly of claim 10 wherein the chin guard assembly is pivotally attached to the face mask.

13. The helmet assembly of claim 11 comprising:
one or more rotatable attachment elements attaching the
chin guard assembly to the face mask.

14. The helmet assembly of claim 13 wherein at least one rotatable attachment element is in the form of a bar extending
from the face mask to the chin guard assembly and the bar is
rotatable with respect to the face mask and the chin guard.

15. The helmet assembly of claim 13 wherein at least one of the rotatable attachments is releasable.

16. The helmet of claim 13 further comprising one or more spacer components disposed to maintain a selected distance between one or more rotatable attachment elements and parts of one or both of the face mask and chin guard assembly.

17. The helmet assembly of claim 1 wherein the chin guard assembly is rotatable with respect to the helmet shell at pivots on the right and left side of the helmet shell.

18. The helmet assembly of claim 1 further comprising a chin strap coupled to the helmet shell for securing the helmet assembly in place on a wearer.

19. The helmet assembly of claim 1 wherein the chin strap is engaged with the chin guard assembly to help keep the chin guard assembly in place.

20. The helmet assembly of claim 3 further comprising a cupped chin component secured to the chin strap.

21. A helmet accessory comprising:
a fastening assembly for attaching the helmet accessory to
a helmet shell;
a chin guard assembly, which when connected to the hel-
met shell is disposed and configured to help protect the
underside of the wearer’s chin and counter rotational
acceleration created by impact to the underside of the
wearer’s chin and jaw.

22. The helmet accessory of claim 21 wherein the chin guard assembly comprises:
a rigid expanse, which when attached to the helmet shell
extends from the helmet shell right side to the helmet
shell left side and is disposed on the front side of the
wearer;
the rigid expanse attached at a first end to the helmet shell right side and attached at a second end to the helmet shell left side and disposed to help protect against impact to the underside of a wearer’s chin and jaw.

23. The helmet accessory of claim 22 wherein the rigid expanse comprises:
   a right elongated member attachable to the helmet shell right side and a left elongated member attachable to the helmet shell left side;
   a fastening assembly for attaching at least one of the right side elongated member and the left side elongated member, the fastening assembly comprising:
   a sleeve attachable to the helmet shell into which a portion of an end of one of the elongated members is disposed; and
   a first stop at the end of the elongated member.

24. The helmet accessory of claim 23 wherein the sleeve is rotatable.

25. The helmet accessory of claim 23 further comprising a spring disposed about a portion of the end of the elongated member between the first stop and the sleeve.

26. The helmet accessory of claim 23 further comprising:
   a second stop disposed about a portion of the end of the elongated member on a side of the sleeve opposing the first stop.

27. The helmet accessory of claim 21 wherein the helmet accessory is attachable to a face mask on the helmet shell.

28. The helmet accessory of claim 21 for use with a helmet shell having a chin strap, wherein the chin strap is engagable with the chin guard assembly to keep the chin guard assembly in place.

29. The helmet accessory of claim 21 for a helmet with a face mask, the helmet accessory further comprising:
   one or more connection components to connect the helmet accessory to a face mask;
   one or more spacer components to define selected relative distances between connections components and parts of the face mask and parts of the chin guard assembly.