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(71) Applicants:
- **Premec S.P.A.**
  31010 Godega di Sant'Urbano (TV) (IT)
- **Baggio, Giorgio**
  35018 San Martino di Lupari (PD) (IT)

(72) Inventors:
- **Baggio, Giorgio**
  35018, San Martino di Lupari PD (IT)
- **Salatin, Nicola**
  31010, Godega di Sant'Urbano, Frazione Pianzano TV (IT)

(74) Representative: **Modiano, Micaela Nadia**
Modiano & Partners
Via Meravigli, 16
20123 Milano (IT)

(54) Closure device, particularly for sports shoes

(57) A closure device (1), particularly for sports shoes, comprising a slotted band (13) which can be associated, at a first end, with an element for interconnection to a lever arm (2), which in turn is associated with a first flap (17) of said shoe and has a series of transverse openings (14). The device comprises a rack (17), which can be associated with a second flap (19) of the shoe and has an arc-shaped body (20), from which at least one (21) protrudes which is inclined by a chosen acute angle and has straight walls and interacts selectively with the series of openings provided in the slotted band. The rack (17) further has a flat tab (28), which supports partially, and is directed toward, the slotted band (13).

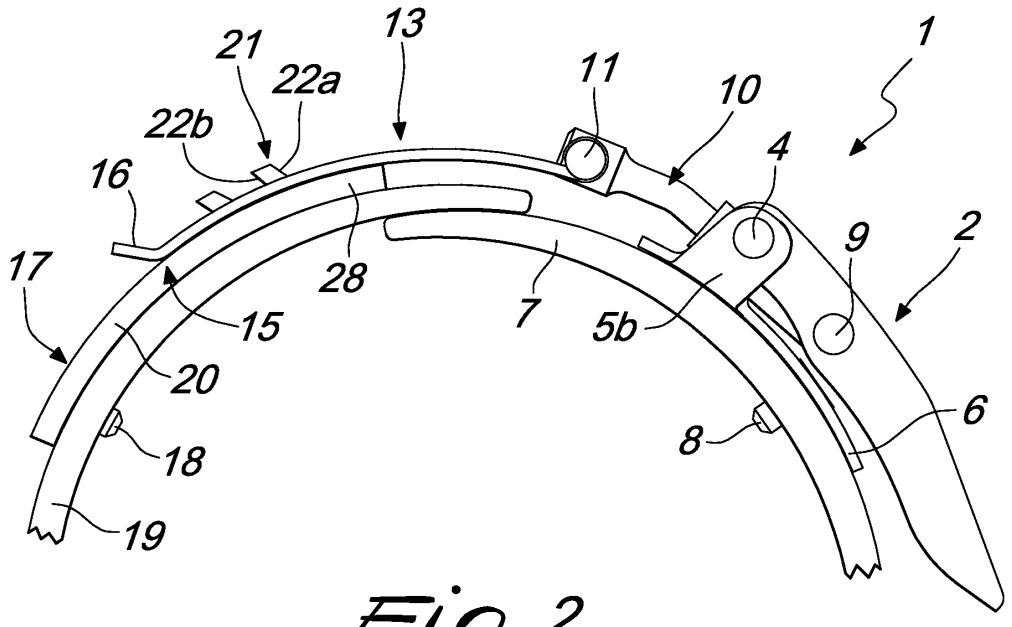

Fig. 2

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Description

[0001] The present invention relates to a closure device, particularly for sports shoes.

[0002] In the field of sports shoes, it is known to use closure devices which comprise levers adapted to allow the fastening of a first flap and of a second flap which form the shoe.

[0003] Levers are known which comprise a lever arm, which can be gripped by the user and is associated with a first flap to be joined, connected, by means of an interconnection element, to a ring or hook, which interacts for example with the teeth of a rack or a band or strap provided with teeth, which can be associated with the second flap to be joined of the shoe.

[0004] The problem is felt of making the shoe as anatomically form-fitting for the user as possible, and in this regard the rack or toothed band has a sequence of teeth which are all identical and mutually equidistant for selective interaction with the ring or hook.

[0005] Moreover, such teeth usually have an arc-like shape, which on the one hand facilitates engagement with the hook during the fastening step, because it forces the hook in the direction of the underlying rack, but on the other hand facilitates and guides the rotation of the hook in the condition of slight tension, necessary for example during a break in sports activities for being able to walk around, and the hook thus tends to disengage completely and very easily from the rack.

[0006] FR 2.684.851 is also known which illustrates an improvement for a locking device for ski boots, which is composed of a lever arm, coupled to a first end of a shoe, articulated to an interconnection element for a band or rack; the latter has a single tooth, which protrudes from it at right angles and in plan view lies transversely to the band and has an arc-like shape; such single tooth interacts selectively with complementarily shaped seats formed at a rack which is associated with the second flap of the shoe.

[0007] However, this solution has drawbacks, since the arc-like shape of the tooth makes its interaction with the seats provided on the rack difficult, and further the seats provided in the rack fill with snow, making coupling difficult.

[0008] Such background art also illustrates a solution in which a band or rack is associated with the interconnection element connected to the lever arm and a plurality of arc-like seats are provided at the lower surface of the band or rack through part of its thickness, such seats being adapted to interact selectively with a complementarily shaped arc-like tooth, which protrudes at right angles at the end of a strap which is coupled to the second flap of the shoe.

[0009] Even this solution has the drawbacks noted earlier, with the addition of the fact that the arc-like shapes of the band and of the strap cause them to lie, during the initial step of their coupling, on planes which are not parallel, so that in the engagement step the interconnection becomes even more difficult, and this problem is aggravated if one attempts to insert the tooth in the seat that lies closest to the lever arm.

[0010] Moreover, when the lever arm is opened, for example to allow the user to walk when he is not wearing the ski, the arc-like shapes of the band and of the strap facilitate the tipping of the former with respect to the latter, thus forcing their mutual disengagement.

[0011] CH 686.755 A5 is also known which illustrates a locking device for a ski boot, which is composed of a lever arm associated with a first flap of the shoe, which is articulated to an interconnection element for a band which has a rack-like surface and is therefore composed of a series of transverse teeth whose longitudinal cross-section has an arc-like shape in the direction of the first flap.

[0012] The teeth interact selectively with a single protrusion, which protrudes at right angles at the end of a strap which is associated with the other flap of the shoe.

[0013] This solution, too, has the drawbacks noted earlier, in particular the fact that reduction of the tension of the lever arm is followed, due to the arc-like shape of the band and of the engagement element, by mutual disengagement.

[0014] The solutions according to the cited background art further consist of elements which have, for the components that can be compared to the slotted band and to the rack, such dimensions as to create thicknesses which cause the lever to protrude considerably with respect to the flaps of the shoe, which impairs the overall aesthetics of the shoe, since the levers are usually present in a number which can vary from three to five.

[0015] Moreover, greater thicknesses also entail an increase in the weight of the shoe, which has to be multiplied by the number of levers applied to the shoe.

[0016] The aim of the present invention is to solve the above noted technical problems, eliminating the drawbacks of the cited background art, by providing a closure device that makes it possible to achieve quick and optimum fastening of the flaps of a sports shoe, gaining optimum comfort and a strong closure without deformations and/or breakages, and to contain the thickness of the slotted band/rack assembly, so as to improve the overall aesthetic appearance of the shoe.

[0017] Within this aim, an object of the invention is to provide a closure device for sports shoes that can make it possible to achieve closure even in the presence of snow on the slotted band or on the rack.

[0018] Another object of the invention is to obtain a closure device for sports shoes that makes it possible to improve the interconnection between the slotted band and the rack, both during tensioning and during the release of the lever arm.

[0019] Another object is to provide a device that combines the above characteristics with those of being structurally simple and of having low production costs.

[0020] This aim and these objects, as well as others which will become better apparent hereinafter, are

achieved by a closure device, particularly for sports shoes, which comprises a lever arm, which is coupled to a first flap of said shoe and is articulated to an interconnection element for a slotted band which has a series of transverse seats, **characterized in that** it comprises a rack, which can be associated with a second flap of said shoe and has a slightly arc-shaped body, from which at least one tooth protrudes on the side opposite to said lever arm and is inclined by an acute angle α, said tooth having flat and straight walls and interacting selectively with said seats provided in said slotted band, said rack having a flat tab which is directed toward said slotted band and partially supports it.

[0021] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a particular but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a top view of a closure device according to the invention;
Figure 2 is a side view of the closure device;
Figure 3 is a sectional view of the closure device, taken along the line III-III of Figure 1;
Figure 4 is an exploded view of the slotted band and of the rack.

[0022] In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0023] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0024] With reference to the figures, the reference numeral 1 designates a closure device, particularly for sports shoes, which comprises a lever arm 2, which is associated so that it can rotate, by means of a pair of first pivots 3 and 4, with a pair of shoulders 5a and 5b that protrude from a base 6 which is coupled to a first flap 7 of the shoe by means of a first rivet or screw 8.

[0025] The lever arm 2 is articulated, by means of a second pivot 9, to an end of an interconnection element 10, which is rotatably associated at its other end, by means of a pivot 11, with a complementarily shaped first end 12 of a slotted band 13, which consists of a flat and arc-like plate provided with a series of transverse through seats 14 which have a rectangular plan shape.

[0026] The slotted band 13 has a plane 16 at its second end 15, which is inclined in the opposite direction with respect to the shoe.

[0027] The device 1 comprises a rack 17, which can be associated by means of a second rivet or screw 18 with a second flap 19 of the shoe.

[0028] The rack 17 has a body 20, which is slightly arc-shaped, approximately similar to the slotted band 13, and is preferably provided by blanking and shaping a steel plate, like the slotted band.

[0029] At least one tooth 21 protrudes from the body 20 along part of its width and on the side opposite to the lever arm 2, and has a rear wall 22a and a front wall 22b which are flat and straight.

[0030] Such walls therefore have a chosen and constant inclination with respect to the body 20, preferably with an acute angle α of $60° \pm 3°$, preferably 63°, as shown in Figure 3.

[0031] The thickness of the tooth 21 is such as to allow complete insertion thereof within one of the seats 14, whereas the dimension along the axis that lies longitudinally to the slotted band 13 of each seat 14 is such as to allow, in the coupling condition shown in Figures 2 and 3, the optimum overlap of the slotted band on the rack, so that the lower perimetric edge 23 of the rear surface 24 of each seat 14 approximately coincides with the lower perimetric edge 25 of the rear wall 22a for coupling the tooth 21 with the body 20.

[0032] In this manner, tensioning of the lever arm 2 entails interaction of the upper perimetric edge 26 of the front surface 27 of each seat 14 with the inclined surface of the front wall 22b of the tooth 21, thus applying a force which pushes the slotted band against the rack, improving fastening.

[0033] The rack 17 further has a flat tab or tail 28, which protrudes and is directed toward the slotted band 13, and therefore toward the lever arm 2, and protrudes beyond the lower perimetric edge 25 of the rear wall 22a of the tooth 21.

[0034] The tab or tail 28 thus forms an additional resting surface for part of the overlying slotted band 13 in the direction of the lever arm 2, and this prevents the latter from lifting proximately to the end 15 and to the inclined plane 16 or from rotating with respect to the underlying rack 17.

[0035] Such resting surface formed by the tab or tail 28 thus keeps the rack and the slotted band mutually parallel, preventing the overturning of the latter and its consequent lifting: a reduced overall height is thus maintained which increases both safety, since the possibility is reduced considerably that the skier might touch the snow or poles with the rack or slotted band during sports practice, and the overall aesthetic aspect of the shoe.

[0036] The rack 17 may further have a second tooth 21, which is adjacent to the preceding one and is provided in the direction opposite to the tab or tail 28, for interaction with an additional and contiguous seat 14.

[0037] The use of two teeth makes it possible to improve fastening, since the tooth can be used that lies closest to the tab or tail 28 to achieve a first tensioning of the flaps.

[0038] Advantageously, the longitudinal extension of the tab or tail 28 is approximately twice the thickness of the slotted band 13.

[0039] It has thus been found that the invention has achieved the intended aim and objects, a device having

been obtained which makes it possible to achieve quick and optimum fastening of the flaps of a sports shoe, achieving optimum comfort and strong closure without deformations and/or breakages, and a containment of the thickness of the slotted band/rack assembly, so as to improve the overall aesthetic appearance of the shoe.

[0040] Moreover, the closure device makes it possible to achieve closure even in the presence of snow on the slotted band or on the rack, the interconnection between the slotted band and the rack being improved both during the tensioning step and during the step for release of the lever arm, keeping the two mutually parallel and preventing accidental uncoupling in the condition of partial tension reduction.

[0041] The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be more pertinent according to the specific requirements.

[0042] The various means for performing certain different functions need not certainly coexist only in the illustrated embodiment but can be present per se in many embodiments, including embodiments that are not illustrated.

[0043] The characteristics indicated as advantageous, convenient or the like may also be omitted or replaced with equivalents.

[0044] The disclosures in Italian Patent Application No. TV2008A000149 from which this application claims priority are incorporated herein by reference.

[0045] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A closure device (1), particularly for sports shoes, comprising a lever arm (2), which is coupled to a first flap (7) of said shoe and is articulated to an interconnection element (10) for a slotted band (13) which has a series of transverse seats (14), **characterized in that** it comprises a rack (17), which can be associated with a second flap (19) of said shoe and has a slightly arc-shaped body (20), from which at least one tooth (21) protrudes on the side opposite to said lever arm (2) and is inclined by an acute angle α, said tooth (21) having flat and straight walls (22a, 22b) and interacting selectively with said seats (14) provided in said slotted band (13), said rack (17) having a flat tab (28) which is directed toward said slotted band (13) and partially supports it.

2. The device according to claim 1, **characterized in that** said lever arm (2) is articulated to one end of said interconnection element (10), which is rotatably associated, at its other end, by means of a pivot (11), with a complementarily shaped first end (12) of said slotted band (13), which has said transverse through seats (14) that have a rectangular plan shape and, at the second end (15), a plane (16) that is inclined in the direction opposite to said shoe.

3. The device according to claims 1 and 2, **characterized in that** said rack (17) can be associated by means of a second rivet or screw (18) with the second flap (19) of said shoe, said body (20), being slightly arc-shaped approximately like said slotted band (13) and being provided by blanking and shaping a steel plate, like said slotted band.

4. The device according to claims 1 and 3, **characterized in that** said at least one tooth (21) protrudes from said body (20) over part of its width and on the side opposite said lever arm (2) and has a rear wall (22a) and a front wall (22b) which are flat and straight.

5. The device according to claim 4, **characterized in that** said walls have a chosen and constant inclination with respect to said body (20) with an acute angle α of approximately $60° \pm 3°$, preferably approximately 63°.

6. The device according to claim 5, **characterized in that** the size of said at least one tooth (21) along the axis that runs longitudinally with respect to said rack (17) is such as to allow complete insertion thereof within one of said seats (14), whereas the dimension along the axis that is longitudinal with respect to said slotted band (13) of each one of said seats (14) is such as to allow, in the coupling condition, the optimum overlap of said slotted band and said rack, so that the lower perimetric edge (23) of the rear surface (24) of each one of said seats (14) approximately coincides with the lower perimetric edge (25) of said rear wall (22a), for the coupling of said tooth (21) to said body (20) and the upper perimetric edge (26) of the front surface (27) of each one of said seats (14) interacts with the inclined surface of said front wall (22b), of said at least one tooth (21).

7. The device according to claims 1 and 6, **characterized in that** said flat tab or tail (28) protrudes and is directed toward said slotted band (13) and therefore toward said lever arm (2) and protrudes beyond the lower perimetric edge (25) of said rear wall (22a) of said at least one tooth (21).

8. The device according to claims 1 and 7, **characterized in that** said tab or tail (28) forms an additional resting surface for part of said overlying slotted band (13) in the direction of said lever arm (2), which pre-

vents the latter from lifting proximately to said end (15) and said inclined plane (16) or from rotating with respect to said underlying rack (17).

9. The device according to claims 1 and 8, **characterized in that** said resting surface formed by said tab or tail (28) keeps said rack and said slotted band mutually parallel, the longitudinal extension of said tab or tail (28) being approximately twice the thickness of said slotted band (13).

10. The device according to one or more of the preceding claims, **characterized in that** said rack (17) has a second tooth (21), which is adjacent to the preceding one (21) and is formed in the direction opposite said tab or tail (28), for interaction with an additional and contiguous seat (14).

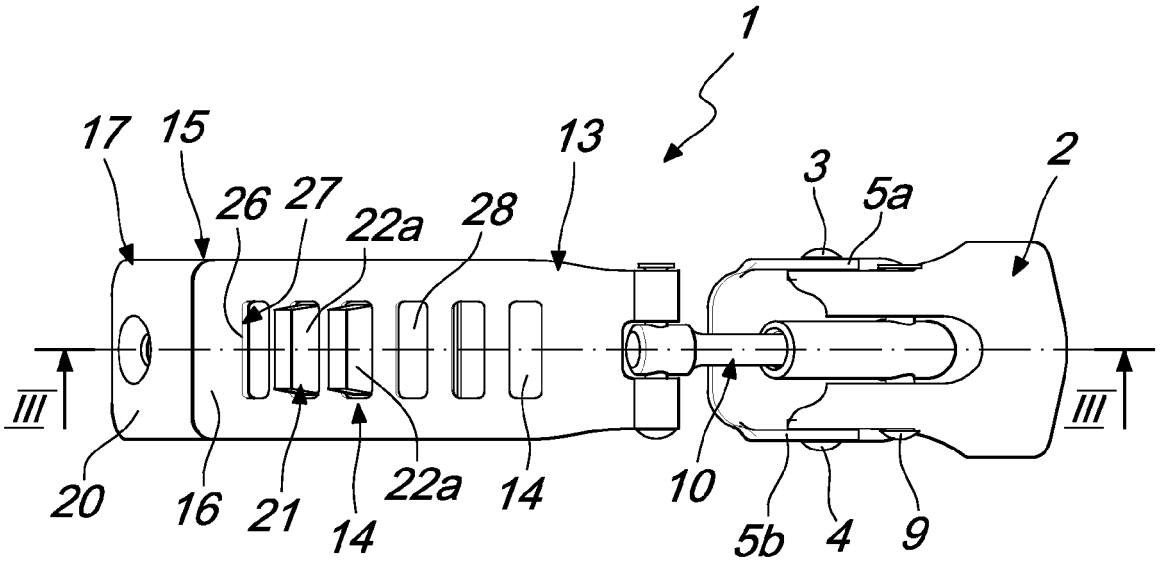
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Fig. 1

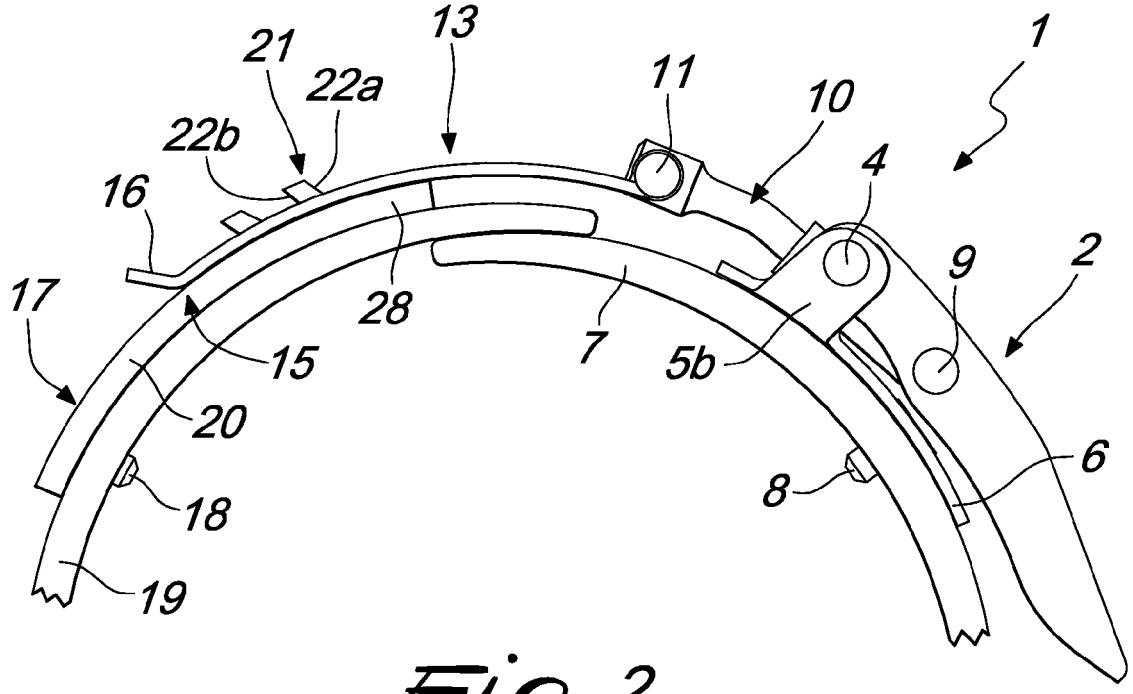
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Fig. 2

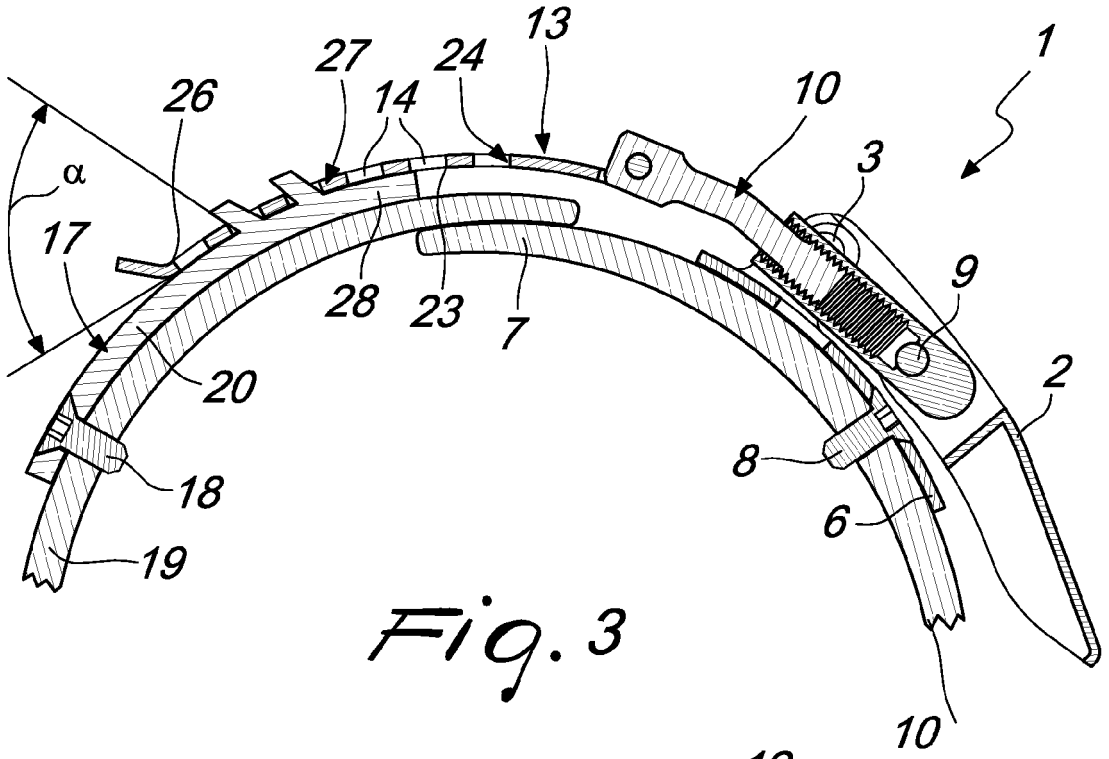
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Fig. 3

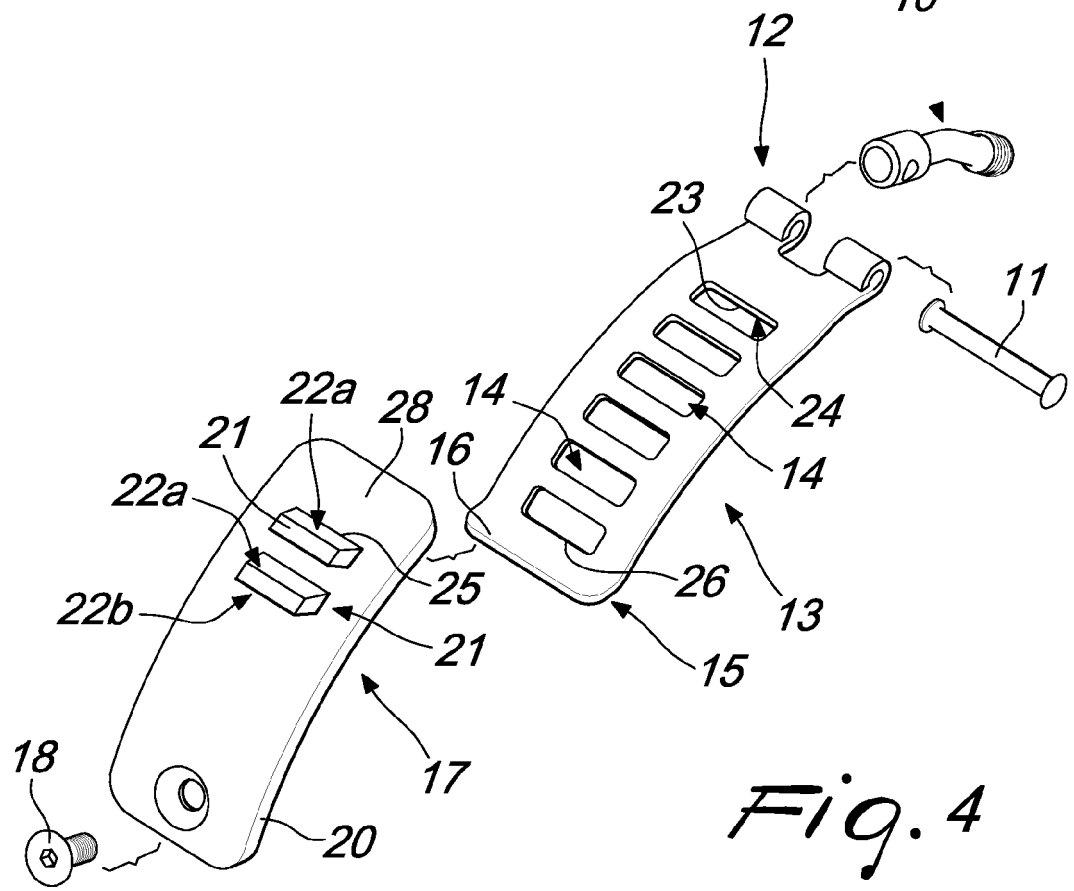
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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 09 17 4179

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 83 367 E (MAISON JALLATTE S A) 22 June 1964 (1964-06-22) * page 1, column 1, paragraph 5 - page 1, column 2, paragraph 4; figures 1-2 *	1,3,4, 6-9	INV. A43C11/14
Y	US 3 132 392 A (SUSSMAN STEINBERG ADALBERTO) 12 May 1964 (1964-05-12) * column 2; figures *	1-4,6-10	
Y	FR 1 339 442 A (MAISON JALLATTE S A) 26 August 1963 (1963-08-26) * figures *	1-4,6-10	
A	FR 2 684 851 A1 (SALOMON SA [FR]) 18 June 1993 (1993-06-18) * the whole document *	1	
A	EP 1 922 944 A1 (PREMEC S P A [IT]) 21 May 2008 (2008-05-21) * paragraph [0018]; figures *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A43C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 March 2010	Herry, Manuel

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24-03-2010

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- CH 686755 A5 **[0011]**
- IT TV20080149 A **[0044]**