



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.12.2011 Bulletin 2011/52

(51) Int Cl.:
A42B 3/14 (2006.01) A42B 3/32 (2006.01)
A42C 2/00 (2006.01)

(21) Application number: **11007299.8**

(22) Date of filing: **17.10.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR

(30) Priority: **19.10.2007 GB 0720441**
16.07.2008 GB 0812963

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
08839938.1 / 2 207 446

(71) Applicant: **Centurion Safety Products Limited**
Norfolk IP24 1HZ (GB)

(72) Inventors:
• **Forrest, Jacques, William**
Thetford
Norfolk IP24 1HZ (GB)

- **Rose, Gary, Martin**
Shoeburyness
Essex SS3 9QP (GB)
- **Garcin, Christopher, Bryson**
London N8 9LA (GB)
- **Anns, Peter, Lawrence**
Thetford
Norfolk IP24 1 HZ (GB)

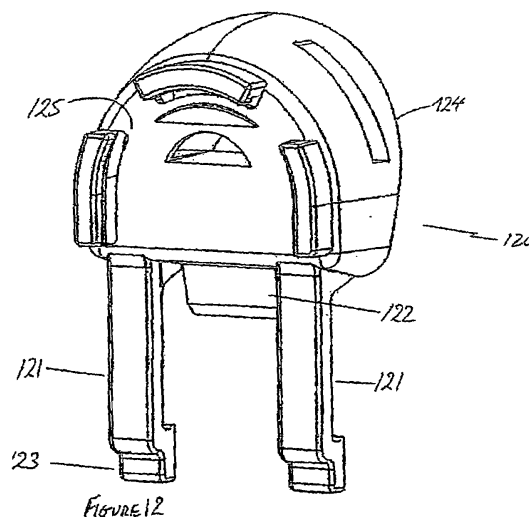
(74) Representative: **Harrison, Paul Richard**
Novagraaf Norwich Limited
12 Meridian Way
Meridian Business Park
Norwich NR7 0TA (GB)

Remarks:

This application was filed on 08-09-2011 as a divisional application to the application mentioned under INID code 62.

(54) **A method of manufacturing a safety helmet**

(57) A method of manufacturing a safety helmet (1), the method including the steps of;
providing an upper, substantially hemispherical protecting shell (10), formed of a plastics material to protect the skull of the wearer when in use;
providing a lower helmet section (61);
the lower helmet section including engaging means for support tape (66);
securing each end of a support tape (66) with a tape engaging means (63) such that the tape spans the lower helmet section (61), and securing sufficient tape to provide a web of material to rest on a wearer's head and support the helmet (1);
engaging the lower helmet section (61) with the upper helmet section, said engagement pushing the tape engaging means (63) against the upper helmet shell, thereby sandwiching the tape ends and restricting movement of said tape ends.



Description

Field of the Invention

[0001] The present invention relates to a safety helmet. In particular, it pertains to a helmet which can be easily assembled.

Background to the Invention

[0002] Safety helmets, also referred to as hardhats are well known and widely used in a diverse range of industries. The helmets are for protection to the wearer's head to protect against falling objects and also against obstacles which are located at head height and which can easily cause accidental damage as persons move about a workplace. The helmets can in addition be employed as a support means for further safety elements. For example, provision is normally provided, often as part of the helmet's structure to attach ear defenders, reflective markers, identification labels etc. It is important when making such provision that the further safety elements can be easily replaced if required, for example for worn or damaged elements.

[0003] The material from which the helmets are formed must first and foremost therefore be impact resistant. However, they must allow the helmet to be worn over prolonged periods without causing undue discomfort to the wearer. This latter criterion not only applies to the physical aspects of the helmet rubbing against the person's scalp, but can also apply to less obvious considerations. For example, unless ventilation is included, the helmet can trap heat and moisture in the volume above the wearer's head.

[0004] A further problem with prior art helmets lies with their assembly. Typically, a helmet comprises a hard plastic shell which ultimately serves as the protecting element of the helmet. A number of tapes, of differing length need to be secured within the inside of the helmet. Said tapes are secured in place by means of an adhesive, ultrasonic welding, sewing or a support component which is secured to the shell through specially designed fitments, fixing the tapes between the support component and the shell. The tapes form thereby a flexible web which engages the wearer's head, keeping the helmet in position and also providing a cushioning effect if the helmet is struck.

[0005] Assembly of the completed helmet from the components can therefore be time consuming. Moreover, the assembly is normally done by specialists on site at the place of manufacture. The assembled helmets are therefore not easily transported in a way which maximises space as the helmets do not stack well and include empty volume.

[0006] It is also of advantage for helmets to be available which enable secondary fixing mechanisms to be included, allowing additional features to be incorporated into a helmet. Such additional features include reflectors,

pencil holders and the like. For prior art helmets the flexibility to include these secondary fixing mechanisms is limited due to the problems they would cause during the moulding step.

[0007] It is an object of the present invention to address the above problems, and provide a more easily and transportable safety helmet.

Summary of the Invention

[0008] According to the invention there is provided a method of manufacturing a safety helmet, the method including the steps of;

(i) providing an upper, substantially hemispherical protecting shell, formed of a plastics material to protect the skull of the wearer when in use;

(ii) providing a lower helmet section;

(iii) the lower helmet section including engaging means for support tape;

(iv) securing each end of the support tape with a tape engaging means such that the tape spans the lower helmet section, and securing sufficient tape to provide a web of material to rest on a wearer's head and support the helmet;

(v) engaging the lower helmet section with the upper helmet section, said engagement pushing the tape engaging means against the upper helmet shell, thereby sandwiching the tape ends and restricting movement of said tape ends.

[0009] A helmet can therefore be more rapidly produced than previously was the case.

[0010] Preferably the support tape comprises a plurality of tape sections secured together about the central region of each tape and particularly preferably, each tape used in a helmet is of the same length. As a common tape length is used, manufacturing and assembly times are reduced.

[0011] Conveniently, the pushing of the tape engaging means against the upper helmet shell traps a tape in position to prevent the tape's movement.

[0012] Optionally, the tape includes one or more apertures defined in the end regions enabling the tape to be fitted over corresponding locating means on the tape-engaging means. The fitment of a tape is thereby facilitated and the risk of the tape slipping during helmet assembly is reduced. The tape further optionally includes two apertures which number reduces twisting of the tape but does not weaken the tape. Conveniently the or each locating means is a peg. Yet further optionally, the free end of each peg has a portion of conical cross-section, to give an arrow-like appearance, the basal portion of the conic portion being of greater diameter than that of the

peg. The design enables a tape to easily pass over the conic portion onto the peg, but not easily be removed.

[0013] Conveniently, the interior of the shell includes downwardly depending, parallel walls defining an internal volume, into which the lower section, including the engagement means can be fitted, the lower section and the walls including securing means to resist separation.

[0014] The upper shell preferably comprises a ventilation means, the ventilation means including an internal channel defined by the roof of the helmet, the channel being wider at a forward end than the rearward end and being connected by a rearward aperture to the exterior of the helmet. Ventilation is thereby provided allowing movement of heat and moisture out of the volume of the shell and the wearer's head. The greater width of the forward end compared with the rearward end providing a pressure differential drawing air from within the shell and out of an aperture.

[0015] The rearward aperture is further preferably orientated in a downward direction, to minimise the ingress of material from the outside. The lowest point of the tunnel is optionally located above the highest point of the rearward aperture to prevent fluid flowing from outside the helmet onto the wearer's head.

[0016] Optionally, the lower helmet portion includes fitment means enabling accessories such as reflectors, neckshields, pencil holders and the like to be attached. Said fitment means are further optionally apertures engaging tabs on an accessory.

Brief Description of the Drawings

[0017] The invention will now be described with reference to the accompanying drawings which show by way of example only one embodiment of a safety helmet. In the drawings:

Figure 1 is a front view of a helmet;
 Figure 2 is a sectional view along A-A of Figure 1;
 Figure 3 is a top view of a helmet;
 Figure 4 is a sectional view along B-B of the Figure 3;
 Figure 5 is a rear perspective view of a helmet;
 Figures 6, 7 and 8 show an exploded view of the side, front and perspective of the assembly of a helmet;
 Figure 9 is a perspective view of a completed helmet;
 Figures 10 and 11 illustrate a second embodiment of a peg;
 Figures 12-15 illustrate fitment means for accessories; and
 Figures 16-24 illustrate accessories usable on the helmet.

Detailed Description of the Invention

[0018] Referring initially to Figure 1, the helmet 1 can be seen to include a number of features which are common to conventionally made helmets. The shell 10 of the helmet 1 is formed of a rigid impact resistant and non-

electrically conducting plastics material. The frontpiece 11 or badging area is flat and can be used to identify the wearer or the company represented, by affixing a label thereto. A peak 12, below the frontpiece 11 acts to prevent injury to the wearer's face and eyes from material falling from above.

[0019] In order to alleviate the heat problem indicated above, the helmet 1 includes a ventilation means. Referring to Figures 2 to 4 a ventilation ridge 13 runs from a front portion of the top of the helmet 1 towards a rearward exterior opening into the inside of the helmet 1 at aperture 14. The ridge 13 defines an internal channel 14a running from the front towards the rear of the helmet 1. Said channel, opening to the outside at the aperture 14 is larger in width at the forward interior end than at the rearward end, and is also larger than the aperture 14. The channel 14a therefore connects the interior volume at the top of the helmet 1 with the outside.

[0020] The aperture 14 is orientated downwardly to minimise ingress of material through the aperture 14. Heat and moisture which would otherwise accumulate above the wearer's head are thereby removed. The aperture 14 together with the narrowing of the channel 14a towards that aperture 14 act to produce a slight lowering of pressure which draws air from the interior volume of the helmet and aids the cooling process. An additional optional exterior channel 16 is included to aid run off of moisture from the helmet 1. If required, a stopper or bung can be employed to close the hole for example, to minimise the risks where there is a danger of hot materials splashing in to the aperture. Alternatively, a stopper or bung can be used to prevent the user's head from becoming too cold.

[0021] Within prior art helmets a supporting structure—often referred to as a cradle—is fitted inside the shell 10 and acts as a support for a number of tapes which span the internal volume of the shell 10. The tapes combine together to form a web, which web of tapes acts to support the helmet when in use and also to absorb forces impacting the helmet.

[0022] Prior to insertion into the helmet shell the tapes, usually three in number, are sewn together at a common point, approximately central to each tape.

[0023] Special attachment means are then used to fix the free ends of the tapes to a cradle. The cradle and tape assembly is fixed into the helmet shell, rendering the helmet ready for use.

[0024] Due to the difficult nature of the above assembly method, these steps are typically done prior to dispatch of the helmets from a specialist manufacturing site. The result of this is firstly increased manufacturing times and secondly higher transport costs due to the poor stackability of completed helmets.

[0025] The method of assembly of a helmet according to the invention described herein facilitates the processes involved. The method also allows for all the tapes to be used to be of the same length, reducing assembly time and lowering manufacturing costs.

[0026] In Figures 6-8, it can be seen that the helmet shell 60 is formed from two separate sections 61,62. The upper section 61 includes the ventilation tunnel 14a indicated above, although this feature is not essential to the working of the method of assembly.

[0027] complementary features on the upper section 61 enable the invention to function. Firstly, at intervals around the lower section 62, tape securing elements 63 are located. Each securing element 63 has an outwardly facing planar surface 64. Two pegs 65 project upwardly from the securing element 63 which engage the end regions of a tape 66. To facilitate said engagement, holes (not illustrated) corresponding to the diameter and separation of the pegs 65 can be formed in the tape 66.

[0028] In the embodiment shown the lower section 61 has six securing elements 63, enabling three tapes 66 to be fitted combining together to form a supporting web inside the helmet 60. By suitable location of the securing elements 63, the distance between diametrically opposed elements 63 can be made the same, enabling therefore only one length of tape 66 to be used. Such standardisation reduces production and assembly costs.

[0029] In order to secure the upper and lower sections 61,62 to one another, a push-fit fixing mechanism is provided. Male fixing tabs are supplied on the lower portion 62. Said tabs are formed of a plastics material and are partially resilient. The corresponding female elements on the upper section 61 engage the male tabs, and vice versa, to provide a firm fitment. The resilient nature of the tabs enables the two sections 61,62 to be separated only with difficulty. The temptation for a wearer to carry out repairs if one section is damaged is therefore reduced: such repairs often being dangerous as, following an impact, weakening of the shell can occur which is not visible, but renders the helmet unsafe with regard to its being used further. The one-way fit also provides the helmet as a coherent unit comparable to conventional helmets.

[0030] To assist fitment together of the two sections, the upper section 61 has a double skin 67,68 which both guides the lower section 62 into position and also subsequently strengthens the completed unit.

[0031] In order to assemble the completed helmet therefore, an upper section 61 is selected and positioned such that the other elements can be added thereto. A lower section 62 is selected along with three tapes 66 of equal length. The pegs 65 are located within the holes at the end of each tape 66, with the tapes 66 thereby secured to the securing elements 63 on opposing sides of the lower section 61.

[0032] The upper and lower sections 61,62 are then brought together. In so doing the securing elements 63 pass between the walls of the double skins 67,68 carrying the tape 66. The free ends of a tape 66 are thereby sandwiched between the planar face 64 of a securing element 63 and the outer skin 68. Once the two sections 61,62 are clicked into their final position, the tapes 66 are held firmly in position to form a supporting web. The helmet

60 is then ready for use.

[0033] An additional embodiment, of peg is shown in Figures 10 and 11. The pegs 110 have, in cross-section, and arrow-head configuration. Once the peg 110 has passed through the tape 66 therefore the peg 110 is difficult to remove and almost impossible without irreparably damaging the tape 66.

[0034] A further feature displayed by the helmet 60 is the neck guard 70, which is included as an extension of the lower section 62.

[0035] In an alternative embodiment, not illustrated, a supporting web can be used in place of the tapes. The web includes tabs to enable the web to be secured in position. Alternatively, a plastic webbing or cradle can be used.

[0036] The helmet of the present invention is defined to be used in conjunction with other safety apparatus. For example, fitments means to accommodate the use of ear defenders is included. The use of ear defenders is well known and different fitments means have been developed and in many regions become standard. For example standard fitments are in use in the United Kingdom with different standards in Continental Europe. The helmet according to the present invention is capable of use with both fitments. Additionally, visor carriers and visors, brow guards and weld shields.

[0037] The fitment means are exemplified in Figures 12-15. In Figure 12, a fitment clip 120 is shown typical for a standard UK fitment. The clip 120 has two downwardly depending arms 121. The arms 121 have limited resilience enabling the arms 121 to bend outwardly from the plane of the clip 120 if a force is applied. Once the force is removed however, the arms 121 revert to the configuration shown. The clip 120 further includes a tab 122, also depending downwardly to engage a fitment on the helmet 1.

[0038] Typically within the UK, the clip 120 engages a fitment 130, on the side of a helmet, shown in Figure 13. The tab 122 passes into the slot 131 in the fitment. Moreover, each arm 121 passes over the surfaces 132, bending due to the force exerted by the surface 132, until the clip portion 123 of the arm passes over the end of the surface 132. Once the clip portion 123 passes over the end, the arm 121 reverts to its normal position and the clip portion passes under the helmet 1 to hold the fitment clip 120 in position, with the support section 124 against the outer surface of the helmet 1. An accessory can then be fitted to the outer surface 125 of the fitment clip 120.

[0039] The fitment 130 is however unsuitable for use with the continental European clip 140 shown in Figure 14. A modified fitment 150, shown in Figure 15 can therefore be included on a helmet 1, which modified fitment can accommodate both types of clip 120 and 140. The fitment 150 is similar to that shown in Figure 13. The slot 151 is firstly broader to allow passage of the tab 141. Moreover the outer surface 152 of this slot 151 includes a throughaperture 153 to receive the projecting tab 142.

[0040] As the tab 141 is therefore pushed into the slot

151, the resilient material from which the tab 141 is formed allowing the tab 141 to bend inwardly. Downward pressure is continued until the tab 141 engages this and enters the aperture 153. The tab 141 then springs back to its normal configuration pushing the tab 141 into the aperture 153 and fixing the fitment 150 in position.

[0041] In addition to the above cited advantages, the use of a two part construction enables fixing mechanisms to be readily incorporated enabling secondary accessories such as reflectors, pencil holders and the like to be included as part of the finished product. The fixing mechanisms are typically slots within the helmet, which slots do not affect the integrity of the helmet.

[0042] Examples of this are shown in Figures 16-24. In Figure 16 and 17, upper slots 160 can be seen on the rear portion 161, together with a lower slot 162 to receive the particular accessories, illustrated in Figures 16 and 17 by a reflector 163. The reflector 163 includes hooks 164 insertable into the slots 160, 162 to secure the reflector 163 in position.

[0043] In the following Figures, the same principle can be seen to serve to support other accessories. So in Figures 18-24 are shown a goggle strapholder 165, lamp cable holder 166, an Radio Frequency (RF) card holder 167, a centrally mounted card holder 168, a neck cover 169, an air supply feed 170 linked into the air vent slot and a pencil holder 171.

[0044] As the tab 141 is therefore pushed into the slot 151, the resilient materials from which the tab 141 is formed allowing the tab 141 to bend inwardly. Downward pressure is confirmed until the tab 141 engages this and enters the aperture 153. The tab 141 then springs back to its normal configuration pushing the tab 141 into the aperture 153 and fixing the fitment 150 in position.

[0045] It will of course be understood that the invention is not limited to the specific details described herein, which are given by way of example only, and that various modifications and alterations are possible within the scope of the invention.

Claims

1. A method of manufacturing a safety helmet (1), the method including the steps of;
 providing an upper, substantially hemispherical protecting shell (10), formed of a plastics material to protect the skull of the wearer when in use; providing a lower helmet section (61);
 the lower helmet section (61) including engaging means for support tape (66);
 securing each end of the support tape (66) with a tape engaging means (63) such that the tape spans the lower helmet section, and securing sufficient tape (66) to provide a web of material to rest on a wearer's head and support the helmet (1);
 engaging the lower helmet section (61) with the upper helmet section, said engagement pushing the

tape engaging means against the upper helmet shell (10), thereby sandwiching the tape ends and restricting movement of said tape ends.

2. A method according to Claim 1 wherein the support tape comprises a plurality of tape sections secured to each other about a central region of each tape section.
3. A method according to Claim 2, wherein each tape used in a helmet is of the same length.
4. A method according to any preceding claim, wherein the pushing of the tape engaging means against the upper helmet shell traps a tape in position to prevent the tape's movement.
5. A method according to any preceding Claim, wherein the tape includes one or more apertures defined in the end regions enabling the tape to be fitted over corresponding locating means on the tape-engaging means.
6. A method according to Claim 5, wherein the tape includes two apertures.
7. A method according to any preceding claim, wherein the or each locating means is a peg (65).
8. A method according to Claim 7, wherein the free end of each peg (65) has a portion of conical cross-section, to give an arrow-like appearance, the basal portion of the conic portion being of greater diameter than that of the peg (65).
9. A method according to any preceding Claim, wherein the interior of the shell includes downwardly depending, parallel walls defining an internal volume, into which the lower section, including the engagement means can be fitted, the lower section and the walls including securing means to resist separation.
10. A method according to any preceding Claim, wherein the upper shell comprises a ventilation means, the ventilation means including an internal channel (14a) defined by the roof of the helmet, the channel being wider at a forward end (14) than the rearward end and being connected by a rearward aperture to the exterior of the helmet.
11. A method according to Claim 12, wherein the rearward aperture is orientated in a downward direction, to minimise the ingress of material from the outside.
12. A method according to Claim 11, wherein the lowest point of the tunnel is located above the highest point of the rearward aperture.

13. A method according to any preceding claim, wherein the lower helmet portion includes fitment means enabling accessories such as reflectors, neckshields, pencil holders and the like to be attached.

5

14. A method according to Claim 13 wherein said fitment means are apertures engaging tabs on an accessory.

10

15

20

25

30

35

40

45

50

55

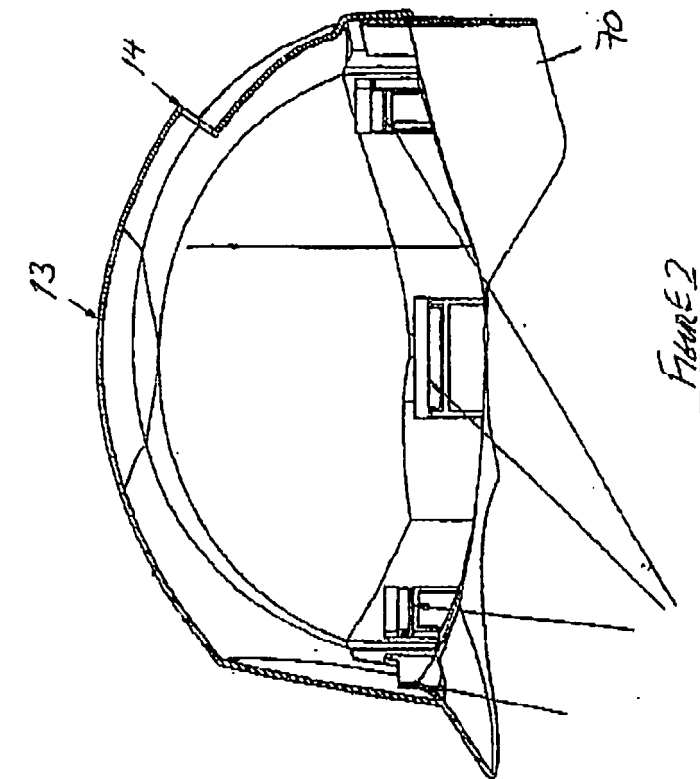


Figure 2

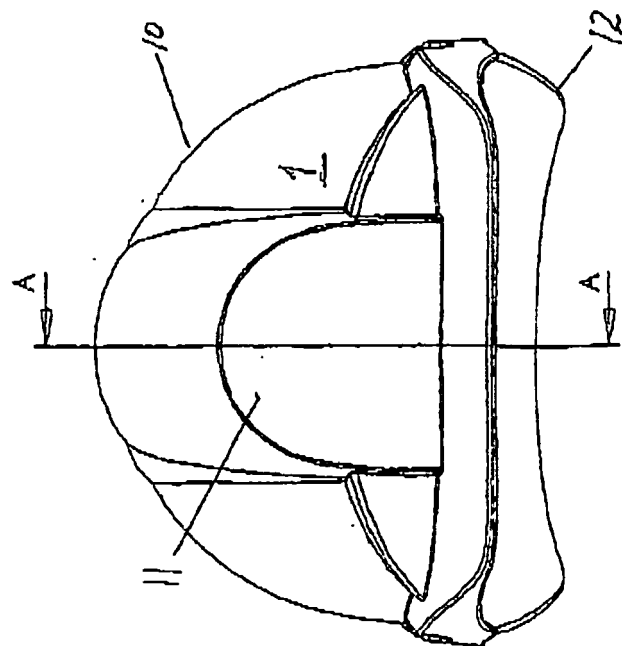


Figure 1

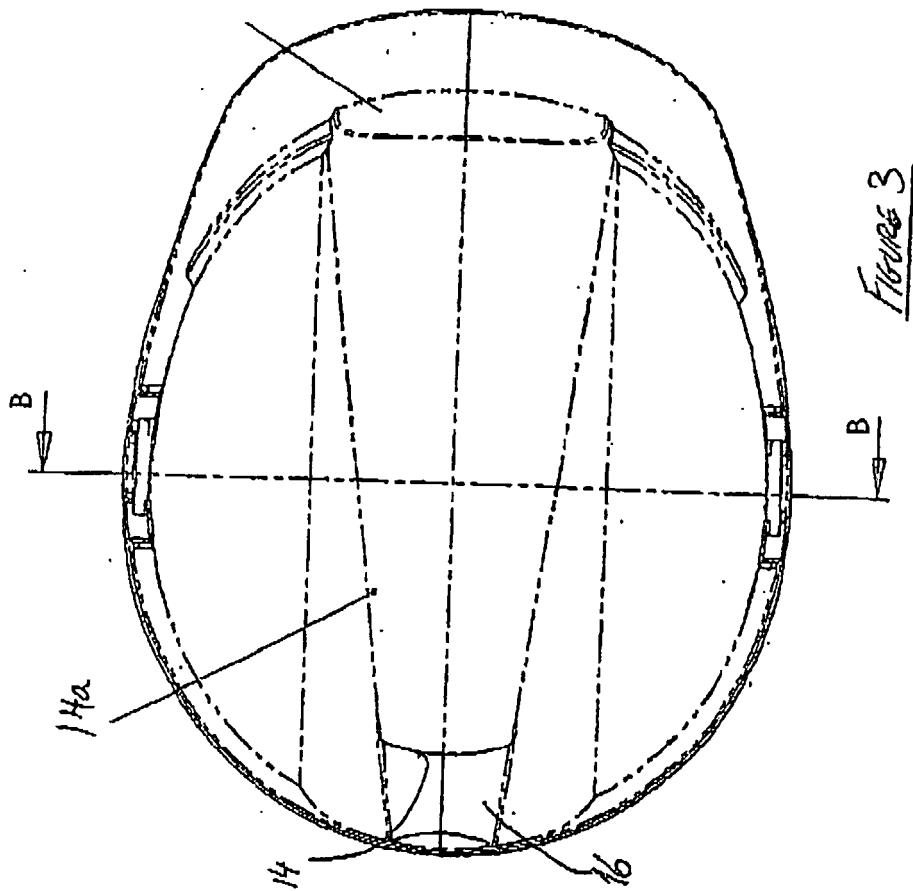


FIGURE 3

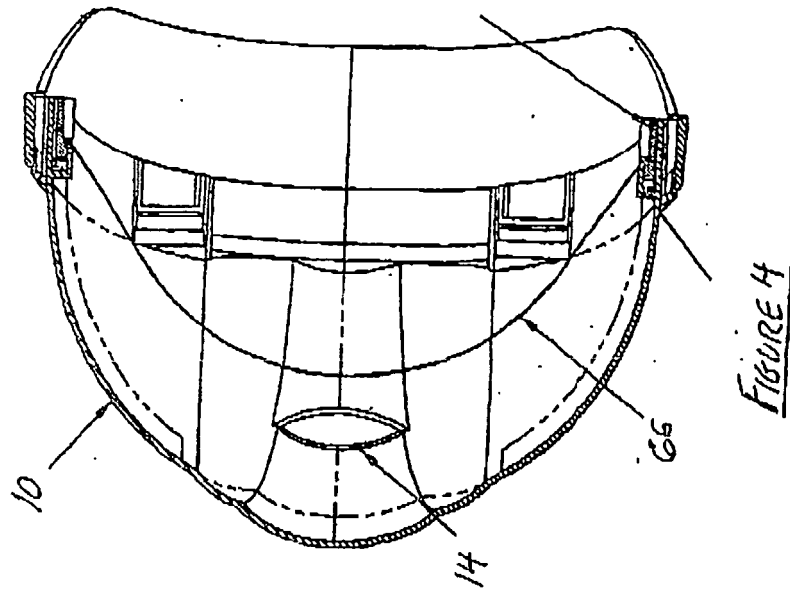
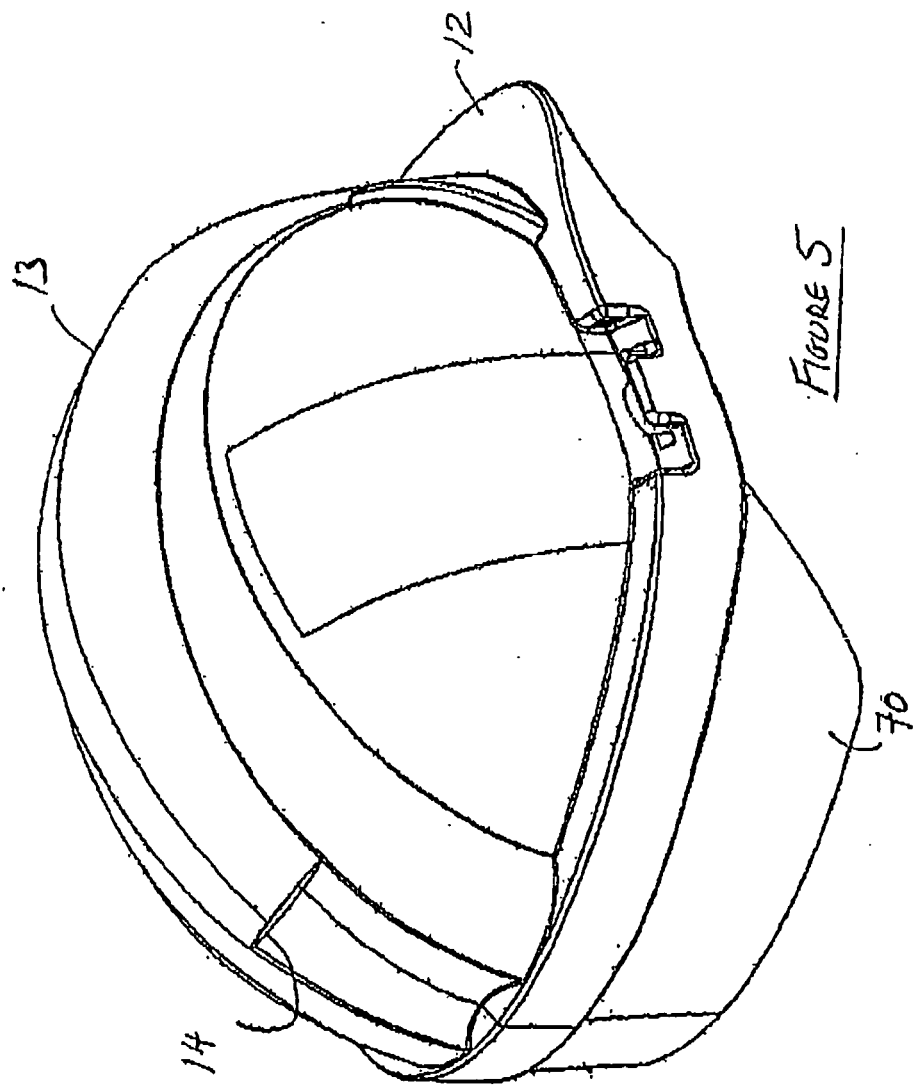
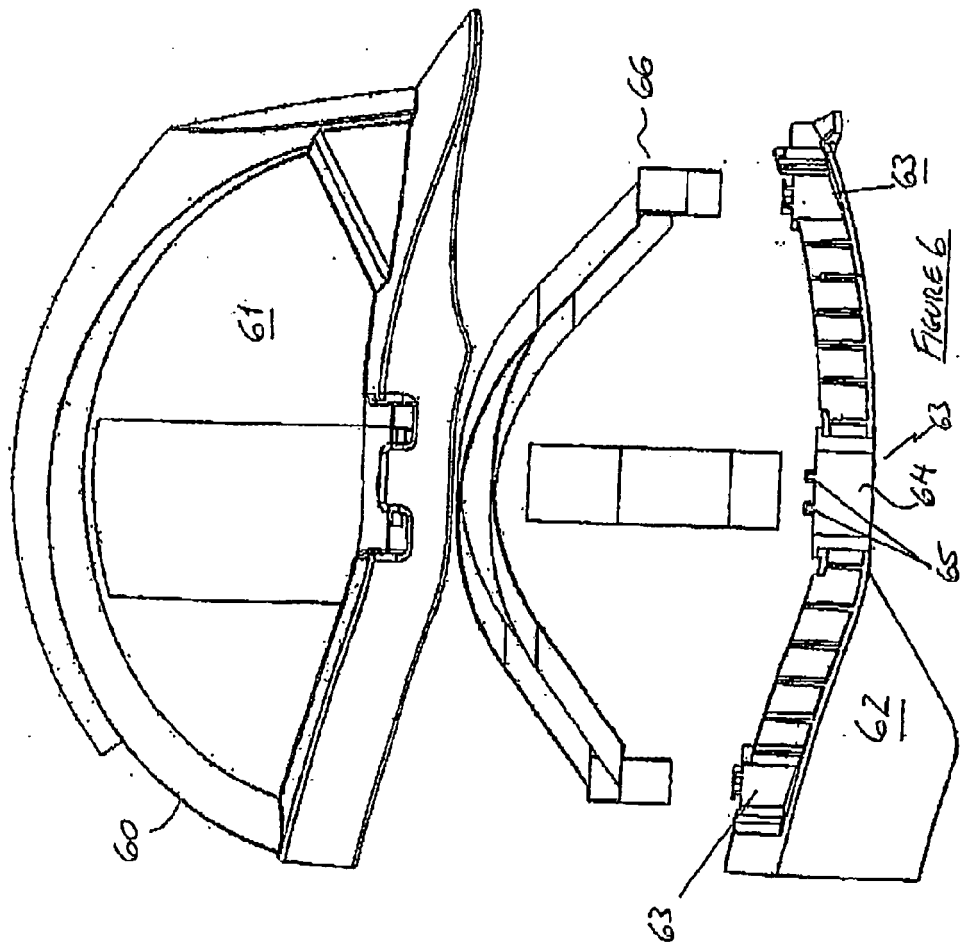
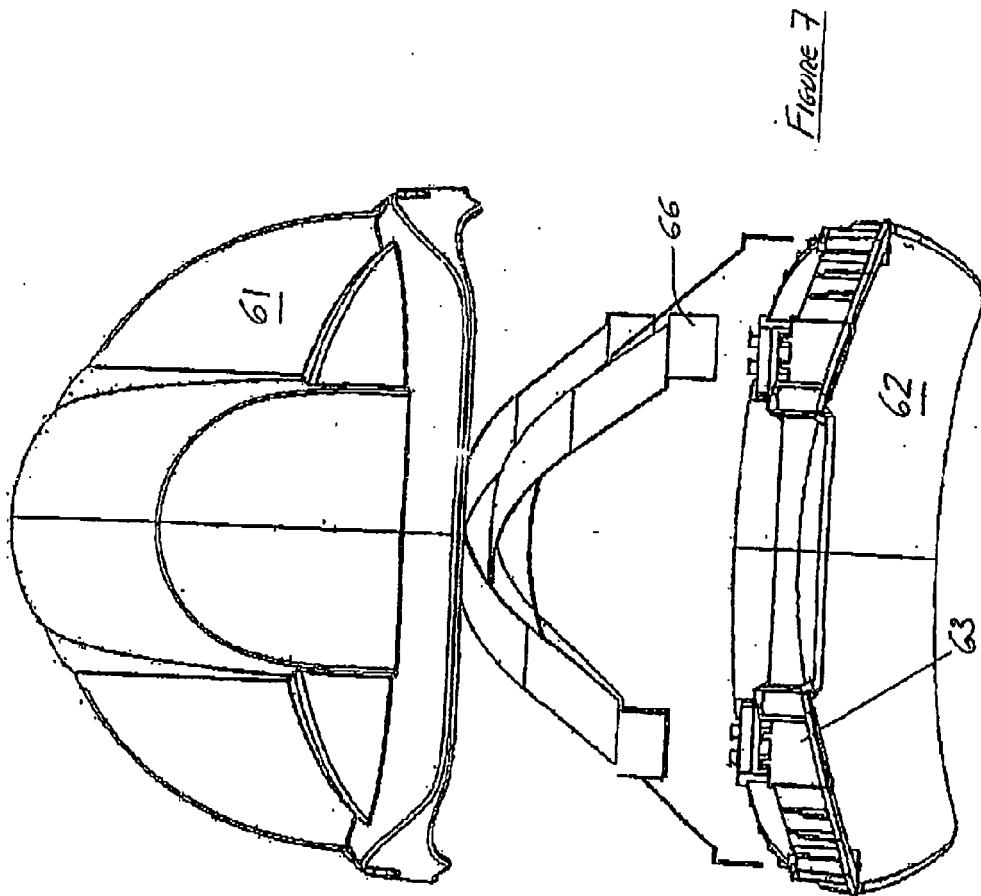
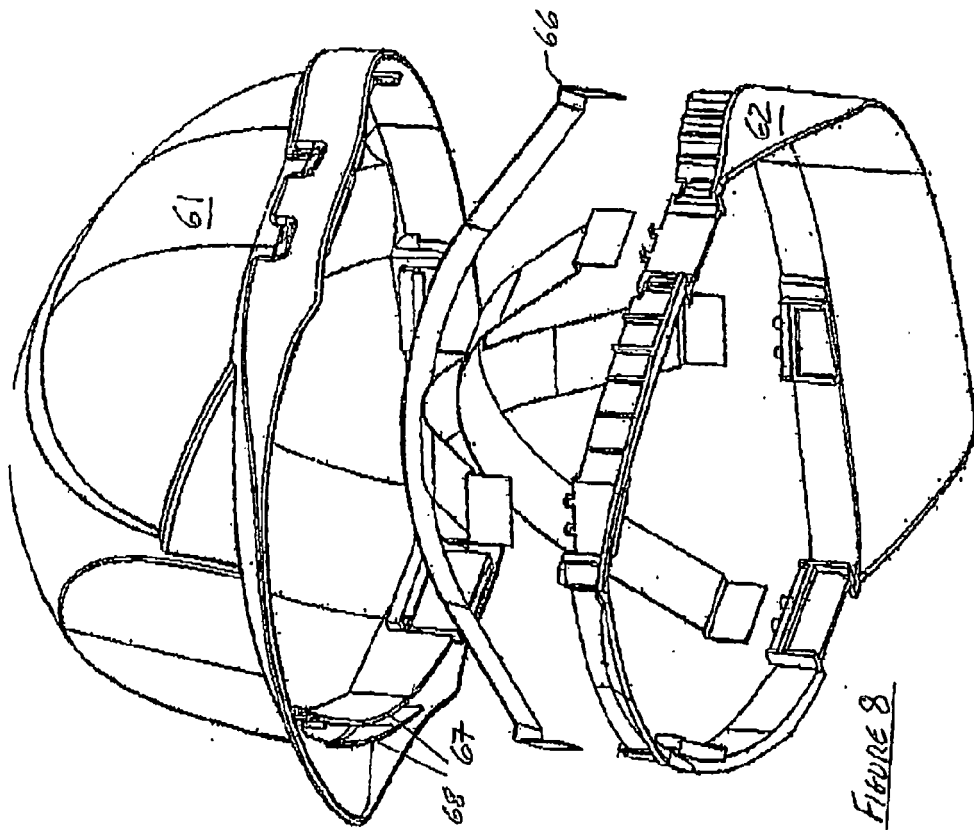


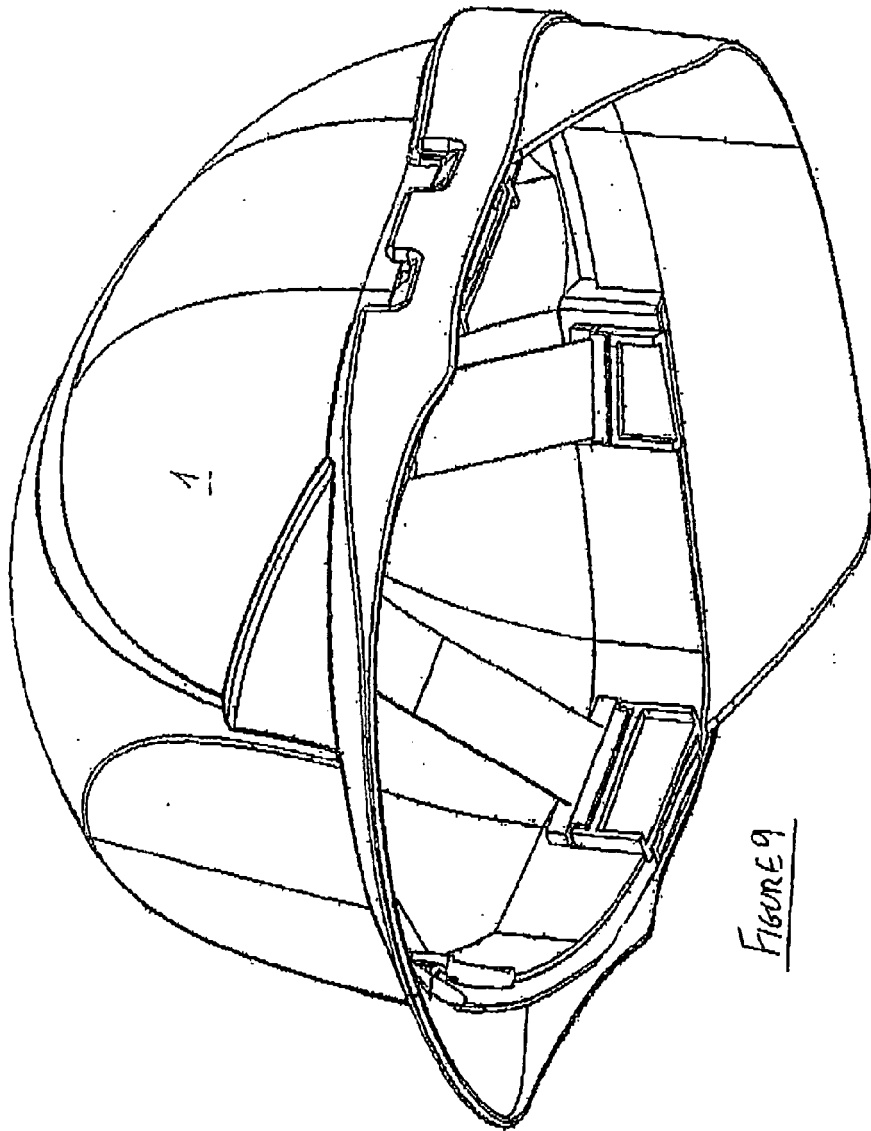
FIGURE 4











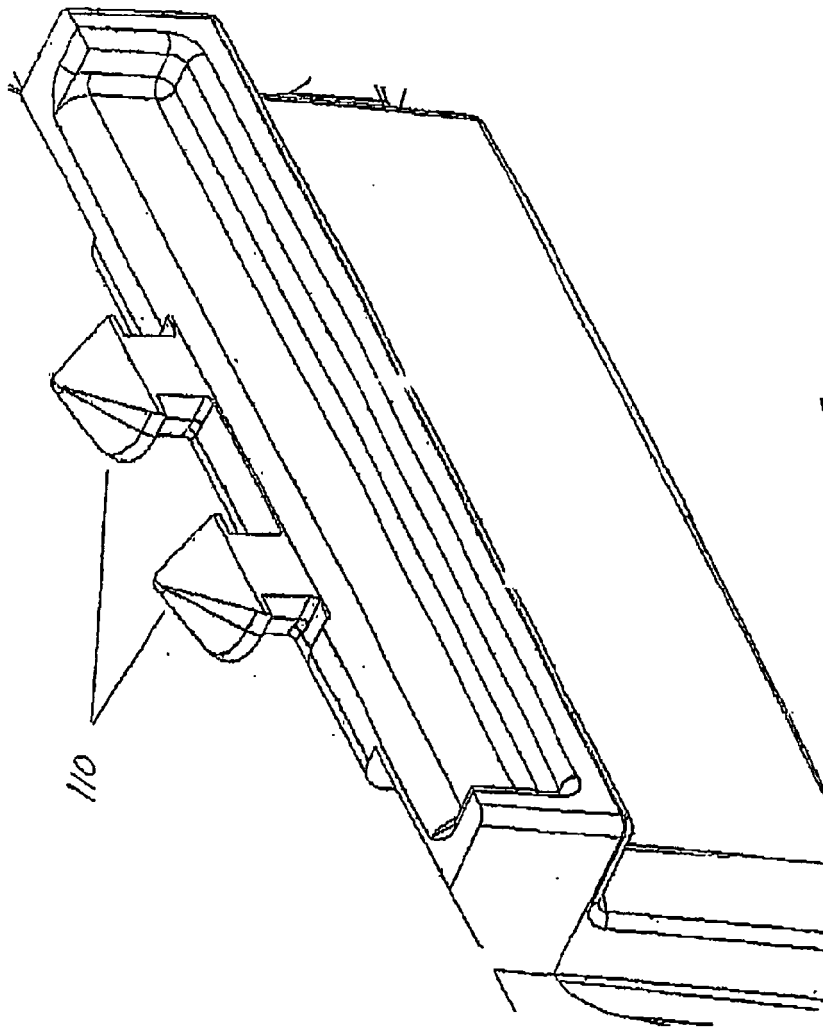


FIGURE 10

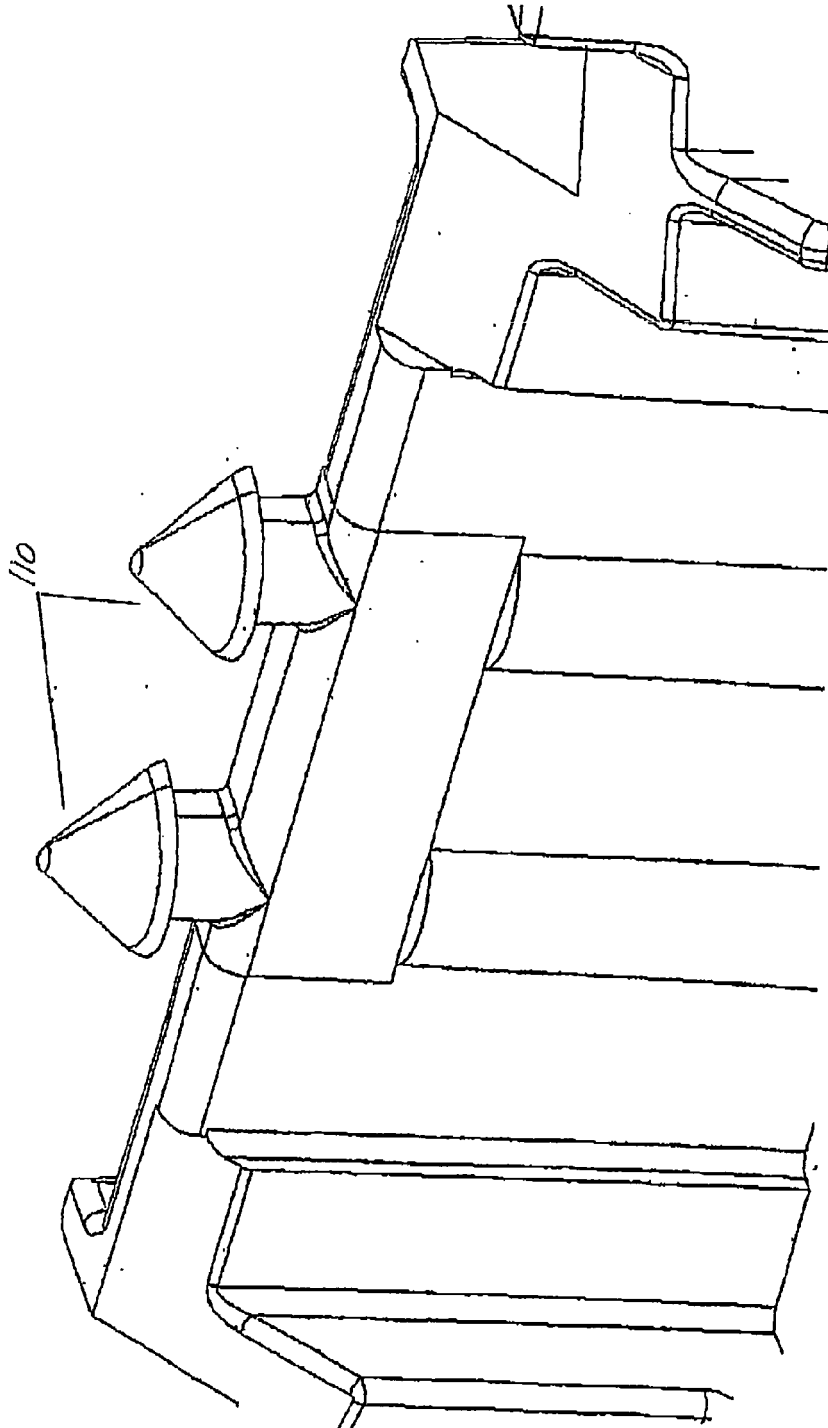


FIGURE 11

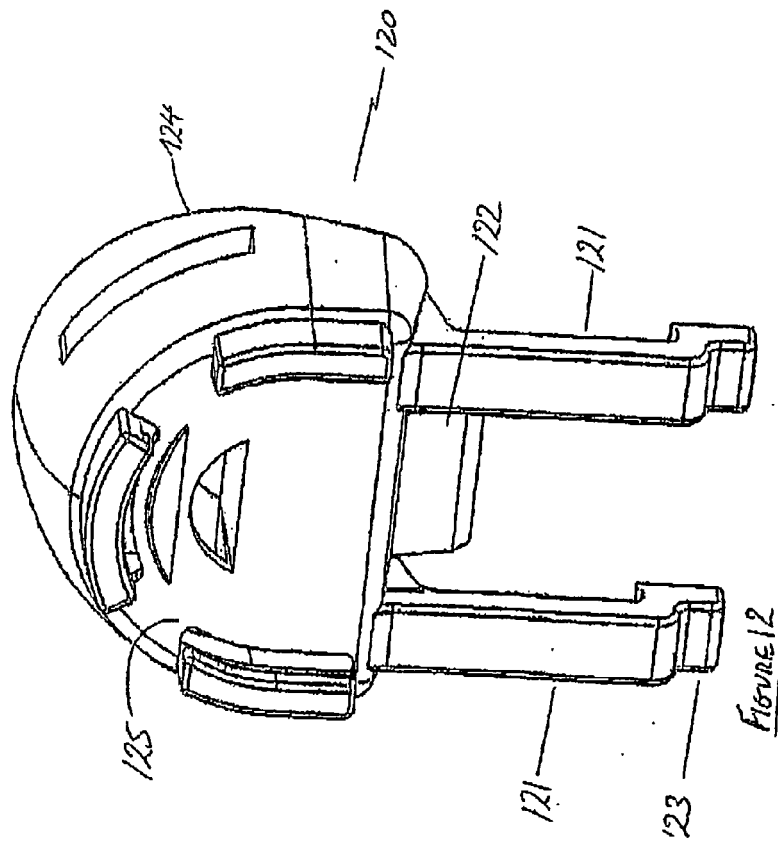


FIGURE 12

