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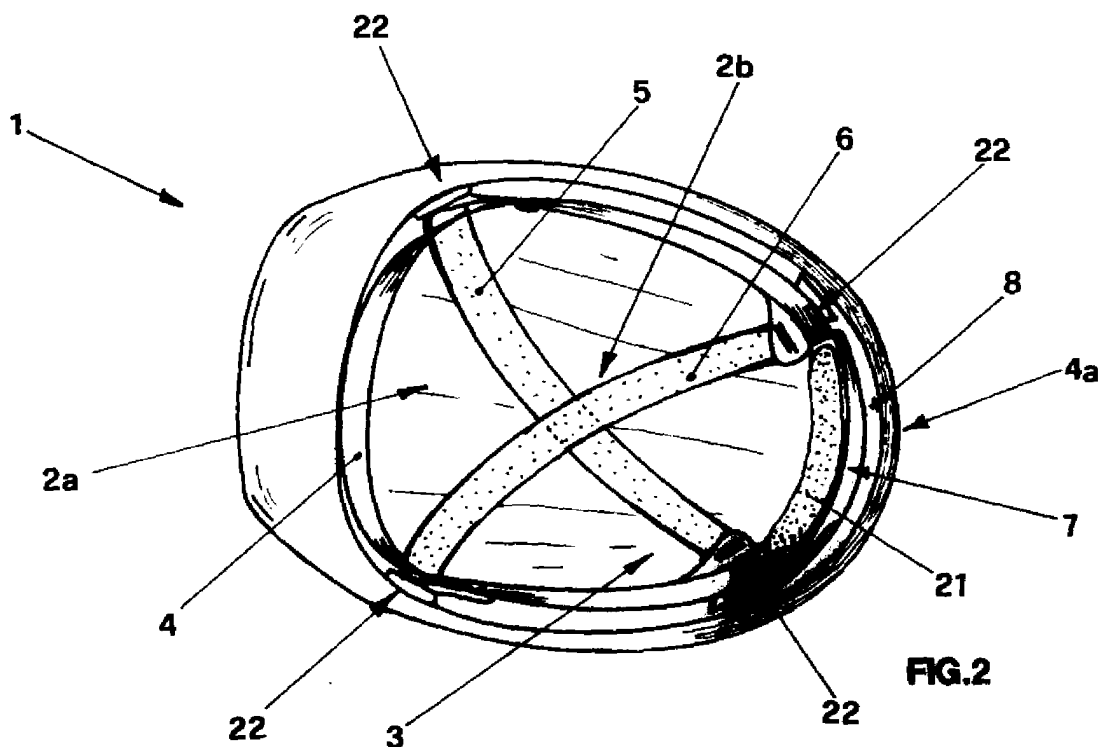
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(54) **Safety helmet.**

(57) A safety helmet (1) comprising a shaped cap (2) internally provided with a harness (3) consisting of an annular band (4), able to surround the head (T) of the user (U), and with at least two mutually crossed straps (5, 6), able to maintain spaced the head (T) of the

user (U) from the shaped cap (2). The annular band (4) comprises elastic means (7) at the portion (4a) supported on the nape (N) of the head (T) of the user (U), suitable for making adaptable the annular band (4) to the conformation of the head (T) of the user (U), to grant the adherence stability of the helmet (1).



EP 1 520 489 A1

## Description

**[0001]** The present invention is about a safety helmet, suitable for being used during working activity in many sectors, like for example in building or road sites in civil field, or in iron plants, steel plants, mines and naval dockyards, just to mention some of them, in industrial field.

**[0002]** It is known that safety helmets, also known as hard hats or skullguards, are used by workers or by the personnel in certain workplaces to protect the head from the impact with other bodies or from falling objects.

**[0003]** In fact, for instance near scaffoldings or overhead workplaces for building works, or near blast furnaces or in foundries in industrial field, the operators expose their body, especially the head, to high risks like accidental hits against iron structures, falling objects or mechanical components of different nature, very dangerous for their physical safety.

**[0004]** Therefore, in such cases, safety helmets are an indispensable, as well as compulsory, instrument, their use being provided by the European Directive no. 89/686 EEC called "Individual protection devices" to protect the head.

**[0005]** Said helmets are provided for protecting the parietal zones, the top of the head and the nape of the user who wears them.

**[0006]** The safety helmets are usually made of resistant plastic material, for example thermoplastic or reinforced polycarbonate or glass fibre, or of metallic material, like aluminium or other light alloys.

**[0007]** They are prevalently made by a cap inside which a reinforcement is obtained, composed by an annular band which surrounds the user's head in wearing conditions of the helmet, and by two or three mutually crossed shock-proof straps disposed between the top of the user's head and the upper internal wall of the cap.

**[0008]** The function of the straps is to space the user's head from the cap to limit to the utmost the negative effects caused by hits against other standing above bodies or by objects falling on said user's head.

**[0009]** Both the annular band and the shock-proof straps are fixed to the cap at anchoring points symmetrically disposed on the internal wall of said cap.

**[0010]** The safety helmets are secured to the user's head by the presence of proper blocking systems disposed on the annular band, at the zone applied to the user's nape.

**[0011]** Said blocking systems allow the helmet to be adapted to the different use conditions and requirements of the user, as well as they allow the helmet to be worn by different users, each clearly having his own head conformation.

**[0012]** The prior art provides for several systems for securing the safety helmets to the user's head.

**[0013]** A first kind of helmets of known type comprises an annular band provided by a couple of mutually symmetric tangs, made of plastic material, able to be joined

together in different positions according to the conformation of the user's head. One of the tangs has mutually equidistant slight projections, snap-coupled in correspondent through holes made in the other tang, according to a system typically used in cloth-caps usually worn by young people in everyday life.

**[0014]** The inconvenience of this kind of safety helmets is represented by the fact that the user must change every time the mutual position of the two tangs to adapt the helmet to different use conditions.

**[0015]** This is performed either by taking off the helmet from the head and mutually releasing the two tangs to dispose them in a new desired position, or by performing said operation wearing the helmet, with evident disadvantages in terms of manipulation simplicity and regulation accuracy.

**[0016]** Another inconvenience is due to the fact that the continual execution of the tang adjustment operations leads to the wear of the tangs projections, compromising their coupling efficacy.

**[0017]** In another kind of helmets of known type, said tangs are mutually coupled by the snap-insertion of one tang inside the other according to different positions.

**[0018]** More particularly, a first tang has a plurality of teeth along its lateral edge which are coupled to a respective toothing provided on the internal surface of an opening longitudinally obtained on the other tang, providing for a male and female connection type.

**[0019]** An inconvenience of this second kind of known helmets is due to the fact that the user must exert a rather intense strength to uncouple the two tangs and to adjust them according to a new mutual position.

**[0020]** Moreover, in this case too the repeated adjustment operations leads to the wear and sometimes to the breaking of the tangs, with the consequent need to replace them.

**[0021]** These inconveniences were overcome with a further kind of safety helmets of known type, in which the tangs are placed in a shaped case and they are mutually adjustable by a rack system comprising a toothing obtained on both tangs, which engages with a gear-wheel placed inside the case, movable by an external knob connected therewith and operable by the user.

**[0022]** The mutual position of the tangs is set up by turning the knob in one or in the other direction, depending on whether said tangs should be mutually loosened or tightened.

**[0023]** It is evident that such a tangs adjustment system allows to fit in an easy and practical way the safety helmets to the user's head and it removes the inconvenience of spoiling the tangs with their continual mesh.

**[0024]** However, also this kind of safety helmets of known type has some inconveniences.

**[0025]** A first inconvenience is due to the fact that the knob stands out from the helmet in a rather considerable way, consequently having a not negligible encumbrance.

**[0026]** As a consequence, another inconvenience is

represented by the fact that said knob is dangerous for the physical safety of the user, increasing the possibility of hits against other bodies when he moves his head and the negative effect of the impacts of the nape against other structures or on the ground.

**[0027]** Not the least inconvenience is the fact that the user, to perfectly fit the helmet on his head, should perform in any case a manual adjustment operation which can also continue for a lot of time.

**[0028]** The present invention intends to solve the aforesaid inconveniences.

**[0029]** In particular, it is the main object of the invention to allow the user to wear and to adjust a safety helmet in a more practical and rapid way with respect to the equivalent helmets of known type.

**[0030]** It is a second object of the invention that the helmet does not have constructive parts which increase its encumbrance and generate or aggravate the danger of the user's head hits against other bodies or any structure.

**[0031]** Said objects are obtained by a safety helmet which, according to the contents of the main claim, comprises a shaped cap internally provided with a harness consisting of an annular band, able to surround the user's head, and with at least two mutually crossed straps, able to maintain spaced said user's head from said shaped cap, wherein said annular band comprises elastic means at the portion supported on the nape of said user's head, suitable for making adaptable said annular band to the conformation of said user's head, to grant the adherence stability of said helmet.

**[0032]** According to a preferred executive embodiment of the invention, the elastic means are placed inside a shaped case having an arc shaped transversal sectional profile to substantially reproduce the conformation of the nape of the user's head.

**[0033]** Advantageously, the safety helmet of the invention can be correctly worn by the user in an extremely rapid way, without needing to perform rather complicated manual adjustment operations to fit it to the conformation of the head.

**[0034]** At the same time and as much advantageously, the invention allows to reduce the external encumbrance of the helmet, thus limiting with respect to the prior art the seriousness of the nape's impacts against other bodies.

**[0035]** More advantageously, the helmet of the invention is particularly ergonomic, because it reduces the expected risks and other trouble factors of the particular use conditions, by impeding as little as possible the gestures and the assumption of certain positions by the user.

**[0036]** Said objects and advantages will be better highlighted in the description of preferred embodiments of the invention given in an explanatory but not limiting way, with reference to the figures of the annexed drawings, wherein:

- Figure 1 is an axonometric view of the safety helmet of the invention, in use conditions;
- Figure 2 is a bottom view of the helmet of Figure 1;
- Figure 3 shows an enlarged detail of Figure 1;
- Figure 4 is an exploded axonometric view of another enlarged detail of Figure 1; and
- Figure 5 is a plan view of a detail of Figure 4.

**[0037]** The safety helmet of the invention is shown in an axonometric view in Figure 1, where it is worn by a user indicated with **U**, and in a bottom view in Figure 2, being generally indicated with numeral **1** in both Figures.

**[0038]** It is noted that it comprises a shaped cap **2**, made of plastic material particularly resistant to hits and atmospheric agents, internally provided with a harness, visible in Figure 2 only where it is generally indicated with numeral **3**, comprising an annular band **4** which surrounds the head **T** of the user **U**, and a couple of mutually crossed straps **5, 6** which maintain spaced the head **T** of the user **U** from the shaped cap **2**.

**[0039]** According to the invention, the annular band **4** comprises elastic means, generally indicated with numeral **7**, at the portion **4a** supported on the nape **N** of the user's **U** head **T**, suitable for making adaptable the annular band **4** to the conformation of the user's **U** head **T**, to grant the adherence stability of the safety helmet **1**.

**[0040]** The annular band **4**, made of plastic material, and the straps **5, 6**, made of synthetic material, are fixed to the shaped cap **2** at anchoring points **22**, substantially disposed according to the vertexes of a rectangle on the internal wall **2a** of the shaped cap **2**.

**[0041]** According to another executive embodiment, not shown in the annexed drawings, the straps forming the harness could be more than two, for instance three, fixed to the shaped cap at anchoring points disposed on its internal walls according to the vertexes of an irregular hexagon.

**[0042]** As shown in Figure 2, but more in detail in Figure 3, the strap **5** is through-inserted in a couple of through holes, only one of them, indicated with numeral **23**, being shown, obtained in one of the anchoring points **22** belonging to the opposite vertexes of the aforesaid rectangle and loop-closed at the central portion **2b** of the shaped cap **2**. What described hereby is applicable in the same way for the strap **6** as well.

**[0043]** Each of the anchoring points **22** comprises a button **24**, fixed to the shaped cap **2** and inserted in a buttonhole **25** obtained on the annular band **4** at each of the anchoring points **22**, in order to bind said annular band **4** to the shaped cap **2**.

**[0044]** According to the preferred executive embodiment of the invention described hereby, the elastic means **7** are placed inside a shaped case **8**, partially visible in the Figures described so far and well shown in Figure 4, having an arc shaped transversal sectional profile to substantially reproduce the conformation of the nape **N** of the user's **U** head **T**.

**[0045]** The shaped case **8**, preferably but not neces-

sarily made of plastic material, is connected to the annular band **4** by a couple of core parts **9**, **10**, made of plastic, steel or other material, symmetrically disposed inside the shaped case **8**, from which their extremity **9a**, **10a**, bound to the annular band **4** by first fixing means generally indicated with numeral **11** and formed by rivets in this specific example, protrudes.

**[0046]** It is evident that, in other executive embodiments of the helmet according to the invention, said fixing means could be of different kind, like for instance screws or other things.

**[0047]** In further executive embodiments, the shaped case could be connected to the annular band through a couple of tangs formed integral with the same annular band.

**[0048]** About the core parts **9**, **10**, in Figure 4 it is shown that each of them comprises a plane transversal wall **12**, **13**, one facing the other, at the extremity **9a**, **10a** disposed inside the shaped case **8**.

**[0049]** Each of the core parts **9**, **10** protrudes from the shaped case **8** by means of a through hole, not shown in the attached figures, obtained on the respective lateral edge **8a**, **8b** of the shaped case **8**.

**[0050]** The elastic means 7 placed inside the shaped case **8** are formed by a couple of helical springs **14**, **15**, each of them slidably containing the corresponding core part **9**, **10** and placed at one end **14a**, **15a** abutting against the transversal wall **12**, **13**, and at the other end **14b**, **15b** abutting against the respective lateral edge **8a**, **8b** of the shaped case **8**.

**[0051]** In Figures 4 and 5 it is noted that, according to the present constructional embodiment, the shaped case **8** comprises a box **16** containing the elastic means **7**, shown in released position, and a cover **17** coupled to the box **16** by second fixing means, generally indicated with numeral **18**, of well known type.

**[0052]** Preferably but for explanatory purpose only, the second fixing means **18** comprise a male element **19**, protruding from the concave surface **17a** of the cover **17**, suitable for being snap inserted in a female element **20** obtained on the convex surface **16a** of the box **16**.

**[0053]** However, it is clear that in other executive embodiments of the invention the second fixing means could be of different kind from the above described one.

**[0054]** As shown in Figure 4, in this specific embodiment the concave surface **8c** of the shaped case **8** is provided with a pad **21** able to soften the contact between the shaped case **8** and the nape **N** of the user's **U** head **T** when he wears the safety helmet **1**.

**[0055]** Operatively, the user **U** acts by grasping the shaped case **8** to fit the safety helmet **1** to the conformation of his head **T**, with reference to the different use conditions that he wants to apply to said helmet **1**.

**[0056]** The user **U** pulls outwards with a hand the shaped case **8**, thus compressing the elastic means **7** and expanding the annular band **4**.

**[0057]** This operation is made possible by the elasticity of the annular band **4** and it is facilitated because the

buttons **24** slide inside a buttonhole **25** of reduced dimensions, so that as many pivoting points of the annular band **4** as the anchoring points **22** are obtained in this phase.

**[0058]** Subsequently, the user **U** puts the helmet **1** on his head in the desired and more congenial position, then releasing the shaped case **8** by placing it abutting against, or near, the nape **N** of his head **T**, securing the correct and stable position of the safety helmet **1**.

**[0059]** It is thus particularly easy to wear, fit and secure a safety helmet according to the invention to the user's head.

**[0060]** This is performed starting from the phase in which the user is leaning the safety helmet on his head, without needing to perform further adjustments to secure the perfect adherence of the helmet.

**[0061]** The accomplishment of a shaped case which substantially reproduces the shape of the user's nape means to have at disposal a safety helmet particularly comfortable during its use.

**[0062]** Such aspect is also improved by the application of a pad, made of soft and flexible material, on the surface of the shaped case disposed toward the nape.

**[0063]** Moreover, the constructive expedient of providing for a buttonhole of limited dimensions in the anchoring point of the annular band, instead of a longitudinal slit like in most of the safety helmet of known type, allows a very efficient deformation of the annular band during the initial phase of wearing the helmet.

**[0064]** In fact, the uncoordinated movement of the annular band under the traction applied by the user to enlarge said annular band is avoided, this being an element which reduces the efficacy of the operation and causes inconveniences to said user.

**[0065]** Differently from a series of safety helmets of known type, the helmet of the invention does not have protuberances on its back side, which are dangerous for the physical safety of the user if he hits his nape on the ground.

**[0066]** The absence of protruding parts avoids as well the presence of further contact points on the helmet, and thus on the user's head, with other adjacent bodies or structures, without limiting the freedom of movement.

**[0067]** On the basis of the aforesaid description, it should be understood that the safety helmet according to the invention achieves all its object and attains all the previously mentioned advantages.

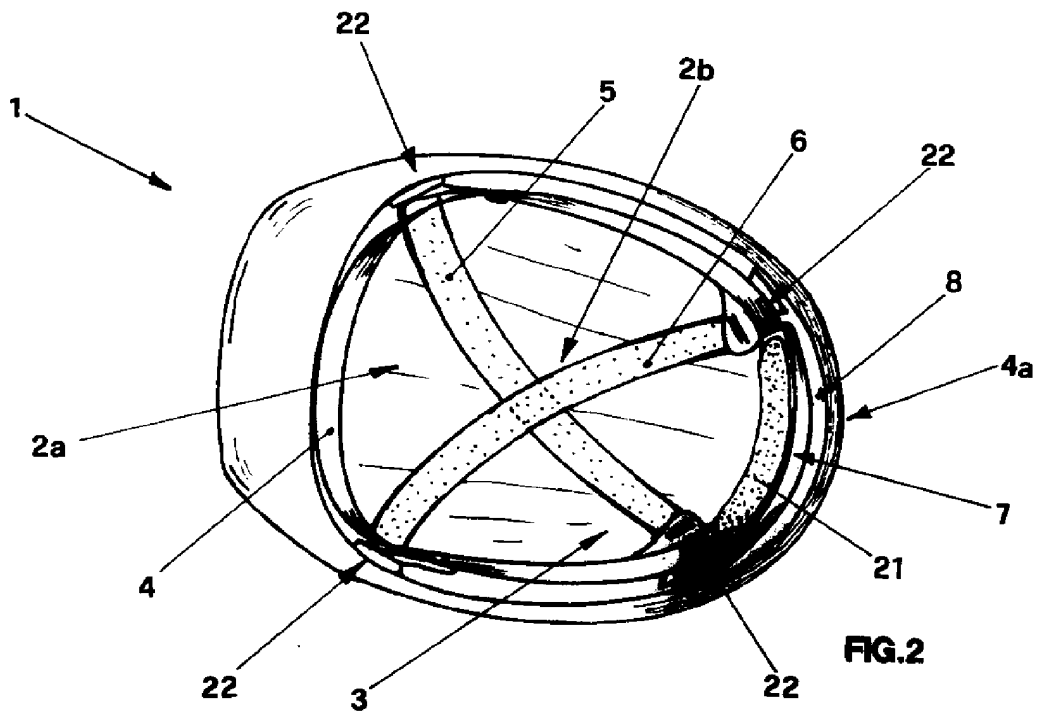
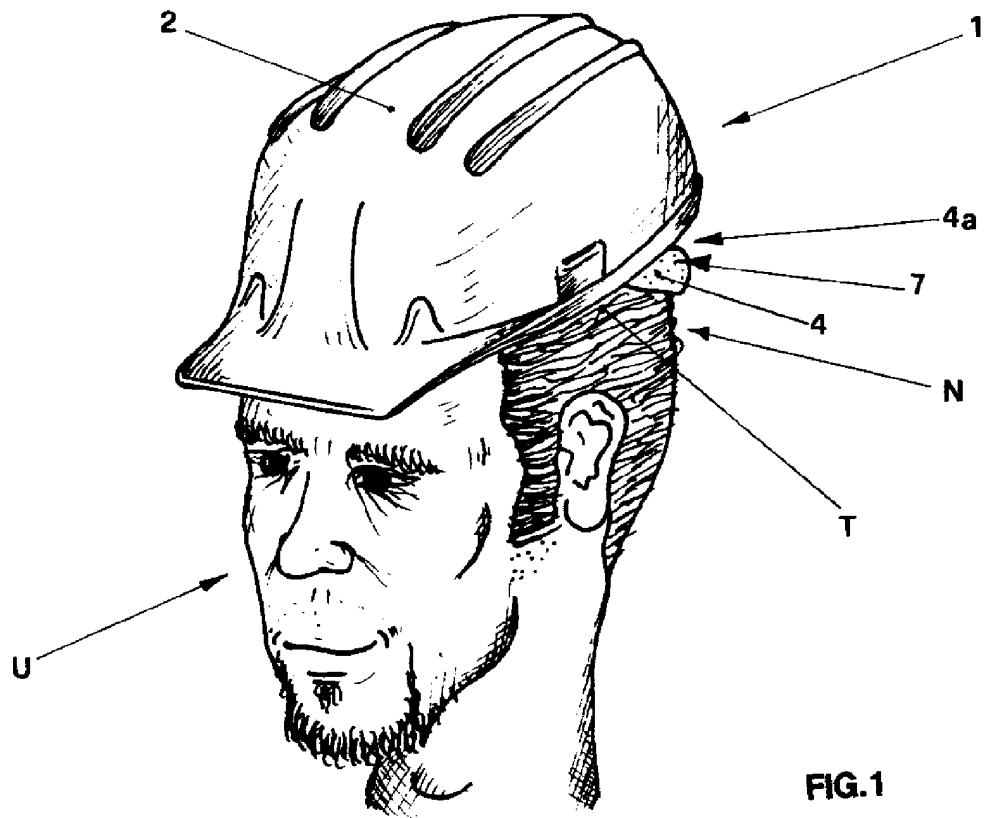
**[0068]** Modifications to the safety helmet of the invention could be introduced in the production stage.

**[0069]** In particular, both the shaped case and the elastic means placed therein could be of different kind from the one described in the present patent.

**[0070]** All the described and cited embodiments, even if not shown in the annexed drawings, when they should fall within the scope of protection of the following claims, should be considered protected by the present patent.

## Claims

1. A safety helmet (1) comprising a shaped cap (2) internally provided with a harness (3) consisting of an annular band (4), able to surround the head (T) of the user (U), and with at least two mutually crossed straps (5, 6), able to maintain spaced said head (T) of the user (U) from said shaped cap (2), **characterized in that** said annular band (4) comprises elastic means (7) at the portion (4a) supported on the nape (N) of said head (T) of the user (U), suitable for making adaptable said annular band (4) to the conformation of said head (T) of the user (U), to grant the adherence stability of said helmet (1).
2. The helmet (1) according to claim 1) **characterized in that** said elastic means (7) are placed inside a shaped case (8) having an arc shaped transversal sectional profile to substantially reproduce the conformation of said nape (N) of said head (T) of the user (U).
3. The helmet (1) according to claim 2) **characterized in that** said shaped case (8) is connected to said annular band (4) by a couple of core parts (9, 10) symmetrically disposed in said shaped case (8), from which their extremity (9a, 10a), bound to said annular band (4) by first fixing means (11), protrudes.
4. The helmet (1) according to claim 3) **characterized in that** said first fixing means (11) are formed by rivets.
5. The helmet (1) according to claim 3) **characterized in that** said first fixing means (11) are formed by screws.
6. The helmet (1) according to claim 3) **characterized in that** each of said core parts (9, 10) comprises one plane transversal wall (12, 13) facing the other at the extremity (9a, 10a) disposed inside said shaped case (8).
7. The helmet (1) according to claim 6) **characterized in that** each of said core parts (9, 10) protrudes from said shaped case (8) by means of a through hole obtained on the respective lateral edge (8a, 8b) of said shaped case (8).
8. The helmet (1) according to claim 7) **characterized in that** said elastic means (7) are formed by a couple of helical springs (14, 15), each of them slidingly containing the corresponding of said core part (9, 10) and being placed at one end (14a, 15a) abutting against said transversal wall (12, 13), and at the other end abutting against said lateral edge (8a, 8b) of said shaped case (8).
9. The helmet (1) according to claim 2) **characterized in that** said shaped case (8) comprises a box (16) containing said elastic means (7), and a cover (17) coupled to said box (16) by second fixing means (18).
10. The helmet (1) according to claim 9) **characterized in that** said second fixing means (18) comprise a male element (19) obtained on the concave surface (17a) of said cover (17), inserted in a female element (20) obtained on the convex surface (16a) of said box (16).
11. The helmet (1) according to claim 2) **characterized in that** the concave surface (8c) of said shaped case (8) is provided with a pad (21) able to soften the contact between said shaped case (8) and said nape (N) of said head (T) of the user (U).
12. The helmet (1) according to claim 1) **characterized in that** said annular band (4) and said straps (5, 6) are fixed to said shaped cap (2) at anchoring points (22) disposed on the internal wall (2a) of said shaped cap (2).
13. The helmet (1) according to claim 12) **characterized in that** said anchoring points (22) are substantially disposed according to the vertexes of a rectangle.
14. The helmet (1) according to claim 12) **characterized in that** said anchoring points (22) are substantially disposed according to the vertexes of an irregular hexagon.
15. The helmet (1) according to claim 12) **characterized in that** each of said straps (5, 6) is through-inserted in a couple of through holes (23), each of them obtained in one of said mutually opposite anchoring points (22), and it is loop-closed at the central portion (2b) of said shaped cap (2).
16. The helmet (1) according to claim 12) **characterized in that** each of the anchoring points (22) comprises a button (24) fixed to said shaped cap (2), coupled to a buttonhole (25) obtained on said annular band (4) at each of said anchoring points (22).
17. The helmet (1) according to claim 1) **characterized in that** said annular band (4) is made of plastic material.
18. The helmet (1) according to claim 1) **characterized in that** said annular straps (5, 6) are made of plastic material.
19. The helmet (1) according to claim 2) **characterized in that** said shaped case (8) is made of plastic material.



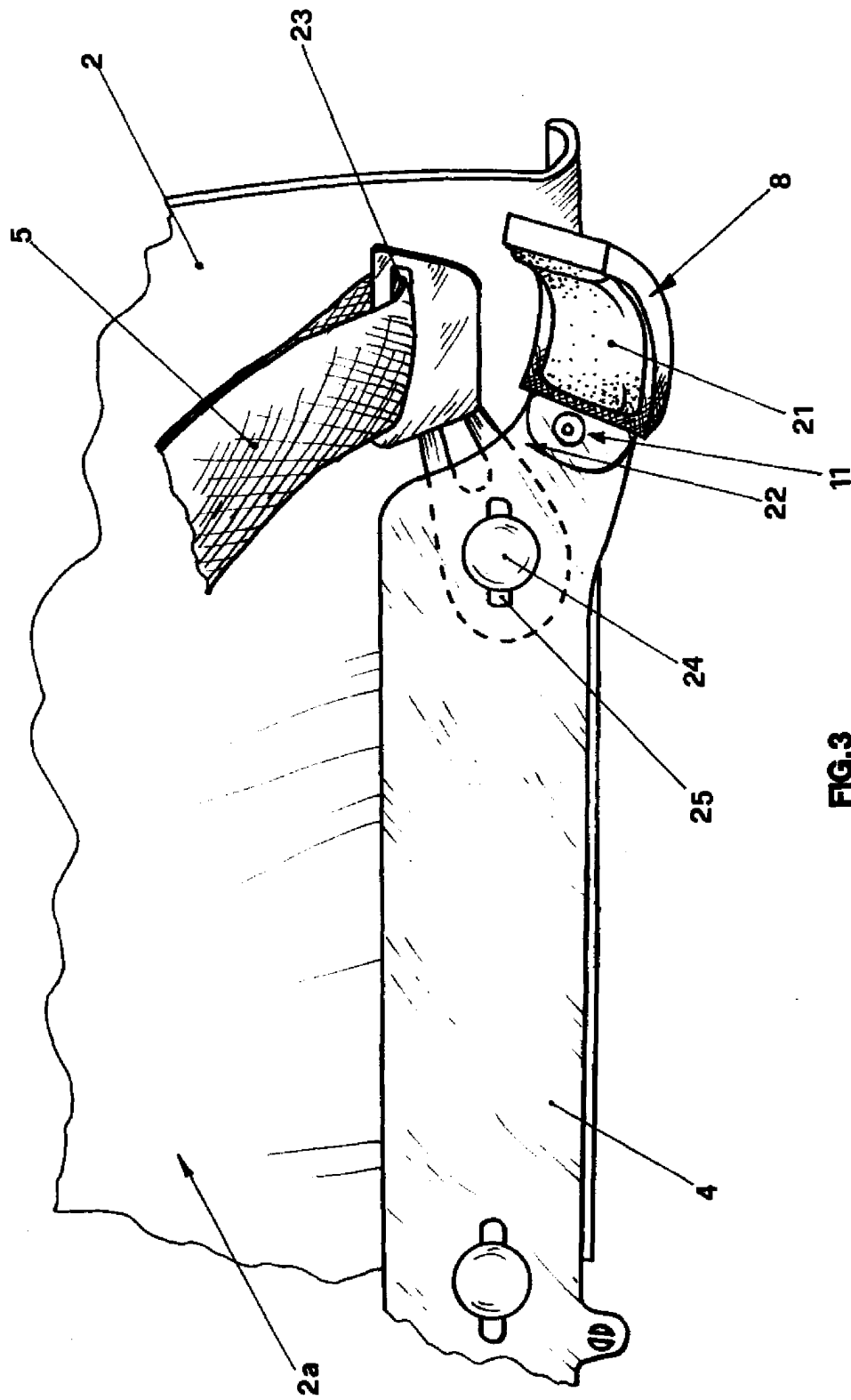


FIG.3

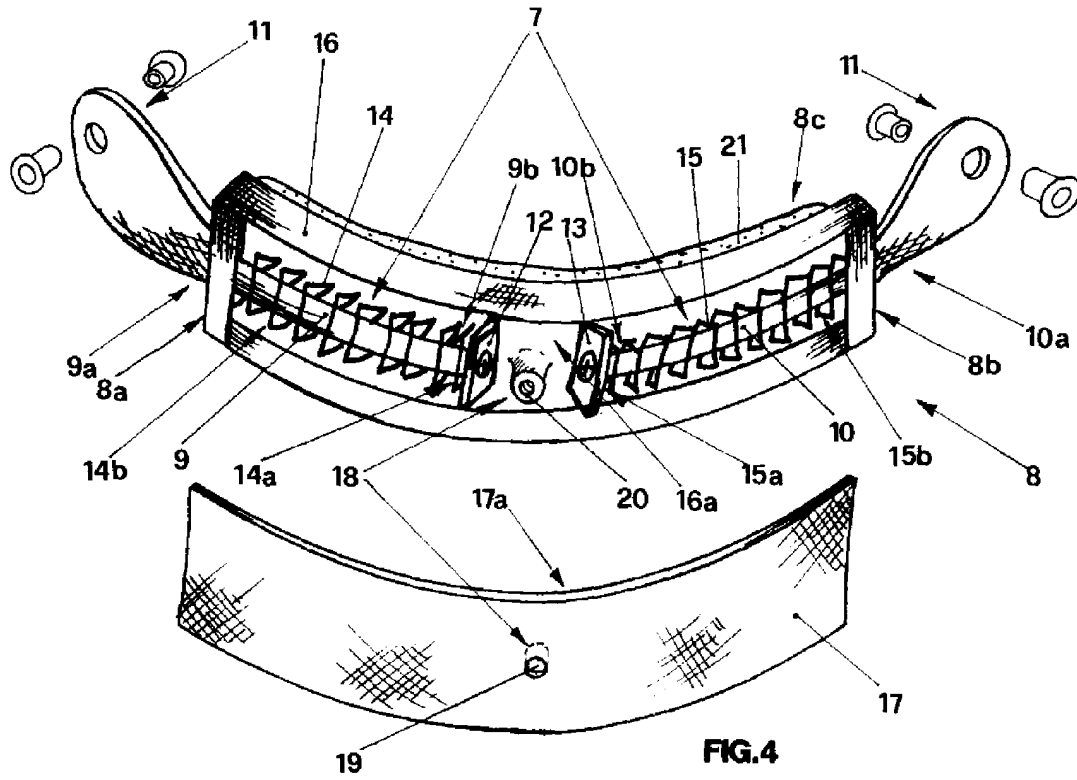


FIG. 4

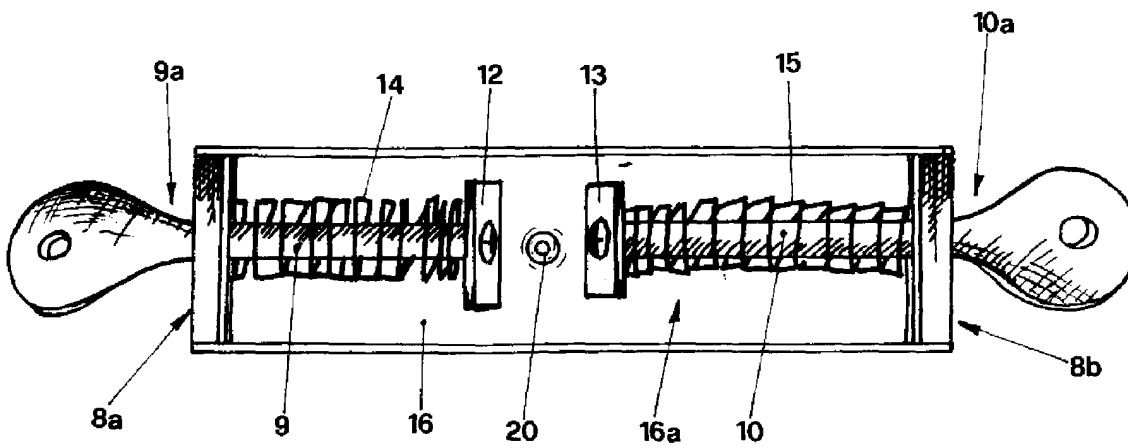


FIG. 5





European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 04 10 2743

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 January 2005	Examiner Bourseau, A-M
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 10 2743

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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