



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.04.2005 Bulletin 2005/17

(51) Int Cl.7: **A44B 19/34**

(21) Application number: **04024755.3**

(22) Date of filing: **18.10.2004**

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

(30) Priority: **20.10.2003 IT TO20030824**

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(54) **An open end slide fastener, particularly for knitwear**

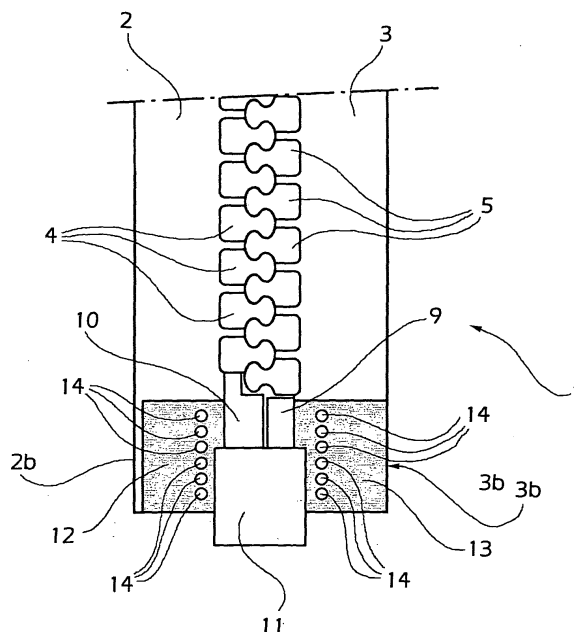
(57) The slide fastener (1) comprises

a pair of woven or knitted tapes (2, 3) having respective pluralities of coupling elements (4, 5),
a slider (6) movable along the tapes (2, 3) to mutually engage or disengage the coupling elements (4, 5), and
a stop member (11) fixed to the bottom end (3b) of one tape (3) and adapted to stop the slider (6) and to detachably receive an end coupling member (10) which is fastened to the bottom end (2b) of the other tape (2) and is introduced through the slider (6).

A reinforcement sheet member (12, 13) made of a plastic material is permanently affixed to at least one face of the bottom end portions (2b, 3b) of the tapes (2, 3), adjacent the stop member (11) and the end coupling member (10), respectively.

The bottom end portions (2b, 3b) of the tapes (2, 3) are provided with at least one respective longitudinal row of uniformly spaced apertures (14; 114), extending through the tapes (2, 3) and the reinforcement sheet members (12, 13) and adapted to receive a stitch-forming thread.

Fig. 2



Description

[0001] The present invention relates to an open end slide fastener, particularly for knitwear.

[0002] More specifically the invention relates to an open end slide fastener of the kind comprising

a pair of woven or knitted tapes, having respective top ends and bottom ends and carrying respective pluralities of coupling elements,

a slider movable along said tapes to mutually engage or disengage said coupling elements, and

a stop member fixed at the bottom end of one tape, and adapted to stop the slider and to detachably receive an end coupling member which is fastened to the bottom end of the other tape and introduced through the slider;

a reinforcement sheet member made of plastic material being permanently affixed to at least one face of the bottom end portions of the tapes, adjacent the stop member and the end coupling member, respectively.

[0003] Open end slide fasteners of the above-defined kind are widely in use, particularly in garments and the like.

[0004] Referring to figure 1 of the annexed drawings, a slide fastener 1 of that kind comprises a pair of tapes 2, 3, made of a woven or knitted material. The tapes 2, 3 have respective top ends 2a, 3a and respective bottom ends 2b, 3b. In a quite conventional manner, a respective longitudinal edge of each tape 2, 3 is provided with a respective plurality of coupling elements 4, 5, such as interlockable teeth.

[0005] The slide fastener 1 further includes a slider 6 which in a per se known manner comprises a slider body 6a, a so-called crown 6b and a pull tab 6c. Beyond the lowermost coupling elements 4, 5, respective end coupling members 9, 10 are fastened to the tapes 2, 3. A bottom stop member 11 is permanently fixed to the bottom end of one tape, for instance tape 3, and is adapted to stop the slider 6, and to detachably receive the end coupling member 10 which is fastened to the bottom end 2b of the other tape 2, which is in use preliminarily introduced through the slider 6.

[0006] The slide fastener 1 of figure 1 is of the open end kind, i.e. of the kind in which, by drawing the slider to its lowermost position, namely against the bottom stop member 11, it is possible to "open" the slide fastener by disengaging the end coupling member 10 from the bottom stop member 11 and the slider 6.

[0007] Reinforcement sheet members 12 and 13, made of a plastic material, are permanently affixed, for instance by ultrasound welding, to at least one and preferably both faces of the bottom end portions 2b, 3b of the tapes 2, 3, adjacent the stop member 11 and the end coupling members 9, 10. The reinforcement sheet members 12, 13 are made for instance of a woven polyamide or polyester having a structure such as that of a so-called "taffeta". Preferably the reinforcement sheet members 12 and 13 are disposed astride the lowermost

edges of the two tapes 2, 3, and extend on both sides of said tapes.

[0008] A slide fastener of the above-described kind can be attached to a piece of knitwear by affixing to each of two mating portions thereof a respective tape of the slide fastener, by means of a conventional sewing machine.

[0009] It would however be desirable, in view of the more satisfactory results, to attach such a slide fastener to a knitted garment by using a so-called linking machine for knitwear.

[0010] A linking machine for knitwear includes a linear (circumferential) array of fixed guide needles or points, onto which each tape of a conventional slide fastener without the reinforcement sheet members, and the corresponding mating portion of the knitted garment are to be pressed, so as to make said needles pass there-through. Thereafter each tape is fastened to the corresponding garment portion through a series of stitches formed by means of a moving crochet needle which co-operates with said fixed needles.

[0011] However, with a slide fastener according to figure 1, the presence of the previously mentioned reinforcement sheet members prevents or at least seriously hinders the penetration of the fixed needles of a linking machine through the bottom portions of the tapes of such a slide fastener.

[0012] It is an object of the present invention to provide an improved slide fastener of the initially defined kind, allowing the above-outlined inconvenience of the prior art to be overcome.

[0013] This and other objects are achieved according to the present invention by an open end slide fastener of the previously defined kind, characterised in that the bottom end portions of said tapes are provided with at least one respective longitudinal row of uniformly spaced apertures, extending through the tapes and the said reinforcement sheet members and adapted to receive a stitch-forming thread.

[0014] Further characteristics and advantages of the present invention will become apparent from the following detailed description, provided purely by way of non-limitative example, with reference to the attached drawings, in which:

figure 1, already described, shows an open end slide fastener according to the prior art;

figure 2 is a partial view of an open end slide fastener according to the present invention;

figure 3 is a partial perspective view showing an open end slide fastener according to the invention properly positioned in a linking machine for attaching the slide fastener to a garment (not shown); and figure 4 is a partial view of another embodiment of an open end slide fastener according to the present invention.

[0015] A first embodiment of the invention is shown in

figure 2. In said figure, parts and components which have already been described in connection with figure 1 have been attributed once again the same reference numerals.

[0016] In the embodiment shown in figure 2 the bottom end portions 2b, 3b of the tapes 2, 3 are provided each with at least one respective longitudinal row of uniformly spaced apertures 14, extending through the tapes 2, 3 and through the associated reinforcement sheet members 12, 13.

[0017] The apertures 14 of the embodiment shown in figure 2 are through holes, having preferably an essentially circular shape.

[0018] Said apertures or holes 14 are adapted to receive a stitch-forming thread in a linking machine.

[0019] Figure 3 shows a portion of a linking machine, such as the machine Model 99VE manufactured by the Italian company CONTI Complett. With a view to stitching tape 3 of the slide fastener 1 of figure 3 to a corresponding mating portion of a knitted garment, said tape 3 is pressed onto the array of fixed needles 50 of the linking machine, so as to make said needles 50 pass therethrough close to the coupling teeth 5. The provision of the apertures 14 in the bottom end portion 3b of tape 3 allows said bottom end portion to be easily pressed onto the needles of the linking machine.

[0020] The corresponding mating portion of the garment can then be in turn positioned in the machine, by making the needles 50 pass therethrough. Thereafter, tape 3 of the slide fastener is fastened to the garment portion, by the provision of a series of stitches formed by means of a moving crochet needle (not shown in figure 3) which cooperates with the fixed guide needles 50.

[0021] After affixing tape 3 of the slide fastener to the corresponding mating portion of the garment, the same operations described above are repeated by properly positioning tape 2 and the corresponding mating portion of the garment onto the needles 50 of the linking machine. This can be easily accomplished due to the fact that, in accordance with the invention, the bottom end portion 2b of tape 2 is preliminarily provided with its own row of through apertures 14.

[0022] The embodiment of figure 2 provides optimum results if the through apertures 14 provided in the bottom end portions 2b and 3b of the tapes 2 and 3 are positioned substantially at the same distance between the fixed needles 50 of the linking machine intended to be used.

[0023] In the embodiment shown in figure 4 the bottom end portions 2b, 3b of the tapes 2, 3 are provided with a respective longitudinal row of uniformly spaced apertures 114, each of which is essentially formed of two orthogonally intersecting cuts. In other words, the apertures 114 have an essentially cross-like shape. The longitudinal portions of the apertures 114 allow to accommodate the tapes 2, 3 onto the fixed needles of linking machines having slightly different pitch distances between the said needles.

[0024] In further embodiments, not shown in the drawings, each tape 2, 3 of the slide fastener is a woven tape including a plurality of longitudinal warp threads, at least one of which is made of a thermally-soluble material. Said at least one thermally-soluble warp thread is conveniently aligned with the corresponding row of apertures 14 or 114 of the tape 2 or 3, and allows to create, through the thermal elimination of said warp threads, a weakened line along the tapes, through which it is easier to cause the penetration of the fixed needles 50 of a linking machine when the tape is to be affixed to a knitted garment portion.

[0025] Naturally, the principle of the invention remaining the same, the embodiments and details of construction can be widely varied with respect to what has been described and illustrated purely by way of non-limitative example, without by this departing from the scope of the invention as defined in the annexed claims.

Claims

1. An open end slide fastener (1) comprising
 - a pair of woven or knitted tapes (2, 3) having respective top ends (2a, 3a) and bottom ends (2b, 3b), and carrying respective pluralities of coupling elements (4, 5),
 - a slider (6) movable along said tapes (2, 3) to mutually engage or disengage said coupling elements (4, 5), and
 - a stop member (11) fixed to the bottom end (3b) of one tape (3) and adapted to stop the slider (6) and to detachably receive an end coupling member (10) which is fastened to the bottom end (2b) of the other tape (2) and is introduced through the slider (6);
 - a reinforcement sheet member (12, 13) made of a plastic material being permanently affixed to at least one face of the bottom end portions (2b, 3b) of the tapes (2, 3), adjacent the stop member (11) and the end coupling member (10), respectively;

characterised in that

the bottom end portions (2b, 3b) of the said tapes (2, 3) are provided with at least one respective longitudinal row of uniformly spaced apertures (14; 114), extending through the tapes (2, 3) and the said reinforcement sheet members (12, 13) and adapted to receive a stitch-forming thread.
2. An open end slide fastener (1) according to claim 1, **characterised in that** said apertures (14) are through holes.
3. An open end slide fastener (1) according to claim 2, **characterised in that** said apertures (14) have an essentially circular shape.
4. An open end slide fastener (1) according to claim

1, **characterised in that** said apertures (114) are essentially formed of two orthogonally intersecting cuts.

5. An open end slide fastener (1) according to any of the preceding claims, wherein each tape (2, 3) is a woven tape including a plurality of longitudinal warp threads, at least one of which is made of a thermally-soluble material; in each tape (2, 3) said at least one thermally-soluble warp thread being aligned with the said row of apertures (14; 114) of the tape (2, 3).

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Fig. 1
(PRIOR ART)

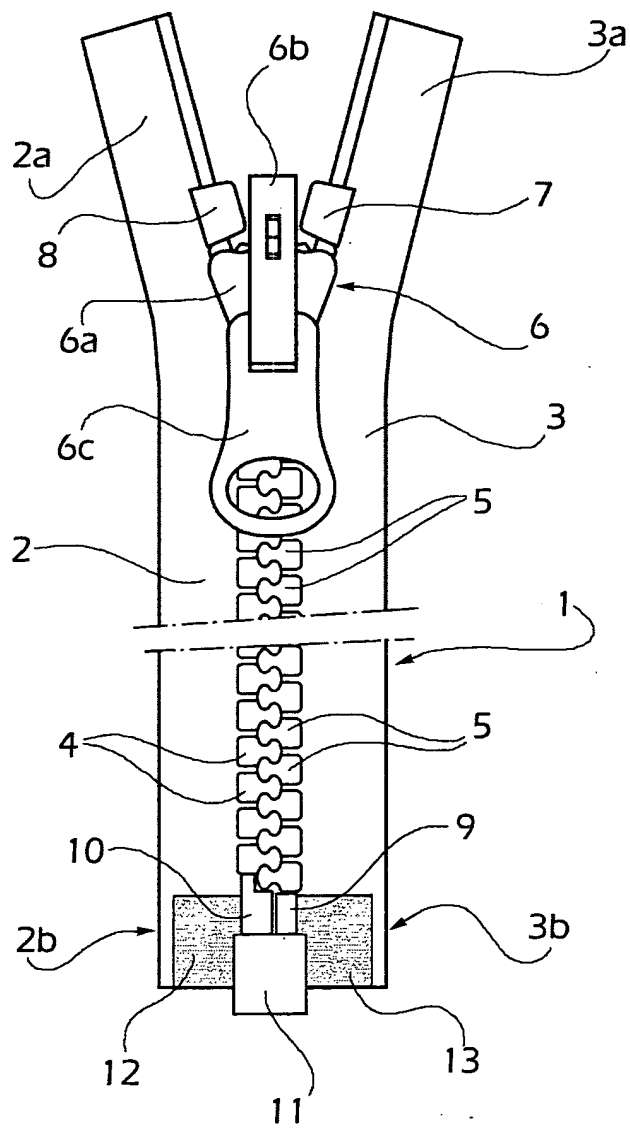
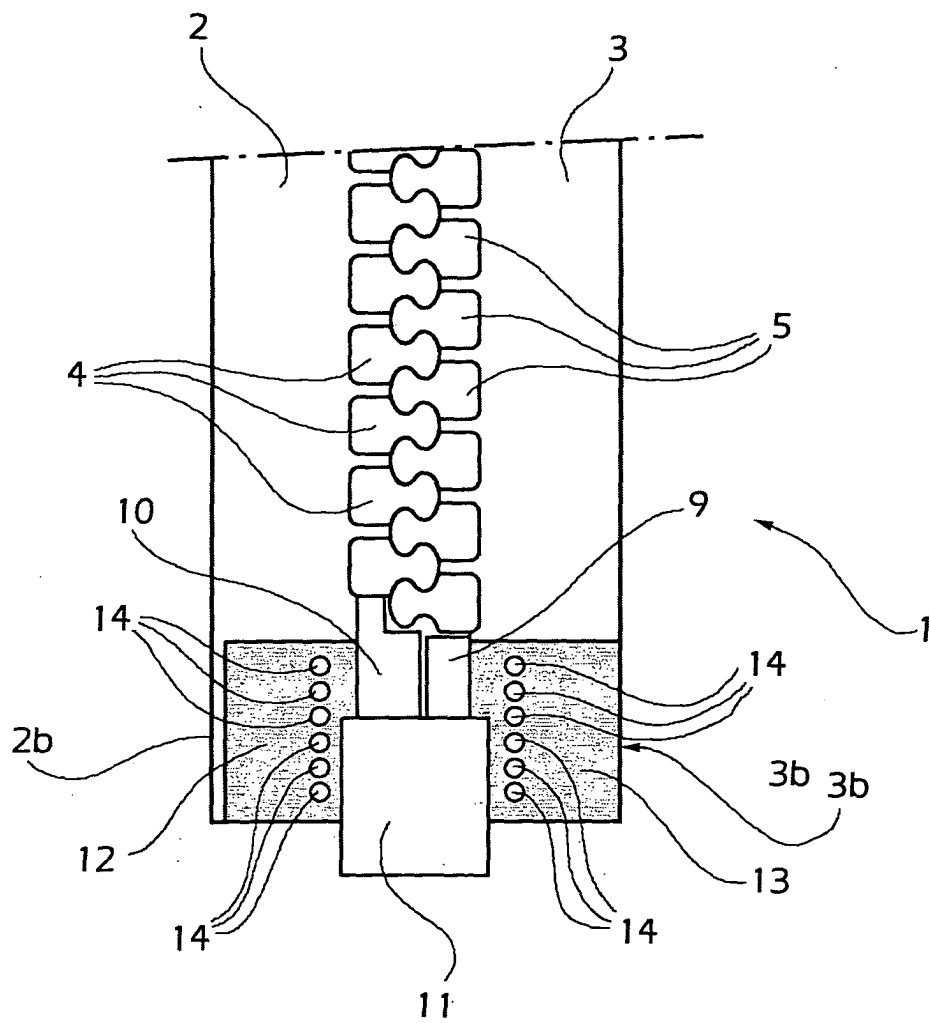


Fig. 2



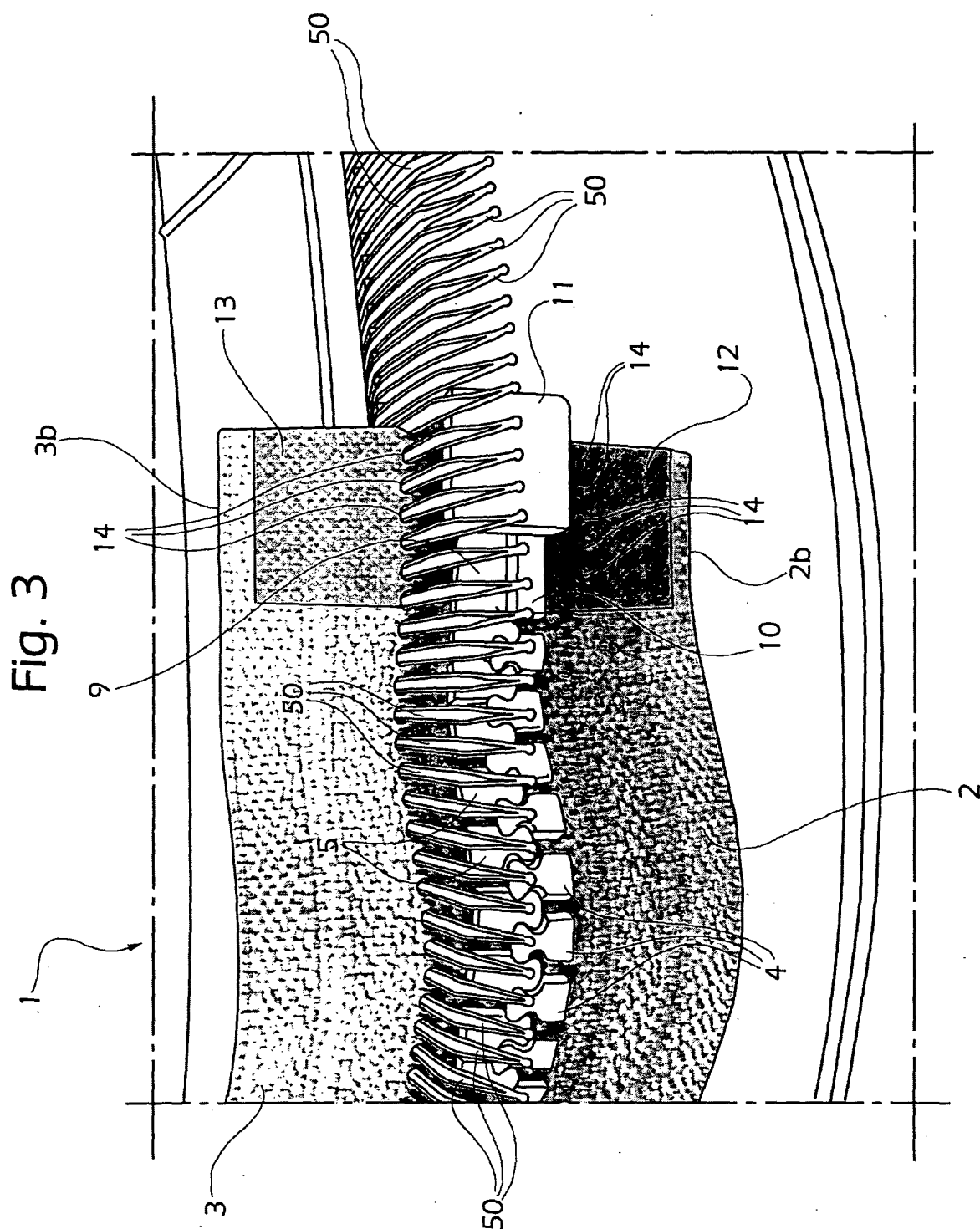
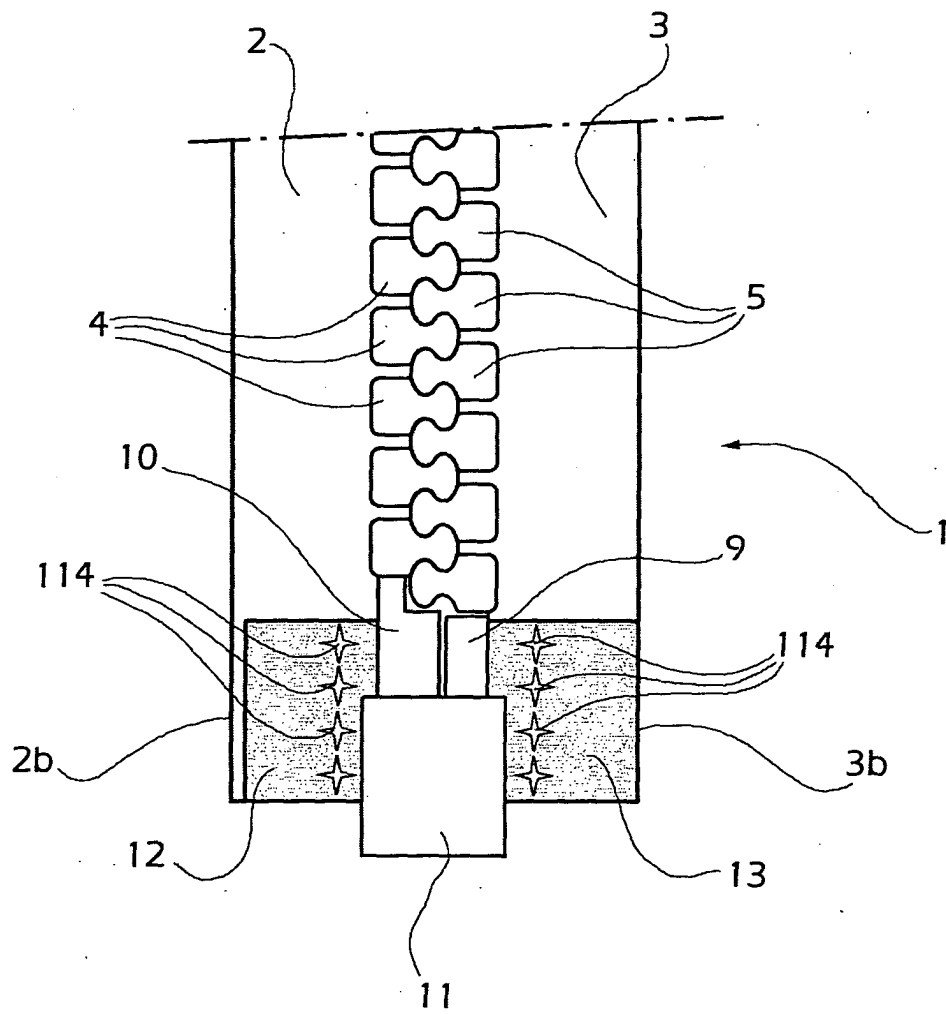


Fig. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 4755

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Y	* column 4, line 57 - line 68 * * column 5, line 45 - line 68; figures 1,2,11,17 *	1-3	
Y	----- US 4 422 221 A (AKASHI ET AL) 27 December 1983 (1983-12-27) * column 2, line 6 - column 3, line 14; figures 1,2 * -----	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 February 2005	Examiner Horubala, T
CATEGORY OF CITED DOCUMENTS		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	
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			

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