(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 908 363 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.04.2008 Bulletin 2008/15

(51) Int Cl.:
A44B 19/32 *(2006.01)* ***A44B 19/42*** *(2006.01)*

(21) Application number: **06020820.4**

(22) Date of filing: **04.10.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **RIRI GROUP S.A.**
6850 Mendrisio (CH)

(72) Inventor: **Cossutti, Livio**
6850 Mendrisio (CH)

(74) Representative: **Zardi, Marco**
M. Zardi & Co. S.A.
Via Pioda 6
6900 Lugano (CH)

(54) **A fluid-tight slide fastener**

(57) Fluid-tight slide fastener (10) comprising a pair of tapes(12), each tape(12) having a layered structure comprising an inner reinforcing textile material layer (14) enveloped in a fluid barrier layer (16) made of a thermoplastic elastomer material (TPE), each tape (12)exhibiting a row (20) of aligned teeth (21) made of a thermoplastic material on at least a portion of one of the long sides (13a)thereof, the rows (20)of aligned teeth (21) of said pair of tapes (12)facing each other and being associated to top and bottom stops(24,26), and a slider (22) slidable between said top and bottom stops (24,26) for engaging in a fluid-tight way or disengaging said aligned teeth (21) respectively, characterized in that it further comprises an adhesive between the inner textile material layer and the outer fluid-barrier material layer of the tapes.

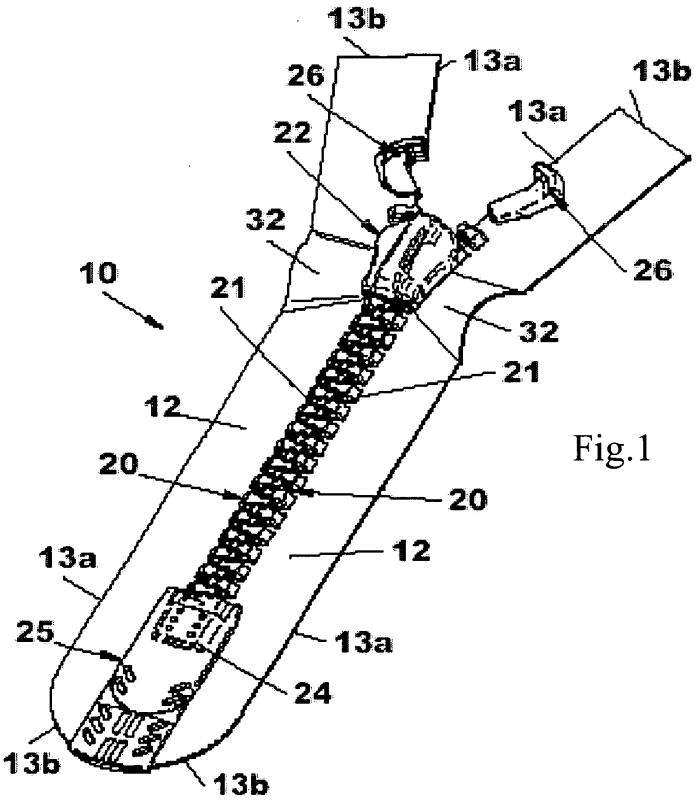

Fig.1

EP 1 908 363 A1

Description

Field of application

[0001] The present invention, in its most general aspect, refers to a slide fastener.

[0002] In particular, the invention refers to a fluid-tight slide fastener, i.e. a slide fastener that is impermeable to fluids.

[0003] In the following description, the term "fluid-tight" refers to a seal or material that is resistant to the passage of liquids, in particular water, and/or gases, for example air, even when put under a considerable pressure strain, for example a pressure difference between the interior and the exterior sides of a slide fastener of up to about 2 bar.

[0004] More in particular, the present invention refers to a fluid-tight slide fastener of the type comprising a pair of impermeable tapes, each tape having a layered structure comprising an inner layer of a reinforcing textile material strip and an outer layer of fluid barrier material enveloping said inner layer, each tape also comprising a row of aligned teeth on at least a portion of one of the long edges thereof, said rows of aligned teeth facing each other and being associated to top and bottom stops, and a slider slidable between said top and bottom stops for engaging in a fluid-tight way or disengaging said aligned teeth respectively.

[0005] The expressions "reinforcing textile material" and "textile material" refer to a woven or non woven material obtained from fibers of materials which are suitable for and compatible with the requirements of the end products onto which the slide fastener is to be applied.

[0006] The present invention also refers to a process for manufacturing a fluid-tight slide fastener as above.

Prior Art

[0007] It is well-known in the art that slide fasteners comprise a pair of tapes of a textile material, each tape bearing a row of aligned teeth on at least a portion of one of the long edges thereof, said rows of aligned teeth facing each other and being associated to top and bottom stops, and a slider slidable between said top and bottom stops for engaging or disengaging said aligned teeth respectively.

[0008] It is also known that in some sports and outdoor activity items, such as for example diving or sailing suits, camping tents and the like, slide fasteners are required to be fluid-tight, to prevent the passage of fluids, in particular water, across the two sides of the tapes of the slide fasteners, yet both tenacious and pliable, to a certain extent.

[0009] To this purpose, it is known to use multi-layered tapes composed of an inner layer of a reinforcing textile material enveloped in an outer fluid barrier material layer in such a way that none of the inner textile material is exposed to the surface, and to seal the aligned teeth on the outer fluid barrier material of the respective tapes so that the bonding which is formed between the teeth and the fluid barrier material is effectively fluid-tight.

[0010] More in particular, according to the prior art, a combination of a textile material for the inner layer of the tapes, a thermoplastic elastomer material (TPE) for the outer fluid-barrier layer of the tapes and a thermoplastic material for the teeth are used for the manufacture of said fluid-tight slide fasteners. In fact, these materials have proven to better meet most of the requirements that these products must satisfy, such as the above-mentioned impermeability and flexibility of the tapes, as well as their stability to light, resistance to sea water, and also easiness of sealing, gluing and stitching. Furthermore, such materials can be efficiently worked in extrusion processes by which the layered structure of the tapes is formed and in injection overmolding processes by which the teeth are sealed to the tapes.

[0011] However, although effectively fluid-tight at the teeth - outer barrier layer interface, slide fasteners of the above-described type exhibit a drawback in that they do not always show satisfactory mechanical properties, in particular at the interface between the inner layer and the outer layer of the tapes.

[0012] In this respect, it is often observed that upon repeated exposure of said slide fasteners to various kinds of stresses deriving from their frequent and repeated use, and/or from conventional washing operations, the layers of the tapes tend to separate from one another.

[0013] This separation process, known as delamination, which is mainly due to a non-satisfactory adhesion between the materials constituting the inner and the outer layers of the tapes, causes the tapes to weaken and the inner textile material to become exposed to the surface, thus compromising the fluid-tight nature of the tape itself.

[0014] Therefore, it would be desirable to provide a multi-layered fluid-tight slide fastener which is capable of withstanding repeated use without undergoing disruption of its structural integrity, in particular at the interface between the inner and the outer layers of the tapes, due to delamination of said layers, even after long and repeated use under harsh conditions of temperature, pressure, tear and tension.

Summary of the invention

[0015] The technical problem underlying the present invention is that of devising and providing a fluid-tight slide fastener of the type considered above, which is reliable in the long run with regard to its fluid-tight nature as well as its structural integrity, so as to overcome the mentioned drawbacks with reference to the prior art.

[0016] This problem is solved, according to the present invention, by a fluid-tight slide fastener comprising a pair of tapes, each tape having a layered structure comprising an inner reinforcing textile material layer enveloped in a fluid barrier layer made of a thermoplastic elastomer material (TPE), each tape exhibiting a row of aligned teeth

made of a thermoplastic material on at least a portion of one of the long sides thereof, the rows of aligned teeth of said pair of tapes facing each other and being associated to top and bottom stops, and a slider slidable between said top and bottom stops for engaging in a fluid-tight way or disengaging said aligned teeth respectively, characterized in that it further comprises an adhesive between the inner textile material layer and the outer fluid-barrier material layer of the tapes.

[0017] Preferably, said adhesive is applied on at least one of the surfaces of the inner textile material layer, more preferably on both the opposite surfaces of said inner textile material layer.

[0018] Preferably, said textile material for inner reinforcing layer of the tapes is chosen between polyester (PE), preferably polyethylene terephtalate (PET), polyamide (PA) and their blends or copolymers.

[0019] The term "thermoplastic elastomer material (TPE)" indicates specific materials, known per se, having a hard phase and a soft phase which confer thermoplastic properties and elastomer properties (flexibility) respectively. It includes block copolymers as well as blends or alloys comprising a thermoplastic material and an elastomer material.

[0020] Suitable TPEs to be used for the fluid barrier material layer may be selected form the group comprising: thermoplastic elastomer styrene copolymers (TPE-S), such as styrene/butadiene, styrene/butadiene/styzene, styrene/eten butene/styrene, styrene/isoprene blocks, styrene/butadiene/styrene/propyler.e, styrene/butylene/styrene/propylene, styrene/ethylene-butylene/styrene/polyphenylenether, styrene/ethylene-butylene/styrene/polipropylene; thermoplastic elastomer polyolefins (TPE-O, TPE-V), such as ethylene/vinyl acetate, ethylene/vinylacetate/polyvinyldenchloride, ethylene/propylene/propylene terpolymer, ethylene/propylene/cross-linked propylene terpolymer, natural rubber/cross-linked polypropylene, nitrile-butadiene rubber/polypropylene; thermoplastic elastomer ether-ester-amide block copolymers (TPE-A), such as PA base 6 and PA base 12; thermoplastic elastomer polyurethane (TPE-U) such as polyester urethane, polyetherester urethane, polyether urethane and aliphatic TPE-U, and thermoplastic elastomer co-polyesters (TPE-E) such as polyester esters and polyether esters.

[0021] Preferably, said thermoplastic elastomer material for the fluid barrier material layer is chosen between a thermoplastic elastomer polyurethane (TPE-U) and thermoplastic elastomer polyester (TPE-E).

[0022] Preferably, said TPE-E is a polyether-ester block copolymer and said TPE-U is a block copolymer obtained from an ether and/or an ester and a isocyanate (polyetherester urethane).

[0023] Suitable thermoplastic materials for the teeth may be selected from the group comprising polypropylene, polycarbonate (PC), polyethylene terephtalate (PET), polybutylene terephtalate (PBT), polyvinyl chloride (PVC), polyamide (PA), polystyrene (PS), preferably high density polystyrene (HDPS), poly(acrylonitrile-butadiene-styrene) (ABS) and their blends or copolymers.

[0024] Preferably, said thermoplastic material for the teeth is chosen among polybutylene terephthalate (PBT), poly(acrylonitrile butadiene styrene) (ABS), polyamide (PA) and their blends or copolymers.

[0025] According to a preferred aspect of the invention, said thermoplastic material consists of a blend including PBT and polycarbonate (PC).

[0026] Preferably, the PBT/PC weight ratio in said blend ranges between 70/30 and 30/70.

[0027] According to another preferred aspect of the invention, said thermoplastic material consists of a blend including poly(acrylonitrile butadiene styrene) (ABS) and a polyamide (PA) .

[0028] Preferably, the ABS/PA weight ratio in said blend ranges between 70/30 and 30/70.

[0029] According to another aspect of the invention, the materials constituting the fluid barrier layer of the tapes and the teeth may include suitable additives such as, for instance fillers, pigments, binders and/or compatibilizers, the latter being incorporated to improve the physical and chemical affinity between said materials and/or between the materials used for the layered structure of the tape.

[0030] According to a further aspect of the present invention, the adhesive is constituted by any material that can efficiently adhere to both the materials of the inner textile layer and the outer fluid-barrier layer of the tapes.

[0031] Preferably, the adhesive material comprises a polyurethane resin.

[0032] It was found that slide fasteners manufactured according to the invention by interposing an adhesive between the inner textile layer and the outer fluid-barrier layer have good mechanical properties at the interface between the layers of the tapes which are surprisingly well superior to those of prior art slide fasteners manufactured by direct bonding of said layers (i.e. without interposition of adhesives)

[0033] In particular, it was found that by interposing an adhesive layer between the inner textile layer and the outer fluid-barrier layer of the above materials, the layers are capable of reaching optimal values of adhesion to each other, through the intermediate adhesive, that are sufficient for withstanding the normal transfer of traction and shear forces through the contact interface which the slide fasteners are subjected to during their repeated use. At the same time, the thermoplastic elastomer material constituting the outer layer of the tapes confers a good flexibility to the tapes and exhibits a good adhesion by chemical bonding with the thermoplastic material constituting the teeth.

[0034] Without wishing to be bound by theory, it is thought that this improved adhesion between the layers of the tapes is given by the high physico-chemical affinity of the selected adhesive to both the said materials of the layered structure of the tapes as well as by the creation of surprisingly stronger chemical bonds at the bonding

surface between said materials and adhesive molecules in the operating conditions normally used for the manufacture of the tapes.

[0035] The present invention further relates to a process for manufacturing slide fasteners as described above. This process comprises the steps of:

- providing a plurality of strips of a textile material,
- applying an adhesive onto said strips of a textile material,
- covering said strips of a textile material with a layer of a fluid-barrier material,
- applying a plurality of sets of aligned teeth to each coated strip along a longitudinal edge thereof,
- heat cutting each coated strip transversally along consecutive sets of aligned teeth to obtain a plurality of tapes of the desired lengths wherein each tape is equipped with a set of aligned teeth,
- coupling said plurality of tapes in pairs and equipping each pair of tapes with top and bottom stops, and a slider slidable between said top and bottom stops.

[0036] Preferably, said adhesive is applied on at least one of the opposite strips surfaces, more preferably on both the opposed strips surfaces.

[0037] Preferably, the application of the adhesive is performed by soaking each textile material strip in a dispersion of the selected adhesive in an organic solvent or by spraying said adhesive dispersion onto at least one of the opposite surfaces of each textile material strip.

[0038] Preferably, the covering step of the textile material strips with a fluid-barrier material layer is performed by extrusion.

[0039] Preferably, said teeth are obtained by injection overmolding of the selected thermoplastic material onto said longitudinal edge of each covered strip.

[0040] Preferably, the process of the invention further comprises the step of sealing each tape at its short cut edge(s) with said fluid-barrier material. This may be carried out for instance while heat cutting said coated strips or by covering said short cut edge(s) with "fresh" fluid-barrier material.

[0041] Further advantages and characteristics of the slide fasteners according to the inventions will be more evident from the detailed description and examples provided here below, given as indicative and not limiting purpose.

Brief description of the drawings

[0042]

Figure 1 schematically represents a perspective view of a fluid-tight slide fastener according to the present invention.

Figure 2 schematically represents an enlarged perspective view of a detail of the slide fastener of figure 1 showing the layers of the tape.

Detailed description of a preferred embodiment

[0043] With reference to figures 1 and 2, a fluid-tight slide fastener is shown, in accordance with the present invention and globally indicated with 10.

[0044] The slide fastener 10 comprises a pair of tapes 12, substantially parallel to each other, each tape 12 being equipped with a row 20 of aligned teeth 21 on a central portion of the inner long edge 13a thereof, in a conventional manner, for example through injection overmolding processes.

[0045] In particular, said rows 20 of aligned teeth 21 face each other and are associated to two stops, namely a bottom stop 24 and a top stop 26, positioned at a set distance from each other along said row of aligned teeth. A slider 22 is slidable between the bottom stop 24 and the top stop 26, for engaging in a fluid-tight way or disengaging the aligned teeth 21 of said rows 20, respectively. In particular, the slider 22 comes to the end of its opening stroke at the bottom stop 24, thereby disengaging the aligned teeth 21 of said rows 20 whereas the slider 22 comes to an end of its closing stroke at the top stop 26 thereby engaging in a fluid-tight way the opposite aligned teeth 21 of said opposite sets 20.

[0046] In the figure 1, the bottom stop 24 is in form of a single piece applied on both the tapes 12 at the lower ends of the rows 20 of aligned teeth 21, whereas the top stop 26 comprises two half-portions, each half-portion being applied on a respective tape 12 at the upper end of the respective set 20 of aligned teeth 21.

[0047] The application of the top stop 24 and the bottom stop 26 to the tapes 12 can be carried out in a per se conventional manner for example through injection molding.

[0048] Furthermore, the tapes 12 are joined in a fluid-tight way along a portion 25 of the respective inner long edges from the rows 20 of aligned teeth 21 and comprising the bottom stop 24. In particular, with reference to figure 1, on the external side of the slide fastener 10 (the external side being the side that is exposed to fluids during use) the portion 25 extends from the lower ends of said rows 20 of aligned teeth 21 up to the lower short edges 13b of the tapes.

[0049] As shown in figure 2, according to the present invention, each tape 12 comprises an inner reinforcing textile material layer 14 enveloped in an outer fluid barrier material layer 16 which entirely covers the inner textile material layer 14 so that no part of the inner textile material 14 remains exposed. The tape 12 also includes two layers of an adhesive (layers 30 and 31) applied on the opposite (top and bottom) surfaces of the textile material

layer 14. In the areas where the adhesive is present, the textile material layer 14 and the fluid-barrier material layer 16 are then joined indirectly by a strong chemical bonding between the adhesive molecules and the materials constituting the textile layer 14 and the fluid-barrier layer 16, which allows to avoid delamination of said layers 14 and 16.

[0050] The followings are non-limiting examples for the manufacture of slide fasteners according to the invention.

Example 1

[0051] Strips of PE fibers were soaked in a dispersion of polyurethane resin and then two layers of a fluid-barrier material (TPE-U) were extruded onto the respective surface of each strip recovered from said dispersion, so as to fully cover it with the fluid-barrier material. The extrusion of the fluid-barrier material layers was performed from a extrusion head in a conventional way according to the procedure suggested by the manufacturer.

[0052] The coated strips were then equipped each with a plurality of rows of aligned teeth along a longitudinal edge thereof, said rows being set at a predetermined distance to each other. The teeth were each made from a blend of ABS and PA. The teeth application was performed by injection overmolding the teeth onto said longitudinal edge of the coated strips in a conventional way (according to the procedure suggested by the manufacturer). The coated strip equipped with said rows of aligned teeth were then heat cut transversally along consecutive rows of aligned teeth to obtain a plurality of tapes of the same dimensions, wherein each tape was equipped with a set of aligned teeth.

[0053] Then, in a conventional way, the tapes were sealed with said fluid barrier material at their short edge (s) that had remained uncoated.

[0054] A plurality of slide fasteners according to invention was then obtained each from a pair of such tapes through a succession of further conventional steps among which the steps of equipping each pair of tapes with top and bottom stops and a slider running between said stops.

[0055] The slide fasteners so obtained were assayed for their resistance to delamination of the layered structure of the tapes before and after each of repeated washing cycles (up to five washing cycles).

[0056] Each washing cycle of the slide fasteners was carried out in a conventional washing machine at a temperature of 40°C for about 1 hour and 30 minutes using appropriate detergents.

[0057] It was found that the fluid-barrier layer and the textile layer of the respective tape were strongly bonded to each other and as a result no delamination of such layers was observed both before and after each of repeated washing cycles.

[0058] These results then prove that, according to the invention, an extremely strong bonding has been achieved between the inner textile material and the outer fluid-barrier material through the adhesive.

[0059] As a consequence, the slide fasteners according to the invention are able to retain their fluid-tight characteristics in the long run upon repeated exposure to tensile stresses deriving for instance from their frequent and repeated use and upon conventional washing operations..

[0060] With regard to the teeth, their mechanical properties have been found to be fully comparable to those of the prior art slide fastener teeth, thereby proving that the present invention also achieves a good chemical bonding between the teeth material and the outer fluid-barrier material of the tapes.

Example 2

[0061] A plurality of slide fasteners according to the invention were manufactured by the same procedure disclosed in example 1 except that TPE-E including yellow pigments was used as fluid-barrier material covering the textile material strips and PBT was used as a material for the teeth.

[0062] The slide fasteners so obtained were assayed for their resistance to delamination of the layered structure of the tapes.

[0063] The results were fully comparable with those discussed above in connection with the slide fasteners of example 1.

[0064] Again, no delamination of the layered structure of the tapes was observed for slide fasteners according to the invention, both before and after each washing cycle, thereby proving again that, according to the invention, an extremely strong bonding has been achieved between the inner textile material and the outer fluid-barrier material through the adhesive.

[0065] From the previous description it can clearly be seen that the fluid-tight slide fastener according to the present invention solves the technical problem, mostly by the fact that it exhibits good fluid-tight characteristics even in the long run, as the tapes are resistant to delamination.

[0066] Furthermore, the slide fastener of the invention features many advantageous characteristics, including:, good flexibility, low brittle temperature (about -40 °C), performance stability in air in the temperature range of-30 to +70 °C, ease of coloring, water resistance (low hygroscopicity), resistance to sea water, and chemicals such as petrol or ammonia, visible and UV light stability, and ease of sealing, gluing and stitching.

[0067] Of course, a person skilled in the art can bring numerous modifications and variants to the fluid-tight slide fastener described above in order to satisfy specific and contingent requirements, all of which are in any case covered by the scope of protection of the present invention, as defined by the following claims.

Claims

1. Fluid-tight slide fastener (10) comprising a pair of tapes (12), each tape (12) having a layered structure comprising an inner reinforcing textile material layer (14) enveloped in a fluid barrier layer (16) made of a thermoplastic elastomer material (TPE), each tape (12) exhibiting a row (20) of aligned teeth (21) made of a thermoplastic material on at least a portion of one of the long sides (13a) thereof, the rows (20) of aligned teeth (21) of said pair of tapes (12) facing each other and being associated to top and bottom stops (24,26), and a slider (22) slidable between said top and bottom stops (24,26) for engaging in a fluid-tight way or disengaging said aligned teeth (21) respectively, **characterized in that** it further comprises an adhesive between the inner textile material layer and the outer fluid-barrier material layer of the tapes.

2. Fluid-tight slide fastener (10) according to claim 1, **characterized in that** said adhesive comprises a polyurethane resin.

3. Fluid-tight slide fastener (10) according to claim 1 or 2, **characterized in that** said adhesive is applied on at least one of the surfaces of the inner textile material layer, more preferably on both the opposite surfaces of said inner textile material layer (14).

4. Fluid-tight slide fastener (10) according to any of the preceding claims, **characterized in that** said textile material for inner reinforcing layer (14) of the tapes (12) is chosen among polyester (PE), preferably polyethylene terephtalate (PET), polyamide (PA) and their blends or copolymers.

5. Fluid-tight slide fastener (10) according to any of the preceding claims, **characterized in that** said thermoplastic elastomer material (TPE) for the fluid barrier material layer (16) is selected from the group comprising: thermoplastic elastomer styrene copolymers (TPE-S), thermoplastic elastomer polyolefins (TPE-0, TPE-V), thermoplastic elastomer ether-ester-amide block copolymers (TPE-A), thermoplastic elastomer polyurethane (TPE-U) and thermoplastic elastomer co-polyesters (TPE-E).

6. Fluid-tight slide fastener (10) according to claim 5, **characterized in that** said thermoplastic elastomer material for the fluid barrier material layer (16) is chosen between a thermoplastic elastomer polyurethane (TPE-U) and thermoplastic elastomer polyester (TPE-E).

7. Fluid-tight slide fastener (10) according to any of the preceding claims, **characterized in that** said thermoplastic material for the teeth (21) is selected from the group comprising polypropylene, polycarbonate (PC), polyethylene terephtalate (PET), polybutylene (PBT), polyvinyl chloride (PVC), polyamide (PA), polystyrene (PS), preferably high density polystyrene (HDPS), poly(acryl,onitrile-butadiene, styrene) (ABS) and their blends or copolymers.

8. Fluid-tight slide fastener (10) according to claim 7, **characterized in that** said thermoplastic material for the teeth (21) is chosen among polybutylene terephthalate (PBT), poly(acrylonitrile-butadiene-styrene) (ABS) and their blends or copolymers.

9. Fluid-tight slide fastener(10) according to claim 8, **characterized in that** said thermoplastic material consists of a blend including polybutylene terephthalate (PBT) and polycarbonate (PC).

10. Fluid-tight slide fastener (10) according to claim 9 **characterized in that** the PBT/PC weight ratio in said blend ranges between 70/30 and 30/70.

11. Fluid-tight slide fastener (10) according to claim 8, **characterized in that** said thermoplastic material consists of a blend including poly(acrylonitrile butadiene styrene) (ABS) and a polyamide (PA).

12. Fluid-tight slide fastener (10) according to claim 11 or 12, **characterized in that** the ABS/PA weight ratio in said blend ranges between 70/30 and 30/70.

13. Fluid-tight slide fastener (10) according to any of the claims 5 to 12, **characterized in that** said TPE-E is a polyether-ester block copolymer.

14. Fluid-tight slide fastener (10) according to any of the claims 5 to 12, **characterized in that** said TPE-U is a block copolymer obtained from an ether and/or an ester and an isocyanate.

15. Process for manufacturing slide fasteners according to any of the preceding claims, **characterized in that** it comprises the steps of:

    - providing a plurality of strips of a textile material,
    - applying an adhesive onto said strips of a textile material,
    - covering said strips of a textile material with a layer of a fluid-barrier material,
    - applying a plurality of sets of aligned teeth to each coated strip along a longitudinal edge thereof,
    - heat cutting each coated strip transversally along consecutive sets of aligned teeth to obtain a plurality of tapes of the desired lengths wherein each tape is equipped with a set of aligned teeth,
    - coupling said plurality of tapes in pairs and

equipping each pair of tapes with top and bottom stops, and a slider slidable between said top and bottom stops.

16. Process according to claim 15, **characterized in that** said adhesive is applied on at least one of the opposite strips surfaces, more preferably on both the opposed strips surfaces.

17. Process according to claim 15 or 16, **characterized in that** said adhesive is applied by soaking each textile material strip in a dispersion of the selected adhesive in an organic solvent or by spraying said adhesive dispersion onto at least one of the opposite surfaces of each textile material strip.

18. Process according to any of the claims 15 to 17, **characterized in that** said adhesive comprises a polyurethane resin.

19. Process according to any of the claims 15 to 18, **characterized in that** the covering step of the textile material strips with a fluid-barrier material layer is performed by extrusion.

20. Process according to any of the claims 15 to 19, **characterized in that** said teeth (21) are obtained by injection overmolding of the selected thermoplastic material onto said longitudinal edge of each coated strip.

21. Process according to any of claims 15 to 20, **characterized in that** it further comprises the step of sealing each tape (12) at its short cut edge(s) with said fluid-barrier material.

22. A semi-finished product for the manufacture of a slide fastener (10) according to any of claims 1 to 14, comprising a strip of textile material covered with a fluid barrier layer made of a thermoplastic elastomer material (TPE), **characterized in that** it further comprises an adhesive between said strip and said fluid-barrier material layer.

23. A semi-finished product according to claim 22, **characterized in that** said adhesive comprises a polyurethane resin.

24. A semi-finished product according to claim 22 or 23, **characterized in that** said adhesive is applied on at least one of the surfaces of said strip, more preferably on both the opposite surfaces of said strip.

25. A semi-finished product according to any of the claims 21 to 24 further comprising a plurality of rows (20) of aligned teeth (21) equipped along a longitudinal edge of said strip, said rows (20) of aligned teeth (21) being set at a predetermined distance to each other.

26. Use of a fluid-tight slide fastener according to any of claims 1 to 14 for the manufacture of sports and outdoor activity items such as diving suits, sailing suits, camping tents and the like.

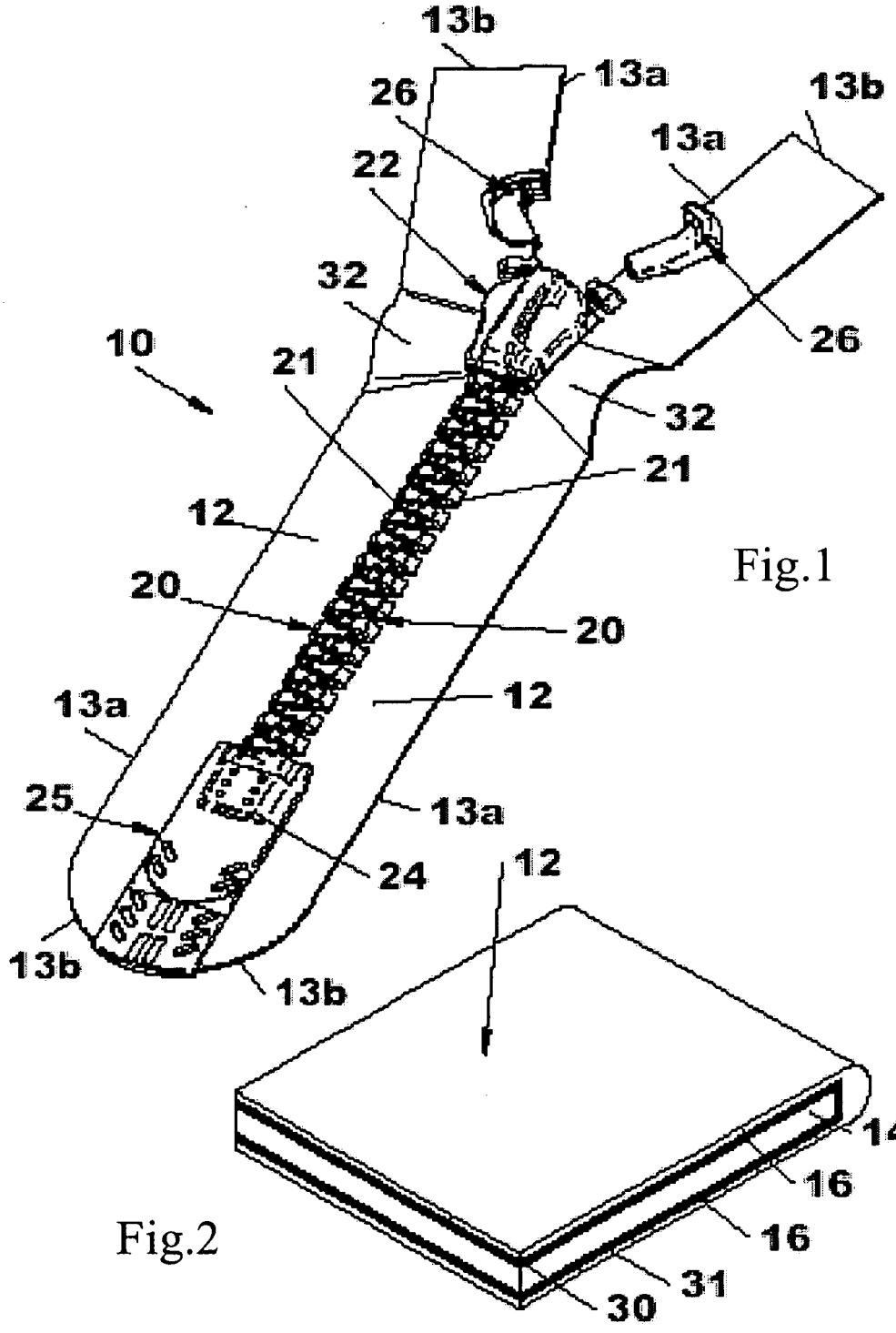
13b
13a
26
13b
13a
22
32
26
10
21
32
21
12
20
20
12
13a
25
13a
24
12
13b
13b
14
16
16
31
30

Fig.1

Fig.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 02 0820

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 Y	WO 02/058500 A (ARDMEL AUTOMATION LTD [GB]; FERNANDO SEMAGE RUPASIRI [GB]) 1 August 2002 (2002-08-01) * page 2, line 29 - page 16, line 14; figures 4-6 *	1,3-6, 22-26 7-12	INV. A44B19/32 A44B19/42
X	US 4 601 085 A1 (YOSHIDA HIROSHI [JP] ET AL) 22 July 1986 (1986-07-22) * column 2, line 66 - column 5, line 59; figures 2-5 *	1,3,22, 24-26	
X	EP 0 111 788 A2 (YOSHIDA KOGYO KK [JP]) 27 June 1984 (1984-06-27) * page 4, line 1 - page 6, line 12; figures 2-4 *	1,3, 22-26	
X Y	US 2004/237266 A1 (WANG SHIN-JEN [TW]) 2 December 2004 (2004-12-02) * the whole document *	1-6, 22-26 15-21	TECHNICAL FIELDS SEARCHED (IPC)
Y	WO 02/03825 A (RIRI S A [CH]; BERNASCONI SERGIO [CH]) 17 January 2002 (2002-01-17) * page 3, line 3 - page 4, line 18; figures 1,2,4 *	7-12	A44B
Y	EP 0 162 350 A2 (YOSHIDA KOGYO KK [JP]) 27 November 1985 (1985-11-27) * page 6, lines 12-25; figures 13-15 *	15-21	
A	US 2006/101632 A1 (YANG SHIH SHENG [TW]) 18 May 2006 (2006-05-18) * paragraph [0025] - paragraph [0030]; figures 2-4 *	1-26	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 May 2007	Thomson, Sarah

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 02 0820

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-05-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 02058500 A	01-08-2002	AT 339123 T	15-10-2006
		CA 2435437 A1	01-08-2002
		EP 1357815 A1	05-11-2003
		US 2006090306 A1	04-05-2006
		US 2004064922 A1	08-04-2004
US 4601085 A1		NONE	
EP 0111788 A2	27-06-1984	AU 546407 B2	29-08-1985
		AU 2212983 A	12-07-1984
		BR 8306953 A	24-07-1984
		CA 1232120 A1	02-02-1988
		DE 3375063 D1	11-02-1988
		DE 111788 T1	27-09-1984
		ES 276486 U	01-05-1984
		GB 2132688 A	11-07-1984
		HK 74988 A	23-09-1988
		JP 1471677 C	14-12-1988
		JP 59108502 A	23-06-1984
		JP 63014963 B	02-04-1988
		MY 3188 A	31-12-1988
		SG 83087 G	15-04-1988
		US 4724586 A	16-02-1988
US 2004237266 A1	02-12-2004	TW 220106 B	11-08-2004
		US 2006016051 A1	26-01-2006
WO 0203825 A	17-01-2002	AT 355773 T	15-03-2007
		AU 5422100 A	21-01-2002
		CA 2400733 A1	17-01-2002
		CN 1452464 A	29-10-2003
		EP 1294248 A1	26-03-2003
		EP 1707066 A1	04-10-2006
		JP 2004502480 T	29-01-2004
		NO 20030122 A	05-02-2003
		NZ 520522 A	29-08-2003
		RO 121002 B1	30-11-2006
		TR 200202028 T2	21-01-2003
EP 0162350 A2	27-11-1985	AU 574779 B2	14-07-1988
		AU 4245585 A	21-11-1985
		BR 8502482 A	28-01-1986
		CA 1231832 A1	26-01-1988
		DE 3561438 D1	25-02-1988
		ES 8606996 A1	01-11-1986
		GB 2159209 A	27-11-1985

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 02 0820

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-05-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0162350 A2		HK 40489 A	26-05-1989
		JP 60246704 A	06-12-1985
		SG 18789 G	07-07-1989
		US 4596065 A	24-06-1986
US 2006101632 A1	18-05-2006	DE 102005018261 A1	24-05-2006
		JP 2006136705 A	01-06-2006
		TW 249384 B	21-02-2006

EPO FORM P0459

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