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(54) **Retractable fin**

(57) The invention relates to the water sports equipment sector.

In particular, the invention concerns a retractable fin

(1) associable with a shoe (2), comprising:

- a hollow structure (3);
- a moving equipment (4) adapted to assume a first closed configuration inside said structure (3) and a second open configuration when it is outside said structure (3),

wherein said equipment (4) comprises:

- at least two plates (5, 6) rotatably associated with linear sliding means (7, 8) adapted to enable the extraction of

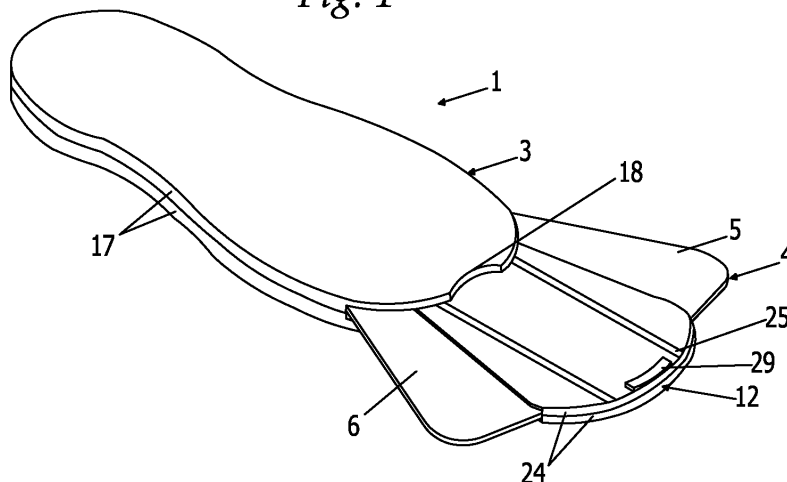
said at least two plates (5, 6) from said hollow structure (3) and subsequent repositioning thereof inside the same structure;

- elastic means (9, 22, 23) adapted to spread said at least two plates (5, 6) in the form of a fan during extraction thereof to change from said first closed configuration to said second open configuration,

and wherein said fin (1) comprises:

- first locking means (10) for said at least two plates (5, 6) in said first closed configuration;
- second locking means (11, 27, 28) for said at least two plates (5, 6) in said second open configuration.

Fig. 1



EP 2 664 364 A1

Description

[0001] The invention relates to the water sports equipment sector.

[0002] In particular, the invention concerns a retractable fin associable with shoes that are increasingly often worn when walking in aquatic environments, such at the seaside on the beach, on rocks while fishing, but also at the lake, along rivers and streams, or at the swimming pool.

[0003] The shoes commercially available are comfortable for walking in these environments, they protect the sole of the foot, but naturally offer no help in the water, for example while swimming or when abandoning shallow water to move into open water or to view the sea bed and when it is necessary to swim fast or in depth.

[0004] Currently, it is necessary to carry a pair of conventional swim fins, to replace the shoes immediately before entering the water.

[0005] Swim fins are footwear used to swim faster, or by divers to move more effectively underwater and, more generally, used for recreational or sporting activities in water.

[0006] Each swim fin comprises a foot pocket that adheres tightly to the foot, fixed to the front end of which is a flat or ribbed plate, called blade, of appropriate length and elasticity, which transmits the foot's movement to the water and amplifies it.

[0007] In fact, swim fins increase the thrust force of the foot, increasing the fluid surface on which this thrust is imparted, contributing to the optimal distribution of muscular action on the water, to maximize the performance of the leg stroke.

[0008] For the user, having to remove the shoe and put the swim fin on, and vice versa, is an inconvenience.

[0009] Even more inconveniently, in the majority of cases, these operations are carried out in the vicinity of slippery surfaces, such as rocks, and therefore the unstable position of the user can make the changing operation even more difficult.

[0010] The object of the invention is to produce a retractable fin permanently associable with a shoe, capable of exiting from or retracting into the sole of the shoe when required and depending on the activity being carried out. Another object of the invention is to produce a functional and strong fin, which is also light, practical and easy to use.

[0011] Yet another object is to produce a sole or a shoe provided with said retractable fin.

[0012] These objects are achieved with a retractable fin associable with a shoe, **characterized in that** it comprises:

- a hollow structure;
- a moving equipment adapted to assume a first closed configuration inside said structure and a second open configuration when it is outside said structure,

wherein said equipment comprises:

- at least two plates rotatively associated with linear sliding means adapted to enable the extraction of said at least two plates from said hollow structure and subsequent repositioning thereof inside the same structure;
- elastic means adapted to spread said at least two plates in the form of a fan during extraction thereof to change from said first closed configuration to said second open configuration, and wherein said fin comprises:
 - first locking means for said at least two plates in said closed configuration;
 - second locking means for said at least two plates in said second open configuration.

[0013] According to a particularly preferred embodiment of the invention, said equipment comprises a third plate associated with said linear sliding means, adapted to be interposed between said two plates in said second open configuration.

[0014] In particular, said third plate comprises two shells provided with shaped conformations and coupled so as to contain therein, in the areas without conformations, said two spreadable plates.

[0015] According to a further embodiment of the invention, said linear sliding means comprise a rectilinear guide associated with said hollow structure and a cutoff provided on said moving equipment adapted to cooperate with one another in mutual sliding relation.

[0016] According to a preferred embodiment of the invention, said linear sliding means also comprise grooves provided inside said hollow structure, and corresponding tracks provided on said moving equipment, adapted to cooperate in mutual sliding relation.

[0017] Said sliding means also comprise limit switch retaining means and, advantageously, said retaining means comprise two flexible hooks arranged at one end of said cutoff, adapted to cooperate by interference with two shaped heads arranged at the opposite ends of said rectilinear guide.

[0018] According to a possible embodiment of the invention, said elastic means comprise two leaf springs associated with said sliding means and adapted to cooperate with said two plates.

[0019] According to a further embodiment of the invention, said elastic means comprise two tabs provided at the ends of said two plates destined to remain inside said hollow structure, and shaped housings provided on said sliding means, where said tabs and said housings are adapted to cooperate with one another to spread said at least two plates in the form of a fan.

[0020] According to further details of the invention, said first locking means for said two plates comprise shoulders provided inside said hollow structure, and said second locking means for said two plates comprise shoulders provided on said third plate.

[0021] Alternatively, said second locking means for

said two plates comprise a slot provided on a first plate and a pin with reinforced head provided on a second plate of said at least two plates, where said pin can slide in said slot.

[0022] According to a possible embodiment of the invention, said hollow structure comprises two shells coupled so as to contain therein said equipment.

[0023] Advantageously, said hollow structure comprises a cutout through which a projecting portion of said plates is accessible, to enable the extraction of said equipment from said hollow structure.

[0024] According to a further embodiment of the invention, said hollow structure comprises gripping means provided on the outer surface thereof.

[0025] The invention also relates to a sole for a shoe provided with a retractable fin according to the invention, and more generally to a shoe comprising said fin.

[0026] The main advantage of the retractable fin according to the invention consists in its maximum functionality: the fin is made available only when effectively required, otherwise it remains inside the shoe without increasing the footprint thereof.

[0027] Advantageously the user does not require to be equipped at the same time with both shoes and flippers, as separate items, but the two elements are coupled directly and form a single shoe with dual functionality.

[0028] The equipment, which forms the fundamental part of the fin, can advantageously assume two configurations, maintaining the minimum footprint possible: a first non-operating configuration, closed and completely retracted inside the hollow structure and hence inside the shoe with which it is associated, and a second operating configuration, open in the form of a fan and almost completely extracted from said hollow structure.

[0029] The equipment can comprise two plates which spread in the form of a fan to form the open operating configuration or, in an even more preferred embodiment, it can also comprise a third central plate formed by two coupled shells, which act, in the closed configuration, as containment for said spreadable lateral plates and, in the open configuration, also as support and increased stiffening for the same spread plates.

[0030] Said sliding means are necessary to enable the equipment to slide in longitudinal direction to exit from said hollow structure or return therein, maintaining the alignment at all times.

[0031] Advantageously, said sliding means also comprise retaining means, which prevent the equipment from detaching from the hollow structure and disengaging therefrom during the open operating configuration, losing the reversibility of the movement. In the same way, said retaining means retain the element inside the structure in the closed non-operating configuration preventing it from exiting accidentally, even partially, and causing the user to stumble.

[0032] Said elastic means determine the progressive opening of the plates in the form of a fan as the equipment moves outside the hollow structure.

[0033] To define and limit lateral opening of the plates, locking means are provided, to prevent the same plates from spreading out excessively and losing their resistance to the pressure of the water.

5 **[0034]** The conformation of the hollow structure with two shells forms a further advantage as the equipment is always protected and locked tightly inside the structure in its closed configuration, and moreover the whole fin can thus be mounted easily also on any shoe due to its extremely compact shape.

10 **[0035]** The cutout obtained on said hollow structure enables the user to easily access the moving element in order to extract it from the hollow structure and arrange the fin in the open configuration.

15 **[0036]** The gripping means provided on the outer surface of the hollow structure prevent the fin from detaching and accidentally exiting from the cavity of the sole of the shoe in which it can be housed.

20 **[0037]** These and other advantages will be more apparent below in the description of a preferred embodiment of the invention, provided by way of non-limiting example, and with the aid of the figures, wherein:

Figs. 1 and 2 represent, in an axonometric view, a retractable fin associable with a shoe according to the invention, in two configurations for use;

Fig. 3 represents, in an exploded top plan view, a retractable fin in all its components according to the invention;

30 Fig. 4 represents, in a partly transparent top plan view, a retractable fin associable with a shoe according to the invention, in a first configuration for use; Figs. 5, 6 and 7 represent, in longitudinal and cross sections, the fin of Fig. 4;

35 Fig. 8 represents, in a partly transparent top plan view, a retractable fin associable with a shoe according to the invention, in a second configuration for use; Figs. 9, 10 and 11 represent, in longitudinal and cross sections, the fin of Fig. 8;

40 Figs. 12a and 12b represent, in a partly exploded plan view, the fin of Fig. 4 in two configurations for use and with particular reference to the elastic means adapted to spread the lateral plates;

45 Fig. 13 represents, in a partly exploded plan view, the fin according to a possible embodiment of the invention which concerns the elastic means with respect to Figs. 12a and 12b;

Figs. 14a and 14b represent, in a top plan view, the fin according to a possible simplified embodiment of the invention, in two configurations for use;

50 Fig. 15 represents, in an axonometric view, a shoe with which there is associated a fin according to the invention, open in the configuration for use.

55 **[0038]** With reference to the figures, there is shown a retractable fin 1, adapted to be associated with a shoe 2 which can be used in aquatic environments and adapted to be reversibly extractable therefrom.

[0039] Said fin 1 substantially comprises a hollow structure 3 and an equipment 4 that forms the fundamental part of the fin, i.e. the pushing blade.

[0040] In particular, said hollow structure 3 comprises two half-shells 17 coupled with one another so as to produce the same structure and contain said equipment 4 therein.

[0041] Said hollow structure 3 also comprises specific holes 21 that allow water to flow out from the inside thereof as a result of reversible sliding of the equipment 4.

[0042] Said element 4 comprises a plurality of plates 5, 6 and 12 adapted to be arranged in the form of a fan to form the blade of the fin 1, and said equipment 4 is adapted to assume a first configuration closed inside said hollow structure 3 (Fig. 2) and a second configuration open in the form of a fan when it is instead extracted outside the same structure (Fig. 1).

[0043] With particular reference to the variant shown in Figs. 1-13 and 15, said equipment 4 comprises two lateral plates 5 and 6 and a central plate 12, while Fig. 14 shows a fin 1 whose moving equipment 4 is formed only by the two lateral plates 5 and 6 rotatively associated with one another and adapted to form on their own the pushing blade.

[0044] The moving equipment 4 is provided with special sliding means, inside said hollow structure 3, adapted to enable the extraction and retraction thereof with respect to said hollow structure 3.

[0045] With reference to Figs. 1-13, said two lateral plates 5 and 6 are rotatively associated with said sliding means, while said third central plate 12 is associated stably therewith and forms an extension thereof.

[0046] In particular, said third plate 12 comprises two shells 24 provided with shaped conformations 13 and coupled so as to contain therein, in the areas without conformations 13, in closed configuration of the fin 1, said two lateral plates 5 and 6, as is clearly evident in the sections of Figs. 10 and 11.

[0047] In all the embodiments shown, said linear sliding means comprise a slightly flared rectilinear guide 7, associated stably with the half-shells 17 of said hollow structure 3, and a cutoff 8, obtained on said moving equipment 4, adapted to cooperate with one another in mutual sliding relation.

[0048] In particular, said two lateral plates 5 and 6 are rotatively associated with said third plate 12 by means of pins 20 positioned laterally to said cutoff 8, so that they can spread progressively in the form of a fan rotating on said pins 20 as said cutoff 8 slides on said guide 7.

[0049] Said linear sliding means also comprises grooves 25, provided inside said hollow structure 3, and corresponding tracks 26, provided on said moving equipment 4 and in particular on the outer surfaces of half-shells 24 that form the third plate 12.

[0050] Said grooves 25 and said tracks 26 are also adapted to cooperate in mutual sliding relation to maintain the moving equipment 4 and the hollow structure 3 in perfect alignment and ensure maximum functionality

of the fin 1.

[0051] Said sliding means also comprise retaining means adapted to limit the sliding of said cutoff 8 on said guide 7 between two positions of minimum and maximum extraction, defined by the opposite ends of the same guide, so as to prevent detachment of said equipment 4 from said hollow structure 3.

[0052] Said retaining means are produced by means of a particular conformation of one end of said cutoff 8 and of both ends of said guide 7.

[0053] In fact, said cutoff 8 comprises two flexible hooks 14 having a certain curvature toward the inside of said cutoff and adapted to cooperate by interference with two shaped heads 15 and 16 of said rectilinear guide 7.

[0054] Said fin 1 also comprises elastic means adapted to spread said two lateral plates 5 and 6 during extraction thereof to pass from said first closed configuration to said second open configuration, so that they are arranged on the right and on the left of said third plate 12, which remains in the center.

[0055] With particular reference to Figs. 3-12, said elastic means comprise two tabs 22, provided at the ends of said two plates 5, 6 inside said hollow structure 3, and respective shaped housings 23 provided on said sliding means, laterally to said cutoff 8.

[0056] Said tabs 22 and said housings 23 are adapted to cooperate with one another to spread said at least two plates 5, 6: in the form of a fan in the closed configuration the tabs 22, made of flexible material, are loaded and curved with force in said shaped housings 23 (Figs. 8 and 12b), while in the open configuration the tabs 22 are released and extend along the straight edge of said shaped housings 23 (Figs. 4 and 12a).

[0057] With particular reference to Fig. 13, said elastic means are instead interposed between said two lateral plates 5, 6 and said shaped conformations 13 of said third plate 12 and comprise two leaf springs 9 fixed to said shaped conformation 13, adapted to act with elastic thrust on the inner edge 5' and 6' of said two lateral plates 5 and 6, pushing them outward, due to the rotation on the pins 20.

[0058] To delimit the movement of said lateral plates 5 and 6 and stably define said two configurations, said fin 1 comprises first and second locking means for said plates.

[0059] Said first locking means comprise shoulders 10 obtained inside said hollow structure 3, and in particular along the edges 17' of the shells 17 of which it is formed, and are adapted to delimit the position of said two lateral plates 5 and 6 in said first closed configuration.

[0060] With particular reference to Figs. 4, 12a and 13, said second locking means comprise shoulders 11 obtained on the end edge 12' of said third plate 12 and delimit the position of said two lateral plates 5 and 6 in said second open configuration.

[0061] With reference instead to Figs. 14a and 14b, which show an embodiment of the fin provided only with the two lateral plates 5 and 6 and without the central plate

12, said second locking means comprise at least one slot 27 provided on a first plate 5 and a pin with reinforced head 28 provided on a second plate 6 of said two plates, where said pin 28 can slide in said slot 27 determining the width of the pushing blade of the fin.

[0062] With reference to all the embodiments shown, on the shells 17 of said hollow structure 3 there is provided a cutout 18, through which a portion of said plates 5, 6 or 12 is accessible.

[0063] Through said cutout 18 it is, in fact, possible to access said equipment 4 to extract it from the hollow structure 3.

[0064] Said hollow structure 3 also comprises gripping means provided on the outer surface thereof, and in particular specific serrated knurlings 30 adapted to cooperate with the cavity of the sole 19 inside which the fin 1 is inserted to retain it therein.

[0065] The use of a retractable fin 1 according to the invention is described below.

[0066] The user puts on a shoe 2 with a sole 19 in which a fin 1 is associated stably, as described above.

[0067] While the user is walking in a dry environment, the fin 1 is in the closed configuration thereof, where its equipment 4 is housed completely inside the hollow containing structure 3 without projecting from the footprint of the sole 19 of the shoe 2.

[0068] Just before entering the water, or after entering the water, the user grips the equipment 4, accessing it through the specific cutout 18 obtained in the hollow structure 3, and extracts it by pulling it toward the outside of the same hollow structure.

[0069] The equipment 4 thus slides longitudinally along the hollow structure 3 until it is completely outside the same structure.

[0070] Simultaneously to the extraction in longitudinal direction, the elastic means are released and spread the two lateral plates 5 and 6, arranging them in the form of a fan laterally to the third central plate 12 which is also now extracted from the hollow structure 3.

[0071] The whole equipment 4 is now completely outside the hollow structure 3 and the fin 1 is in its open configuration and ready for use in water (Fig. 15).

[0072] To restore the fin 1 to its closed configuration, the user simply acts by pushing the end 12' of the third central plate 12 toward the inside of the hollow structure 3. Sliding longitudinally toward the inside, said third central plate 12 draws with it the two lateral plates 5 and 6 which are automatically closed over one another, pushed by the lateral containing edges 17' of the shells 17 of the hollow structure 3.

[0073] Water and any grains of sand exit through the openings 21.

Claims

1. A retractable fin (1) associable with a shoe (2), **characterized in that** it comprises:

- a hollow structure (3);
 - a moving equipment (4) adapted to assume a first closed configuration inside said structure (3) and a second open configuration when it is outside said structure (3),
- wherein said equipment (4) comprises:
- at least two plates (5, 6) rotatably associated with linear sliding means (7, 8) adapted to enable the extraction of said at least two plates (5, 6) from said hollow structure (3) and subsequent repositioning thereof inside the same structure;
 - elastic means (9, 22, 23) adapted to spread said at least two plates (5, 6) in the form of a fan during extraction thereof to change from said first closed configuration to said second open configuration,
- and wherein said fin (1) comprises:
- first locking means (10) for said at least two plates (5, 6) in said first closed configuration;
 - second locking means (11, 27, 28) for said at least two plates (5, 6) in said second open configuration.

2. Retractable fin (1) according to claim 1, **characterized in that** said equipment (4) comprises a third plate (12) associated with said linear sliding means (7, 8), adapted to interpose between said two plates (5, 6) in said second open configuration.
3. Retractable fin (1) according to claim 2, **characterized in that** said third plate (12) comprises two shells (24) provided with shaped conformations (13) and coupled so as to contain therein, in the areas without conformations (13), said two spreadable plates (5, 6).
4. Retractable fin (1) according to claim 1, **characterized in that** said linear sliding means comprise a rectilinear guide (7) associated with said hollow structure (3) and a cutoff (8) provided on said moving equipment (4) adapted to cooperate with one another in mutual sliding relation.
5. Retractable fin (1) according to claim 1, **characterized in that** said linear sliding means also comprise grooves (25) provided inside said hollow structure (3), and corresponding tracks (26) provided on said moving equipment (4), adapted to cooperate in mutual sliding relation.
6. Retractable fin (1) according to claim 1, **characterized in that** said sliding means (7, 8) comprise limit switch retaining means (14, 15, 16).
7. Retractable fin (1) according to claim 6, **characterized in that** said retaining means comprise two flexible hooks (14) arranged at one end of said cutoff (8), adapted to cooperate by interference with two

shaped heads (15, 16) arranged at the opposite ends of said rectilinear guide (7).

8. Retractable fin (1) according to claim 1, **characterized in that** said elastic means comprise two leaf springs (9) associated with said sliding means and adapted to cooperate with said two plates (5, 6). 5

9. Retractable fin (1) according to claim 1, **characterized in that** said elastic means comprise two tabs (22) provided at the ends of said two plates (5, 6) destined to remain inside said hollow structure (3), and shaped housings (23) provided on said sliding means, where said tabs (22) and said housings (23) are adapted to cooperate with one another to spread said at least two plates (5, 6) in the form of a fan. 10
15

10. Retractable fin (1) according to claim 1, **characterized in that** said first locking means for said two plates (5, 6) comprise shoulders (10) provided inside said hollow structure (3). 20

11. Retractable fin (1) according to claim 2, **characterized in that** said second locking means for said two plates (5, 6) comprise shoulders (11) provided on said third plate (12). 25

12. Retractable fin (1) according to claim 1, **characterized in that** said second locking means for said two plates (5, 6) comprise a slot (27) provided on a first plate (5) and a pin with reinforced head (28) provided on a second plate (6) of said at least two plates, where said pin (28) can slide in said slot (27). 30

13. Retractable fin (1) according to claim 1, **characterized in that** said hollow structure (3) comprises two shells (17) coupled so as to contain therein said equipment (4). 35

14. Retractable fin (1) according to claim 1, **characterized in that** said hollow structure (3) comprises a cutout (18) through which a projecting portion (29) of said plates (5, 6, 12) is accessible, to enable the extraction of said equipment (4) from said hollow structure (3). 40
45

15. Retractable fin (1) according to claim 1, **characterized in that** said hollow structure (3) comprises gripping means (30) provided on the outer surface thereof. 50

16. A sole (19) for a shoe (2) **characterized in that** it is provided with a retractable fin (1) according to any one of the preceding claims. 55

17. A shoe (2) **characterized in that** it is provided with a retractable fin (1) according to any one of the preceding claims.

Fig. 1

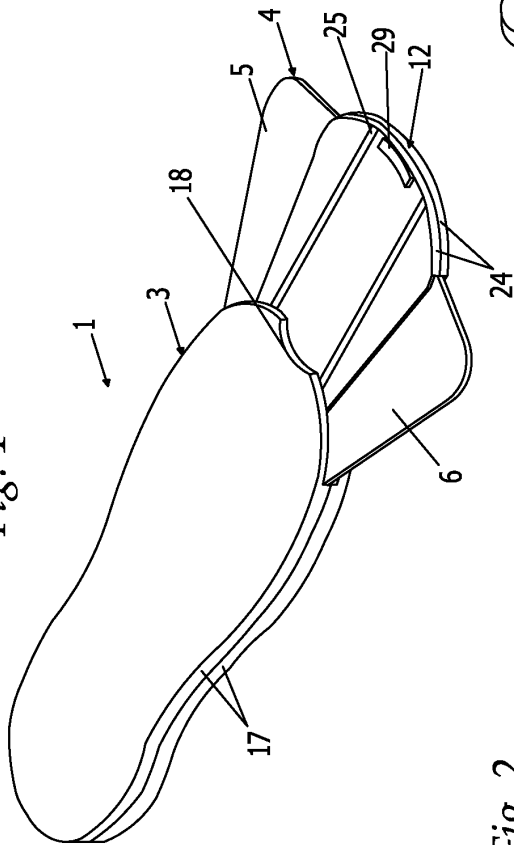


Fig. 15

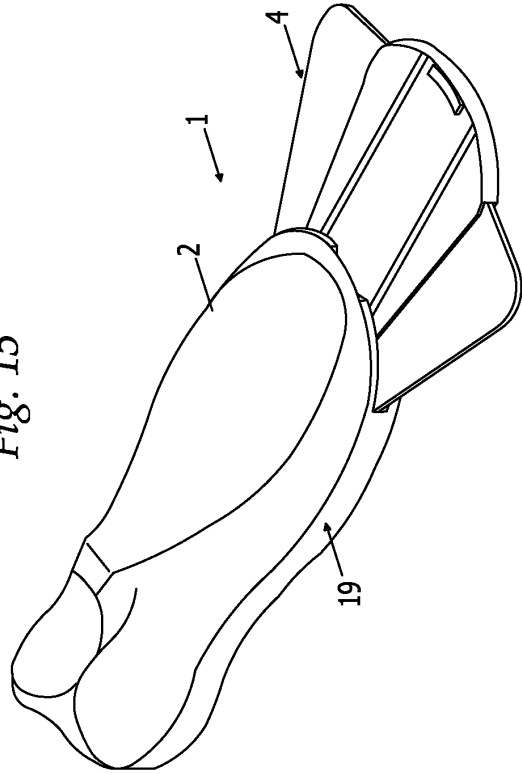
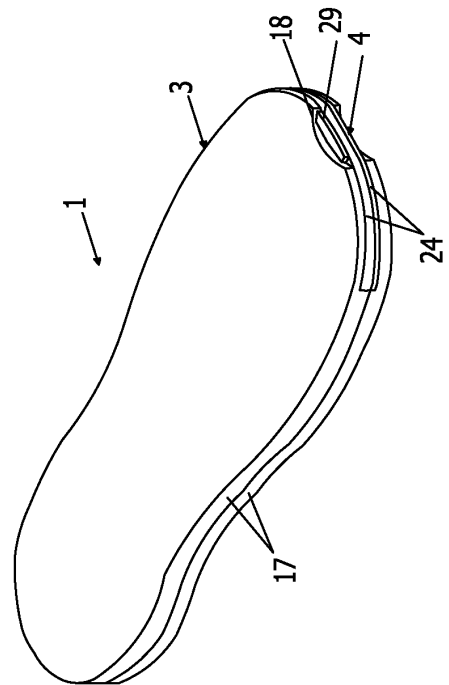


Fig. 2



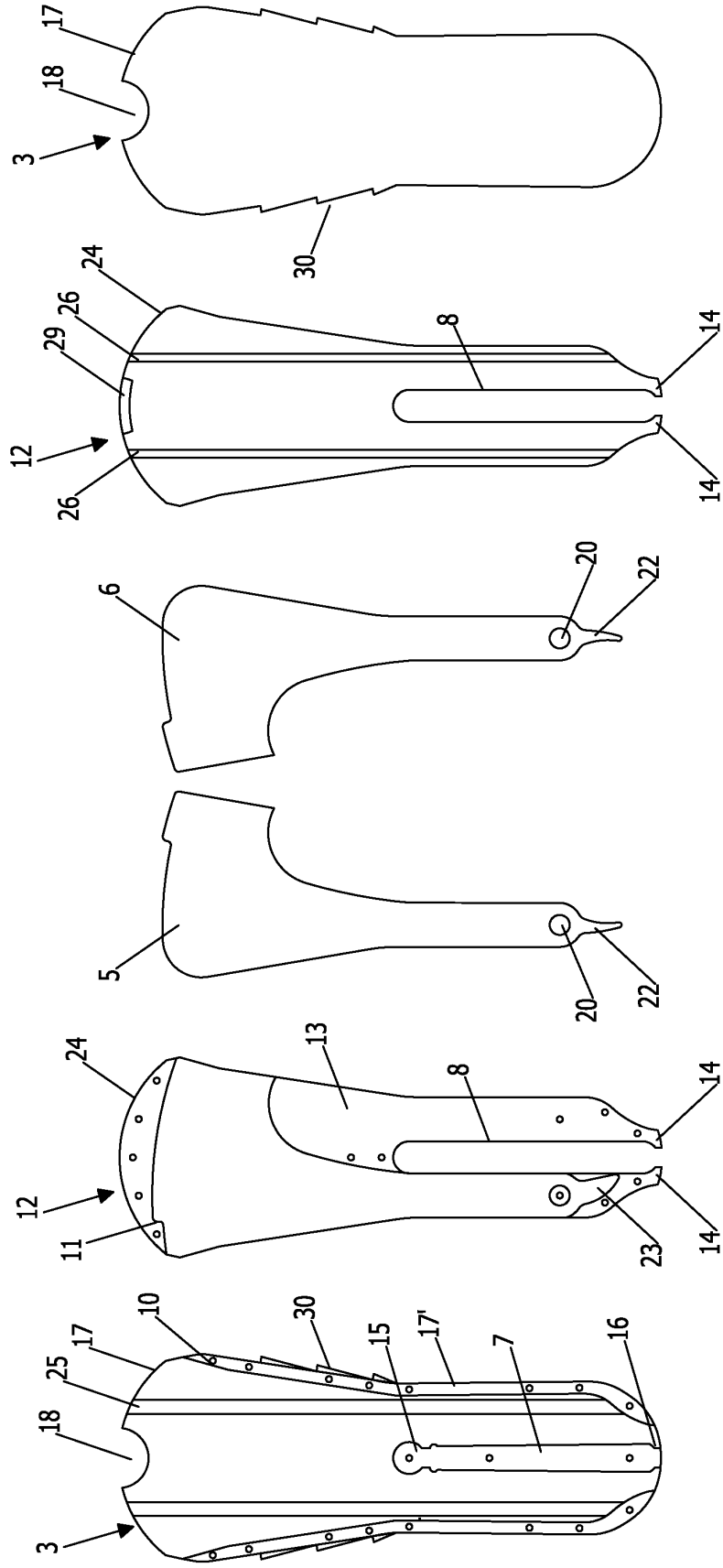


Fig. 3

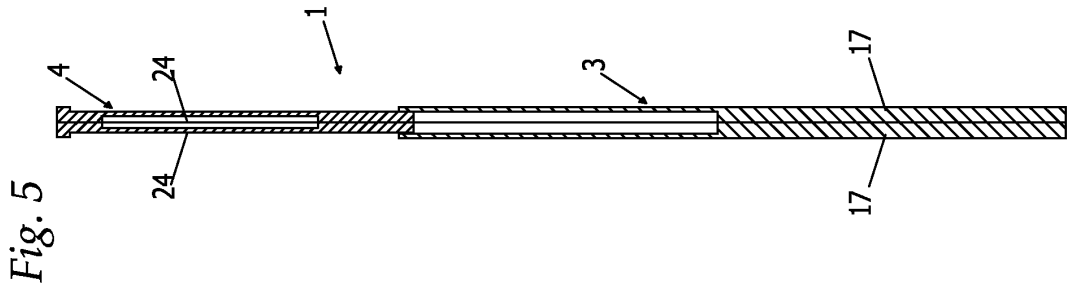
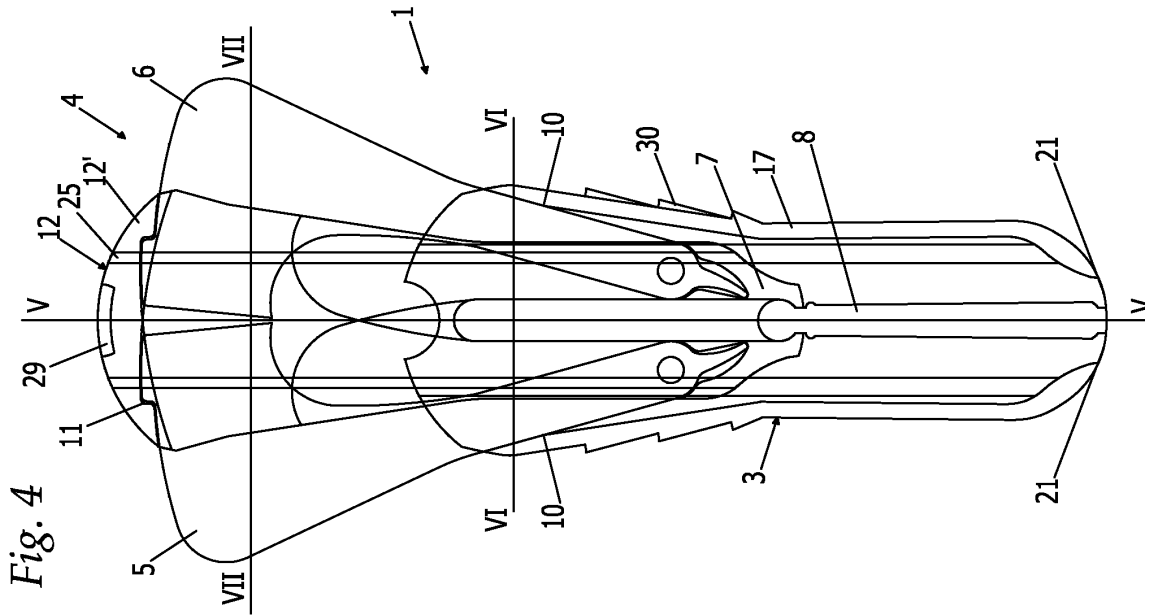


Fig. 6

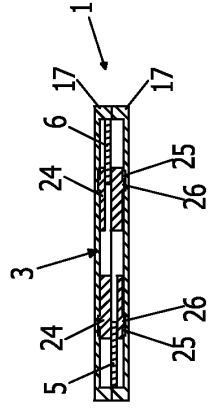


Fig. 7

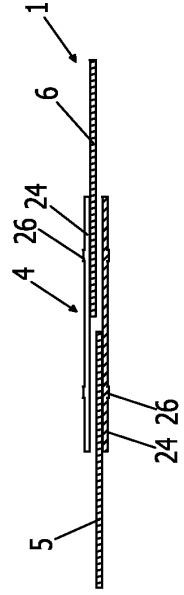


Fig. 9

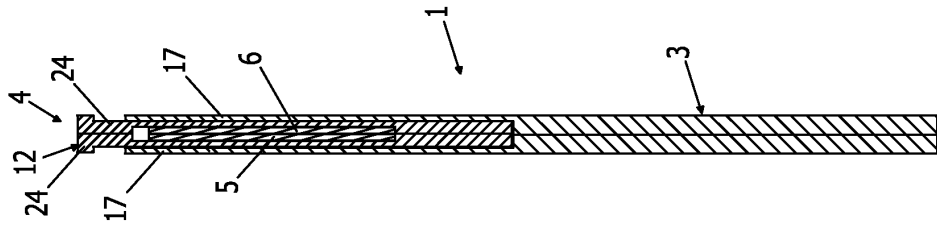


Fig. 8

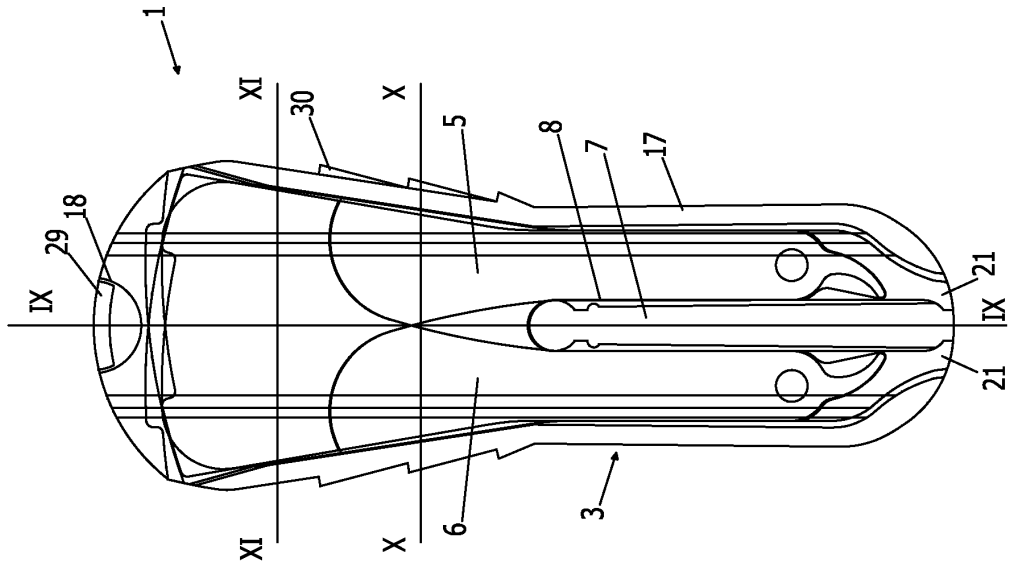


Fig. 10

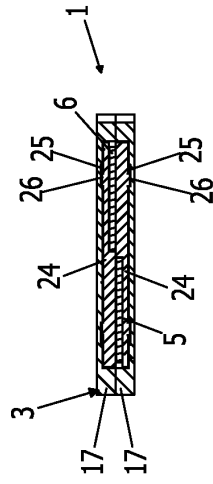
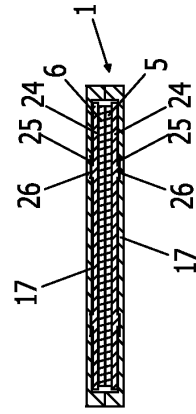
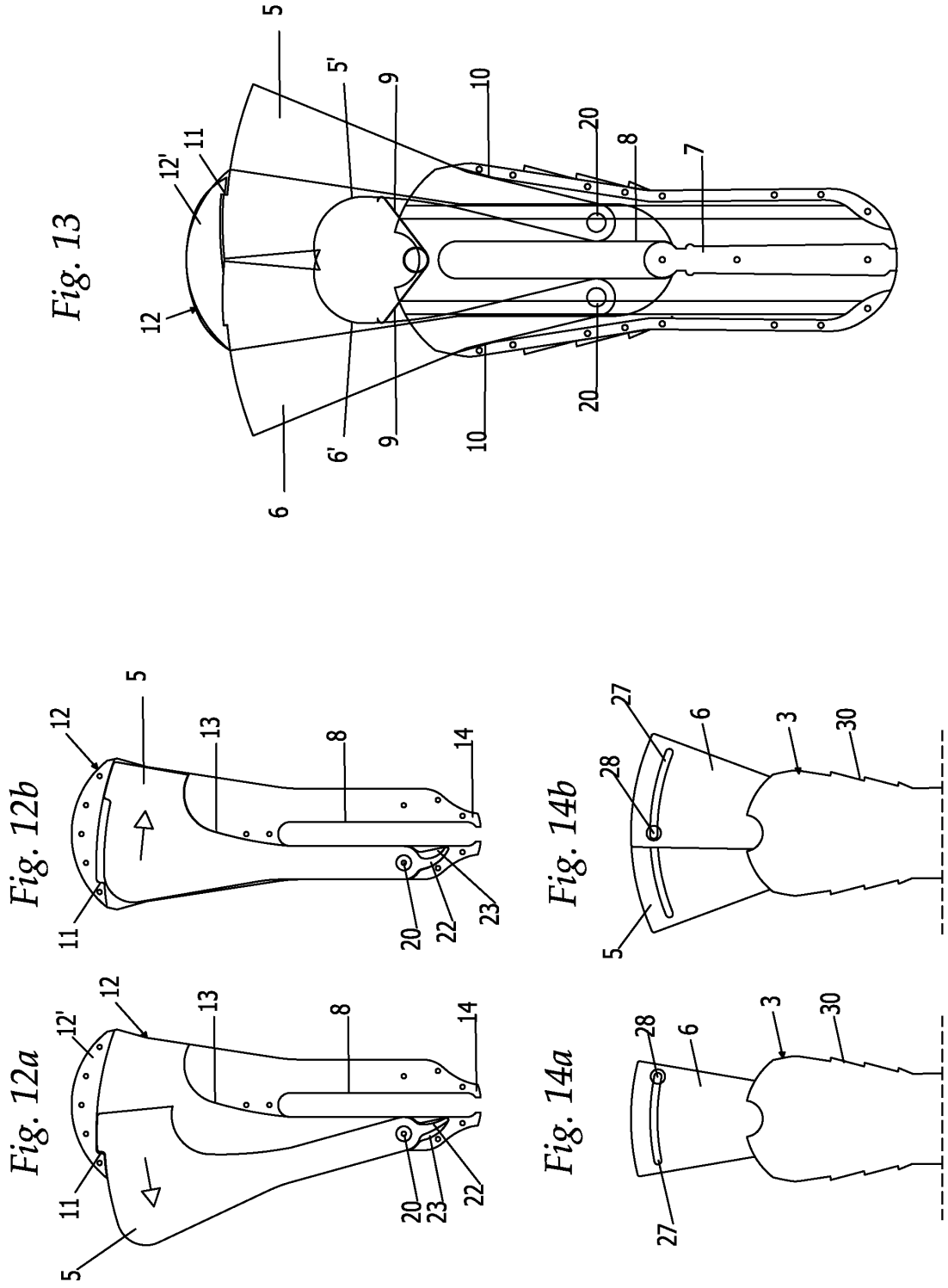


Fig. 11







EUROPEAN SEARCH REPORT

Application Number
EP 13 16 8111

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2010/029152 A1 (FRASER MICHAEL [US] ET AL) 4 February 2010 (2010-02-04) * paragraph [0032] - paragraph [0099]; figures 1-29 *	1-17	INV. A63B31/11 A43B5/08
A	DE 298 11 623 U1 (SCHNEIDER UWE TECH [DE]) 24 September 1998 (1998-09-24) * page 1, line 1 - page 3, line 22; figures 1-10 *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63B A43B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 July 2013	Examiner Jekabsons, Armands
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 16 8111

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25-07-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010029152 A1	04-02-2010	AU 2009276893 A1	04-02-2010
		CA 2735388 A1	04-02-2010
		EP 2321014 A1	18-05-2011
		JP 2011529723 A	15-12-2011
		US 2010029152 A1	04-02-2010
		US 2010279562 A1	04-11-2010
		WO 2010014383 A1	04-02-2010

DE 29811623 U1	24-09-1998	NONE	

EPO FORM P0459

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