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(54) **ONE-PIECE FASTENING ELEMENT**

(57) The invention relates to a fastening element (100) formed in one piece, comprising a body element (120) and at least one head element (110). The head element (110) is formed by an opening (111) and is oriented in a longitudinal extension direction. The opening (111) has an opening width a and an opening length b, wherein the opening width a is decreasing towards the body element (120). A first ending of the head element (112) is adjacent to the body element (120). The first

ending (112) has a width c, wherein c is equal to or smaller than the largest opening width a.

The body element (120) is oriented in a longitudinal extension direction of the fastening element (100). The body element (120) is formed in a way that it can reversibly bend and be inserted into the opening (111) of the head element (110), thereby forming a loop in a closed state of the fastening element (100).

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Description

[0001] The present invention relates to a fastening element made from one piece that can be attached by way of loop forming around attachment points.

Background

[0002] Fastening elements usually consist of several elements that are attached to each other by way of rivets, adhesive joint, snap fastener, buckle etc. These means of attachment have the two main drawbacks of providing a weak point in the fastening element as well as complicating the production by an additional step in the method of production and the use of additional materials.

[0003] Known one-piece fastening elements such as a simple knot have the disadvantage that they usually involve a multitude of loops and tight bends and can therefore only be used with very flexible and usually thin materials. A certain kind of knots with less loops and bends, in particular a cow hitch, achieve a very good form-closure around their attachment points by forming a loop contacting the attachment point on its whole circumference. However, these knots have the disadvantage of having two separate strands that can separate from each other or require additional means to keep strands together. In any case the structural integrity of the element is compromised if only one of the strands is severed. Therefore, the durability of such a knot is lower than fastening elements, which do not have two separate strands, but a single body with a volume equal to both separate strands. Furthermore, these knots can only be fastened to one attachment point. The other end of the strands cannot be tied to a second attachment point without the need of joining the two strands together e.g. by way of rivets, adhesive joints, buckles, knots, sewing.

[0004] Fastening elements known in the art such as those of DE1942207U use an opening that is not tailored to fit to the size and shape of the main body of this element. This results in inadequate form-closure und distortion of the material in the fastened state. Furthermore, the loop formed in the fastened state has a large volume. To enable the fastening by way of a loop they further use a long slit that adds to the volume of the loop and weakens the structural integrity of the fastening element. Therefore, such fastening elements are only suitable for use in situations not requiring the resistance to heavy loads, such as label holders etc. A use for example as a handle for heavy weights or to connect two objects under load is not possible with these fastening elements.

[0005] Based on the above-mentioned state of the art, the objective of the present invention is to provide a one-piece fastening element with high structural integrity and low volume. This objective is attained by the claims of the present specification.

Description

[0006] According to a first aspect of the invention a fastening element (100) formed in one piece, comprising a body element (120) and at least one head element (110) is provided.

[0007] The head element (110) is formed by an opening (111) and is oriented in a longitudinal extension direction of the fastening element (100). The opening (111) has a width a and a length b, wherein the width a is decreasing in the longitudinal extension direction towards the body element (120). Certain embodiments exhibit a linear decrease of the width a along the length b. In other embodiments, the width a is decreasing symmetrically on both sides of the opening (111). In yet another embodiment, the width a has a linear and symmetrical decrease of the width a along the length b.

[0008] A first ending of the head element (112) with a width c, is adjacent to the body element (120). The width c is equal to or smaller than the largest opening width a.

[0009] In certain embodiments, a first ending of the head element (112) with a width c, is adjacent to the body element (120). The width c is smaller than the width of the body element. This results in a loop width that is equal to or smaller than the width of the body element (120). Such a loop could be used in situations of limited space at the attachment point. Furthermore, a loop that is flush with the body element (120) is less prone to mechanical damage at a site with increased vulnerability due to the material being thinner.

[0010] In certain embodiments, a first end of the head element (112) with a width c, is adjacent to the body element (120). The width c is equal to the body element width.

[0011] The largest opening width a is equal to or larger than the first ending width c. In certain embodiments, the opening width a has the largest dimension towards the second ending of the head element (113) that is not adjacent to the body element (120).

[0012] The body element (120) is oriented in a longitudinal extension direction. It is formed in a way so that it can reversibly bend and be inserted into the opening (111) of the head element (110), thereby forming a loop in a closed state of the fastening element (100).

[0013] Therefore, materials suitable to exercise the invention must allow for bending of the material in a reversible fashion. Furthermore, the flexibility of the material must allow the formation of a tight loop in order to accomplish good form-closure. However, the material usable in the invention does require a lesser degree of flexibility as would be needed to form a knot such as a cow hitch, therefore it also allows the use of material with greater thickness and in consequence a higher stiffness.

[0014] The configuration of the fastening element and the resulting optimal form-closure around an attachment point also results in an advantageous force distribution throughout the loop in the closed state. The material of the loop is not distorted, compressed or in any other way

subject to forces except for the force applied to the body element by e.g. heavy loads.

[0015] Another advantage resulting from the configuration, in particular the formation of the opening (111), is that the loop does not have a particular weak-point. The ligaments of the head element on both sides of the opening at the position of the largest width *a* is naturally the thinnest part of the head element. However, the relation of the opening width *a* and the width *c* of the first ending of the head element results in the two ligaments together having the same dimension as the width *c*. Therefore, the configuration of the head element avoids a particular structural weak point by balancing the dimensions of the head element throughout the loop.

[0016] In certain embodiments, the opening width *a* is equal to the width *c* of the first ending of the head element.

[0017] In certain embodiments, the head element (110) has a second ending (113) opposite to the first ending (112) in the longitudinal extension direction of the head element (110) and the second ending has a width *d*. In other words, the second ending (113) is not adjacent to the body element (120) in the opened state. The body element (120) has a first segment that is located adjacent to the first ending of the head element (112) and this segment, has a width *e* and *e* is equal to or larger than *d*. The width *d* of the second ending (113) is also the determining factor of the width of the loop in the closed state. If *d* is equal to or smaller than *e*, the resulting loop is flush with the body element (120), thereby eliminating any protrusions of the loop. Protrusions of the loop would be more vulnerable to damage than a loop being flush with the body element (120). Furthermore, would the fastening element (100) have a more voluminous loop and could not be mounted in situations of limited space.

[0018] In certain embodiments, *d* is larger than *e*. This would result in loops with a wider width than the body element.

[0019] In certain embodiments, the body element (120) comprises a multitude of segments that are not necessarily of the same width.

[0020] In certain embodiments, the inner circumference of the loop in the closed state of the fastening element (100) is equal to the opening length *b*. The fastening element (100) can be attached to virtually any object as long as the fastening element (100) can be wrapped around the object. In order to achieve optimal form-closure the inner circumference of the loop formed by the fastening element in the closed state should be essentially identical to the outer circumference of the object the element is fastened to. The opening length *b* should be equal to the inner circumference of the loop. This also leads to the second ending of the head element (113) being folded over the first ending of the head element (112) in the closed state. This also eliminates the necessity of an additional element to keep two strands together, should the opening length *b* be longer than the circumference of the attachment point, such as would be the case for knots like the cow-hitch. In certain embodiments,

the material of the first ending of the head element (112) is compressed and/or thinner along the width *c* to further reduce the volume of the loop in the closed state. The second ending (113), which folds over the first ending (112) in the closed state, would then at least partially be recessed into the first ending (112) and the volume of the loop is reduced.

[0021] In certain embodiments, the opening length *b* is smaller than the inner circumference of the loop. This would result in the second ending of the head element (113) not being folded over the first ending of the head element (112). In certain embodiments, the opening length *b* is 30% to 90% of the dimension of the inner circumference of the loop. In certain embodiments, the opening length *b* is 35% to 80% of the dimension of the inner circumference of the loop. In certain embodiments, the opening length *b* is 40% to 70% of the dimension of the inner circumference of the loop.

[0022] In certain embodiments, the opening length *b* is slightly larger than the inner circumference of the loop. In these embodiments *b* is the inner circumference plus the thickness of the material at the first ending of the head element.

[0023] In certain embodiments, at least one groove (114) is formed at the first ending of the head element (112). Each groove (114) is located on one of the transverse sides of the first ending of the head element (112) adjacent to the body element (120). In the closed state the groove (114) is forming with the second ending of the head element (113) a tongue and groove type form-closure. This locks the loop more tightly in the closed state. The groove (114) is located at the first ending of the head element (112) and the groove width would therefore also reduce the width *c*. In consequence the opening width *a* could be smaller and optimal form-closure would still be achieved. In order to achieve optimal form-closure around the attachment point and achieve a tongue and groove form-closure using the groove (114), the opening length *b* has to be essentially equal to the outer circumference of the attachment point.

[0024] In certain embodiments, the groove (114) has a length *f* that is orientated in the longitudinal extension direction of the fastening element (100). The groove length *f* is equal to or larger than the thickness of the material used for the body element (120). Since the body material is forming the tongue that has to fit in the groove (114) any body material thicker than *f* would not fit in the groove (114). In certain embodiments, the body element (120) comprises several segments with a different thickness of the material used. Only the body segment that forms the tongue for the groove (114) has to have a material thickness equal to or smaller than *f*.

[0025] In certain embodiments, the opening (111) comprises a first and a second segment, which are located consecutively in a longitudinal direction from the second (113) to the first ending of the head element (112). The first segment has a width *a*¹ and a length *b*¹. The second segment has a width *a*² and a length *b*², wherein

the width a^2 is decreasing in the longitudinal extensions direction towards said body element (120). In other words, the first segment is located adjacent to the second ending of the head element (113). The second segment is located between the first segment and the first ending of the head element (112). In certain embodiments, the sum of a^1 and a^2 is equal to a . In certain embodiments, the sum of b^1 and b^2 is equal to b . In certain embodiments, the shape of the first segment is essentially rectangular. In certain embodiments, the second segment is funnel shaped.

[0026] In certain embodiments, the second segment has an ending in the longitudinal extension direction towards the body element (120), wherein the ending is forming an opening angle. In other words, the ending of the second segment that is forming the opening angle is not adjacent to the first segment. The opening angle is formed by the tapering sides of the second segment. In certain embodiments, the opening angle is 1° to 88° . In certain embodiments, the opening angle is 2° to 70° . In certain embodiments, the opening angle is 5° to 60° . In certain embodiments, the opening angle is 10° to 50° . In certain embodiments, the opening angle is 15° to 45° .

[0027] In certain embodiments, the opening (111) further comprises a third segment adjacent to said second segment in a longitudinal direction towards the body element (120). The third segment is therefore located between the second segment and the first ending of the head element (112). The third segment has a width a^3 and a length b^3 . In certain embodiments, the sum of a^1 , a^2 and a^3 is equal to a . In certain embodiments, the sum of b^1 , b^2 and b^3 is equal to b .

[0028] In certain embodiments, the fastening element (100) comprises at least two head elements (110). This would create a fastening element (100) that can be used, by way of non-limiting example, as a handle. In such an embodiment, a two-headed fastening element could be attached to two attachment points on a suitcase, bag, shoulder bag etc. to function as a handle and facilitate easier carrying. In other embodiments, a two-headed or multi-headed fastening element could be used as part of a harness. The flexible nature of the used material would allow such a use. In yet another embodiment, a two-headed fastening element can be used to connect two different objects. This use as a connecting element could be suitable for diverse purposes ranging from a leash, to a hanger assembly etc. The head elements (110) of these embodiments are not necessarily identical to each other. In particular embodiments of connecting elements different head elements (110) may be used to connect to attachment point of different size and shape.

[0029] In certain embodiments, the fastening element (100) has three head elements. These embodiments include, without being limited to, star-shaped fastening elements that can be combined with similar elements and ring-shaped attachment points yielding a lattice work or weave.

[0030] In certain embodiments, the fastening element

(100) has two identical head elements (110). Such a fastening element (100) is particularly useful if two attachment points of similar or identical size and shape are used to fasten the fastening element (100) to.

[0031] The term *elastic modulus* in the context of the present specification relates to an intensive property of a material and is therefore independent of the size and shape of an object made of this material. It measures the resistance of a material to being non-permanently deformed when a force is applied. The higher the elastic modulus of a material the stiffer a material is. Typical values of elastic modulus for materials such as rubber is in the range of 15 N/mm^2 to 50 N/mm^2 . The elastic modulus of leather is typically in the range of 30 N/mm^2 to 60 N/mm^2 .

[0032] The material used in the current invention should possess certain elastic properties in order to facilitate the necessary bending of the head and body element to form a tight loop in the fastened state.

[0033] In certain embodiments, the fastening element is made of a material with an elastic modulus of 10 N/mm^2 to 300 N/mm^2 .

[0034] In certain embodiments, the fastening element is made of a material with an elastic modulus of 15 N/mm^2 to 200 N/mm^2 .

[0035] In certain embodiments, the fastening element is made of a material with an elastic modulus of 25 N/mm^2 to 150 N/mm^2 .

[0036] In certain embodiments, the fastening element is made of a material with an elastic modulus of 30 N/mm^2 to 100 N/mm^2 .

[0037] In certain embodiments, the fastening element is made of a material with an elastic modulus of 30 N/mm^2 to 80 N/mm^2 .

[0038] In certain embodiments, the fastening element is made of a material with an elastic modulus of 35 N/mm^2 to 70 N/mm^2 .

[0039] In certain embodiments, the fastening element is made of a material with an elastic modulus of 55 N/mm^2 to 70 N/mm^2 .

[0040] In certain embodiments, the fastening element is made of a material with an elastic modulus of 60 N/mm^2 .

[0041] The term *stiffness* in the context of the present specification relates to the rigidity of an object and is a measure of the resistance offered by an elastic body to deformation. In contrast to the elastic modulus stiffness is an extensive property and depends on size and shape of the object. A major factor influencing stiffness is therefore the thickness of a material.

[0042] In certain embodiments, the fastening element has a thickness of 0.1 mm to 10 mm .

[0043] In certain embodiments, the fastening element has a thickness of 0.3 mm to 8 mm .

[0044] In certain embodiments, the fastening element has a thickness of 0.5 mm to 7 mm .

[0045] In certain embodiments, the fastening element has a thickness of 0.8 mm to 6 mm .

[0046] In certain embodiments, the fastening element is made of natural materials.

[0047] The term natural material in the context of the present specification relates to materials made from organically grown materials. The organically grown materials can therefore be plant-derived or animal-derived. Non-limiting examples of plant-derived materials are cotton, linen, wool etc. Non-limiting examples of animal-derived materials are fur, leather etc. These natural materials can be either used directly as material or as fabrics or weaves made out of them.

[0048] In certain embodiments, the fastening element is made of leather.

[0049] The term *leather* in the context of the present specification relates to a material made from animal rawhide by the process of tanning. Leather is a durable and flexible material suitable to exercise the invention. Depending on the animal the rawhide is derived from and the tanning process used, the elastic modulus of leather is in the range of 30 N/mm² to 60 N/mm².

[0050] In certain embodiments, the fastening element is made of artificial leather.

[0051] The term *artificial leather* in the context of the present specification relates to substitutes for leather with similar properties. Artificial leather usually comprises a basic textile fabric and a synthetic surface coating. Common surface coatings include polyvinylchloride (PVC) and polyurethane (PU).

[0052] In certain embodiments, the fastening element is made of rubber.

[0053] The term *rubber* in the context of the present specification relates to natural rubber as well as synthetic rubber. Natural rubber comprises typically polymers of isoprene and minor impurities depending on the origin of the natural rubber. Synthetic rubber is a polymer made from various petroleum-based monomers. The most common synthetic rubbers are styrene-butadiene rubbers.

[0054] In certain embodiments, the fastening element is made of elastomers.

[0055] The term *elastomer* in the context of the present specification relates to polymers with both viscosity and elasticity. In other words, an elastomer deforms when an adequate force is applied and returns in its original size and shape when the applied force is removed.

[0056] In certain embodiments, the fastening element is made of plastic.

[0057] The term *plastic* in the context of the present specification relates to a synthetic organic compound that is malleable and can be formed into various shapes. Examples of common plastics are polyamides, polycarbonates, polyester, polyethylene, polypropylene, polystyrene, polyurethanes, polyvinyl chloride etc.

[0058] In certain embodiments, all of the materials usable for the invention can be used as the material itself or as a fabric or weave made out of these materials.

[0059] According to a second aspect of the invention a set comprising a base element and a fastening element

according to the first aspect of the invention is provided. The base element comprises at least two attachment points and the fastening element is attached to said attachment points. Such a set could be useful as a handle for bags, suitcases etc. which do not comprise usable attachment points. The one piece fastening element according to the first aspect of the invention can be attached to the base element. The base element could be attached by any means known in the art e.g. stitching, gluing, riveting etc to the desired object.

[0060] Wherever alternatives for single separable features are laid out herein as "embodiments", it is to be understood that such alternatives may be combined freely to form discrete embodiments of the invention disclosed herein.

[0061] The invention is further illustrated by the following examples and figures, from which further embodiments and advantages can be drawn. These examples are meant to illustrate the invention but not to limit its scope.

Brief description of the figures

[0062]

Fig. 1 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113).

Fig. 2 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113). The width *c* of the first ending of the opening (112) is smaller than the width of the body element in this embodiment.

Fig. 3 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113). The width *c* of the first ending of the opening (112) is smaller than the width of the body element in this embodiment. In addition, two grooves (114) are located at the first ending (112).

Fig. 4 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113).

Fig. 5 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113). The width *c* of the first ending of the opening (112)

- is smaller than the width of the body element in this embodiment. In addition, two grooves (114) are located at the first ending (112).
- Fig. 6 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113). In addition, two grooves (114) are located at the first ending (112).
- Fig. 7 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113). The opening (111) of the head element comprises a large first segment.
- Fig. 8 shows an embodiment of the fastening element (100) comprising a head element (110), a body element (120), with a tapering opening (111). The head element comprises a first ending (112) and a second ending (113). The opening (111) of the head element comprises a large second segment.
- Fig. 9 shows an embodiment of the fastening element (100) in the closed state from three sides comprising a head element (110) and a body element (120). The head element comprises a first ending (112) and a second ending (113).
- Fig. 10 shows an embodiment of the fastening element (100) in the closed state from three sides comprising a head element (110) and a body element (120). The head element shows a first ending (112).
- Fig. 11 shows an embodiment of a two headed fastening element (100) in the closed state comprising a head element (110) and a body element (120).
- Fig. 12 shows on the left an embodiment of the fastening element (100) in the closed state around an attachment point. On the right an embodiment, wherein the loop is flush with the body element, is shown in the closed state around an attachment point.
- Fig. 13 shows an embodiment of a two headed fastening element (100) in the closed state comprising a head element (110) and a body element (120). Such an embodiment is suitable as a handle.
- Fig. 14 shows an embodiment of a two headed fastening element (100) in the closed state similar to figure 3. This embodiment is suitable for the use in a belt buckle.
- Fig. 15 shows an embodiment of a two headed fastening element (100) in the closed state similar to figure 3. This embodiment is suitable for the use in a belt buckle.
- Fig. 16 shows an embodiment of a two headed fas-

tening element (100) in the closed state comprising a head element (110) and a body element (120). Such an embodiment is suitable two connect two elements.

Claims

1. A fastening element (100) formed in one piece, comprising a body element (120) and at least one head element (110), **characterized in that** said head element (110) formed by an opening (111) is oriented in a longitudinal extension direction of said fastening element (100) with an opening width a and an opening length b, wherein said opening width a is decreasing in said longitudinal extension direction towards said body element (120) and wherein a first ending of said head element (112) is adjacent to said body element (120) and said first ending (112) has a width c, wherein c is equal to or smaller than the largest opening width a, and said body element (120) is oriented in a longitudinal extension direction of said fastening element (100), and wherein said body element (120) is formed in a way that it can be reversibly bend and inserted into said opening (111) of said head element (110), thereby forming a loop in a closed state of the fastening element (100).
2. The fastening element (100) according to claim 1, wherein the head element (110) has a second ending (113) opposite to said first ending (112) in the longitudinal extension direction of the head element (110) and said second ending (113) has a width d, and in a first segment of the body element (120), adjacent to said first ending of the head element (112), has a width e, wherein e is equal to or larger than d.
3. The fastening element (100) according to any one of the above claims, wherein the inner circumference of said loop in said closed state of the fastening element (100) is equal to the opening length b and the second ending of the head element (113) is folded over the first ending of the head element (112) in the closed state.
4. The fastening element (100) according to any one of the above claims, wherein at least one groove (114) is formed at the first ending of the head element (112), adjacent to the body element (120) and wherein said groove (114) is achieving in the closed state a tongue and groove type form-closure with the second ending of the head element (113).
5. The fastening element (100) according to any one of the above claims, wherein the groove (114) has a length f in the longitudinal extension direction of the fastening element (100) which is equal to or larg-

er than the thickness of the material used for the body element (120).

6. The fastening element (100) according to any one of the above claims, wherein the opening (111) comprises consecutively in a longitudinal direction from the second (113) to the first ending of the head element (112):
 - a first segment with a width a^1 and a length b^1 , and
 - a second segment with a width a^2 and a length b^2 , wherein the width a^2 is decreasing in the longitudinal extensions direction towards said body element (120).
7. The fastening element (100) according to any one of the above claims, wherein the second segment has an ending in the longitudinal extensions direction towards said body element (120), wherein said ending is forming an opening angle of 1° to 88° , in particular 5° to 60° , more particular 10° to 50° .
8. The fastening element (100) according to any one of claims 6 and 7, wherein the opening (111) further comprises a third segment adjacent to said second segment in a longitudinal direction towards the body element (120) and has a width a^3 and a length b^3 .
9. The fastening element (100) according to any one of the above claims, wherein the fastening element (100) comprises at least two head elements (110), in particular two identical head elements (110).
10. The fastening element (100) according to any one of the above claims, wherein the fastening element (100) is made of a material with an elastic modulus of 10 N/mm^2 to 300 N/mm^2 , in particular 15 N/mm^2 to 200 N/mm^2 , more particular 30 N/mm^2 to 100 N/mm^2 , most particular 30 N/mm^2 to 80 N/mm^2 .
11. The fastening element (100) according to any one of the above claims, wherein the fastening element (100) has a thickness of 0.1 mm to 10 mm , in particular 0.3 mm to 8 mm , more particular 0.5 mm to 7 mm , most particular 0.8 mm to 6 mm .
12. The fastening element (100) according to any one of the above claims, wherein the fastening element (100) is made of a material selected from:
 - Natural materials, in particular leather,
 - artificial leather,
 - rubber,
 - elastomers, and
 - plastic;

in particular leather and artificial leather, more par-

ticular leather.

13. A set comprising a base element and a fastening element according to any one of claims 1 to 12, wherein the base element comprises at least two attachment points and the fastening element is attached to said attachment points.

Fig. 1

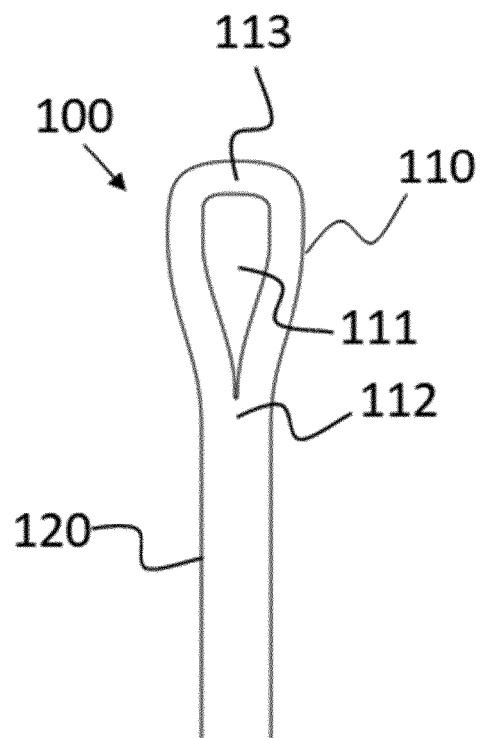


Fig. 2

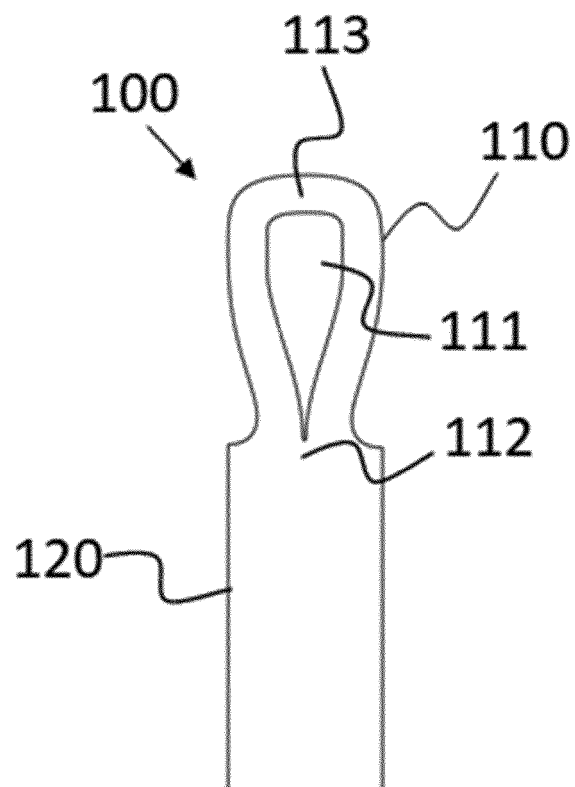


Fig. 3

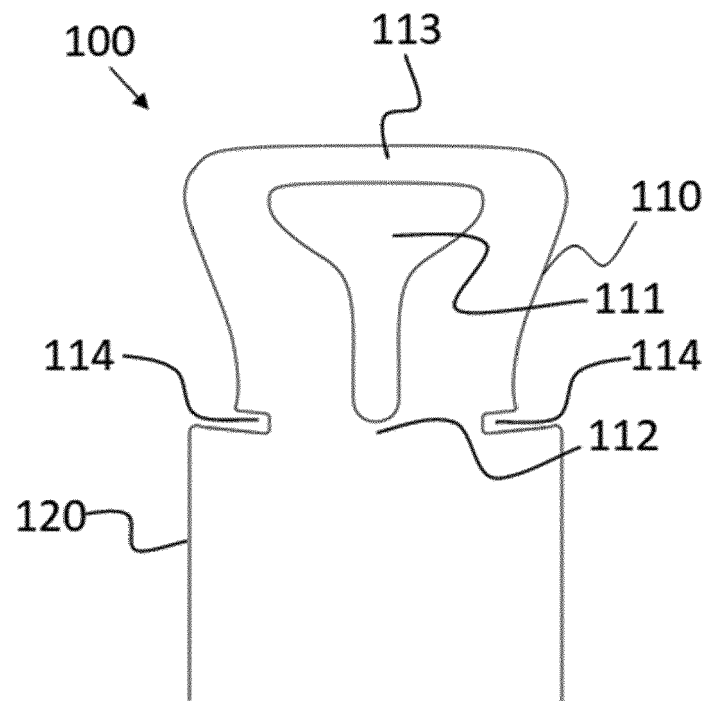


Fig. 4

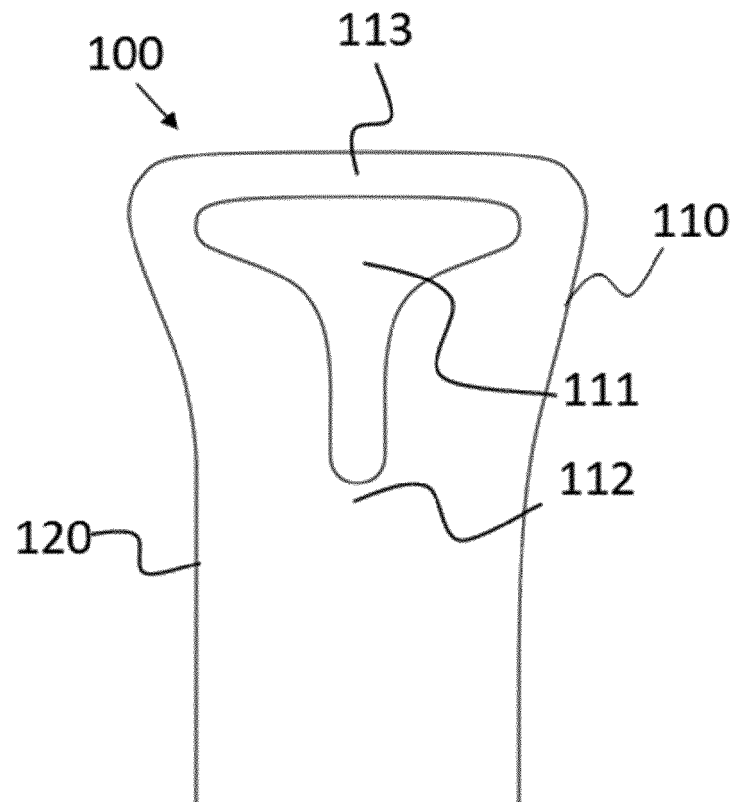


Fig. 5

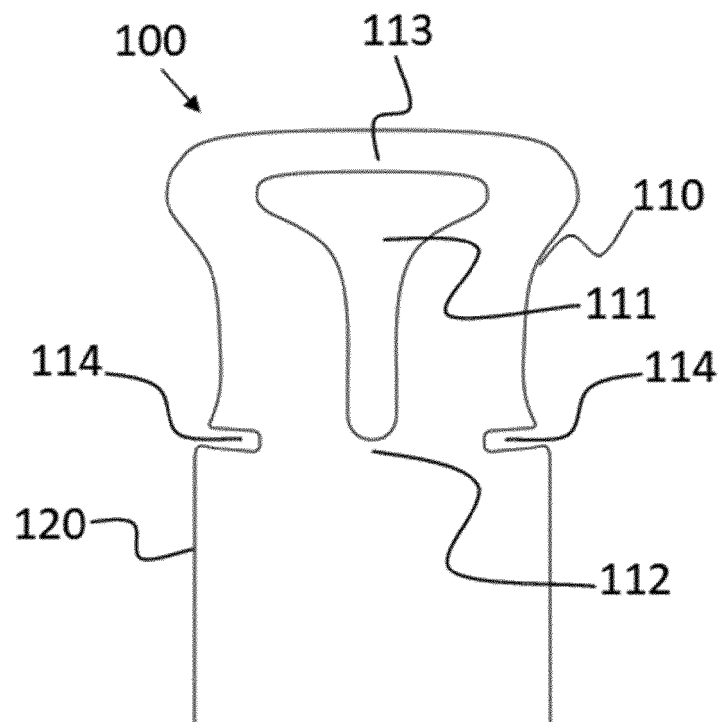


Fig. 6

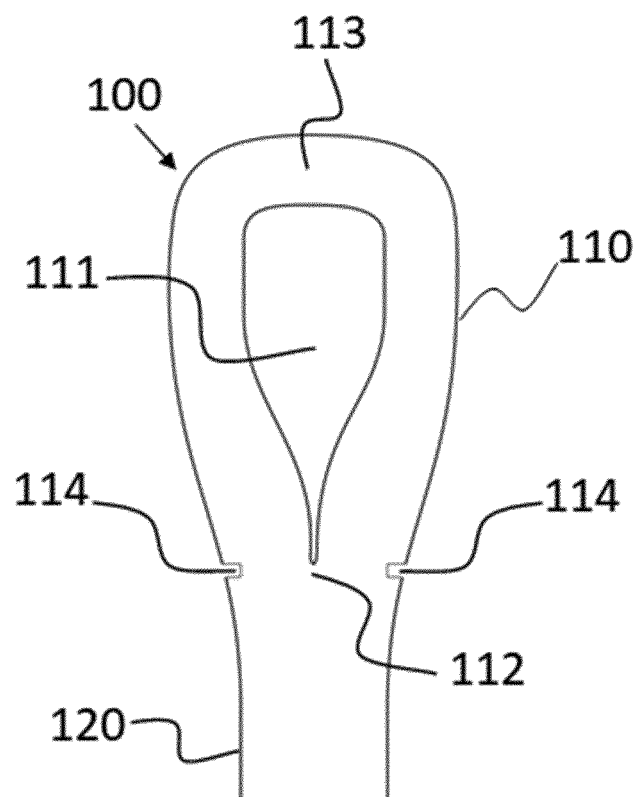


Fig. 7

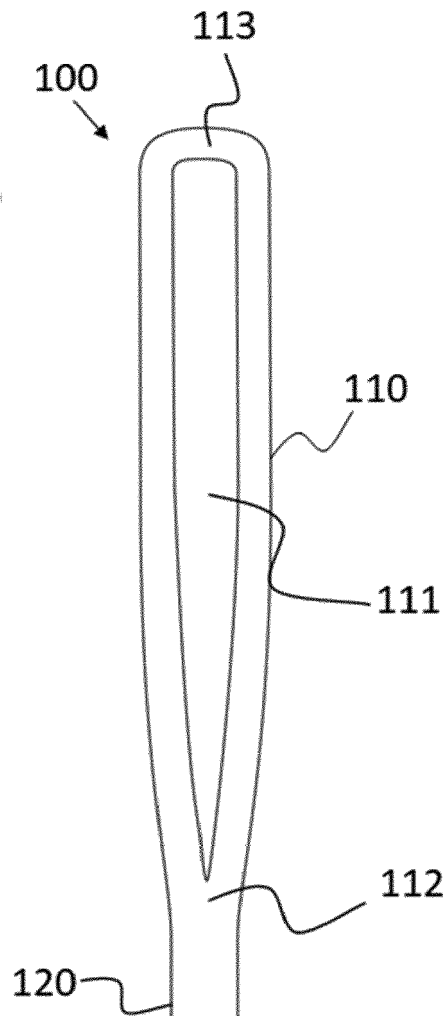


Fig. 8

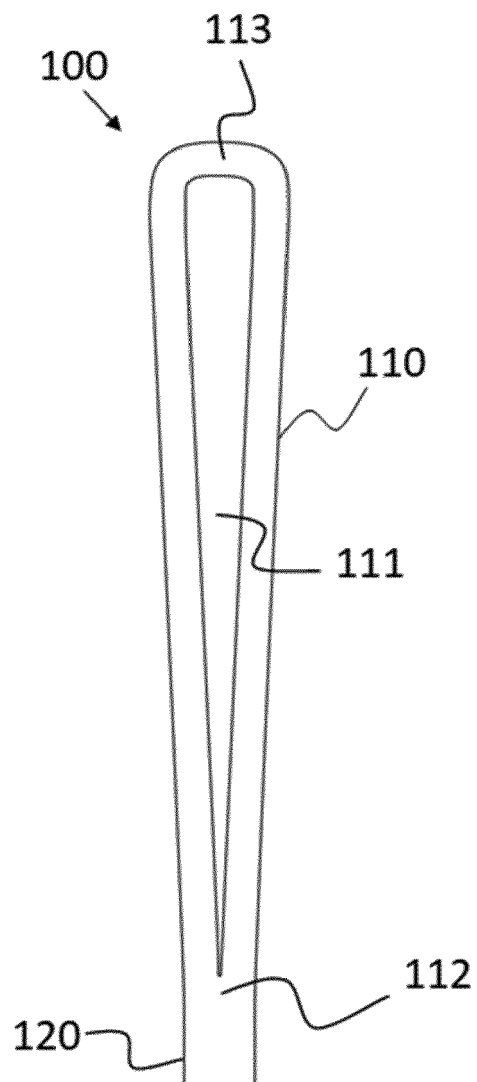


Fig. 9

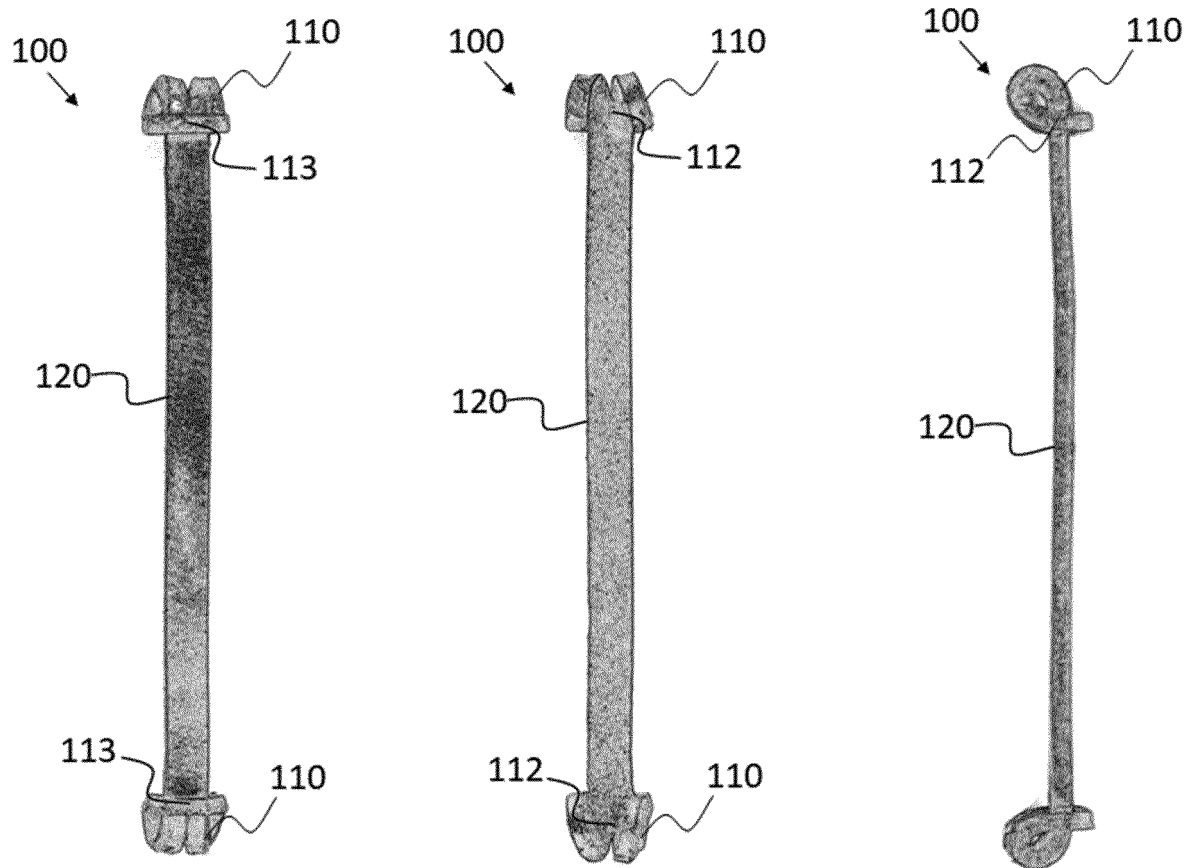


Fig. 10

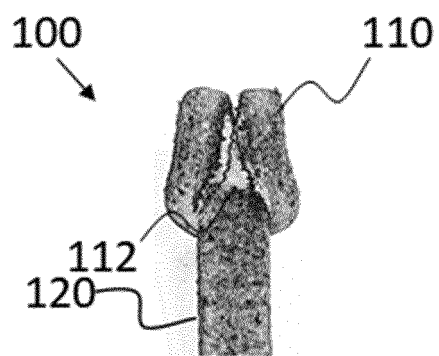


Fig. 11

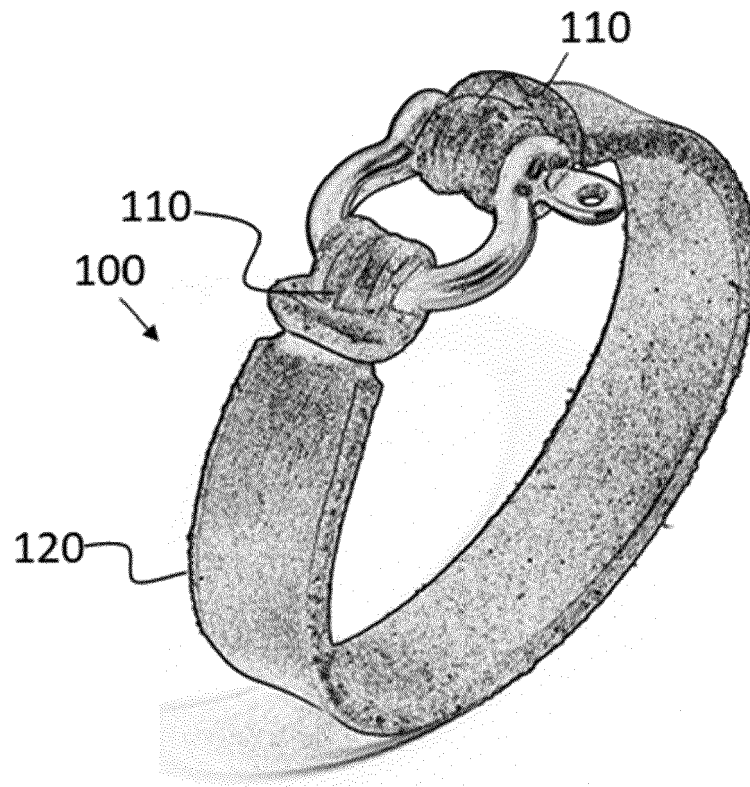


Fig. 12

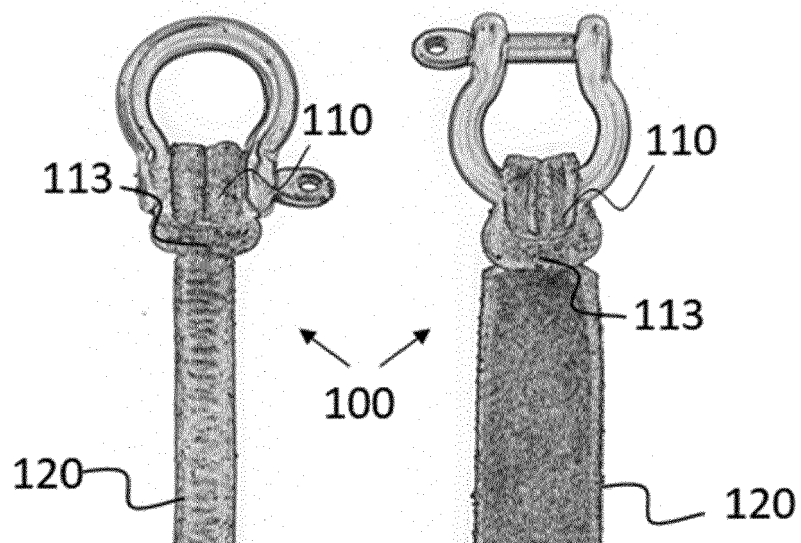


Fig. 13

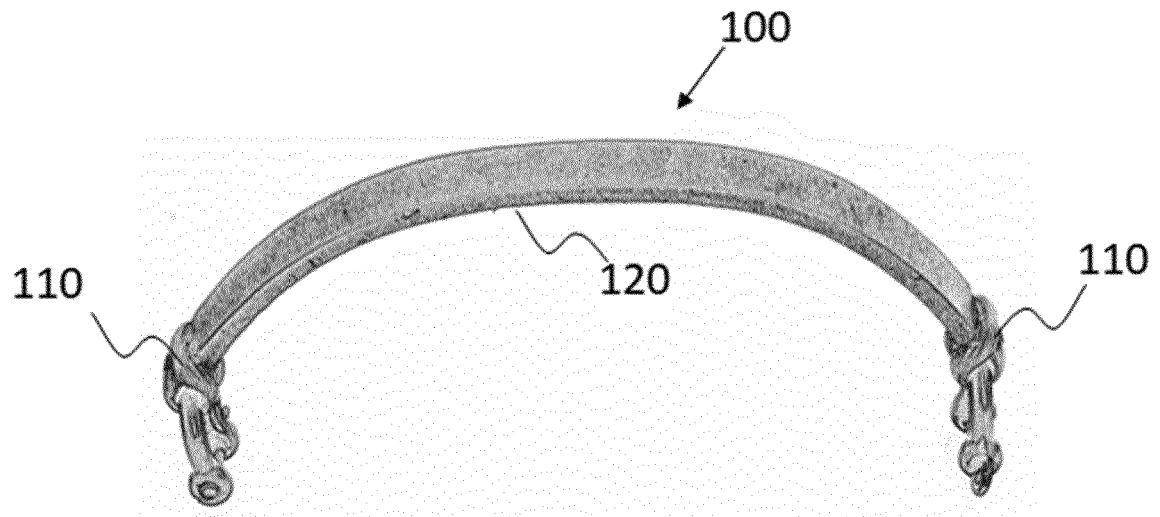


Fig. 14

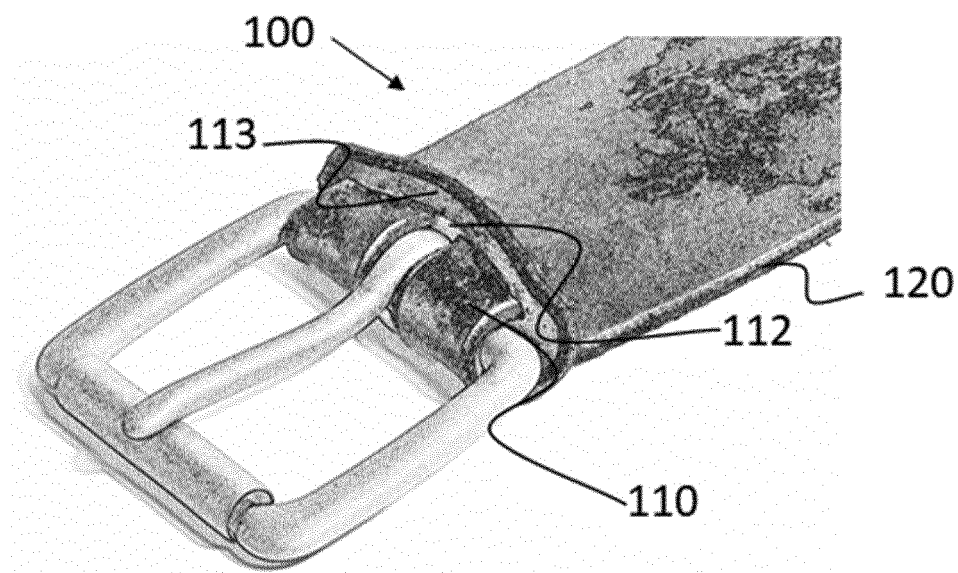


Fig. 15

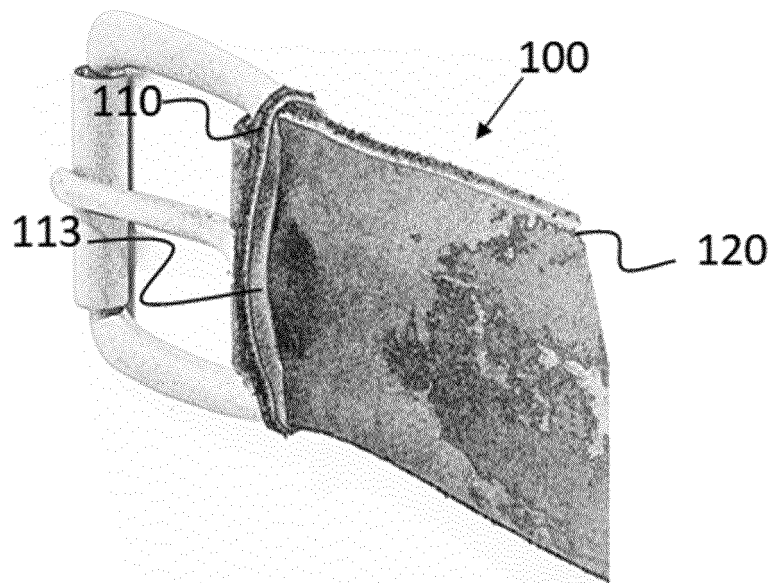
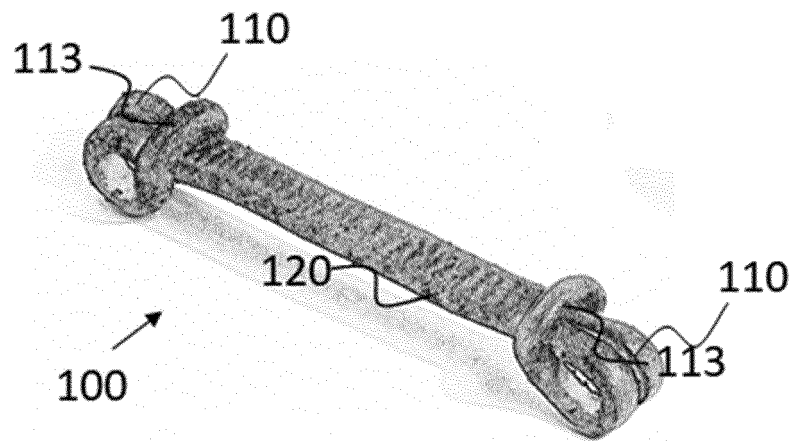


Fig. 16





EUROPEAN SEARCH REPORT

 Application Number
EP 17 19 4260

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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	US 2 961 785 A (TOEPFER EDWIN F) 29 November 1960 (1960-11-29) * figures 1, 2 *	1-8, 10-13 9	INV. A44B99/00 B65D63/12
Y	-----		
X	US 5 291 640 A (RISE LEIF [US]) 8 March 1994 (1994-03-08) * figures 1, 2 *	1	
X	-----		
X	US 3 365 753 A (PRENNER LOUIS J ET AL) 30 January 1968 (1968-01-30) * figures 1, 2 *	1	
Y	-----		
Y	DE 40 07 784 A1 (KMF MASCHINENFABRIK GMBH [DE]) 19 September 1991 (1991-09-19) * figures 1, 3 *	9	

			TECHNICAL FIELDS SEARCHED (IPC)
			A44B B65D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		31 January 2018	Krüger, Sophia
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ON EUROPEAN PATENT APPLICATION NO.**

EP 17 19 4260

5

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The members are as contained in the European Patent Office EDP file on
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31-01-2018

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2961785	A	29-11-1960	NONE	
US 5291640	A	08-03-1994	NONE	
US 3365753	A	30-01-1968	NONE	
DE 4007784	A1	19-09-1991	NONE	

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Patent documents cited in the description

- DE 1942207 U [0004]