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(54) **Zip fastener**

(57) A zip fastener (30) comprised of a long strip of two thermoplastic support tapes (35); two rows of coupling elements (40), each row being attached to its own support tape (35); and a slider body (45) comprising a puller (50) attached to the slider body (45). Portions of the two support tapes (35) are shaped to cause the two rows of coupling elements (40) to rest higher or lower than the shaped portions of the support tapes (35). At least one end portion of the zip fastener (30) is curved downward and in a closed position said curved portion (75) accommodates at least one slider body (45).

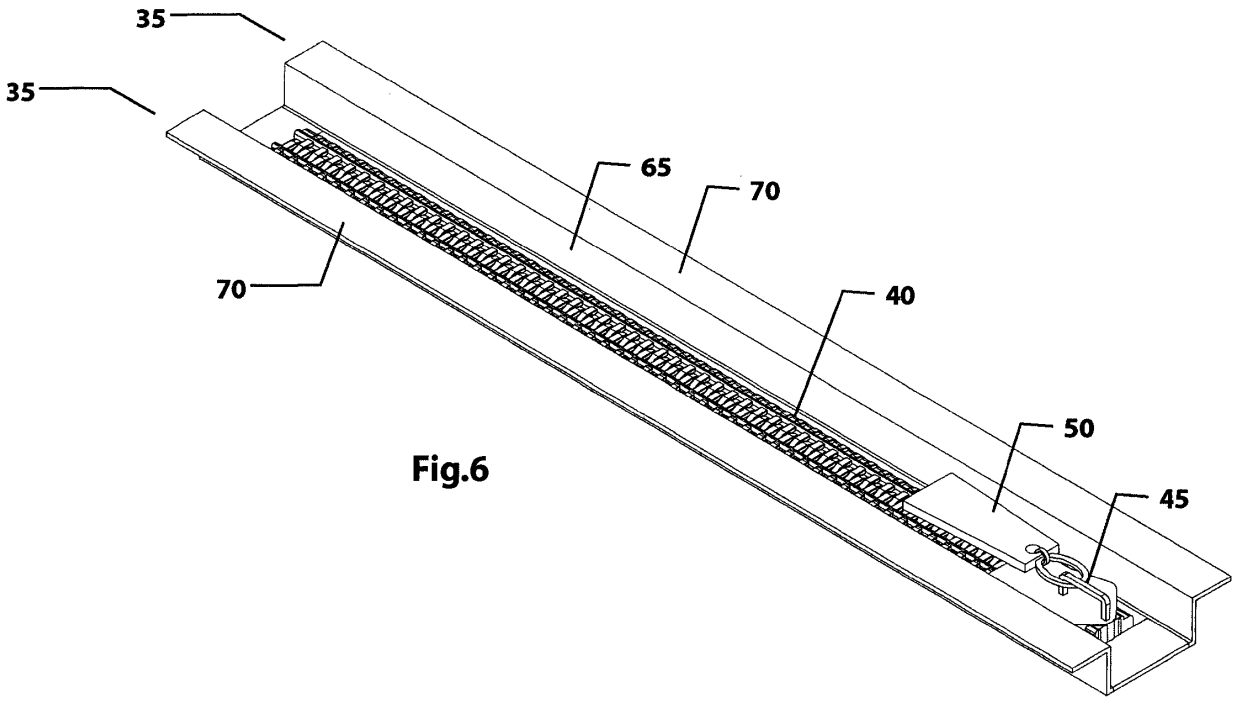

Fig.6

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a thermoforming method of using heat and pressure to transform a thermoplastic substrate into a zip fastener.

BACKGROUND OF THE INVENTION

[0002] Zip fasteners are commonly used for joining together edges of two pieces of material. They may be used to provide a closable slit in a unit or may be used to join two separate pieces of material. They are widely used in the clothing industry as well as other industries, with almost any type of material.

[0003] A conventional zip fastener is comprised of two support tapes; two rows of coupling elements, each row being attached to its own support tape; and a slider element comprised of a puller attachment used to open or close the zip fastener.

[0004] Typically, when a conventional zip fastener is closed, there are slits between each coupling element. In addition, there is always a small opening at the distal end of the zip fastener where the width of the slider prevents the coupling elements at the distal end from locking together. When a conventional zip fastener is exposed to water, the water tends to collect around the zip fastener permitting water to seep through the coupling elements or the opening at the distal end of the zip fastener.

[0005] In addition, in a conventional zip fastener, when the slider unites the coupling elements, the puller and top part of the slider body are clearly visible. Unless the zip fastener is designed as a decoration for an article, the zip fastener tends to disrupt the smoothness of the article's surface making it unpleasing to the eye.

[0006] A tunnel, sometimes referred to as a garage, is created in an attempt to cover the opening at the distal end of the zip fastener as well as to hide the puller and the slider body. However, creating a tunnel or a garage is time consuming and/or undesirable in some cases and does not effectively reduce the problem of water seeping through the coupling elements. Therefore, there is a need for an improved zip fastener that further reduces the aforementioned problems and disadvantages of the conventional zip fastener.

[0007] The objective of this invention is to provide a zip fastener with improved characteristics capable of reducing the problem of water seeping through the coupling elements as well as through the opening located at the distal end of the zip fastener.

[0008] Another objective of the present invention is to provide a zip fastener that, once attached to the article, is less likely to disrupt the smoothness of the article and hides from view the unsightly puller and slider body without using a tunnel or garage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention will be better understood with reference to the detailed description and to the drawings, in which:

Figure 1 shows a cross sectional view of one embodiment of the zip fastener according to the present invention inside a mould.

Figure 2 shows a perspective view of the zip fastener of Figure 1 inside the mould.

Figure 3 shows a cross sectional view of one embodiment of the zip fastener shaped into an inverted U-shape.

Figure 4 shows a perspective view of the zip fastener of Figure 3.

Figure 5 shows a cross sectional view of one embodiment of the zip fastener shaped into a U-shape.

Figure 6 shows a perspective view of the zip fastener of Figure 5.

Figure 7 a shows cross sectional view of one embodiment of the zip fastener shaped into an expanded V-shape.

Figure 8 shows a perspective view of the zip fastener of Figure 7.

Figure 9 shows a cross sectional view of one embodiment of the zip fastener shaped into an inverted and expanded V-shape.

Figure 10 shows a perspective view of the zip fastener of Figure 9.

Figure 11 shows a cross sectional view of one embodiment of the zip fastener shaped into a curve shape.

Figure 12 shows a perspective view of the zip fastener of Figure 11.

Figure 13 shows a cross sectional view of one embodiment of the zip fastener shaped into an inverted curve shape.

Figure 14 shows a perspective view of the zip fastener of Figure 13.

Figure 15 shows a side view of one embodiment of the zip fastener with one end curved downward and said curve accommodating one slider body.

Figure 16 shows a top view of the zip fastener of Figure 15.

Figure 17 shows a perspective view of the zip fastener of Figure 15.

Figure 18 shows a side view of one embodiment of the zip fastener with one end curved downward and said curve accommodating two slider bodies.

Figure 19 shows a top view of the zip fastener of Figure 18.

Figure 20 shows a perspective view of the zip fastener of Figure 18.

Figure 21 shows a side view of one embodiment of the zip fastener with both ends curved downward and each curve accommodating one slider body.

Figure 22 shows a top view of the zip fastener of Figure 21.

Figure 23 shows a perspective view of the zip fastener of Figure 21.

DISCLOSURE OF PREFERED EMBODIMENT OF THE INVENTION

[0010] It is to be understood that the present disclosure of the zip fastener described herein is a perfect exemplification of the principles of the invention and does not limit the invention to the illustrated embodiments.

[0011] A zip fastener (30) according to this invention comprises first and second support tapes (35), each of which has one row of coupling elements (40) each row being attached to each support tape (35), and a slider body (45) including a puller (50). The support tapes (35), coupling elements (40), slider body (45) and puller (50) may be of any standard shape and structure. However, the novelty of the zip fastener (30) according to this invention lies in the shapes and structures of the two support tapes (35).

[0012] The support tapes (35) are thermo-plasticized and portions of the first and second support tapes (35) are shaped into a U-shape, V-shape, inverted U-shape, expanded V-shape, or curve-shape by using a mold (55) and thermoforming. Shaping of the support tapes (35) through molding causes the coupling element (40) to situate either between or above the shaped support tapes (35).

[0013] According to this invention, the thermo plasticized first and second support tapes (35) having the coupling elements (40) engaged with the opposed row, to which the slider (45) and the puller (50) have not yet been attached are placed between two halves of the mold (55) having the desired configuration as shown in Figure 2 of which the mould is a U-shape. The strip of thermoplastic support tapes (35) having the coupling element (40) attached inside the mold (55) is then heated to a temperature between 80-180°C to shape or transform the support tapes (35) into the configuration corresponding to the mold. While still inside the mold (55), the strips of support tapes (35) are left to cool while still under pressure so that the desired configuration is maintained. Once cooled, the shaped support tapes (35) are removed from the mold (55).

[0014] Figure 4 shows the second embodiment of the zip fastener (30) according to this invention wherein the first and second support tapes (35) are shaped to form an inverted U-shape. As shown, one end portion (60) of the first and second support tapes (35) of which the coupling element (40) sits on the top of the inverted U-shape, the middle portion (65) of the support tapes (35) is bent downward and the free end portion (70) of the support tapes (35) is bent outward to be on the same plane with the end portion (60) with the attached coupling element (40). As a result, the middle portion (65) and the free end portions (70) of the support tapes (35) in turn act as a support for the coupling elements (40) sitting on the top of the inverted U-shape creating a zip fastener (30) with a coupling element (40) on the support tapes (35) higher than the normally flat zip fastener.

[0015] Figure 6 shows another embodiment of the zip fastener (30) according to this invention wherein the first and second support tapes (35) are shaped to form a U-shape. In this embodiment, using the coupling element (40) as a reference point, the end portion (60) of the first and second support tapes (35) with the attached coupling element (40) act as a base. The middle portion (65) of support tapes (35) is vertically lifted up and the free end portion (70) of the first and second support tapes (35) is horizontally bent to the same plane with the end portion (60) of which the coupling element attached. Thereby, the U-shaped zip fastener (30) with the coupling element (40) inside the U-shape is obtained.

[0016] Further examples of additional embodiments of the zip fastener according to this invention are as shown in Figure 8 and Figure 10 wherein the zip fastener (30) is shaped into an expanded V- shape and inverted V-shape, respectively. Figure 12 and Figure 14 show further embodiments of the zip fastener (30) according to the present invention. In these embodiments, portions of the first and second support tapes (35), including the end portion (60) of which the coupling element (40) is attached and the middle portion (65), are merged and are shaped into a curve. The coupling element (40) may be on the top of the curve or inside the curve similar to the U-shape.

[0017] In yet another embodiment of the zip fastener (30) according to the present invention, as shown in Figure 15 and Figure 18 the support tapes (35) are flat and one end or both ends of the support tapes (35) are curved downward. This is also obtained by thermoforming using the mold (55) under controlled temperature and pressure. When the slider (45) and the puller (50) are assembled

to the strip of the support tapes (35) with the coupling element (40) attached, the curved portion (75) of the support tapes (35) will be where the slider body (45) rests in the closed position of the zip fastener (30). The curved portion (75) of the zip fastener (30) accommodates at least one slider body (45) as shown in Figure 17. After being attached to the article, the curved portion (75) lies beneath the surface of the article. As a result, the slider body (45) as well as the puller (50) is hidden from view creating a smoother look on the surface of the article. As the slider body (45) is hidden under the surface of the article, the opening, caused when the width of the slider body obstructs the coupling elements at the distal end from engaging with each other will also be protected by the article's surface. This eliminates the need for the tunnel or garage while effectively reducing the chance of water passing through the opening.

[0018] Once the zip fastener (30) according to the present invention, particularly, the embodiment where the coupling element (40) sits high on the first and second support tapes (35) such as the inverted U-shape, inverted expanded V-shape, is assembled to the article and is subsequently exposed to water, the water is less likely to seep through the coupling element (40). This is because the water tends to flow away from the coupling element (40) area onto the surface adjacent to the zip fastener (30) rather than pooling as in the conventional zip fastener. This is particularly suitable for use with watertight/water-proofed articles. For the embodiment of which portions of the first and second support tapes (35) were lifted up, such as in the U-shape, expanded V-shape, and curve shape the coupling element (40) rests between the lifted portions of the first and second support tapes (35). Once the slider body (45) is assembled to form a zip fastener (30), the slider body (45) is housed within the lifted up portions of the first and second support tapes (35), creating a smoother look on the article's surface as the slider body (45) and the puller (50) are hidden from view, or if so desired, the entire zip fastener (30) can be hidden resulting in an even smoother look on the article's surface.

[0019] As illustrated in the various embodiments, the zip fastener (30) according to this invention may be shaped into any desired configuration for various purposes and can be used with various types of material including clothing articles, canvas, etc.

[0020] Other and further arrangements, variations, and embodiments for the present invention will be apparent from the forgoing disclosure and teaching and no undue limitations are to be implied there from.

Claims

1. A zip fastener comprising two support tapes, two rows of coupling elements, each row attached to its own support tape and at least one slider body having a puller attached to the said slider body, **characterized in that** portions of the two support tapes are shaped to cause the two rows of coupling elements to rest between the shaped portions of the two support tapes.

2. The zip fastener according to Claim 1 wherein portions of the two support tapes are shaped to cause the two rows of coupling elements to rest above portions of the support tapes.

3. The zip fastener according to Claim 1 or Claim 2 wherein the two support tapes having a row of coupling elements attached to each support tape are shaped to include but not be limited to a U-shape, inverted U-shape, curve shape, inverted curve shape, expanded V-shape, and inverted expanded V-shape.

4. The zip fastener according to Claim 1 to Claim 3 wherein at least one end of the two support tapes are curved downward, and in a closed position the curve accommodates at least one slider body.

5. A zip fastener comprising two support tapes, two rows of coupling elements, each row of coupling element attached to said support tapes, at least one slider body together with a puller assembled to the slider body, **characterized in that** the two support tapes are flat and at least one end of the two support tapes is curved downward, and in a closed position the curve accommodates at least one slider body.

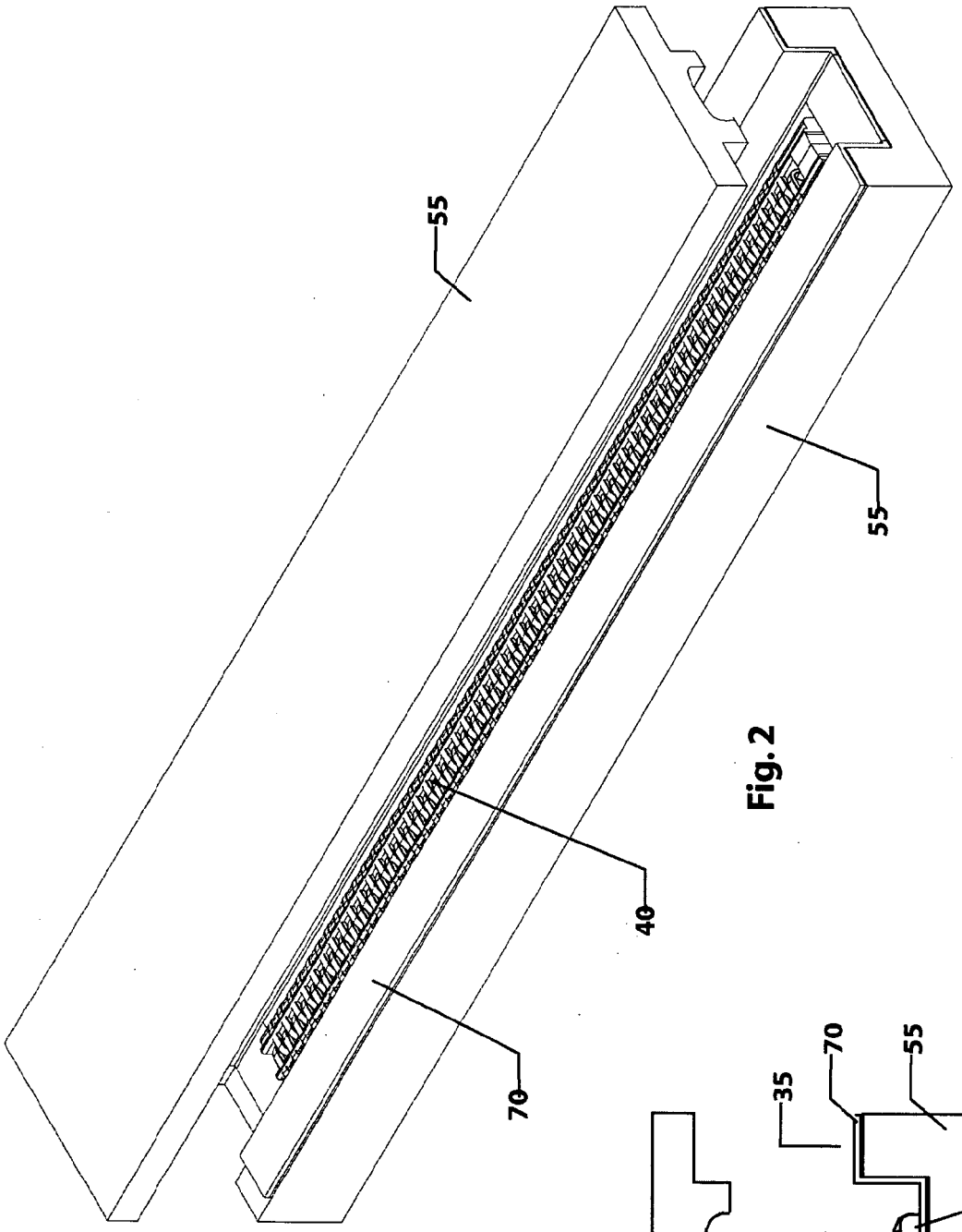

Fig. 2

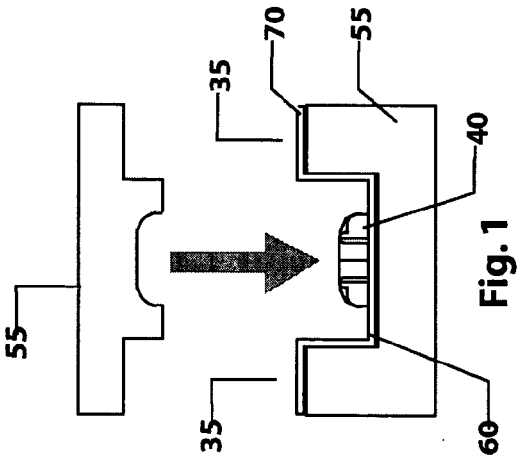

Fig. 1

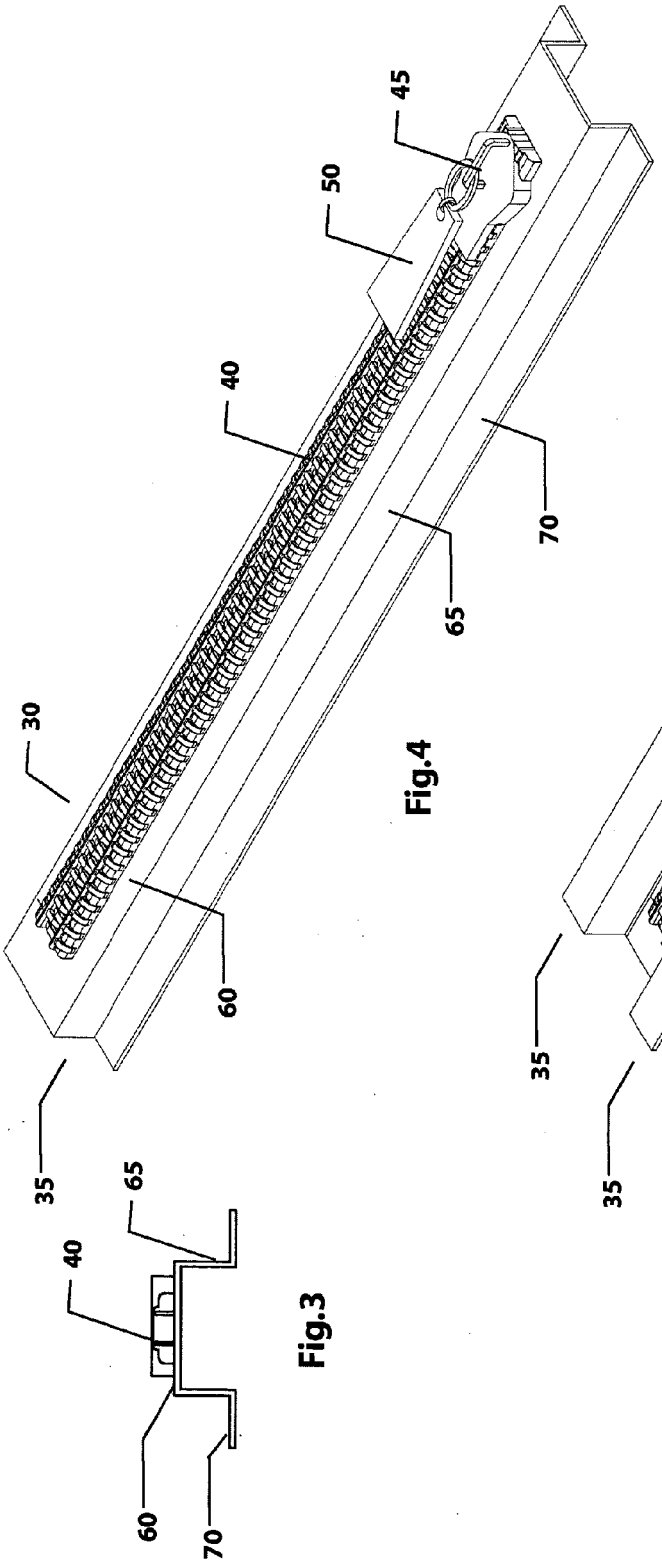

Fig.3

Fig.4

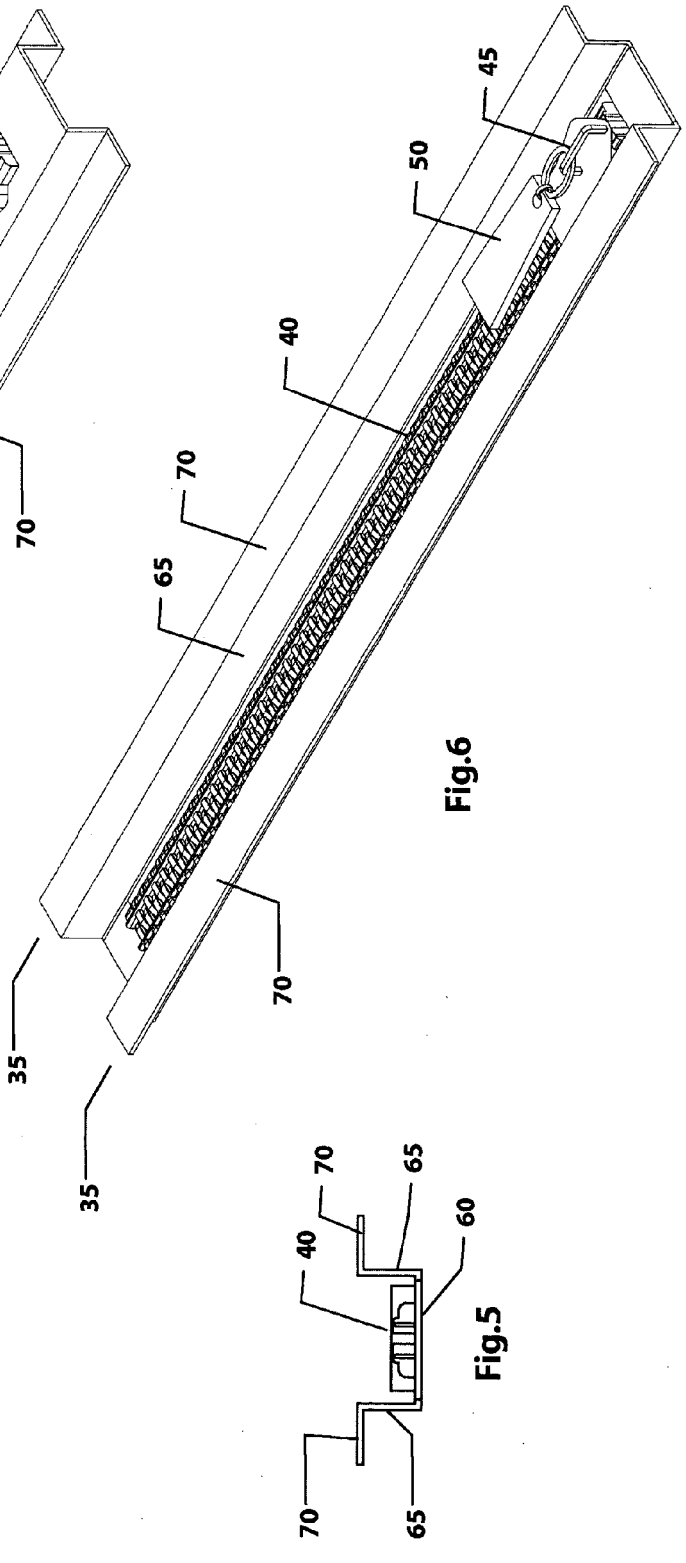

Fig.5

Fig.6

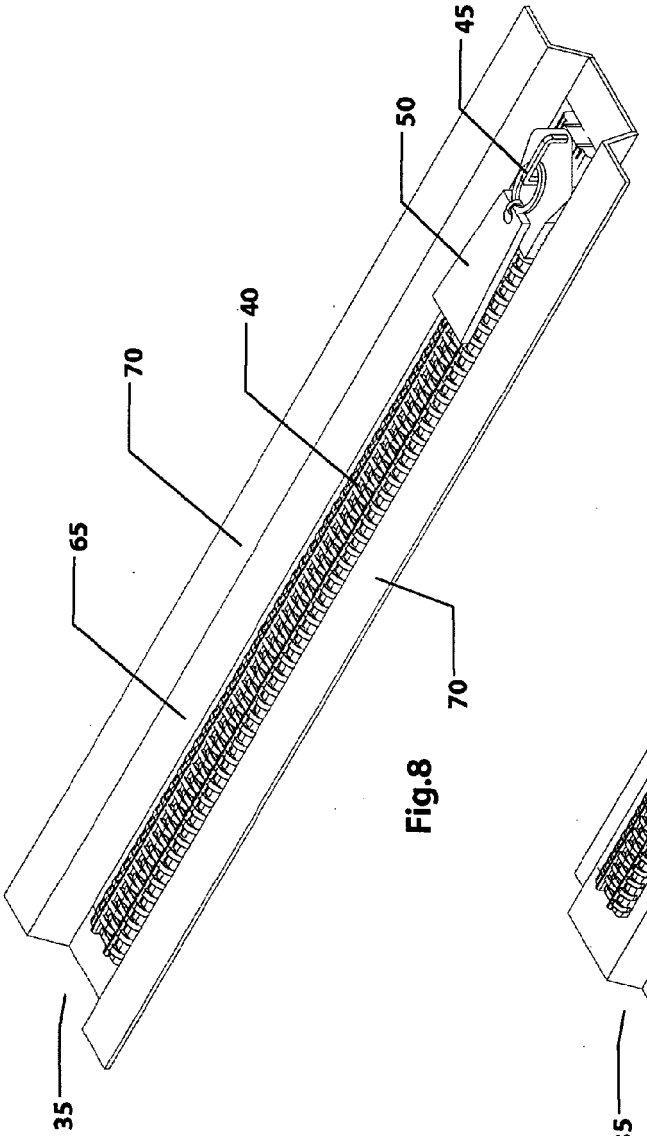

Fig.8

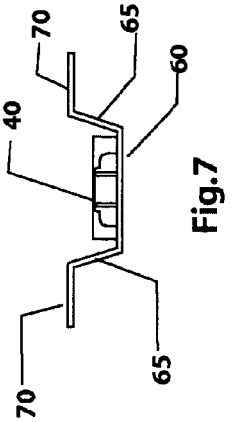

Fig.7

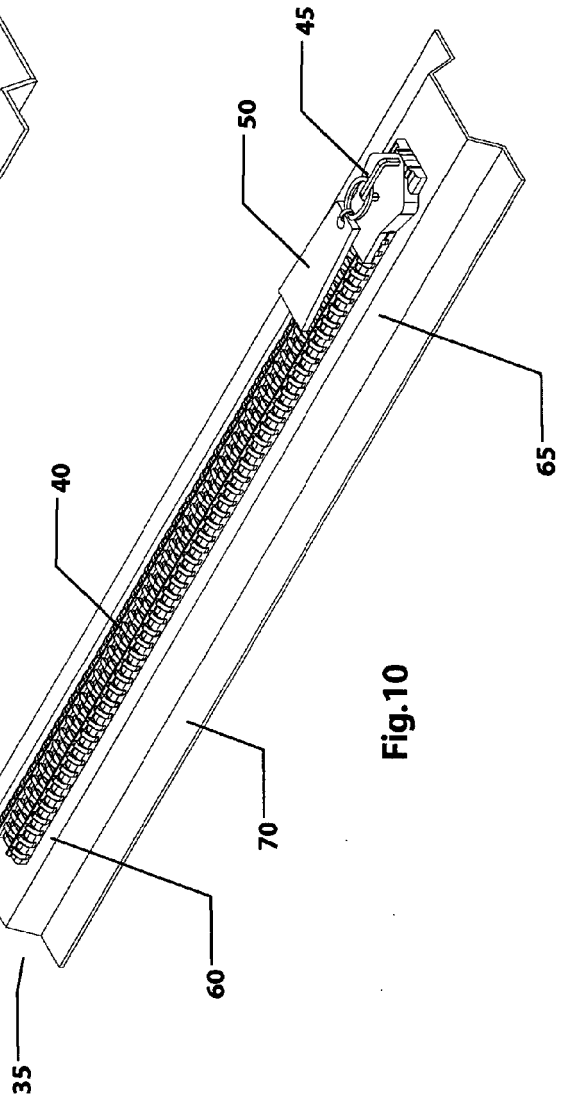

Fig.10

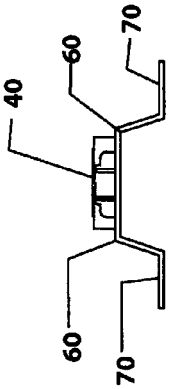

Fig.9

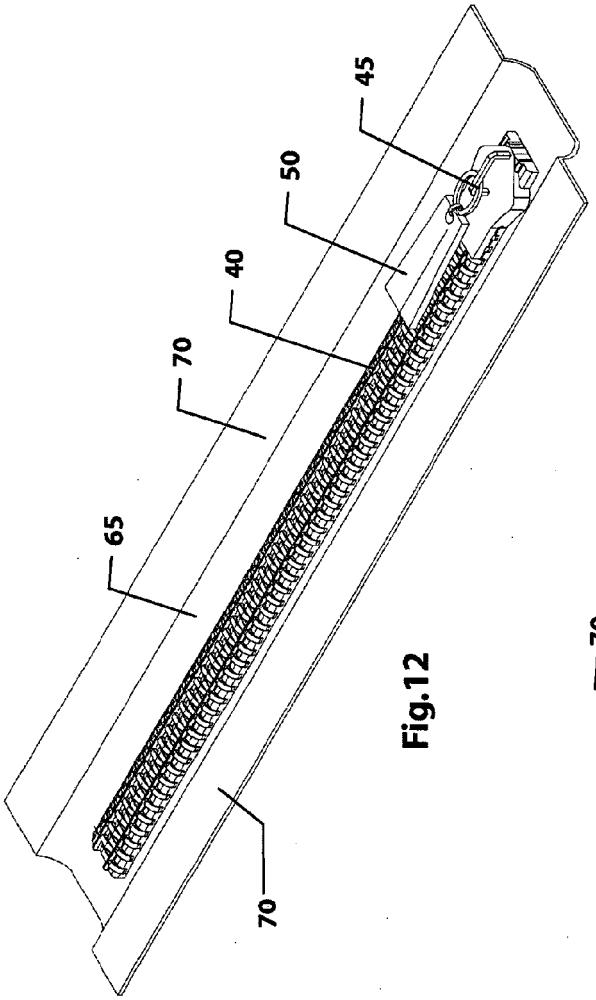

Fig.12

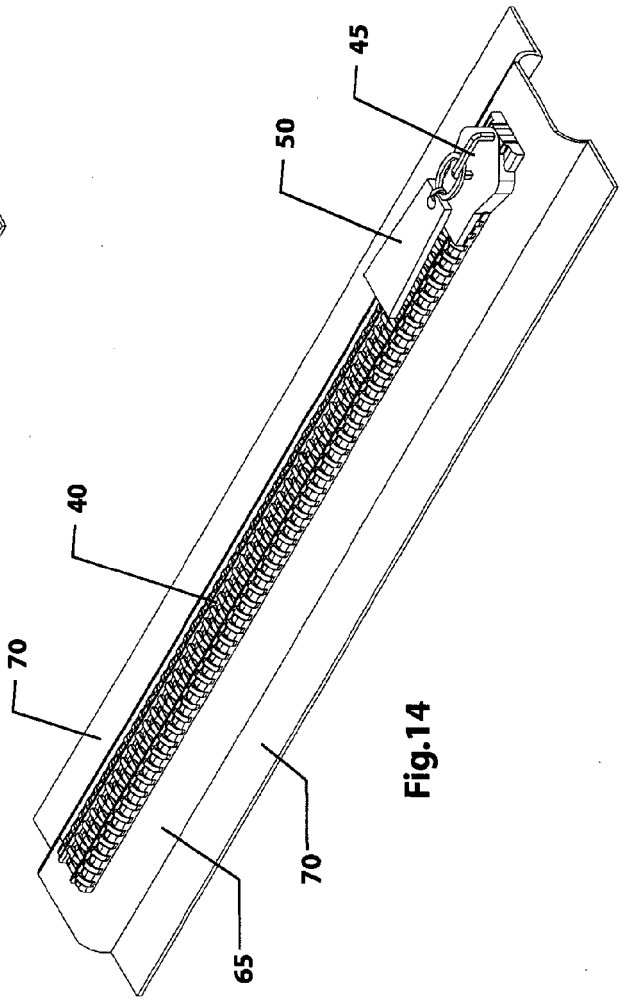

Fig.14

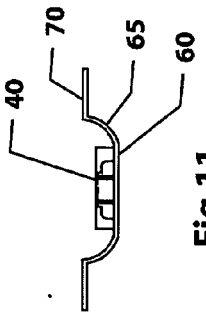

Fig.11

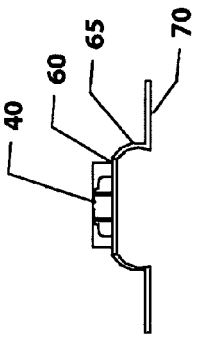

Fig.13

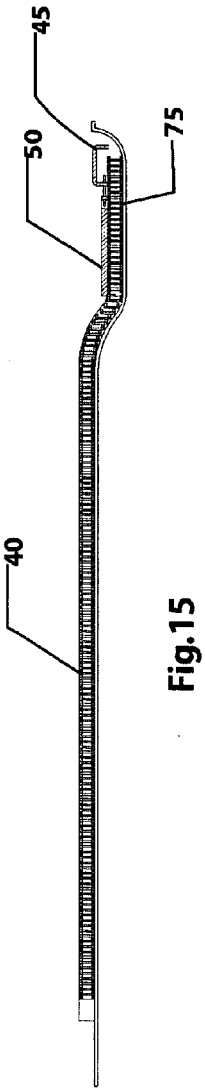

Fig.15

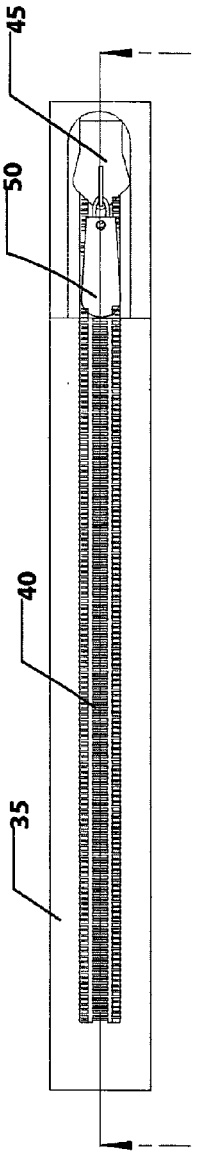

Fig.16

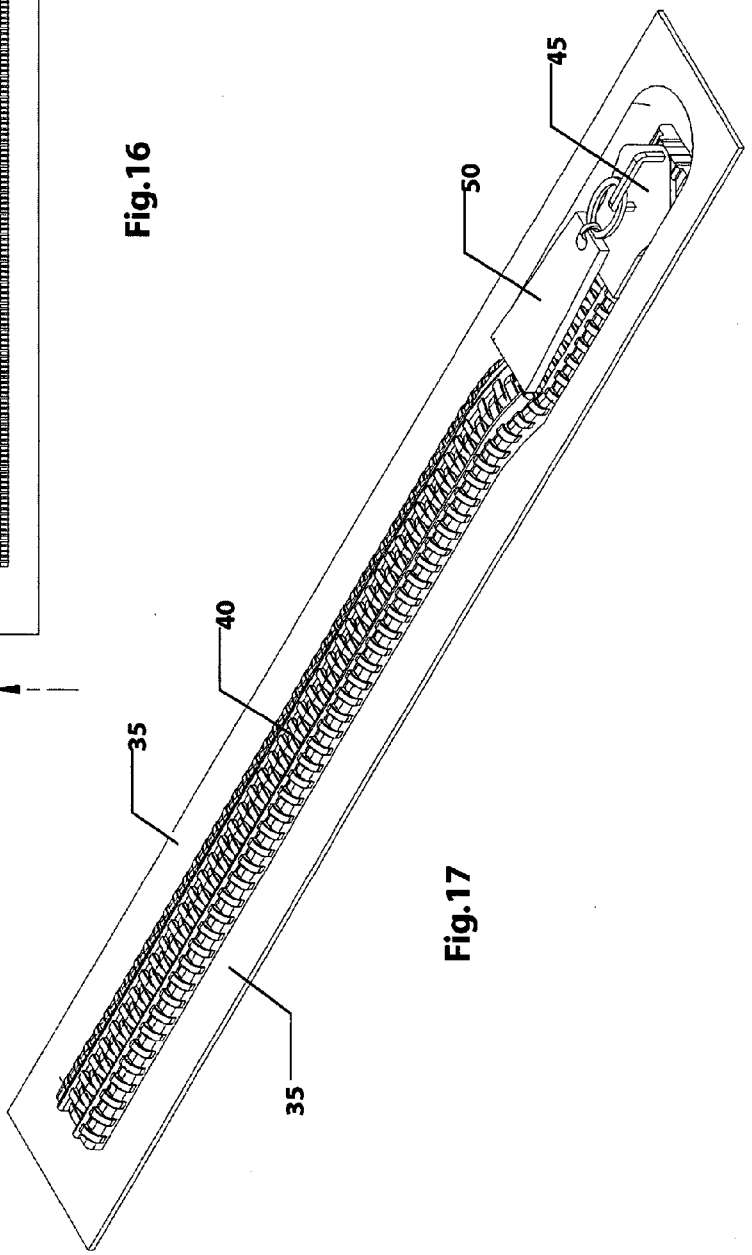

Fig.17

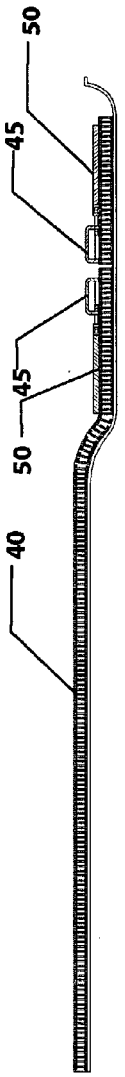

Fig.18

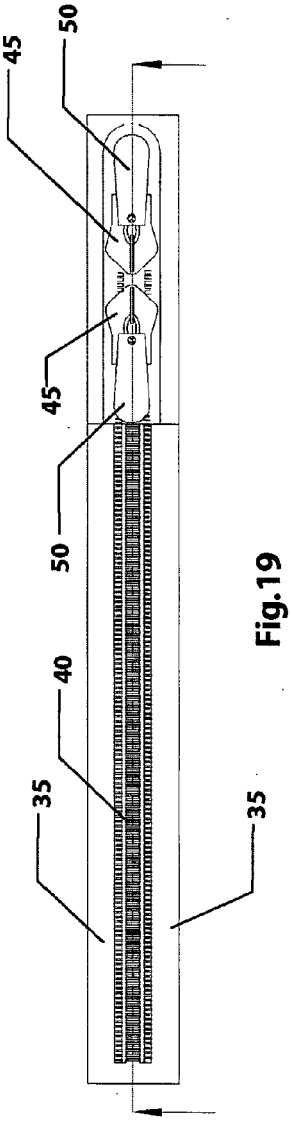

Fig.19

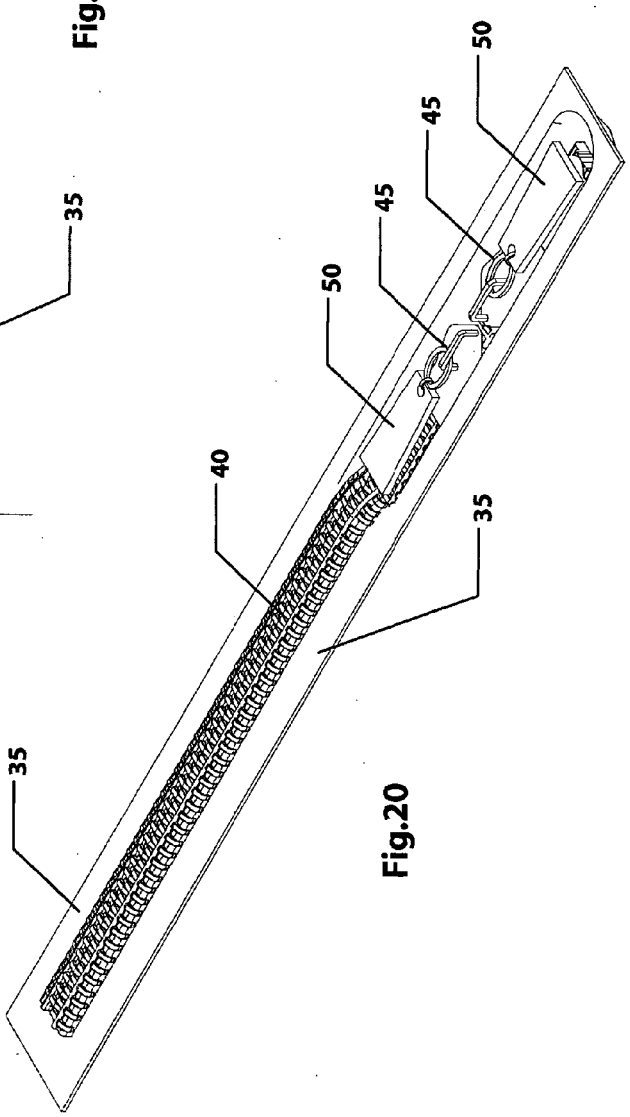

Fig.20

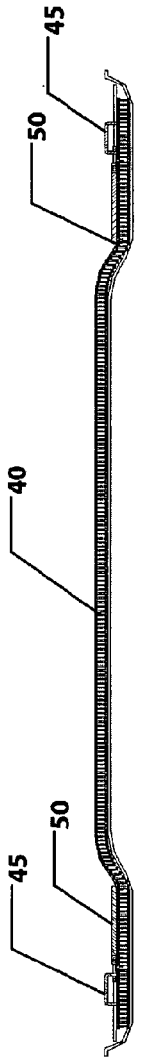

Fig.21

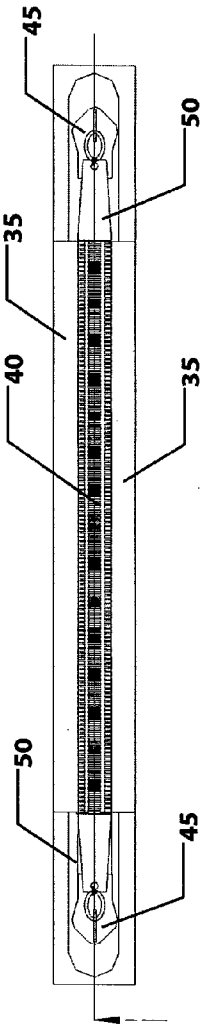

Fig.22

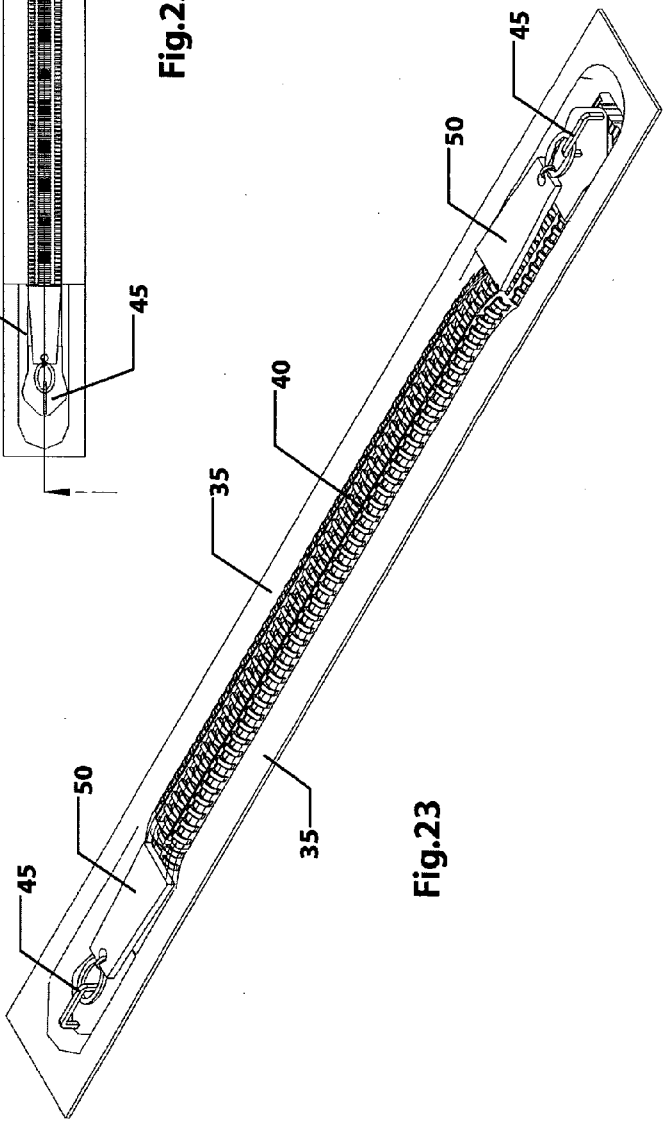

Fig.23

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 45 0203

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 132 311 A (REYNOLDS CONSUMER PRODUCTS, INC) 12 September 2001 (2001-09-12) * paragraphs [0015], [0019], [0020]; figure 2 *	1-4	INV. A44B19/34
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TECHNICAL FIELDS SEARCHED (IPC)

A44B
B65D
A41H
A45C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 June 2006	Monné, E

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 45 0203

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
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