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(54) Lever particularly for sports shoes

(57) A fastening lever for sports shoes comprises a base which is rigidly coupled to a first flap and is provided with two shoulders between which a U-shaped lever arm is articulated, a traction member being pivoted between the wings of the U-shaped arm. The traction member is slidingly guided, at its free end, in two slots formed in a bar which has, at its free end, a pin which is selectively associated with one of a plurality of teeth of a rack which is associated with a second flap. The traction member slides in contrast with a preloaded elastically deformable member which is adapted to maintain a constant closure load.

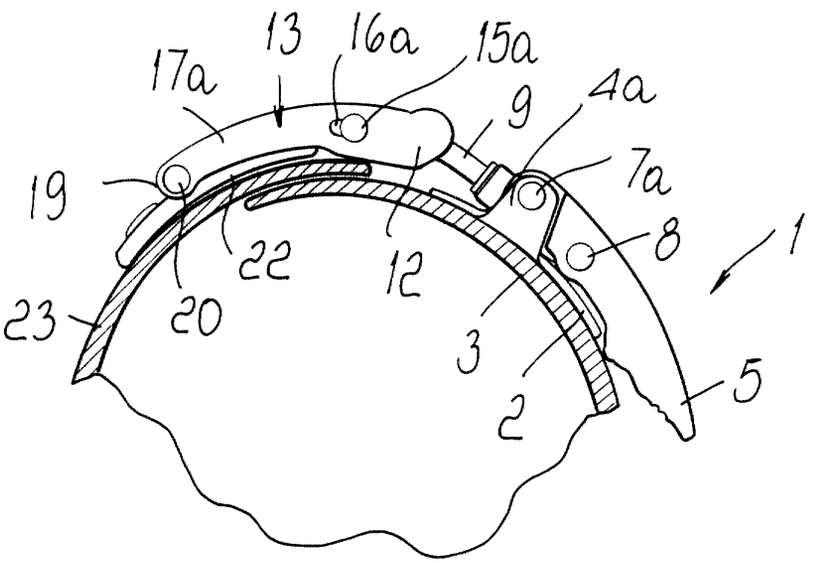

Fig. 1

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Description

[0001] The present invention relates to a fastening lever, particularly for sports shoes such as ski boots, roller skates, ice skates, or ice-climbing boots.

[0002] A problem encountered in sports shoes is to achieve optimum fastening of the flaps of a quarter or shell while maintaining good comfort.

[0003] A conventional fastening lever is generally constituted by a lever arm articulated to a base which is rigidly coupled to a first member of the shoe and by a spring traction member which is associated with a second member of the shoe.

[0004] The lever arm has, on its lower surface, a plurality of teeth for engaging the free end of the spring traction member, which is constituted by two parallel cylindrical springs which are mutually rigidly coupled at the free end of the traction member.

[0005] With respect to other conventional fastening levers wherein the traction member has no elastically deformable members, such "elastic" lever has the advantage that it allows effective and uniform mutual closure of the two flaps over each other, while the springs tend to compensate for the differences in adjustment that frequently occur among the various levers of the sports shoe.

[0006] However, such conventional elastic fastening lever has an important drawback: as the fastening is tightened, engaging the teeth that lie further from the pivoting point of the lever arm, the closure action becomes increasingly difficult for the user, because the force that has to be applied to the lever arm increases.

[0007] A further drawback is that, during the fastening action, the two cylindrical springs are subjected to possibly considerable elongations according to the intended fastening that can be imparted to the lever.

[0008] This situation entails the fact that, especially for the teeth that lie furthest from the pivoting point of the lever arm, the two cylindrical springs elongate excessively, to their yield point, causing even greater difficulty in the fastening action.

[0009] Moreover, since the springs are very large and are arranged outside the lever arm, in an exposed position, they are prone to breaking or at least to being damaged by impacts with objects, such as rocks, branches, other shoes, skis and anything else that might accidentally make contact with the sports shoe.

[0010] A further drawback is that dirt, mud and grass blades, or any other solid object, such as small fragments of rocks, pebbles or ice fragments, can easily penetrate between the springs, causing possible defects in the operation of the lever and also possible damage thereto.

[0011] A second conventional type of elastic lever is constituted by a lever arm, which is articulated to a base which protrudes from a first flap or member of a shoe, and by a traction member, which is associated with the second flap of the shoe and has elastically deformable parts.

[0012] Teeth protrude downward from the lever arm and engage the free end of the traction member, which is constituted by two telescopic members which contain mutually parallel elastically deformable members. Each member has a hollow cylinder in which a piston is slidingly arranged, the piston being constituted by a head and a stem which protrudes outside the hollow cylinder in the opposite direction with respect to the second flap.

[0013] A cylindrical spring, which is coaxial to the stem, is arranged so that it is compressed by the head of the piston when the stem slides toward the outside of the cylinder, so as to contrast the elongation of the traction member.

[0014] The stems of the pistons that lie outside the hollow cylinders are mutually connected so as to form the free end, which interacts with the teeth of the lever arm.

[0015] This second type of conventional elastic lever too has the advantage of allowing effective and uniform closure of the two flaps. The lever in fact has a structure which is fully similar to the previously described conventional type of fastening lever and differs only in the type of elastically deformable member that is used.

[0016] This second conventional type of lever, however, has drawbacks which are similar to those of the preceding fastening lever. The lever arm is disadvantageous and the closure action becomes more and more difficult as the distance of the tooth used for connection to the free end of the traction member with respect to the pivoting point of the lever arm increases.

[0017] Moreover, the telescopic members are difficult to manufacture, because they are composed of several parts, most of which are small, requiring expensive precision processes.

[0018] All the conventional types of levers in general have a further drawback since: the shoes are provided with more than one lever, closing a lever which is adjacent to another one, which is already fastened, can usually affect the already fastened lever and the position of the flaps of the shoe. This entails several readjustments of the levers until a compromise is reached.

[0019] The aim of the present invention is to solve the above-noted drawbacks and the described technical problems, by providing a lever in which the user can achieve optimum comfort for the foot while maintaining a constant closure load.

[0020] An object of the invention is to provide a lever which provides for a constant closure load even when the flaps, by settling and elongating, tend to reduce the initial closure load of the lever.

[0021] Another important object is to provide a lever which reduces the number of adjustments of the closure of the various levers applied to the sports shoe.

[0022] Another object is to provide a lever whose closure does not entail the accidental opening of an adjacent lever.

[0023] Another object is to provide a lever in which it

is possible to indicate the obtained closure load value.

[0024] Another object is to provide a lever which is structurally simple and has low manufacturing costs.

[0025] This aim and these and other objects which will become better apparent hereinafter are achieved by a lever, particularly for sports shoes, comprising a base which is rigidly coupled to a first flap and is provided with two shoulders between which a U-shaped lever arm is articulated, a traction member being pivoted between the wings of said U-shaped arm, characterized in that said traction member is slidingly guided, at its free end, in two slots formed in a bar which has, at its free end, a pin which is selectively associated with one of a plurality of teeth of a rack which is associated with a second flap, said traction member sliding in contrast with a preloaded elastically deformable member which is adapted to maintain a constant closure load.

[0026] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a particular embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a front partial section view a sports shoe provided with the lever according to the invention, shown in the closed position with a loaded spring;

Figure 2 is a top view of the fastening lever shown in the closed position;

Figure 3 is a front section view of the shoe provided with the fastening lever, shown in the closed position with a loaded spring; .

Figure 4 is a front partial section view a sports shoe provided with the lever according to the invention, shown in the closed position with an un-loaded spring;

Figure 5 is a top view of the fastening lever shown in the closed position with an un-loaded spring;

Figure 6 is a front section view the sports shoe provided with the lever shown in the closed position with an un-loaded spring.

[0027] With reference to the above-cited figures, the numeral 1 designates a lever particularly for sports shoes such as for example skates and ski boots.

[0028] The lever 1 has a base 2, which is rigidly coupled to a first flap 3 of the sports shoe.

[0029] The base 2 is flat and is laterally provided with two shoulders 4a and 4b that protrude at right angles to the first flap 3 and face each other so that a lever arm 5 can be articulated between them.

[0030] The lever arm 5 is U-shaped so as to form two wings 6a and 6b that are pivoted, at their respective free ends, to the two shoulders 4a and 4b, by means of two first pivoting members 7a and 7b, respectively.

[0031] A traction member, designated by the reference numeral 9 and provided with a slider 10 at its free end, is pivoted between the two wings 6a and 6b, preferably in an intermediate position, by means of a second pivoting member 8.

[0032] The lever is also constituted by a U-shaped bar 13, having a base 12, directed toward the lever arm 5 and provided with a hole 11. A rectangular seat 14 is provided between two wings 17a, 17b.

[0033] The slider 10 has two protrusions 15a and 15b, that protrude transversely to the traction member 9 and are arranged within two respective slots 16a and 16b formed in the facing wings 17a and 17b of the U-shaped bar 13.

[0034] In this manner, the two slots 16a and 16b act as a guide for the sliding of the slider 10 along the bar 13. The slider 10 slides in contrast with an elastically deformable member, constituted for example by a spring which is designated by the reference numeral 18 and may be constituted by a cylindrical helical compression spring.

[0035] The spring is preloaded with a chosen load which is for example approximately equal to the average load that can be achieved when a conventional lever is closed.

[0036] The bar 13 has a pin 20 at its free second end 19. The pin 20 is arranged transversely to the traction member 9 and may be selectively associated with one of a plurality of teeth, generally designated by the reference numeral 21, that protrude from a rack 22.

[0037] The teeth 21 protrude from the rack 22 preferably approximately at right angles to a second flap 23 which is arranged above the first flap 3 and with which the rack 22 is associated.

[0038] The teeth 21 have, in a transverse cross-section, a shape which is curved in the opposite direction with respect to the traction member 9, so as to prevent the pin 20 from performing any movement toward the traction member 9.

[0039] The operation of the fastening lever is as follows: when the lever arm 5 is raised, the pin 20 is arranged at the selected tooth 21 and the lever arm 5 is rotated about the first pivoting members 7a and 7b until it lies parallel to the first flap 3.

[0040] The arrangement of the traction member 9 between the first flap 3 and the plane that passes between the first pivoting members 7a and 7b and the second pivoting member 8 allows to lock the lever 1 in the intended position.

[0041] During the rotation of the lever arm 5, the slider 10 slides toward the base 12, compressing the spring 18 until its turns are in mutual contact ("loaded" or "packed" arrangement of the spring).

[0042] After a few flexing movements, or when an adjacent lever is closed, the settling of the foot inside the sports shoe entails the fact that the first and second flaps of the shoe have adapted and mutually overlapped more extensively.

[0043] The presence of the spring 18, preloaded in closure, compensates by elongating the greater overlap of the flaps, keeping the traction member 9 in traction.

[0044] Accordingly, the closure force applied between

the flaps is thus kept approximately unchanged, ensuring effective locking of the foot.

[0045] The lever 1 also allows a quicker and simpler fastening of the various levers arranged along the quarter and the shell, because the spring 18 allows to compensate for the differences that are inevitably present among the fastening forces of the various levers.

[0046] It has thus been observed that the fastening lever according to the invention has achieved the intended aim and objects, allowing the user to achieve optimum comfort for the foot while maintaining a constant closure load.

[0047] The lever also allows more rapid and effective closure of the sports shoe, avoiding a plurality of adjustments of the fastening levers.

[0048] The fastening lever according to the invention is susceptible of numerous modifications and variations, within the scope of the appended claims.

[0049] The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be more pertinent according to specific requirements.

Claims

1. A lever, particularly for sports shoes, comprising a base which is rigidly coupled to a first flap and is provided with two shoulders between which a U-shaped lever arm is articulated, a traction member being pivoted between the wings of said U-shaped arm, **characterized in that** said traction member is slidingly guided, at its free end, in two slots formed in a bar which has, at its free end, a pin which is selectively associated with one of a plurality of teeth of a rack which is associated with a second flap, said traction member sliding in contrast with a preloaded elastically deformable member which is adapted to maintain a constant closure load.

2. The lever according to claim 1, **characterized in that** said bar is U-shaped and is constituted by a base which is directed toward said lever arm, on which there is a hole, and by two separate wings between which a rectangular seat is formed.

3. The lever according to claim 2, **characterized in that** the free end of said traction member, which passes within said hole formed in said bar, is associated with a slider which is arranged inside said seat of said bar.

4. The lever according to claim 3, **characterized in that** said slider has two protrusions which protrude transversely to said traction member and are arranged within said two slots formed in said two separate facing wings of said bar.

5. The lever according to claim 4, **characterized in that** said two slots act as a guide for the sliding of said slider along said bar, said sliding occurring in contrast with said elastically deformable member, which is constituted by a cylindrical helical compression spring arranged between said slider and said base of said bar.

6. The lever according to claim 5, **characterized in that** said teeth protrude from said rack approximately at right angles to said second flap, and have, in a transverse cross-section, a shape which is curved in the opposite direction with respect to said traction member, so as to prevent said pin from performing any movement toward said traction member.

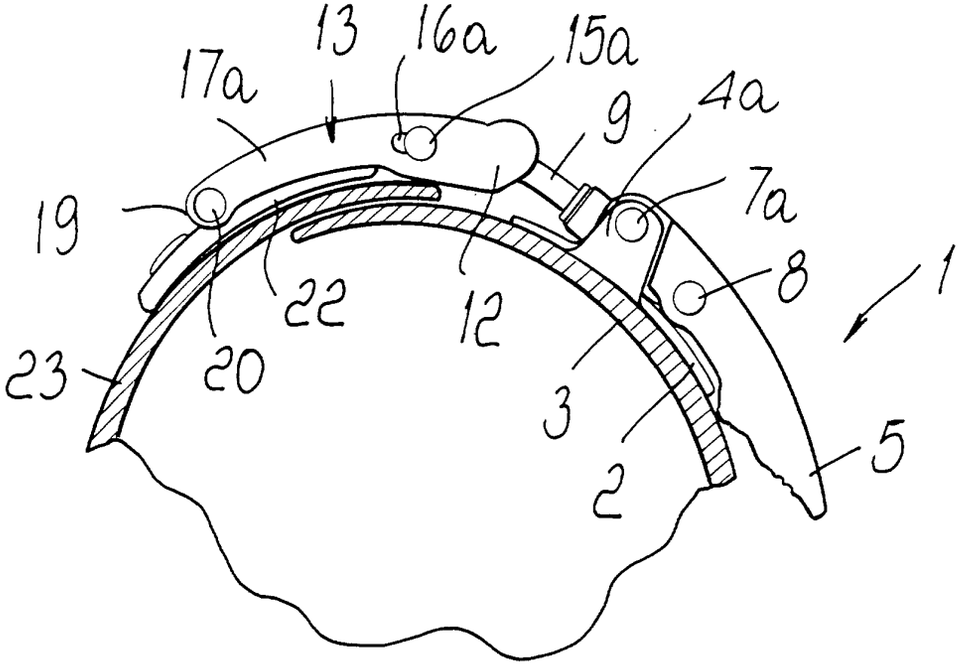

13
16a
15a
17a
9
4a
19
7a
8
1
22
12
23
20
3
5
2

Fig. 1

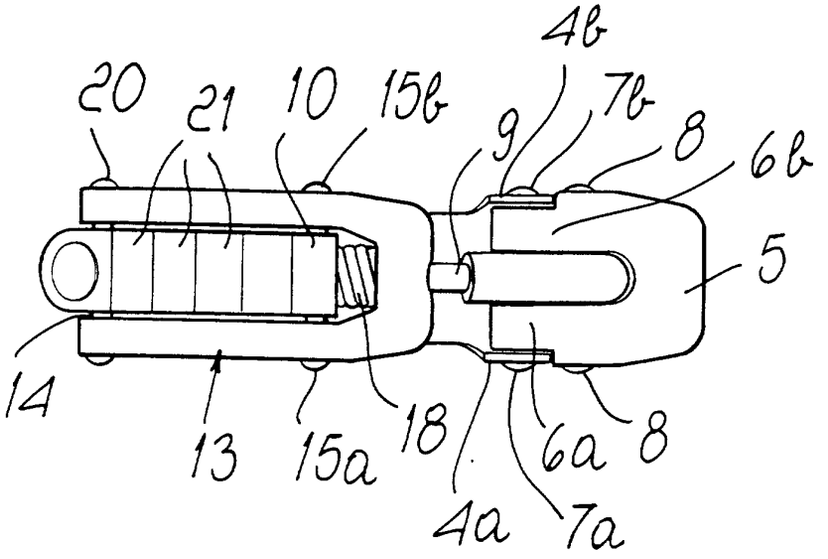
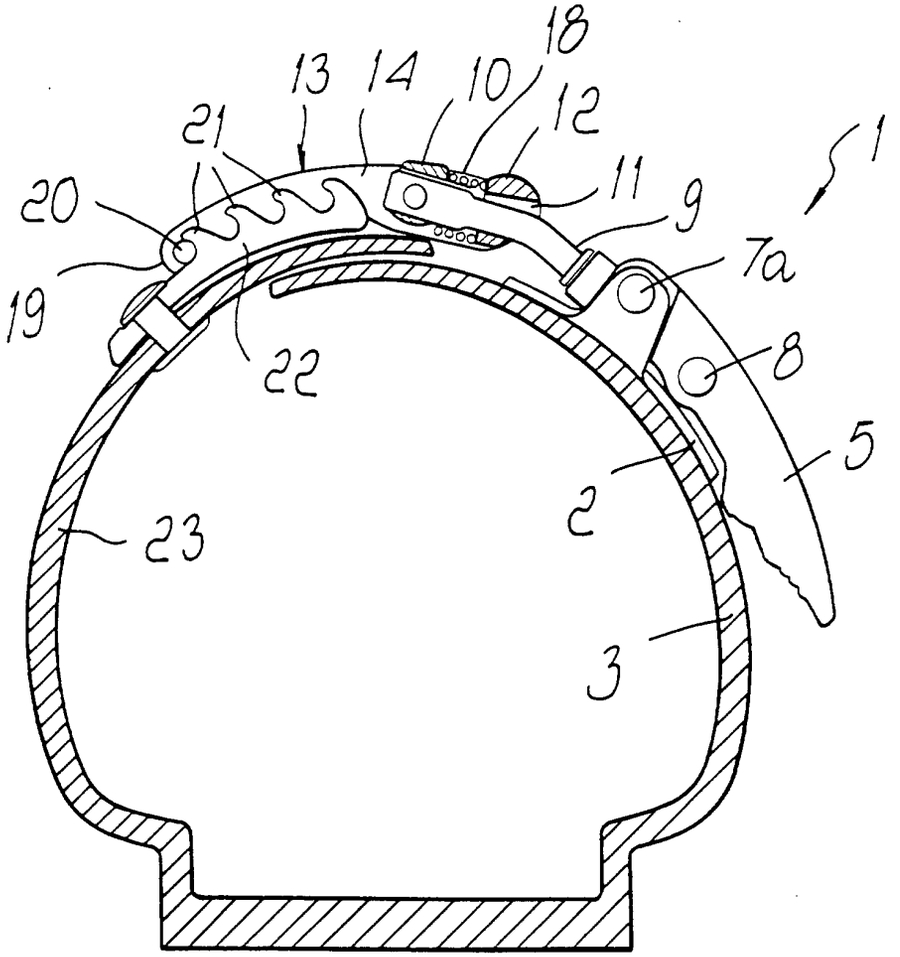

4b
20
21
10
15b
9
7b
8
6b
5
14
13
15a
18
6a
8
4a
7a

Fig. 2


18
13
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11
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7a
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2
23
3

Fig. 3

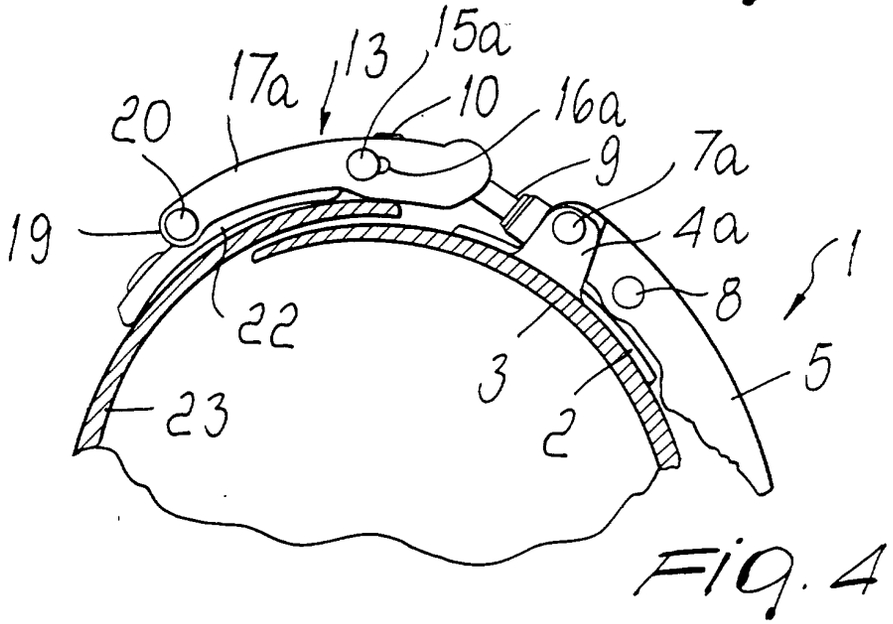
15a
13
17a
10
16a
20
9
7a
19
4a
1
8
22
3
5
23
2

Fig. 4

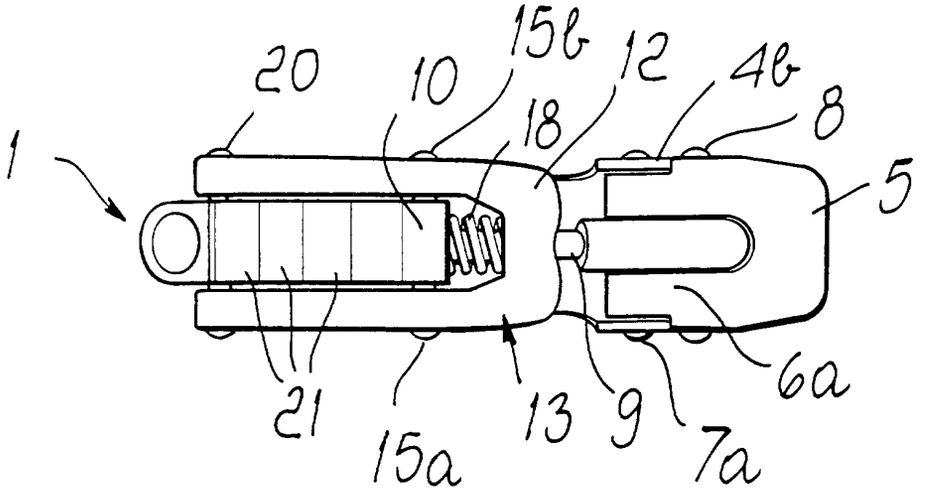
1
20
10
15b
18
12
4b
8
5
21
15a
13
9
7a
6a

Fig. 5

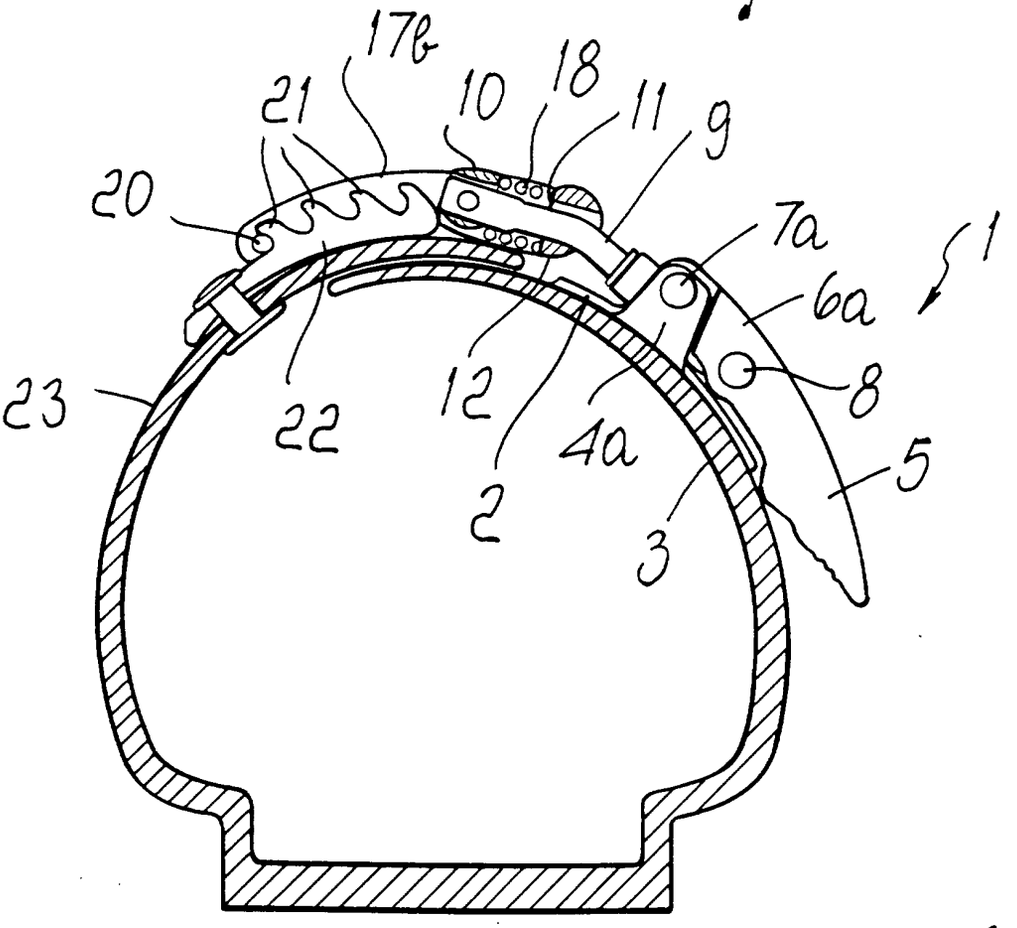
17b
21
10
18
11
9
20
7a
6a
1
23
22
12
4a
8
5
2
3

Fig. 6