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(54) Invisible zipper

(57) An invisible zipper includes two zipper tapes (1a,1b), two rows of interlocking teeth (2a,2b) respectively fastened to the zipper tapes (1a,1b), and a slide (3) movable to close/open the teeth (2a,2b), wherein the teeth (2a,2b) are injection-moulded on respective folded sides edges of the zipper tapes (1a,1b), each tooth having an upper clamping wall (21a,21b) wrapped in the folded side edge of one zipper tape (1a,1b), and a lower clamping wall (22a,22b) for interlocking, the lower clamping wall (22a,22b) being relatively longer than the upper clamping wall (21a,21b) and having a protruding upper face (23a,23b) for interlocking.

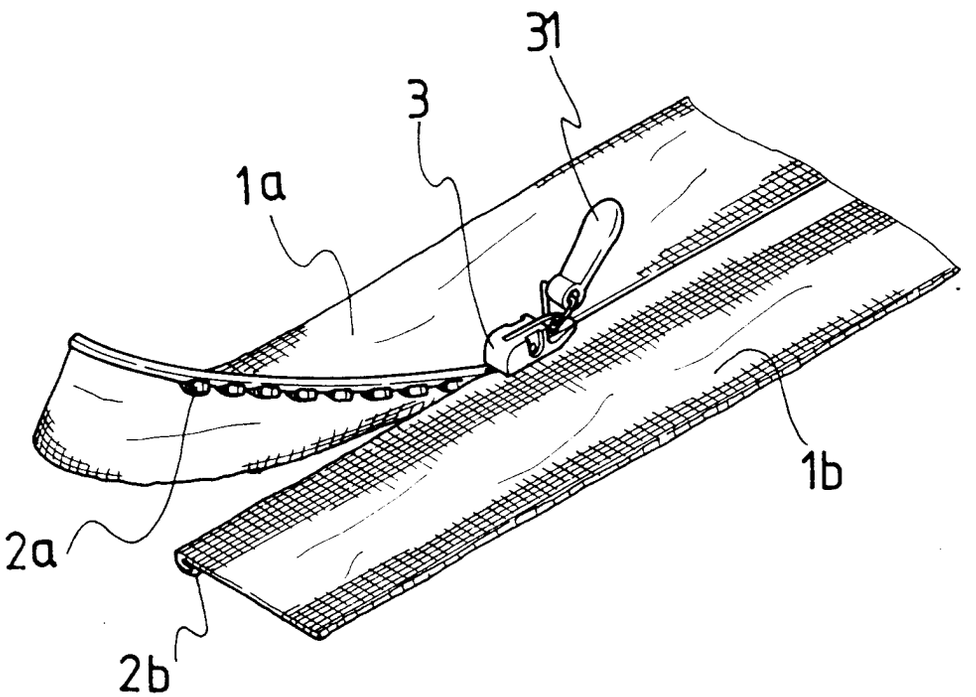

FIG. 3

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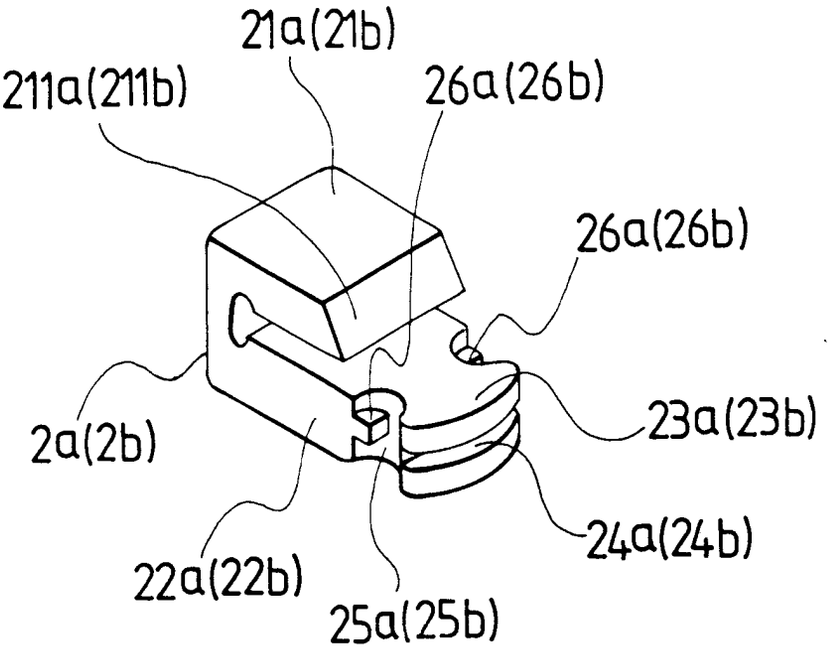

21a(21b)
211a(211b)
26a(26b)
26a(26b)
23a(23b)
2a(2b)
24a(24b)
22a(22b)
25a(25b)

FIG. 7

Description

[0001] The present invention relates to an invisible zipper, and more particularly to such an invisible zipper in which U-shaped interlocking teeth are directly injection molded from plastics on respective side edges of zipper tapes, and the side edges of the zipper tapes are respectively folded up to wrap the interlocking teeth, enabling respective protruding upper faces of the teeth to be exposed to the outside for interlocking.

[0002] Regular zippers are not invisible. When closed, the interlocking elements are visible. Similar visible zippers are seen in U.S. Pat. Nos. 5,653,002; 5,469,605;5,400,482;5.297,319; 5,119,530. There is known an invisible zipper, as shown in Figures 1 and 2, generally comprised of two zipper tapes **30** and **30'**, interlocking spirals **10** and **10'** respectively fastened to folded side edges **301** and **301'** of the zipper tapes **30** and **30'** by stitches. When the slide (not shown) is moved between the zipper tapes **30** and **30'**, the interlocking spirals **10** and **10'** are closed or opened. The fabrication process of this structure of invisible zipper is complicated. Further, the interlocking teeth used in conventional zippers cannot be used for making an invisible zipper according to conventional zipper fabrication methods. Because these interlocking teeth are individually installed, they cannot be fastened to respective folded side edges of the zipper tapes by stitching.

[0003] According to the present invention, the invisible zipper comprises two zipper tapes, two rows of interlocking teeth respectively fastened to the zipper tapes. and a slide moved to close/open the teeth, wherein the teeth are injection-molded on respective folded side edges of the zipper tapes, each having an upper clamping wall wrapped in the folded side edge of one zipper tape, and a lower clamping wall for interlocking, the lower clamping wall being relatively longer than the upper clamping wall and having a protruding upper face for interlocking. According to one embodiment of the present invention, the protruding upper face at the lower clamping wall of each tooth comprises an engagement slot at a front side, two side notches at two opposite lateral sides in communication with the engagement slot, and two tongues respectively suspended in the side notches for interlocking. According to another embodiment of the present invention, the protruding upper face at the lower clamping wall of each tooth comprises a protruding portion at one side and a recessed portion at an opposite side for interlocking.

[0004] Figure 1 is a top plain view of an invisible zipper according to the prior art.

[0005] Figure 2 is a sectional view taken along line A-A of Figure 1.

[0006] Figure 3 is a perspective view of an invisible zipper according to the present invention.

[0007] Figure 4 is an exploded view of a part of the invisible zipper shown in Figure 3.

[0008] Figure 5 illustrates the teeth respectively injection molded on the respective side edges of the zipper tapes according to the present invention.

[0009] Figure 6 shows the side edges of the zipper tapes respectively folded up, the upper clamping walls of the teeth respectively wrapped in the folded side edges of the zipper tapes according to the present invention.

[0010] Figure 7 is a perspective view of a tooth for the invisible zipper according to the present invention.

[0011] Figure 8 is a perspective view of an alternate form of the tooth according to the present invention.

[0012] Figure 9 is a top plain view of the present invention, showing the teeth closed.

[0013] Figure 10 is a sectional view taken along line B-B of Figure 9.

[0014] Referring to Figures from 3 through 6, an invisible zipper in accordance with the present invention is generally comprised of two zipper tapes **1a** and **1b**, a plurality of teeth **2a** and **2b** respectively fastened to corresponding side edges of the zipper tapes **1a** and **1b**, and a slide **3** moved to close/open the teeth **2a** and **2b** between the zipper tapes **1a** and **1b**.

[0015] The teeth **2a** and **2b** are made of plastics, and directly fastened to the corresponding side edges of the zipper tapes **1a** and **1b** by injection-molding (see Figures 3 and 5).

[0016] The tooth **2a**(**2b**), as shown in Figure 7, is a substantially U-shaped member comprising an upper clamping wall **21a**(**21b**), and a lower clamping wall **22a** (**22b**). The lower clamping wall **22a**(**22b**) is relatively longer than the upper clamping wall **21a**(**21b**), having a protruding upper face **23a**(**23b**) for interlocking. The protruding upper face **23a**(**23b**) comprises an engagement slot **24a**(**24b**) at its front side, two side notches **25a**(**25b**) at its two opposite lateral sides in communication with the engagement slot **24a**(**24b**), and two tongues **26a**(**26b**) suspended in the side notches **25a** (**25b**) for interlocking. When the two rows of teeth **2a** and **2b** are closed, the tongues **26a**(**26b**) of the teeth **2a** (**2b**) at one zipper tape **1a**(**1b**) are respectively engaged into the engagement slot **24b**(24a) at the teeth **2b**(**2a**) (see Figures 9 and 10).

[0017] The slide **3** is disposed at an outer side of the zipper (see Figure 10) and moved to close/open the teeth **2a** and **2b**, having a pull tab **31** for pulling by hand.

[0018] After injection molding of the teeth **2a** and **2b** on the corresponding side edges of the zipper tapes **1a** and **1b** (see Figure 5), the zipper tapes **1a** and **1b** are respectively longitudinally folded up and set into shape, enabling the upper clamping walls **21a** and **21b** of the teeth **2a** and **2b** to be respectively wrapped by the zipper tapes **1a** and **1b** with the lower clamping walls **22a**(**22b**) of the teeth **2a** and **2b** exposed to the outside (see Figure 6). Therefore, when the slide **3** is moved to close the teeth **2a** and **2b**. the interlocked teeth **2a** and **2b** are kept from sight (see Figure 3).

[0019] Figure 8 shows an alternate form of the teeth. According to this alternate form, the teeth **2a'**(**2b'**) comprises an upper clamping wall **21'a**(**21'b**), and a lower

clamping wall **22'a**(**22'b**). The lower clamping wall **22'a** (**22'b**) is relatively longer than the upper clamping wall **21'a**(**21'b**), having a protruding portion **221'a**(**221'b**) and a recessed portion **222'a**(**222'b**) bilaterally disposed at its upper protruding face. When the teeth **2'a** and **2'b** are closed, the protruding portion **221'a**(**221'b**) at one tooth **2'a**(**2'b**) is engaged into the recessed portion **222'a**(**222'b**) at another.

[0020] Referring to Figures 7 and 8 again, the upper clamping wall **21a**(**21b**) or **21'a**(**21'b**) has a sloping front side edge **211a**(**211b**) or **211a'**(**211'b**). The design of the sloping front side edge **211a**(**211b**) or **211a'**(**211'b**) prevents the occurrence of a sharp angle after the upper clamping wall **21a**(**21b**) or **21'a**(**21'b**) has been wrapped in the respective zipper tape **1a** or **1b**.

[0021] It is to be understood that the drawings are designed for purposes of illustration only, and are not intended as a definition or limits of the scope of the invention disclosed.

Claims

1. An invisible zipper comprising two zipper tapes (1a, 1b), two rows of interlocking teeth (2a,2b) respectively fastened to said zipper tapes (1a,1b) and a slide (3) movable to close/open said teeth (2a,2b), characterised in that said teeth (2a,2b) are injection-moulded on respective folded side edges of said zipper tapes (1a,1b), each tooth (2a,2b) comprising an upper clamping wall (21a,21b) wrapped in the folded side edge of one zipper tape (1a,1b), and a lower clamping wall (22a,22b) for interlocking, said lower clamping wall (22a,22b) being relatively longer than said upper clamping wall (21a, 21b) and having a protruding upper face (23a,23b) for interlocking,

2. The invisible zipper of claim 1 wherein the protruding upper face (23a,23b) of each of said teeth (2a, 2b) comprises an engagement slot (24a,24b) at a front side, two side notches (25a,25b) at two opposite lateral sides in communication with said engagement slot (24a,24b) and two tongues (26a, 26b) respectively suspended in said side notches (25a,25b) for interlocking.

3. The invisible zipper of claim 1 wherein the protruding upper face of each of said teeth (2^1a,2^1b) comprises a protruding portion (221^1a,221^1b) at one side and a recessed portion (222^1a,222^1b) at an opposite side for interlocking.

4. The invisible zipper of claim 1 wherein the upper clamping wall (21a,21b) of each of said teeth (2a, 2b) comprises a sloping front side edge (211a, 211b).

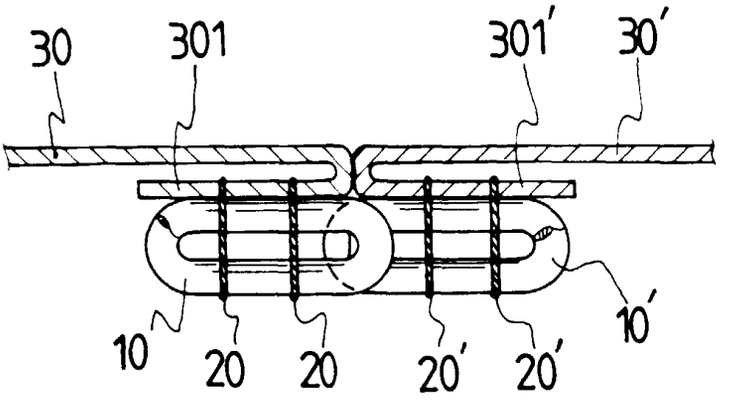


FIG. 2 PRIOR ART

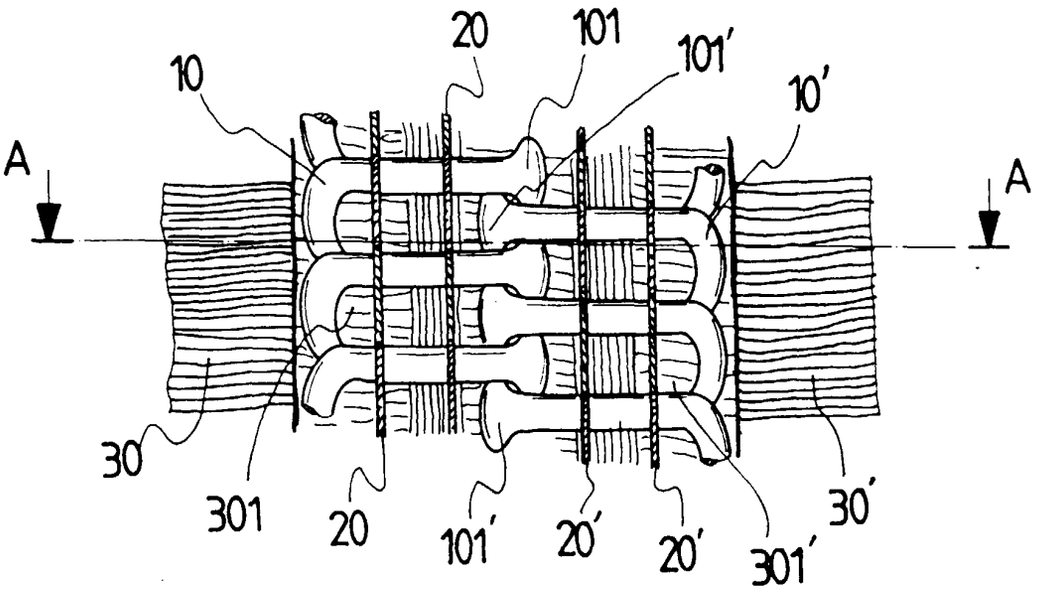


FIG. 1 PRIOR ART

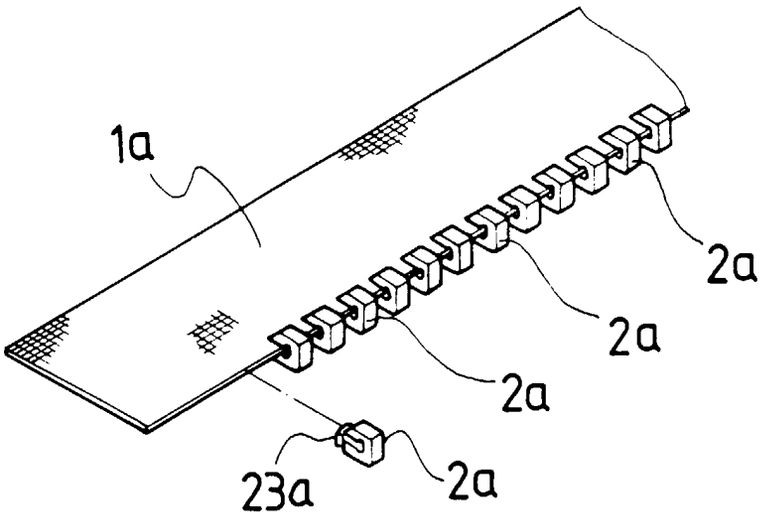


FIG. 4

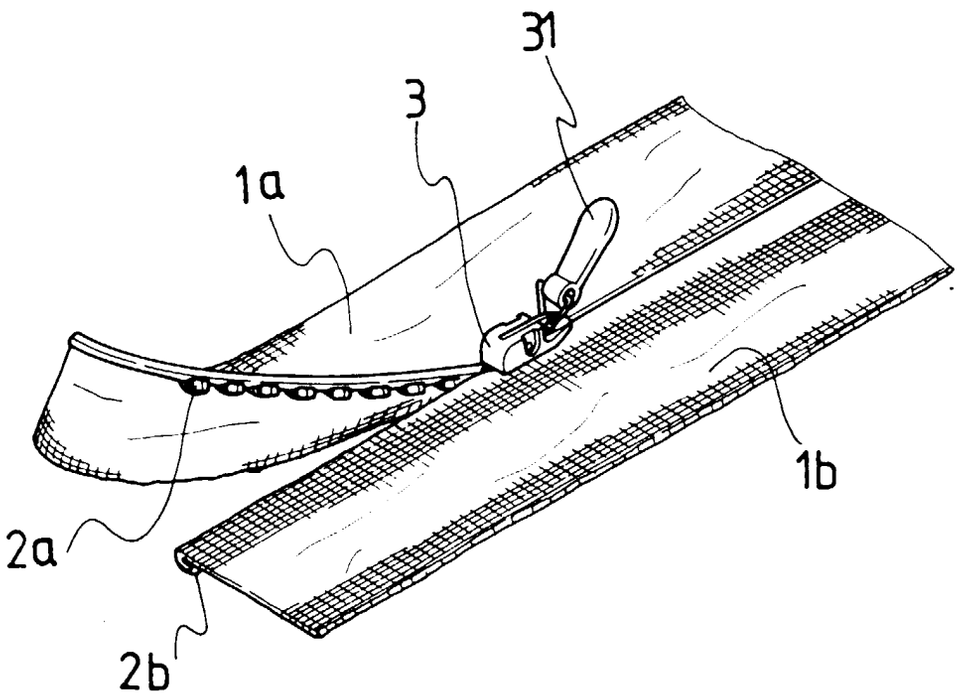


FIG. 3

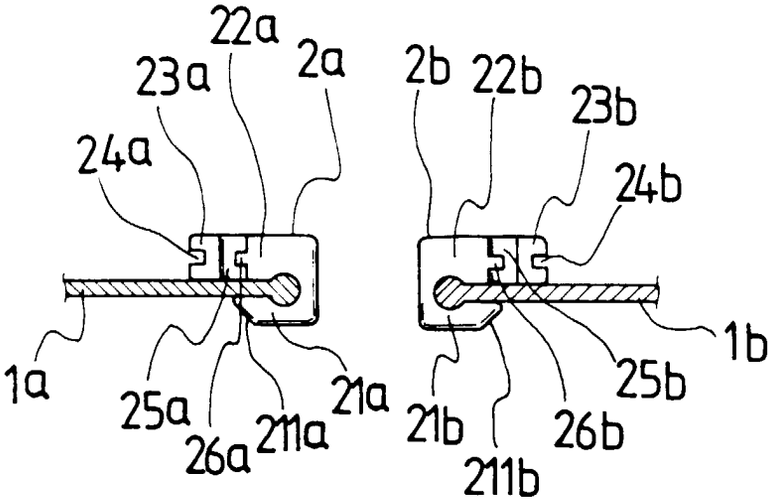

22a
23a
2a
2b
22b
23b
24a
24b
1a
1b
25a
26a
211a
21a
21b
26b
25b
211b

FIG. 5

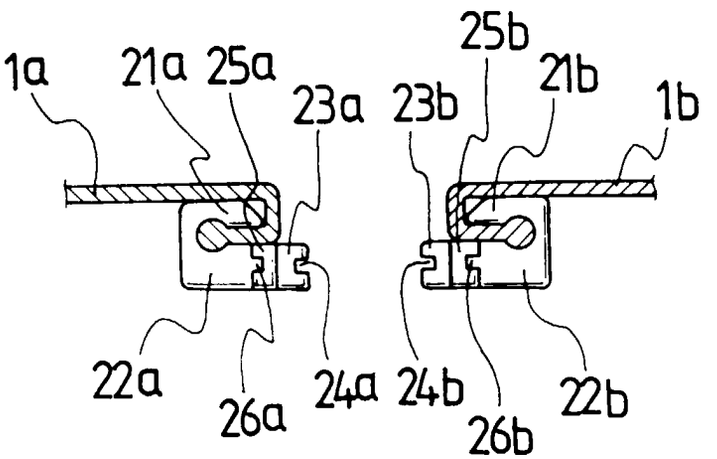
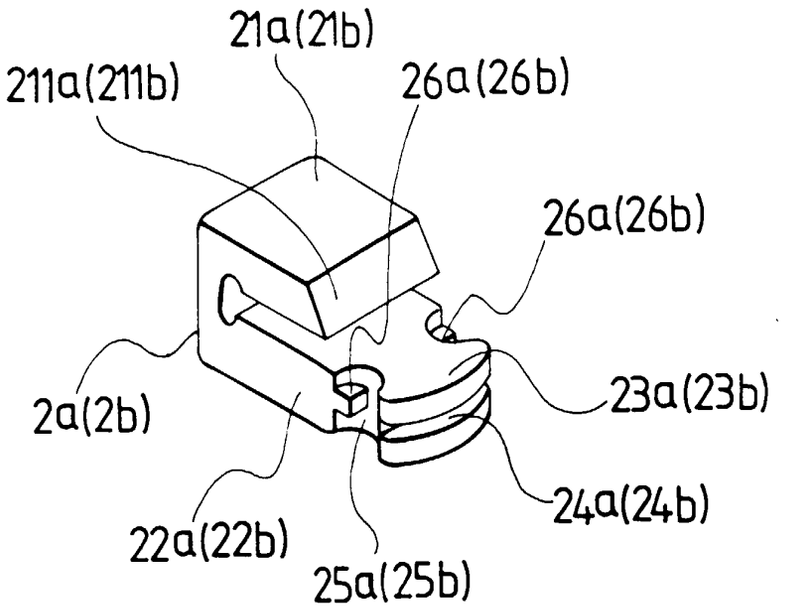

1a
21a
25a
23a
25b
23b
21b
1b
22a
26a
24a
24b
26b
22b

FIG. 6


21a(21b)
211a(211b)
26a(26b)
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23a(23b)
2a(2b)
24a(24b)
22a(22b)
25a(25b)

FIG. 7

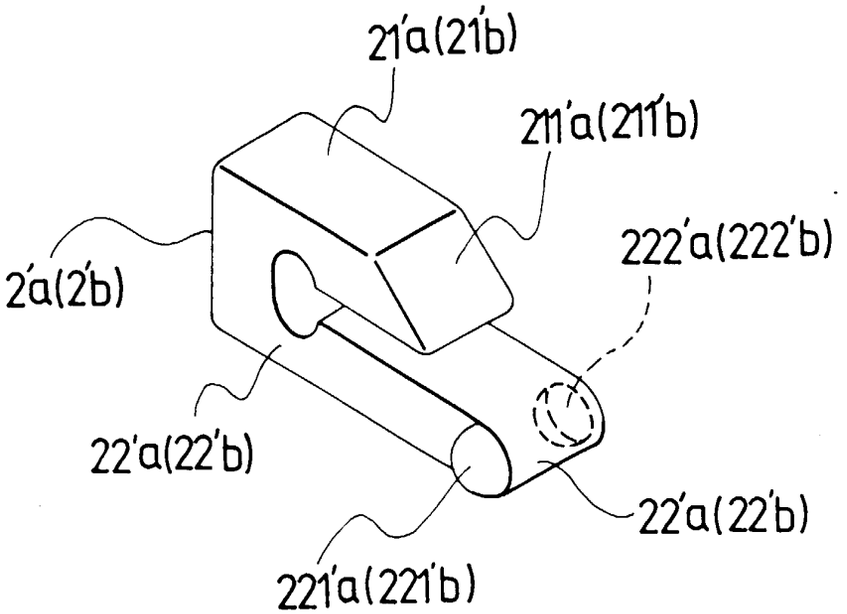
21'a(21'b)
211'a(211'b)
222'a(222'b)
2'a(2'b)
22'a(22'b)
22'a(22'b)
221'a(221'b)

FIG. 8

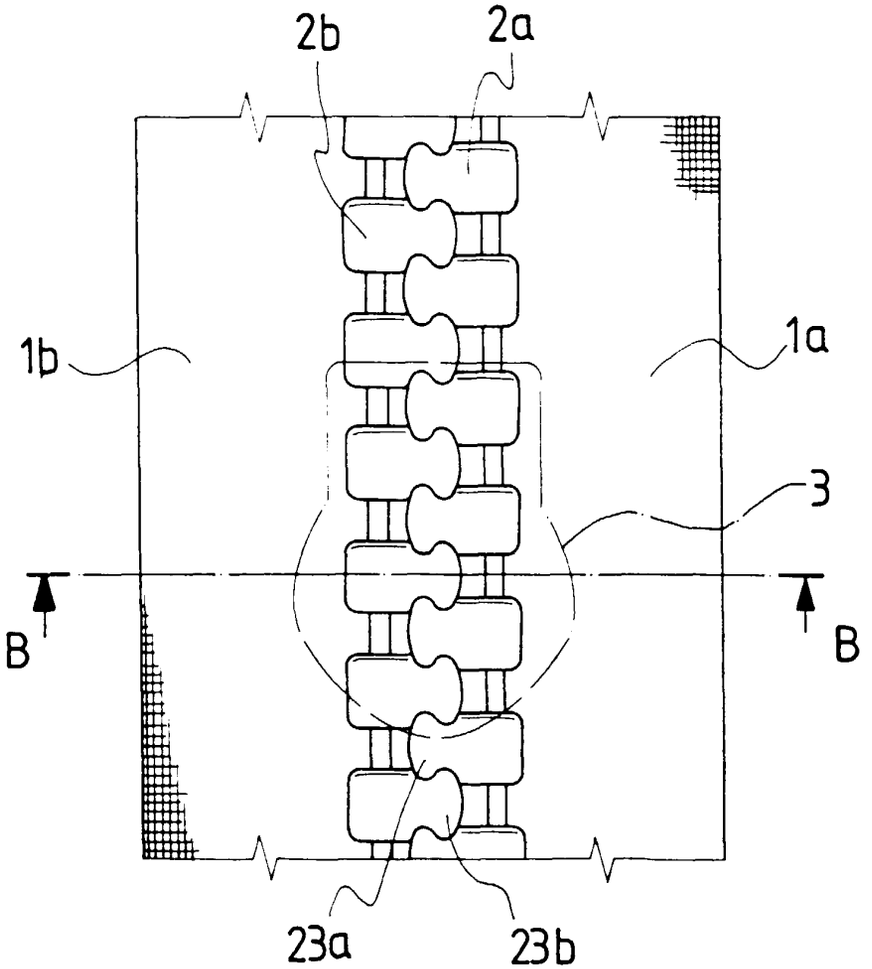

FIG. 9

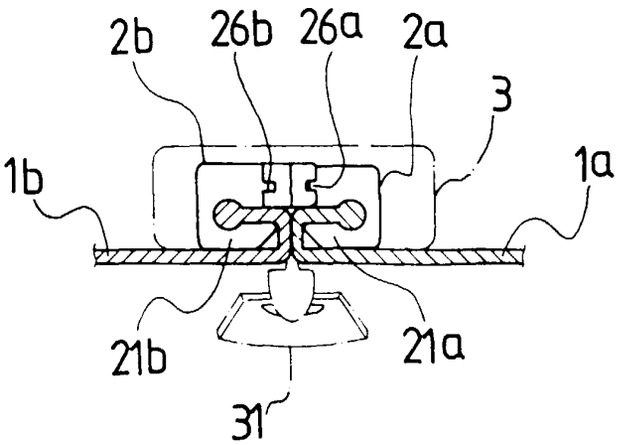

FIG. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 99 30 0962

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 4 426 066 A (MACFEE NORMAN W) 17 January 1984 * column 2, line 8-64; figures 1-3,5 *	1,4	A44B19/06
Y		2,3	
Y	US 4 718 150 A (MOERTEL GEORGE B) 12 January 1988 * abstract; figure 2 *	2	
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Y	US 3 568 266 A (UHRIG WILHELM) 9 March 1971 * column 4, line 17-42; figures *	3	
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TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A44B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	19 May 1999	Kock, S

CATEGORY OF CITED DOCUMENTS

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