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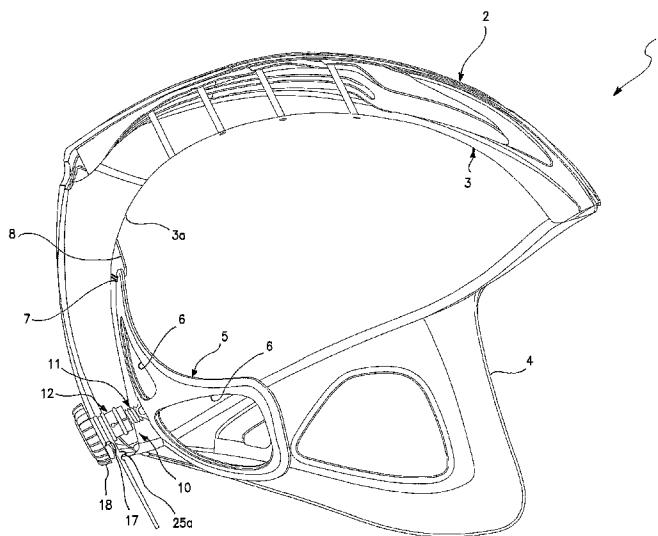
- as to the identity of the inventor (Rule 4.17(i))
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(54) Title: A PROTECTIVE HELMET, PARTICULARLY FOR SPORTS USE



(57) Abstract: A protective helmet, particularly for sports use, comprises an inner shell (3) forming a surface (3a) capable of enclosing the head of the user, at least one support (5) arranged in an articulated manner in the inner shell (3) of encasing the occipital region of the head, and also means for moving and locking the support (5) adjustably relative to the inner shell so that the shell (3) and the support (5) can be matched to the shape of the head, fitting snugly onto the corresponding surfaces of the head, in which the above-mentioned means comprise a spacer (10) extending between the support (5) and the inner shell (3) and including at least a first and a second spacer part connected to each other by a screw-and-nut connection, so that the axial extension of the spacer (10) is adjustable by screwing said parts in or out relative to each other so as consequently to move the support (5) away from or closer to the shell (3).

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A protective helmet, particularly for sports use

Technical field

The present invention concerns a protective helmet, particularly for sports use, having the characteristics set out in the preamble to the main claim 1.

5 Background technology

In the specific technical field of protective helmets, and particularly of helmets designed for sports use and therefore specifically arranged to protect against falls or impacts, it is generally required that the helmet should match the shape of the head as far as possible without constriction and without leaving loose-
10 fitting areas in the coverage of the head, from the frontal area at the temples to the rear occipital area, in order to maximize the protective capabilities. On the other hand, helmets have inner shells which normally measure a predetermined amount, that is they are produced with a predetermined circumference for the measurement around the head, and this therefore offers
15 an optimum fit only for a head of the corresponding shape. Because of production requirements, helmets are also produced in a limited number of sizes and each size is therefore intended to cover different head measurements, that is to say it can be matched to different head dimensions and shapes by means of suitable compensating devices, such as auxiliary
20 padding of selected thickness which can be fitted inside the shell.

In helmets of this type, where specific protection of the rear occipital area of the head is also required, provision is also made for using an occipital retention support consisting typically of a suitably shaped plate fitted in an articulated
25 manner in the inner shell and capable of being moved with respect to the latter to fit snugly onto the occipital lobe, consequently encasing the nape of the neck and therefore allowing a more closely matching fit. Such support systems therefore make it possible to compensate for defects or different head shapes in the fitting of the helmet, preventing it from being removed in case of impact

and assisting in matching the helmet to the head of the user. Examples of these supports for occipital retention are described in US 5659900 and US 5638551. Known devices also provide for these occipital supports to be locked against the head in the position selected by the user when putting on the helmet, with locking means typically of the strap type, which may be independent of the strap fastening system of the helmet or integrated into it, as disclosed by the above-mentioned US patents.

Description of the invention

The present invention falls within the specific sector of helmets provided with supports for protecting the occipital area and its main purpose is to make available a protective helmet which increases the possibility of obtaining a correct fit, that is a helmet which is more capable of matching the specific shape of the head is obtained.

Another purpose is to obtain adjustability in helmets of the above-mentioned type with characteristics of greater accuracy of adjustment of the position of the support relative to the inner shell of the helmet.

Yet another purpose is at the same time to make adjustment easy for the user and also simplify overall construction and the assembly of the support components to the helmet.

These and other purposes which will be shown more clearly in what follows are achieved by the invention by means of a protective helmet produced according to the appended claims.

Brief description of the drawings

Other characteristics and advantages of the invention will become clear from the following detailed description of a preferred example of embodiment illustrated purely by way of non-limiting example with reference to the appended drawings in which:

- figure 1 is a view in side elevation and partial cross-section of a helmet

produced according to the invention,

- figure 2 is a perspective view in partial cross-section of the helmet in figure 1,
- figure 3 is an exploded perspective view of part of the helmet in the preceding drawings.

Preferred mode of embodiment of the invention

With reference to the drawings cited, the number 1 indicates as a whole a protective helmet, particularly designed for sports use, produced according to the present invention.

- 10 The helmet 1 comprises an outer shell 2 and an inner shell 3 firmly attached to each other in a manner conventional in itself, in which the inner shell 3 forms a surface 3a capable of encasing the head of the user. The number 4 indicates opposite lateral portions of the helmet 1 arranged for the protection of corresponding lateral regions of the head, extending close to the ears and also
- 15 below these.

A strap fastening system with tightening below the chin, of substantially conventional type, not shown, is also provided for fastening the helmet 1.

- The helmet 1 also comprises a rear support, indicated by the number 5, arranged to encase the rear occipital region of the head, which is capable of
- 20 being moved adjustably with respect to the inner shell 3, to match the physical shape of the head, as will become clear further on in the description.

- The support 5 is produced in the form of a plate having a convex inner surface profile and appropriately shaped to fit snugly over the corresponding surface of the occipital lobe which it is intended to enclose. Through apertures 6 are
- 25 made in the support 5 with the basic function of reducing weight and also such as to make the support 5 partially pliable, so as to be moderately soft and self-adapting.

The support 5 is also covered with a soft material, not shown, which acts as

padding to seat the helmet comfortably on the head. This covering is also intended to include the apertures 6.

The number 7 indicates a further aperture made through the support 5 to take a small strap 8 with its ends attached to the inner shell 3, by means of which
5 the support 5 is articulated in a kind of hinge to the shell.

Between the support 5 and the inner shell 3 a spacer element indicated as a whole by 10 is provided, having adjustable axial extension, so that the support can be moved away from or closer to the inner shell 3. More particularly, according to a principal characteristic of the invention, the spacer 10 comprises
10 a first and a second spacer part connected to each other by a screw-and-nut connection, so that the axial extension of the spacer 10 is adjustable by screwing said parts in or out relative to each other.

The first spacer part comprises a spindle 11 externally threaded for a length 11a of its axial extent and the second part comprises a tubular bush 12 in the
15 axial cavity of which a female thread 13 is provided, capable of engaging in a screw connection with the threaded length 11a of the spindle 11.

At one of its free ends 11b, the spindle 11 is joined to the support 5 by means of a pair of pin-shaped appendages 14a, b, attached to the spindle 11 and hinged in respective eye formations 15a, b projecting in the same direction
20 from the support 5. The spindle and the bush are produced in such a way as to prevent the spindle from slipping out of the bush axially once they have been connected to each other.

In order to prevent the spindle from slipping out axially, provision is made for the spindle 11 at the opposite end 11c to have a head with a diameter slightly
25 larger than that of the threaded length 11a. The bush is threaded internally along a section of its length, a section which extends from the entry hole for the spindle to a predetermined depth in the bush cavity. Starting from the point where the female thread inside the shell stops, the cavity has a diameter

slightly larger than that of the head of the spindle for the length following on from the threaded length, as far as the area where it is joined to the knob. In normal conditions of use, the screw-and-nut connection between the spindle and the bush takes place between the threaded portion of the bush and the thread on the spindle which is located at said portion, and the head of the spindle in no way prevents movement of the spindle, since it is located inside the portion of bush with no female thread and of larger diameter.

When the spindle has unscrewed so that it is close to coming out of the bush, the head of the spindle comes up against the transverse (ring shaped) wall which separates the unthreaded length from the threaded length inside the bush. Coming to bear against this wall, the head constitutes a stop for the spindle, preventing it from coming out of the bush.

The bush 12 is supported rotatably in the thickness of the helmet, formed between the shells 2, 3, by means of a portion 16 of bush fitted rotatably in a corresponding aperture 17 provided as a through hole in the helmet 1 and is also held axially with respect to the helmet in the direction of axial extension of the spacer 10. By means of this configuration, rotation of the bush 12 about its own main axis produces corresponding axial motion of the spindle 11 by the effect of the screw-and-nut connection, resulting in movement of the support away from or towards the shell 3.

The number 18 indicates an appendage in the form of a knob, firmly attached (for example with adhesive) to the portion 16 of the bush and accessible from the outside of the helmet (on the side of the outer shell 2) to cause the bush to rotate.

Advantageously, the bush 12 is also produced as two half bushes 12a, 12b capable of being connected along the diametrically opposite lateral generatrices of the bush, this structure facilitating assembly of the spacer 10. The helmet 1 is also provided with means for quick release of the screw-and-nut connection.

- For this purpose, longitudinal cuts 19 are provided in the bush 12, in the section having the female thread 13, so that the sectors of female thread located between adjacent cuts 19 can yield elastically in a radial direction to allow the female thread to disengage from the screw if predetermined conditions occur. An O-ring indicated by the number 20 is fitted onto the bush 12 at the portion in which the cuts 19 are made and in such a way that it fits into a groove provided on the bush 12, providing spring loading to keep the sectors of female thread engaged with the screw on the spindle and also to constitute spring return means for these.
- 10 If the helmet is subjected to an impact load, when a predetermined load threshold transmitted along the spindle 11 is exceeded, the energy can be dissipated by means of the radial expansion of the sectors of female thread 13, acting against the spring action of the ring 20, an expansion which causes the female thread to disengage from the screw of the threaded spindle with the latter sliding axially with respect to the bush. Suitable dimensioning of the components described above and also appropriate choice of the ring 20 make it possible to set the load threshold value above which the means for disengaging the female thread operate, thus producing a kind of damping device capable of dissipating part of the energy generated in case of impact.
- 20 To retain the bush 12 axially relative to the helmet, provision is made to use a spring ring 21 with an open break in the circumference and provided with a notch 22, on the opposite side to the above-mentioned break, so that the two sections of ring formed between the notch and the break in the circumference are able to expand elastically in a radial direction in order to fit into a groove 23 provided on the bush 12. The groove 23 is advantageously formed between a pair of circumferential ridges 24 projecting from the outer surface of the bush 12. The ring 21 is also provided with an extension piece 25 to make it easier to handle and to grip when fitting onto the bush, and this is designed to be
- 25

removed subsequently. A preferential bending line is formed by a groove 26 which facilitates separation of the extension piece 25 from the ring 21 when fitting.

Separation of the extension piece is made easier by the shape of the cross-section of the ring, which just above the bending line has a portion 25a projecting towards the inside of the helmet, and approximately wedge-shaped. After the ring is fitted to the bush by inserting it into a cavity provided between the outer shell 2 and the inner shell 3, the wedge-shaped portion 25a of the section can be used as a locating piece for the ring 21 with respect to the edge of the inner shell facing towards the ring. Because of the locking of the ring brought about by the wedge-shaped section on the edge of the inner shell, it is easy to bend and break the lower part of the ring at the bending line by gripping the extension piece 25 and thus causing the extension piece to be separated and then removed.

The ring 21 constitutes a shoulder surface against which the inner surface of the outer shell 2 bears. A corresponding shoulder surface is formed by the knob portion facing the helmet, so that the wall thickness of the helmet bounded by the shells 2 and 3 remains in abutment between the opposing shoulders created by the ring 21 and by the knob 18 so as to provide axial retention of the bush on the helmet.

The portion 25a of the ring with a wedge-shaped section also has the function of preventing the ring 21 from rotating about the bush, since it is retained by the lower edge of the inner shell.

In this way, the ring remains stable in its position while the bush is allowed to rotate when the adjusting action is applied to the knob from the outside of the helmet.

The invention thus achieves the proposed aims and provides numerous advantages compared with known solutions.

A principal advantage lies in the greater accuracy of adjustment of the position of the support with respect to the inner shell, obtained by means of a spacer with axial extension adjustable by means of a screw device, this device allowing fine and accurate adjustments. Accuracy in the adjustment of the support with
5 respect to the inner shell increases the possibility of obtaining a correct fit, that is improves the capability of the helmet to match the specific shape of the head.

Another advantage lies in the compactness of the adjustable spacer according to the invention.

10 Another advantage lies in the simplified construction and assembly of the components which produce the adjustable spacing means disclosed by the invention.

Another advantage still is to be found in the ease of adjustment for the user, simply by rotation of the adjusting knob.

15 Another advantage still is that the adjustable spacing means disclosed by the invention incorporate a system for dissipating part of the energy generated in case of impact.

Finally, a further advantage is provided by the fact that as a whole the adjustable spacer disclosed by the invention does not of itself constitute a
20 threat to the integrity of the head in case of a very severe impact, because of the absence of bulky and potentially dangerous parts constituting the spacer, in conjunction with the action of the impact energy dissipation system.

CLAIMS

1. A protective helmet, particularly for sports use, comprising an inner shell (3) forming a surface (3a) capable of enclosing the head of the user, at least one support (5) arranged in an articulated manner in the inner shell (3) capable of
5 encasing the occipital region of the head, and also means for moving and locking the support (5) in an adjustable manner relative to the inner shell so that the shell (3) and the support (5) can be matched to the shape of the head, fitting snugly onto the corresponding surfaces of the head, characterized in that said means comprise a spacer (10) extending between the support (5) and the
10 inner shell (3) and including at least a first and a second spacer part connected to each other by a screw-and-nut connection, so that the axial extension of the spacer (10) is adjustable by screwing said parts in or out relative to each other so as consequently to move the support (5) away from or closer to the shell (3).
- 15 2. A helmet according to claim 1, in which one of the spacer parts comprises an externally threaded spindle (11) and the other part comprises a tubular bush (12) in the axial cavity of which a female thread (13) is provided, capable of engaging in a screw connection with the threaded length (11a) of the spindle (11).
- 20 3. A helmet according to claim 2, in which said spindle (11) is secured in an articulated manner by one of its axial ends (11b) to the support (5).
4. A helmet according to any one of the preceding claims, in which the bush (12) is supported rotatably on the shell (3) and is held axially with respect to it in the direction of axial extension of the spacer (10), so that rotation of the
25 bush (12) about its own main axis produces corresponding axial motion of said spindle (11) by the effect of said screw-and-nut connection.
5. A helmet according to any one of the preceding claims, comprising an appendage (18) in the form of a knob, firmly attached to the bush (12) and

accessible from the outside of the helmet so that the bush can be made to rotate.

6. A helmet according to any one of the preceding claims, in which means are provided for quick release of the screw-and-nut connection when a
5 predetermined axial load induced in the spindle (11) is exceeded.

7. A helmet according to claim 6, in which said quick-release means comprise sectors of said female thread (13) capable of yielding elastically in a radial direction.

8. A helmet according to claim 7, in which said sectors of female thread (13)
10 are formed in said bush by longitudinal through cuts (19) provided in the bush (12) at said female thread.

9. A helmet according to claim 8, comprising a first spring ring (20) fitted onto the bush (12) at said cuts (19) to oppose by spring action the radial elastic spreading apart of said sectors of female thread (13).

15 10. A helmet according to any one of the preceding claims, in which said bush (12) is produced in two half-bushes (12a, 12b) capable of being connected to each other along diametrically opposite lateral generatrices of said bush.

11. A helmet according to one or more of the preceding claims, in which means are provided for axial retention of the bush (12) with respect to the shell (3)
20 comprising at least a first shoulder formed in a second spring ring (21) capable of fitting into a circumferential groove (23) provided on the bush (12), said ring being capable of abutting against said inner shell.

12. A helmet according to claims 5 and 11, in which said axial retention means comprise a second shoulder surface formed by said appendage (18) in the form
25 of a knob.

13. A helmet according to claim 11, in which the second ring (21) has a break in the circumference, forming opposite portions of ring which can be spread apart radially in an elastic manner.

14. A helmet according to claim 11 or 13, in which a handle extension piece (25) extending from said ring (21) is provided, capable of being selectively removed from the ring.

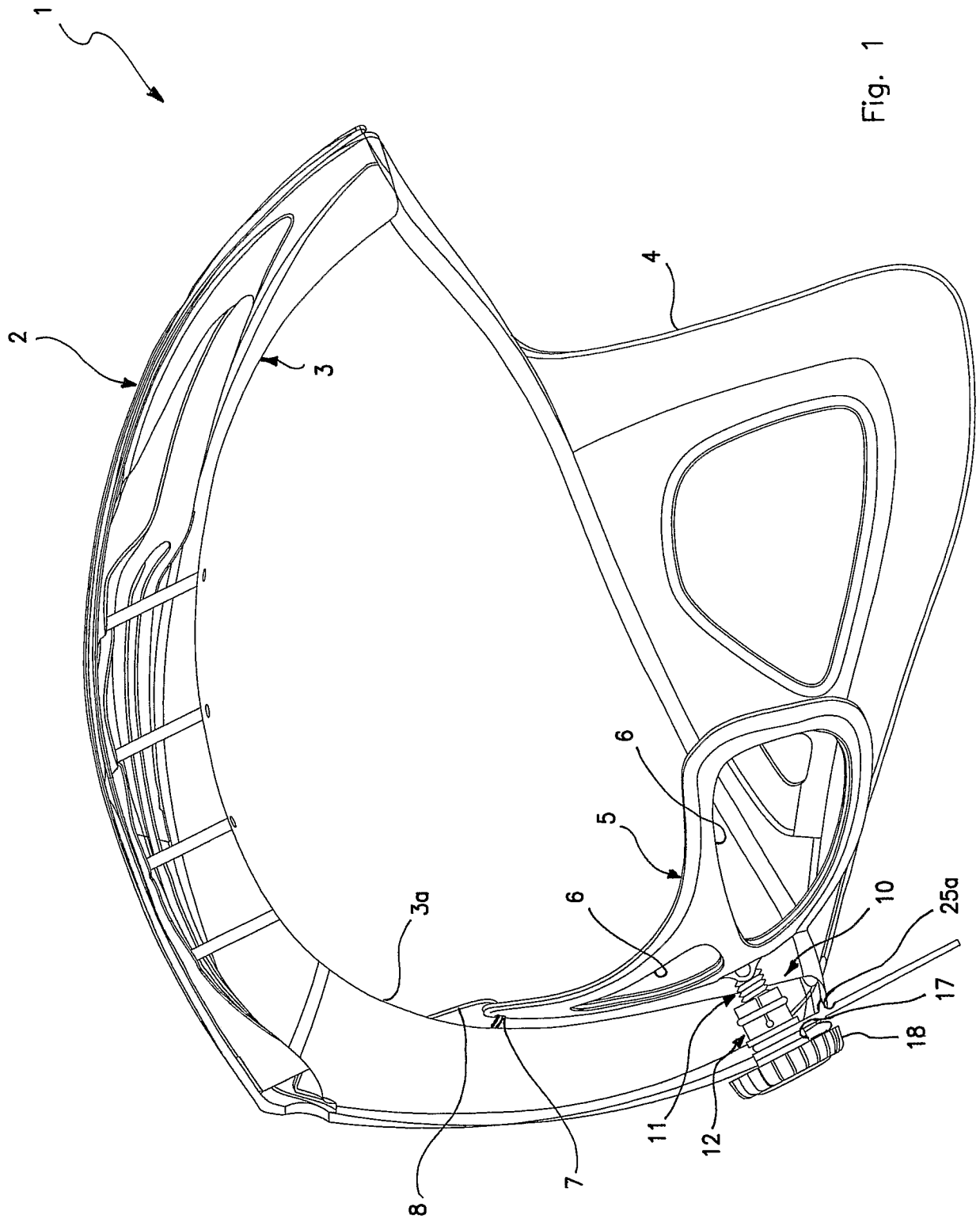


Fig. 1

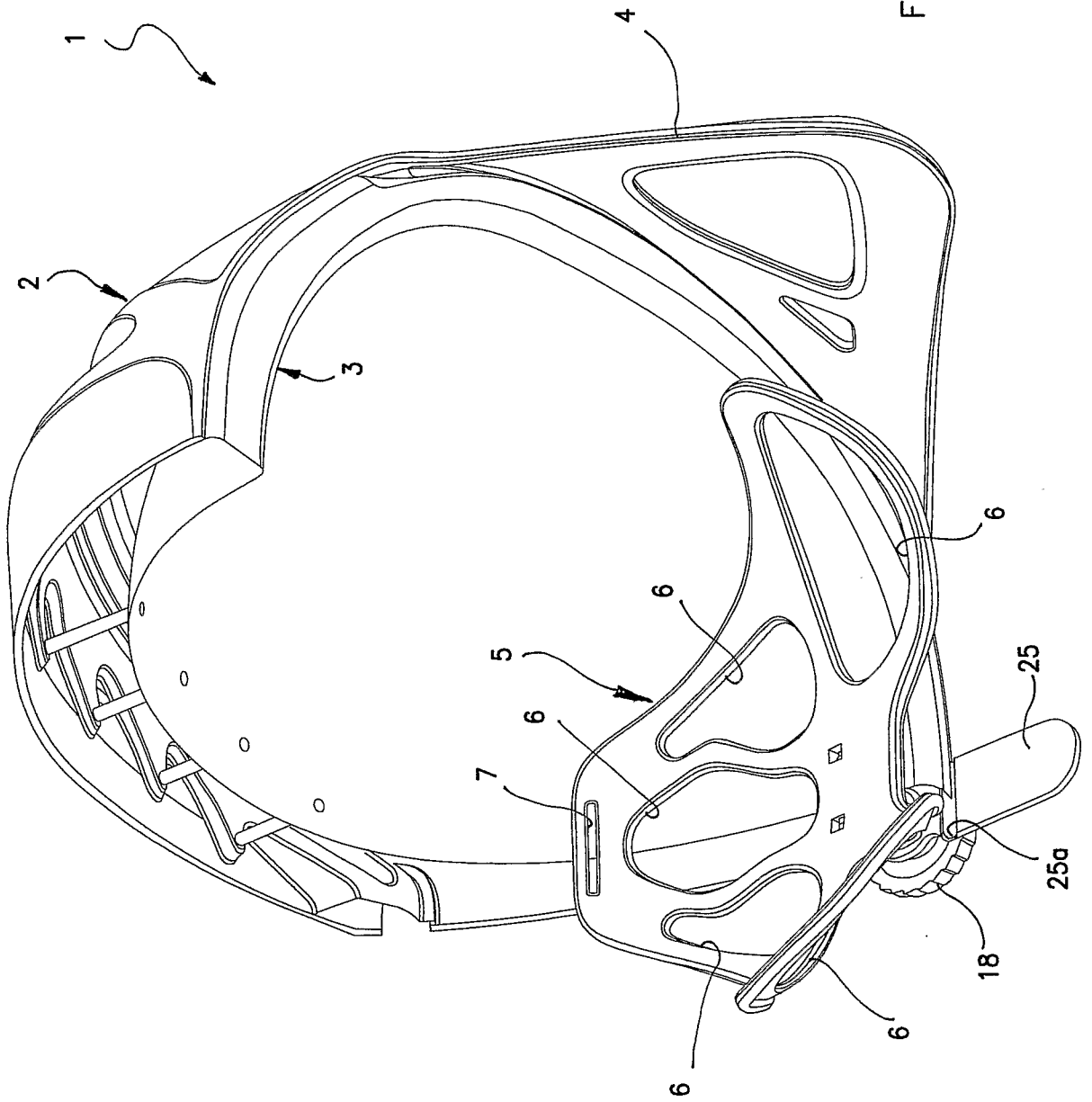
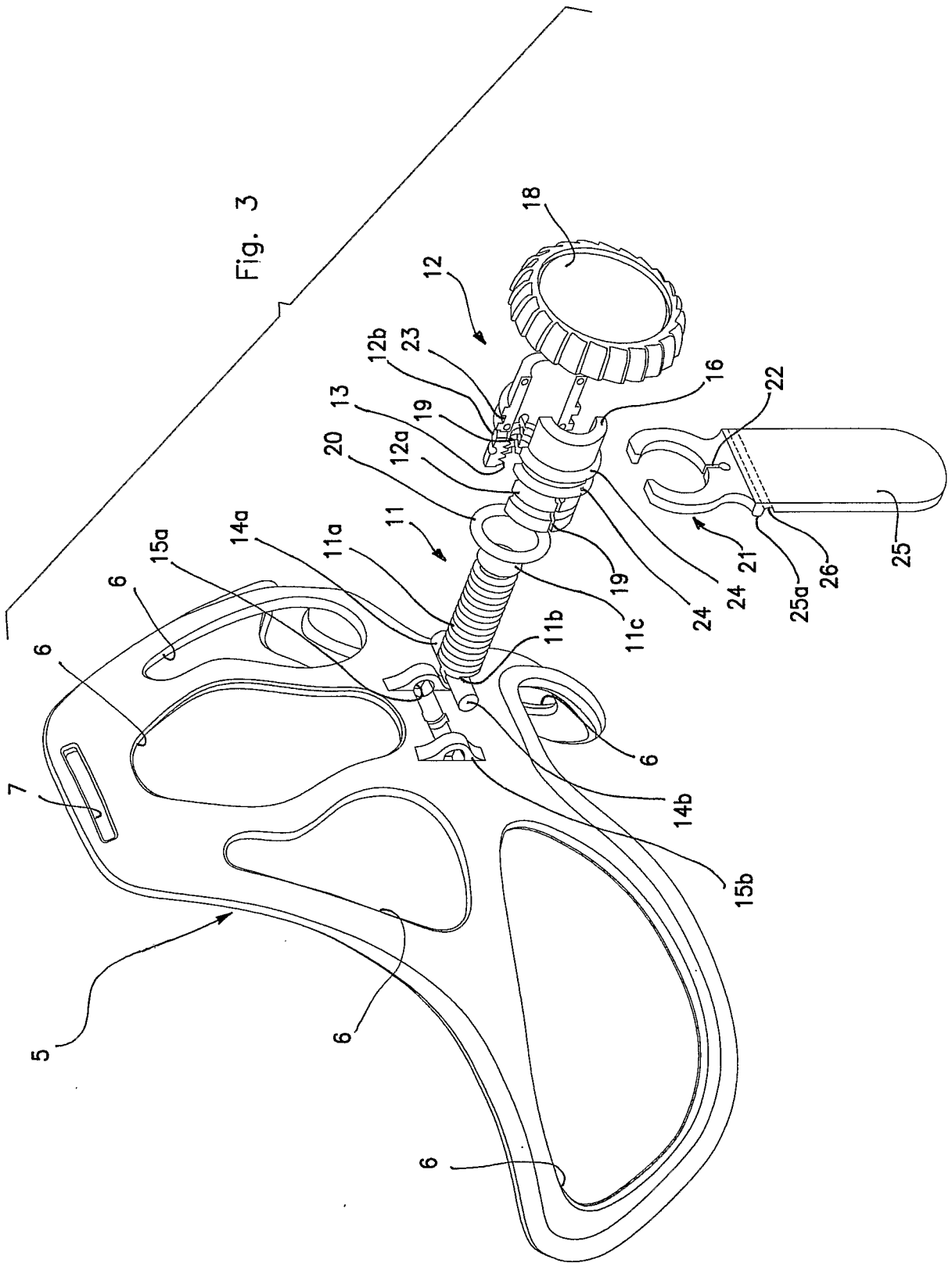


Fig. 2



INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
A42B3/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A42B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 509 145 A (STEVENSON ET AL) 23 April 1996 (1996-04-23) claims 1,4; figure 5 -----	1
A	US 6 023 788 A (MCCALLUM ET AL) 15 February 2000 (2000-02-15) cited in the application claims 1,26; figures 5,8 -----	1
A	US 6 226 802 B1 (SASAKI STEVE ET AL) 8 May 2001 (2001-05-08) claims 1,21; figures 1,2 -----	1
A	US 2005/034222 A1 (DUROCHER JACQUES) 17 February 2005 (2005-02-17) paragraph [0039] - paragraph [0044]; claim 1; figures 7,13 ----- -/--	1

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 765 234 A (PETZL ET AL) 16 June 1998 (1998-06-16) claim 1; figures 1,6 -----	1
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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