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

(11) EP 1 388 302 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.02.2004 Bulletin 2004/07

(51) Int Cl.[7]: **A44B 19/32**

(21) Application number: **02255574.2**

(22) Date of filing: **08.08.2002**

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

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(54) Sealing slide fastener

(57) A sealing slide fastener comprises a pair of tapes 1a, 1b, a sealing member 2a, 2b along a longitudinal edge of said tapes, and a series of coupling elements 4a, 4b mounted on the edges of the tapes. When the tapes are engaged the sealing member 2a, 2b of one tape is urged into the channel 16 formed by the coupling element halves 5a, 5b on the opposing tape and is compressed by a sloping surface 10 on the underside of each of said element halves. This compression deforms the sealing member 2a, 2b on the tape edge of the engaging tape to form an enhanced seal with the opposing sealing member positioned within the channel 16 on the edge of the opposing tape.

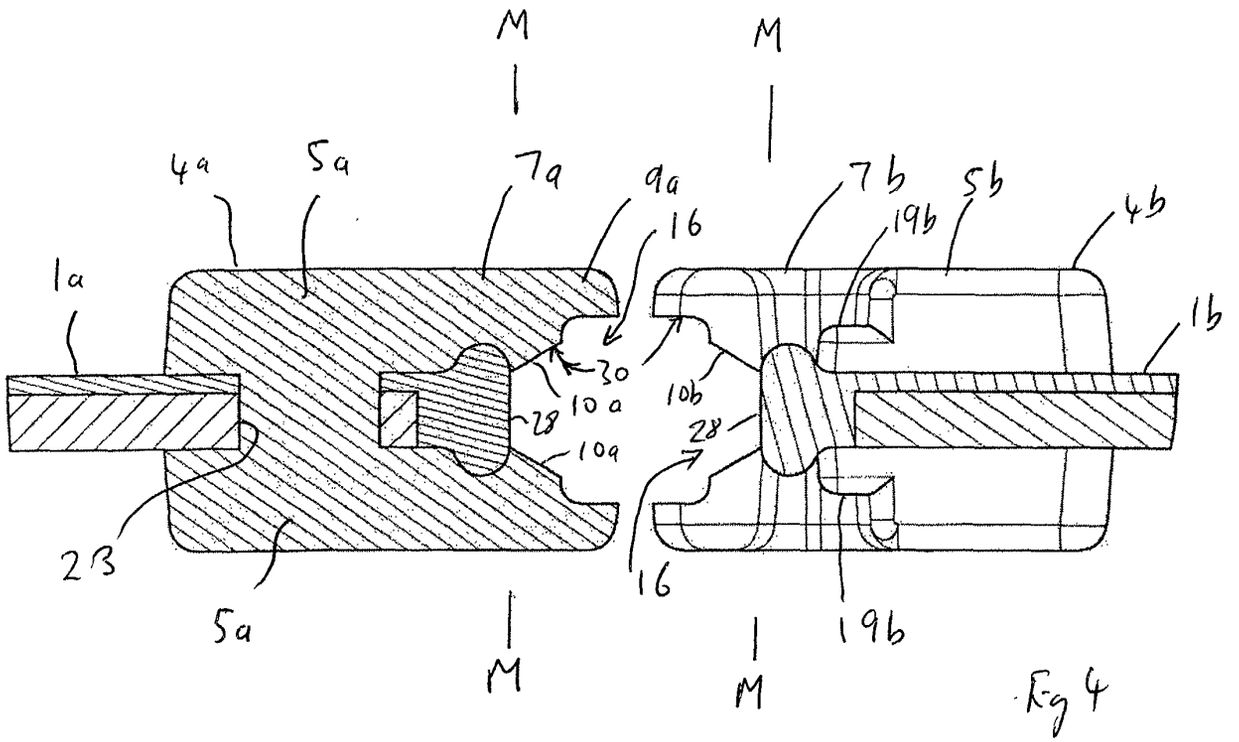


Fig 4

EP 1 388 302 A1

Description

[0001] The present invention relates to slide fasteners, and more particularly to a sealing slide fastener. Such sealing slide fasteners may be liquid tight, particularly water tight to prevent ingress of water to diving suits for example. Sealing fasteners have many other uses, on liquid containers for example, and in some applications a gas tight fastener is required.

[0002] There have been proposed many sealing slide fasteners comprising a pair of impermeable tapes and a seal for protection against leakage between the intermeshing rows of coupling elements which are mounted on the facing edges of the respective tapes.

[0003] Examples of sealing slide fasteners are disclosed in US-A-4 312 102 and EP-A-0108214. Thickened sealing members are provided at the tape edges. Each coupling element includes a pair of members, one on each side of the stringer tape. The members may be insert moulded with an integral connector which extends through the tape to hold the element in place. Each coupling element member includes a coupling portion extending beyond the thickened sealing member, the coupling portion having a neck portion and a coupling head for engagement with the coupling members on the other tape. The coupling element members define between them a slot extending longitudinally along the thickened sealing member for receiving the sealing member of the opposite tape to support the sealing member against distortion out of the plane of the tape. In EP-A-108 214 the coupling head on a coupling element overlaps shoulders on the cooperating elements of the other tape, so that the coupled elements will also resist or limit out of plane movement of the elements, as well as a force tending to urge the elements apart in the plane of the tapes.

[0004] Another example of such a fastener is shown in EP-A-900532, in which a sealing member at the edge of the stringer tape is formed with a tapered, rounded nose. When the coupling elements on the tapes are engaged the edges are urged together at the nose.

[0005] In US-A-2 910 754 a hollow bead is provided at each tape edge, the beads deforming slightly as they are brought to bear on each other as the fastener is closed.

[0006] There is a limit to how much pressure can be applied across the facing surfaces of the sealing members, because it becomes very difficult to close the fastener. Thus, the facing surfaces of the two thickened sealing members are susceptible to separate under extreme pressures.

[0007] The present invention seeks to provide a sealing slide fastener having an improved sealing joint, and good stability in the coupling joints.

[0008] According to a first aspect of the present invention, a sealing slide fastener comprises a pair of stringer tapes each having a tape and coupling elements along the tape, the edge of the tape being formed with a sealing material, and a coupling element straddling the edge to form an open channel, the tapes being coupled together by the coupling elements and the edge of a tape being received in the channels formed by the elements of the opposed tape, wherein compression means is provided on the channel wall to compress the tape edge received in the channel. The tape edge may be compressed transverse to the plane of the tape so as to squeeze the tape edge into enhanced contact with the other tape edge.

[0009] According to a second aspect of the present invention, a sealing slide fastener comprises a pair of impermeable tapes, a sealing member along a longitudinal edge of each of said tapes, and coupling elements mounted on the tapes, a said coupling element comprising a pair of coupling element halves mounted one on each side of a respective tape and each of said coupling halves comprising a coupling portion extending beyond said sealing member, said coupling portion comprising a neck portion and a coupling head joined with said neck portion, characterised in that at least one coupling element half of an element has a wedge shaped underside portion sloped towards the sealing member of the respective tape, such that when the coupling elements of the tapes are engaged the wedge shaped underside portion bears upon the sealing member on the opposite tape edge to compress said sealing member.

[0010] Depending on the planned use of the slide fastener the tapes may be substantially impermeable to liquid or gas as necessary.

[0011] The sealing member preferably has a flat outer mating surface transverse to the plane of the tape, which will bear against the opposed sealing member of the other tape, and may project beyond the thickness of the tape body to form a generally T-shaped edge region.

[0012] Preferably the projecting portions which bound the outer mating surface are arcuate. Preferably the coupling element on a tape supports the projecting portion at the edge of that tape.

[0013] By compressing the opposite sealing member, the pressure across the mating faces of the sealing members is increased, and there is greater resistance to distortion of the mating faces under pressure across the plane of the fastener.

[0014] According to a yet another aspect of the present invention, there is provided a sealing slide fastener having a pair of tapes, each having a sealing member along a longitudinal edge portion of the tape, and a series of elements mounted on said longitudinal edge portion of each of said tapes; each of said elements comprising a pair of coupling element halves mounted one on each side of a respective tape, each coupling element half comprising a leg portion and a coupling portion extending from said leg portion and beyond said sealing member, said coupling portion comprising a neck portion extending from said leg portion and a coupling head joined with said neck portion and projecting beyond said sealing member, characterised in that the

sealing member has a substantially flat outer mating surface bound by projecting portions which extend beyond the upper and lower planes of the tape body, and a said coupling element half has a wedge shaped underside portion narrowing towards the mating surface of the respective sealing member; whereby when said coupling elements of said tapes are engaged said wedge shaped underside portion of a coupling element half bears upon a projecting portion of the sealing member of the opposite tape to compress the sealing member.

[0015] Preferably wedge shaped portions are provided on both halve of a coupling element to compress the sealing member from both sides.

[0016] Other preferred features an advantages of the invention will be apparent from the accompanying description.

[0017] The invention will be further described by way of example with reference to the accompanying drawings, in which,

Figure 1 is a plan view of an embodiment of the present invention, with two stringer tapes in an engaged position;

Figure 2 is a perspective view of a tape of the embodiment of Figure 1;

Figure 3 is a perspective view of a stringer tape of the embodiment of Figure 1;

Figure 4 is a cross-section along line IV-IV of Figure 1, with the stringer tapes separated, and

Figure 5 is a cross-section along line IV-IV of Figure 1, with the tapes joined.

[0018] As shown in Figure 1 a sealing slide fastener comprises of a pair of stringer tapes 100, 200. Each stringer has a tape 1a, 1b carrying coupling elements 4a, 4b which interlock to hold the tapes pressed together at confronting longitudinal edge portions 3a, 3b. For clarity, some of the coupling element 4a, 4b are removed. As well known in the art, the coupling elements will extend along the length of the tape 1a, 1b.

[0019] Referring to Figure 2, each of the tapes 1a, 1b is composed of a woven or knit web core 20. The web core 20 is coated on at least one side with a layer 21 of resilient and water-resistant elastomer such as natural or synthetic rubber, such as chloroprene. The elastomer layer may be extrusion moulded on the web core. Layer 21 provides an impermeable barrier. It will be of a material suitable for the intended purpose of the slide fastener. Thus, if the fastener will be exposed to solvents, corrosive materials, or is to provide a gas tight seal, an appropriate coating material will be used. If a waterproof fastener is required, that is one which is resistant to ingress of water, a chloroprene material is suitable. The web core 20 is preferably used, to provide strength and resistance to stretching, but tape 1a, 1b may be formed entirely of the material of layer 21.

[0020] The layer 21 at the edge of each tape 1a, 1b is shaped to form a T-shaped sealing member 2a, 2b with a thickness greater than that of the tape 1a, 1b proper and extending along the longitudinal edge portion 3a, 3b. The bar 25 of the T-shaped sealing member 2 has a curved top surface 26 formed by a projecting portion 13a, 13b and a corresponding curved bottom surface 27 edge formed by a projecting portion 14a, 14b and a flat outwardly facing region 15a, 15b providing a sealing surface 28 lying substantially perpendicular to the plane of the stringer tape 100, 200. When the stringers are coupled together the regions 15a, 15b are pressed against each other to form a seal at their surfaces 28 so that the slide fastener tapes 100, 200 serve as a sealing slide fastener.

[0021] As noted above, a multiplicity of coupling elements 4a, 4b (only four being shown in Figure 1 for clarity) are mounted on each tape 1a, 1b along a corresponding one of the longitudinal edge portions 3a, 3b. As illustrated in Figure 2, apertures 23 are formed in the body 24 of the tape, along the tape edge region 3a, 3b and spaced inwards of the sealing member 2a, 2b at the required spacing for the coupling elements 4a, 4b. The coupling elements are then moulded on the tape edge as well known in the art, the through aperture 23 providing an integral connection between the element halves. The coupling elements may be formed, for example, of synthetic resin by injection or extrusion moulding, or of metal by die casting for some applications. Also, the element halves may be riveted together through the tape 1a, 1b, for example.

[0022] As illustrated in Figures 4 and 5, each of the coupling elements 4a, 4b includes a pair of upper and lower members or halves 5a, 5b disposed one on each side of the tape 1a, 1b. Each of the upper and lower halves 5a, 5b includes a leg portion 6a, 6b moulded on the body 24 of the tape 1a, 1b and connecting integrally with the leg portion 6a, 6b of the other half through the aperture 23. A coupling portion 7a, 7b extends from the leg portion 6a, 6b and beyond the T-shaped sealing member 2a, 2b.

[0023] The coupling portion 7a, 7b has a neck 8a, 8b extending from the leg portion 6a, 6b, and a rounded coupling head 9a, 9b contiguous to and complementary in shape with the neck 8a, 8b. Rounded heads 9a and 9b sit between the necks 8b and 8a respectively of adjacent elements 4b, 4a on the opposed tape (Figure 1).

[0024] Each coupling element half 5a, 5b also comprises a pair of integrally moulded shoulders 19a, 19b which extend laterally from the neck 8a, 8b. Shoulders 19a, 19b extend along the tape edge, behind the bar of the T shaped sealing member to provide some support to the adjacent projecting portion 13, 14 against deformation in the plane of the tape, and also against deformation out of the plane of the tape, for example when

the tape is flexed along its length. The head 9a, 9b of a coupling element 4a, 4b rests on the shoulders 19b, 19a of the cooperating elements 4b, 4a. These shoulder portions aid the stability of the engaging elements 4a, 4b by limiting the out of plane movement of the elements.

[0025] Referring to Figures 3 and 4, the coupling portions 7a of an element 4a project beyond the sealing member 2a to form a channel 16 for receiving the sealing member 2b of the opposed stringer. The inwardly facing surface 30 of each coupling portion 7a has a sloping or wedge shaped underside portion 10a which slopes inwards of the channel 16, towards the sealing surface 28 at the base of the channel. Thus, the channel 16 narrows towards the sealing face 28, to provide means for compressing the sealing member 2b of the opposed tape. The same arrangement is provided on the coupling portions 7b of element 4b, to receive and compress sealing member 2a.

[0026] As seen in Figure 1, when the coupling elements 4a, 4b of two slide fasteners 100, 200 are coupled together, the coupling head 9a of one coupling element 4a on one tape 100 is received in a corresponding recess 17 defined between the necks 8b of the coupling portions 7b on the other tape 200. The process of coupling and uncoupling the elements of a slide fastener using a slider is well known in the art and need not be described here. Referring to Figure 5, which shows the coupling elements 4a, 4b engaged, the wedge shaped underside portions 10 of the two coupling element halves 5a on the tape 100 engage the projecting portions 13, 14 respectively of the T-shaped sealing member 2b on the other tape 200, flattening them. The engaging pressure compresses the portions 13, 14 of the T-shaped sealing member 2 symmetrically about the plane of the tape. This compression of the top edge 13 and bottom edge 14 inwards in a direction transverse to the plane of the tapes 100, 200 will deform the sealing portion 15 of the engaging T-shaped sealing member 2 on the tape 200 tending to urge the surface 28 outwards towards the surface 28 of the opposite tape to enhance the seal formed between the surfaces 15. It will be appreciated that the elastomeric body of the sealing member 28 is constrained by its surrounding and so may be more dense or firmer, as well as deformed, depending on the precise geometry of the coupling elements, and the flexing of the tapes in use.

[0027] The coupling elements 4a, 4b are moulded to embrace the arcuate surfaces 26, 27 of the projecting portion 13a, 13b, 14a, 14b on the respective tape on which the element is mounted, to provide additional support at the edge of the tape.

[0028] The degree of compression or deformation required at the sealing member will depend on the particular materials used and the strength of the seal required. A high degree of compression and/or a relatively firm sealing material will require greater force when closing the slide fastener. Also, while it is presently preferred that in the uncompressed state, the sealing surface 15 will just lay on the mid line or joint line M-M of the coupling elements, it may be preferable to place it inwards or outwards of this line in some applications to provide a lesser or greater sealing force.

Claims

1. A sealing slide fastener comprising a pair of stringer tapes each having a tape and coupling elements along the tape, a sealing member at an edge of the tape being formed with a sealing material, and a coupling element straddling the sealing member to form a channel, the tapes being coupled together by the coupling elements on the respective tapes and the sealing member of a tape being received in the channels formed by the elements of an opposed tape, wherein compression means is provided on a wall of a channel to compress the sealing member received in the channel.

2. A sealing slide fastener as claimed in claim 1, wherein compression means is provide on the coupling elements of both tapes.

3. A sealing slide fastener as claimed in claim 1 or 2, wherein the compression means is provided on both channel walls to compress the received sealing member.

4. A sealing slide fastener as claimed in claim 1, 2 or 3, wherein the compression means comprises a sloping surface a coupling element.

5. A sealing slide fastener as claimed in any one of claims 1 to 4, wherein a sealing member has a flat outer mating surface which, in use, will bear against the opposed sealing member of the other tape.

6. A sealing member as claimed in any one of claims 1 to 5, wherein a sealing member has a projecting portion which projects beyond a major surface the tape body.

7. A sealing member as claimed in claim 6, wherein the sealing member has two projecting portions which project beyond respective major surfaces of the tape body.

8. A sealing member as claimed in claim 5 or 6, wherein the projecting portions have an arcuate outer surface.

9. A sealing member as claimed in claim 6, 7 or 8, wherein the coupling element is moulded around the contour of the projecting portion(s) of its respective tape.

10. A sealing slide fastener comprising:

a pair of impermeable tapes (100,200), a sealing member (2a, 2b) along a longitudinal edge (3a, 3b) of each tape (100,200), and coupling elements (4a, 4b) mounted on the edges of the tapes, a coupling element (4a, 4b) comprising a pair of coupling element halves (5a, 5b) mounted one on each side of a respective tape (1a, 1b), each of said coupling halves (5a, 5b) comprising a coupling portion (7a, 7b) extending beyond the sealing member (2a, 2b) on its respective tape,

characterised in that:

said sealing member has a substantially flat outer surface (28) bound by arcuate surfaces (26, 27) in upper and lower planes of the tape; and each of said coupling element halves (5a, 5b) has a sloping face (10) narrowing towards the flat outer surface (28) of the respective sealing member (2); whereby
when said coupling elements (4a, 4b) of said tapes (100,200) are engaged, said sloping faces (10, 10) of two corresponding element halves (5a,5b) bear upon the arcuate surfaces (26, 27) of the sealing member (2a, 2b) on an opposing tape edge to compress said sealing member (2a, 2b).

11. A sealing slide fastener comprising:

a pair of tapes (100,200), a sealing member (2a, 2b) along a longitudinal edge (3a, 3b) of each of said tapes (100,200), and coupling elements (4a, 4b) mounted on the edges of the tapes (100,200), a coupling element (4a, 4b) comprising a pair of coupling element halves (5a,5b) mounted one on each side of a respective tape (1a, 1b), each of said coupling halves (5a,5b) comprising a coupling portion (7a, 7b) extending beyond said sealing member (2a, 2b), said coupling portion (7a, 7b) comprising a neck portion (8a, 8b) and a coupling head (9a, 9b) joined with said neck portion (8a, 8b) **characterised in that**:

a coupling element half (5a, 5b) has a wedge shaped underside portion (10) sloped towards said sealing member (2a, 2b),
such that when the coupling elements (4a, 4b) of the tapes (100, 200) are engaged, said wedge shaped underside portion (10) of an element half (5a,5b) bears upon said sealing member (2a, 2b) on the opposite tape edge to compress said sealing member (2a, 2b).

12. A sealing slide fastener as claimed in claim 12, wherein the sealing member (2) is a T-shaped member.

13. A sealing slide fastener as claimed in claim 12, wherein upper and lower portions (13, 14) of the T-shaped sealing member(2) are compressed in a direction transverse to the plane of said tape by two corresponding wedge shaped underside portions (10, 10) on the coupling elements of the other tape, urging a sealing portion (15) outwards towards a corresponding sealing portion (15) on the other tape.

14. A sealing slide fastener as claimed in claim 11, 12 or 13,
wherein two coupling element halves (5a,5b) are integrally connected through holes (23) in the tape.

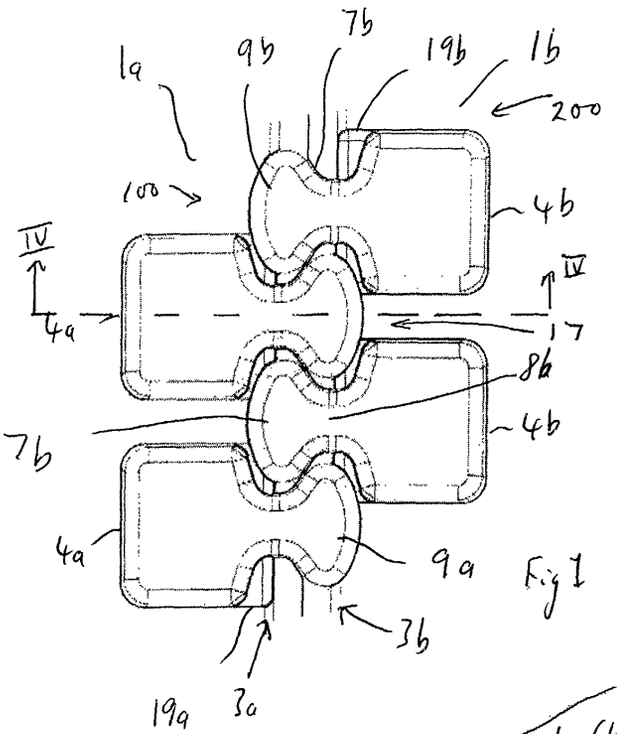


Fig 1

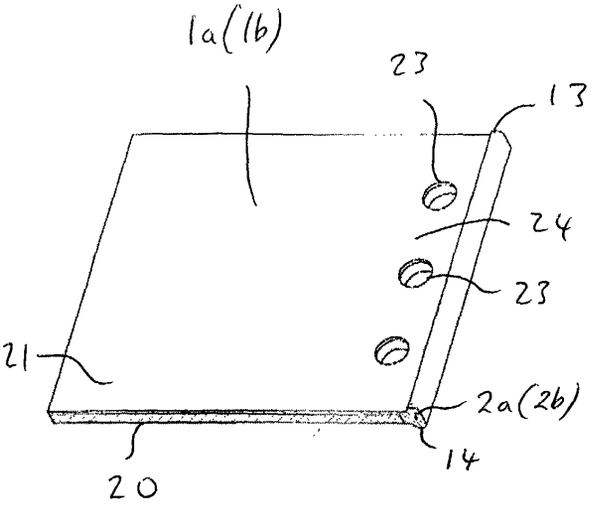


Fig 2

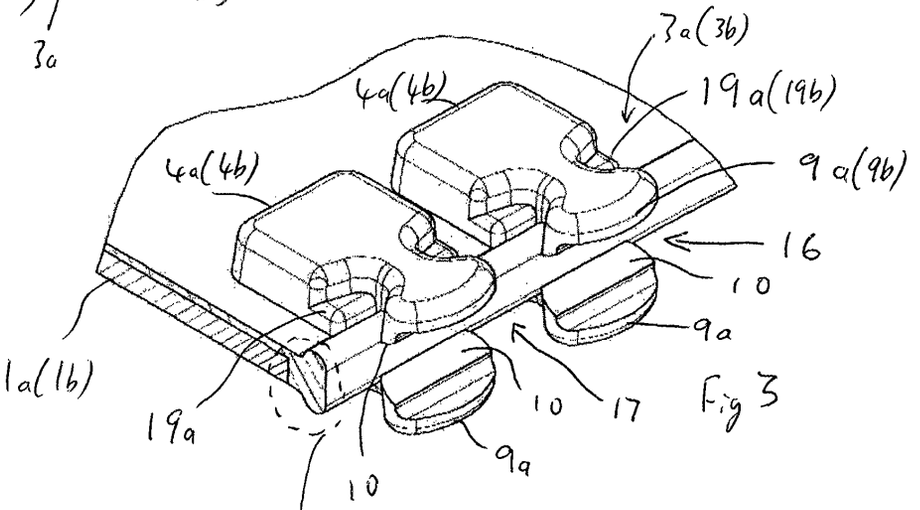
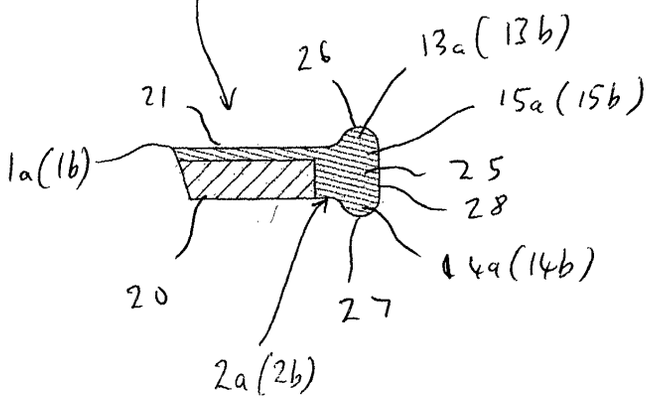


Fig 3



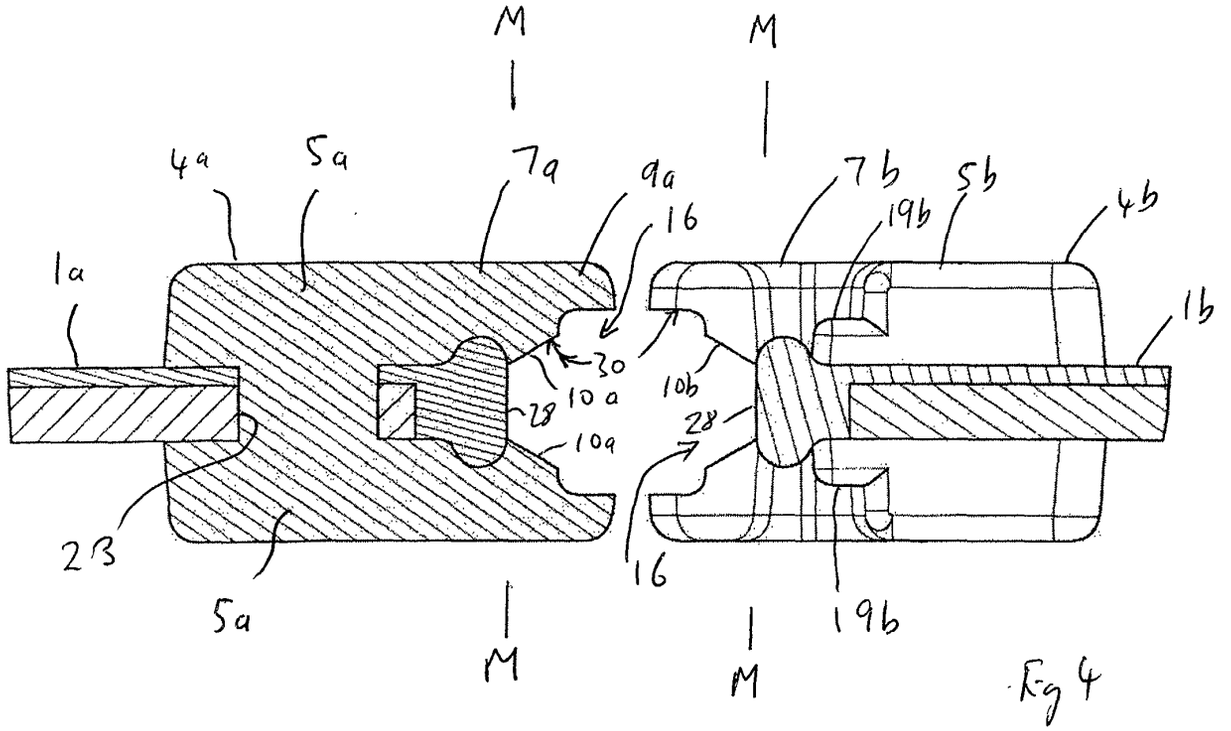

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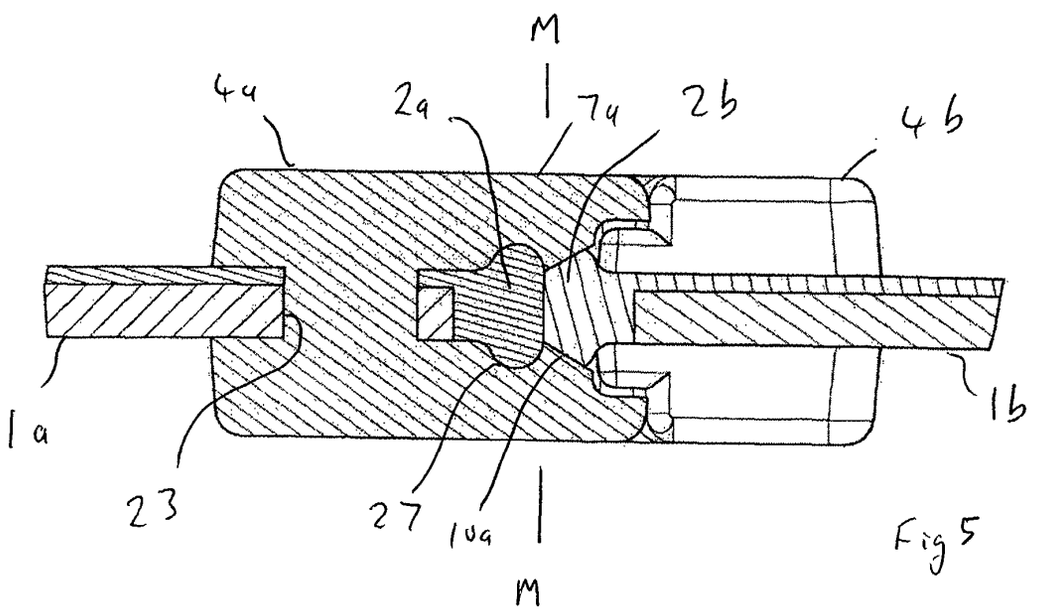
Fig 4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27
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Fig 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 5574

DOCUMENTS CONSIDERED TO BE RELEVANT

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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A44B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	21 January 2003	Horubala, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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