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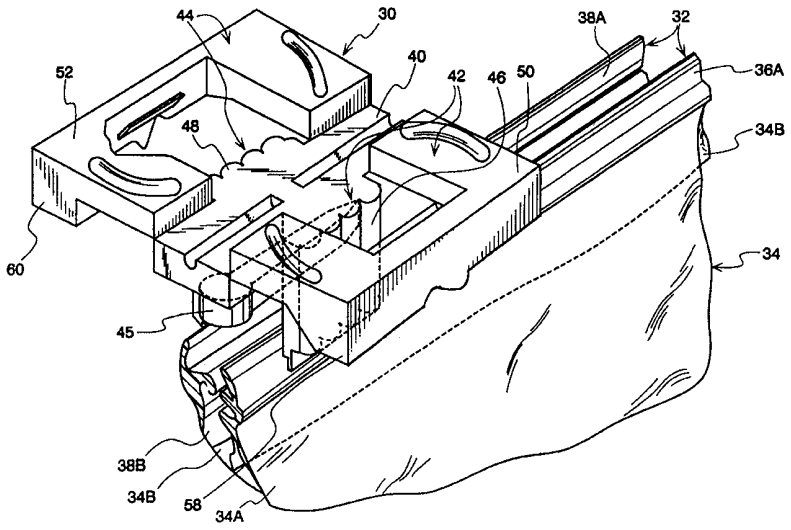
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(54) Title: HIGH-STRENGTH SLIDER FOR A RECLOSABLE BAG



(57) Abstract

A slider (30) is disclosed for straddling relation with a profiled plastic zipper (32) of a reclosable bag. The zipper (32) has first and second interlocking profiles, and the straddling slider (30) closes and opens the interlocking profiles by movement along the zipper (32). The slider (30) includes a transverse support member (40) and a pair of side walls (42, 44) extending downward from opposing sides of the support member (40). The side walls (42, 44) forming respective first and second shoulders (58, 60) extending inwardly toward each other. The first and second shoulders (58, 60) include respective first and second innermost ends (62, 64) facing and contacting respective adjacent portions of the reclosable bag below the respective first and second interlocking profiles. The first and second innermost ends (62, 64) define a tortuous path therebetween, and the adjacent portions of the reclosable bag pass through the tortuous path. The tortuous path is created by protrusions formed by at least one of the innermost ends.

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HIGH-STRENGTH SLIDER FOR A RECLOSABLE BAG

FIELD OF THE INVENTION

The present invention generally relates to plastic sliders for opening and closing zippers of reclosable plastic bags and, more particularly, relates to a high-strength plastic slider that is difficult to separate or pry loose from a zipper on which it has been mounted.

BACKGROUND OF THE INVENTION

Reclosable plastic bags with sliders for operating the zippers of these bags are commonly used in various packaging applications. The zipper typically includes male and female tracks forming respective interlocking profiles. In the manufacture of a thermoplastic bag, the male and female tracks extend along the mouth of the bag and are adapted to be secured in any suitable manner to respective opposing flexible panels of the bag. The male and female tracks may be integral marginal portions of these flexible panels or they may be extruded separately and thereafter attached to the flexible panels along the mouth of the bag. The slider, which is mounted to the zipper, is used to open and close the zipper. When the slider is in a closed position, the profiles are interlocked with each other. In response to moving the slider to an open position, the profiles are disengaged from each other.

One example of a slider for operating a zipper of a reclosable bag is depicted in FIGS. 1 and 2. This slider 10 includes a transverse support member 12, a pair of legs 14a and 14b, and a pair of wings 16a and 16b. The pair of legs 14a and 14b extend downward from opposing sides of the support member 12. The pair of wings 16a and 16b are hingedly connected to the opposing sides of the support member 12 and, when the slider 10 is mounted to the zipper as shown in FIG. 1, the wings 16a and 16b extend downward from the opposing sides of the support member 12. To secure the slider 10 to the zipper after it has been mounted thereto, the wings 16a and 16b form respective shoulders 18a and 18b (see FIG. 2). The shoulders 18a and 18b extend inwardly toward each other and contact respective adjacent portions of the bag below their respective profiles 20a and 20b, thereby retaining the slider on the zipper.

FIG. 2 is a bottom view of the slider 10 mounted to the zipper. It can be seen that the gap D_1 between the inwardly extending shoulders 18a and 18b is smaller than the distance D_2 between the outermost portions of the interlocking profiles 20a and 20b. As a result, the shoulders 18a and 18b effectively maintain the slider 10 in mounting relationship with the zipper. Extremely high forces are required to separate the mounted slider 10 from the zipper. However, such forces could occur if, for example, the contents of the bag are extremely heavy and a user attempts to lift the bag by the slider alone. The present invention makes it more difficult to separate the slider from the zipper.

SUMMARY OF THE INVENTION

An object of the present invention to provide a high-strength plastic slider for a reclosable bag that is difficult to separate or pry loose from a zipper on which it has been mounted.

These and other objects are realized by providing a slider with specially designed shoulders for more effectively retaining the slider on the zipper. The slider includes a transverse support member and a pair of side walls extending downward from opposing sides of the support member. The side walls form respective first and second shoulders that extend inwardly toward each other. The first and second shoulders include respective first and second innermost ends that face and contact respective adjacent portions of the bag below their respective interlocking profiles.

The first innermost end of the first shoulder includes a first non-planar section having a first protruding portion and a first recessed portion. The first protruding portion juts further inward toward the respective adjacent bag portion than a remainder of the first innermost end of the first shoulder. Likewise, the second innermost end of the second shoulder preferably includes a second non-planar section having a second protruding portion and a second recessed portion. The second protruding portion juts further inward toward the respective adjacent bag portion than a remainder of the second innermost end of the second shoulder. The first non-planar section is preferably complementary to the second non-planar section such that the first protruding portion opposes the second recessed portion and the first recessed portion opposes the second protruding portion. The first and second non-planar

sections effectively strengthen the retention of the slider on the zipper, thereby making it more difficult to remove the slider from the zipper.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1 is an isometric view of a prior art plastic slider mounted to a zipper of a reclosable bag;

FIG. 2 is a bottom view of the slider of FIG. 1 showing shoulders of the slider in engagement with interlocking profiles of the zipper;

FIG. 3 is an isometric view of a slider embodying the present invention before it has been mounted to a zipper of a reclosable bag;

FIG. 4 is an isometric view of the slider after it has been mounted to the zipper;

FIG. 5 is a side view of the slider;

FIG. 6 is a section view taken generally along line 6-6 in FIG. 5; and

FIG. 7 is a section view taken generally along line 7-7 in FIG. 5.

While the invention is susceptible to various modifications and alternative forms, a specific embodiment thereof has been shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that it is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

PREFERRED EMBODIMENT OF THE INVENTION

Turning now to the drawings, FIG. 3 depicts a plastic slider 30 prior to being folded and mounted to a zipper 32 of a reclosable plastic bag 34, while FIG. 4 depicts the slider 30 after it has been folded and mounted to the zipper 32. The bag 34 includes first and second opposing panels 34a and 34b fixedly connected to each other along three sides (not shown) to define a receptacle space accessed through a mouth of the bag.

Referring to FIGS. 3, 4, and 6, the zipper 32 extends along the mouth of the bag 34 and includes a female track 36a-b and a male track 38a-b. The female track 36a-b includes a female profile 36a and a first depending fin or flange 36b extending downward from the female profile 36a. Likewise, the male track 38a-b includes a male profile 38a and a second depending fin or flange 38b extending downward from the male profile 38a. If the zipper 32 is formed separately from the panels 34a and 34b of the bag 34, the first and second fins 36b and 38b are thermally fused to inner surfaces of the respective first and second panels 34a and 34b. Alternatively, the zipper 32 may be integrally formed with the panels 34a and 34b such that the first fin 36b is integrally formed with the first panel 34a and the second fin 38b is integrally formed with the second panel 34b.

To assist in opening and closing the zipper 32 of the plastic bag 34, the slider 30 is slidably mounted to the zipper 32 for movement between a closed position and an open position. FIG. 3 illustrates the slider 30 prior to being mounted on the zipper 32, while FIG. 4 illustrates the slider 30 after it has been mounted to the zipper 32. The slider 30 in its assembled position shown in FIG. 4 is used to engage and disengage the female and male profiles 36a and 38a of the zipper 32. The slider 30 has an opening end and a closing end. The slider 30 is wider at the opening end to allow separation of the female and male profiles 36a and 38a. The slider 30 is sufficiently narrow at the closing end to press the female and male profiles 36a and 38a into an interlocking relationship as the slider 30 is moved in a zipper closing direction.

The slider 30 is preferably composed of a single piece of molded plastic such as polycarbonate, polyester, nylon, polypropylene, polystyrene, Delrin or ABS. The assembled slider 30 is generally in the form of an inverted U-shaped member comprising a transverse support member 40 and a pair of side walls 42 and 44 extending downward from opposing sides of the support member 40. A separating finger 45 extends downward from the transverse support member 40 and, when the slider 30 is mounted to the zipper 32, the separating finger 45 disengages the female and male profiles 36a and 38a as the slider 30 is moved in a zipper opening direction. The side walls 42 and 44 of the slider 30 include respective legs 46 and 48 extending downward from the opposing sides of the support member 40. The side walls 42 and

44 also include respective wings 50 and 52 hingedly connected to the opposing sides of the support member 40. Prior to mounting the slider 30 to the zipper 32, the wings 50 and 52 are in the spread position depicted in FIG. 3.

To mount the slider 30 to the zipper 32, the slider 30 is placed over the zipper 32 with the separating finger 45 positioned between the female and male profiles 36a and 38a and the legs 46 and 48 positioned on opposite sides of the zipper 32. Thus, the zipper track 36a-b is disposed between the separating finger 45 and the slider leg 46, while the zipper track 38a-b is disposed between the separating finger 45 and the slider leg 48. With the slider 30 so positioned, the slider wings 50 and 52 are rotated downward about "living" hinges connecting the wings 50 and 52 to the opposite sides of the transverse support member 40. The wings 50 and 52 form central openings to receive the respective legs 46 and 48 when the wings 50 and 52 are folded downward.

The wings 50 and 52 are secured in their downward position depicted in FIG. 4 by a compression-type latch. More specifically, as best shown in FIG. 6, the wings 50 and 52 form respective flexible tongue latches 54 and 56 that engage the lowermost ends of the respective legs 46 and 48 to maintain the wings 50 and 52 in the downward position. Further details concerning the hinged structure of the wings 50 and 52 and the compression-type latch may be obtained from U.S. Patent No. 5,448,808, which is incorporated herein by reference in its entirety. As an alternative to the slider 30 with the compression-type latch, it is contemplated that the slider could be made of a single solid piece of molded plastic without hinges.

Referring to FIGS. 6 and 7, with the slider 30 mounted to the zipper 32, the transverse support member 40 is adapted to move along the upper edges of the zipper profiles 36a and 38a. To retain the slider 30 on the zipper 32 and thereby prevent the slider 30 from being separated from or pried off the zipper 32, the wings 50 and 52 form respective first and second shoulders 58 and 60. The shoulders 58 and 60 extend inwardly toward each other and are positioned beneath the respective zipper profiles 36a and 38a. The shoulders 58 and 60 include respective innermost ends 62 and 64 that face and contact the respective bag panels 34a and 34b (or zipper fins 36b and 38b) below the respective interlocking profiles 36a and 38a.

Referring to FIG. 7, the innermost end 62 of the shoulder 58 includes a non-planar or undulating section having a protruding/convex portion 62a and a

recessed/concave portion 62b. The protruding portion 62a juts further inward toward the adjacent zipper fin 36b than a remainder 62c of the innermost end 62 of the shoulder 58. The recessed portion 62b juts further away from the zipper fin 36b than the remainder 62c of the innermost end 62 of the shoulder 58. Likewise, the innermost end 64 of the shoulder 60 includes a non-planar or undulating section having a protruding/convex portion 64a and a recessed/concave portion 64b. The protruding portion 64a juts further inward toward the adjacent zipper fin 38b than a remainder 64c of the innermost end 64 of the shoulder 60. The recessed portion 64b juts further away from the zipper fin 38b than the remainder 64c of the innermost end 64 of the shoulder 60.

The non-planar section 62a-b of the innermost end 62 of the shoulder 58 is complementary to the non-planar section 64a-b of the innermost end 64 of the shoulder 60. Therefore, the protruding portion 62a opposes the recessed portion 64b, and the recessed portion 62b opposes the protruding portion 64a.

The non-planar sections 62a-b and 64a-b effectively increase the retention of the slider 30 on the zipper 32, thereby making it more difficult to remove the slider 30 from the zipper 32. As shown in FIGS. 4 and 6, the shoulders 58 and 60 are positioned beneath the zipper profiles 36a and 38a, and the zipper fins 36b and 38b and upper portions of the bag panels 34a and 34b are captured between the shoulders 58 and 60. As best shown in FIG. 7, the gap D_1 between the inwardly extending shoulders 58 and 60 is smaller than the distance D_2 between the outermost portions of the interlocking profiles 36a and 38a. The non-planar sections 62a-b and 64a-b create an S-shaped tortuous path through the gap D_1 that must be followed by the zipper fins 36b and 38b and the upper portions of the bag panels 34a and 34b. The protruding portions 62a and 64a preferably extend beyond a longitudinal mid-plane M dividing the slider 30 in half. The foregoing slider construction allows the slider 30 to essentially behave like a "zero" gap part, being very snug and very difficult to pry off the zipper 32. It is contemplated that the tortuous path noted above can be created only one protruding portion (akin to portion 62a or 64a) or by more than one protruding portion.

In a slider retention test, it was found that the slider 30 could easily withstand at least fifteen (15) pounds of pulling force for at least ten (10) second without coming

off the zipper 32. Failure in the slider retention test did not occur until the pulling force reached more than about 25 pounds, at which point the slider 30 was separated from the zipper 32.

In addition to the strong retention of the slider 30 on the zipper 32, the slider 30 is not easily disassembled once it is installed on the zipper 32 as shown in FIG. 4. To make it difficult to disassemble the installed slider 30, the legs 46 and 48 and wings 50 and 52 of the slider 30 are preferably ribbed as shown in FIGS. 4 and 5. The leg 46 forms a plurality of adjacent vertical reinforcement ribs 66, while the leg 48 forms a plurality of adjacent vertical reinforcement ribs 68 (hidden in FIG. 5). The ribs 66 and 68 are generally semicircular in cross-section and extend from an upper end to a lower end of the respective legs. The above slider construction minimizes flexing of the slider side walls 42 and 44 relative to the transverse support member 40 and increases the opening force required to unlatch the wings 50 and 52 from the respective legs 46 and 48.

While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

WHAT IS CLAIMED IS:

1. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls forming respective first and second shoulders extending inwardly toward each other, said first and second shoulders including respective first and second innermost ends facing and contacting respective adjacent portions of the reclosable bag below the respective first and second interlocking profiles, said first innermost end forming a first protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said first innermost end and beyond a longitudinal mid-plane located between said side walls.

2. The slider of claim 1, wherein said first innermost end includes a first non-planar section, said first non-planar section including said first protruding portion and a first recessed portion, said first recessed portion jutting further away from the respective adjacent portion of the reclosable bag than said remainder of said first innermost end.

3. The slider of claim 1, wherein said second innermost end forms a second protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said second innermost end and beyond said longitudinal mid-plane.

4. The slider of claim 3, wherein said second innermost end includes a second non-planar section, said second non-planar section including said second protruding portion and a second recessed portion, said second recessed portion jutting further

away from the respective adjacent portion of the reclosable bag than said remainder of said second innermost end.

5. The slider of claim 1, wherein said first innermost end includes a first non-planar section, said first non-planar section including said first protruding portion and a first recessed portion, said first recessed portion jutting further away from the respective adjacent portion of the reclosable bag than said remainder of said first innermost end, and wherein said second innermost end includes a second non-planar section having a second protruding portion and a second recessed portion, said second protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said second innermost end, said second recessed portion jutting further away from the respective adjacent portion of the reclosable bag than said remainder of said second innermost end.

6. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls forming respective first and second shoulders extending inwardly toward each other, said first and second shoulders including respective first and second innermost ends facing and contacting respective adjacent portions of the reclosable bag below the respective first and second interlocking profiles, said first innermost end forming a first protruding portion and a first recessed portion, said first protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said first innermost end, said first recessed portion jutting further away from the respective adjacent portion of the reclosable bag than said remainder of said first innermost end, said second innermost end including a second non-planar section having a second protruding portion and a second recessed portion, said second protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said second innermost end,

said second recessed portion jutting further away from the respective adjacent portion of the reclosable bag than said remainder of said second innermost end, said first non-planar section being complementary to said second non-planar section such that said first protruding portion opposes said second recessed portion and said first recessed portion opposes second protruding portion.

7. The slider of claim 1, wherein said first and second innermost ends define a tortuous path therebetween and said adjacent portions of the reclosable bag pass through said tortuous path.

8. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls forming respective first and second shoulders extending inwardly toward each other, said first and second shoulders including respective first and second innermost ends facing and contacting respective adjacent portions of the reclosable bag below the respective first and second interlocking profiles, said first and second innermost ends defining an S-shaped tortuous path therebetween, said adjacent portions of the reclosable bag passing through said S-shaped tortuous path, said first innermost end forming a first protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said first innermost end.

9. The slider of claim 1, wherein said side walls each include a plurality of generally adjacent vertical stiffening ribs for reinforcing said side walls and minimizing flexing of said side walls relative to said support member.

10. The slider of claim 9, wherein said side walls each include a leg and a wing, said wing being hingedly connected to said transverse support member and latched to

said leg when said slider is installed on said zipper, said leg including said plurality of generally adjacent vertical stiffening ribs.

11. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls forming respective first and second shoulders extending inwardly toward each other, said first and second shoulders including respective first and second innermost ends facing and contacting respective adjacent portions of the reclosable bag below the respective first and second interlocking profiles, said first and second innermost ends defining an S-shaped tortuous path therebetween, said adjacent portions of the reclosable bag passing through said tortuous path.

12. The slider of claim 11, wherein said tortuous path is S-shaped.

13. The slider of claim 11, wherein said tortuous path is created by protrusions formed by at least one of said innermost ends.

14. The slider of claim 11, wherein said tortuous path is created by protrusions and recesses formed by at least one of said innermost ends.

15. The slider of claim 11, wherein said tortuous path is created by protrusions formed by said innermost ends.

16. The slider of claim 11, wherein said tortuous path is created by protrusions and recesses formed by said innermost ends.

17. The slider of claim 11, wherein said side walls each include a plurality of generally adjacent vertical stiffening ribs for reinforcing said side walls and minimizing flexing of said side walls relative to said support member.

18. The slider of claim 17, wherein said side walls each include a leg and a wing, said wing being hingedly connected to said transverse support member and latched to said leg when said slider is installed on said zipper, said leg including said plurality of generally adjacent vertical stiffening ribs.

19. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls each including a plurality of generally adjacent vertical stiffening ribs for reinforcing said side-walls and minimizing flexing of said side walls relative to said support member.

20. The slider of claim 19, wherein said side walls each include a leg and a wing, said wing being hingedly connected to said transverse support member and latched to said leg when said slider is installed on said zipper, said leg including said plurality of generally adjacent vertical stiffening ribs.

21. The slider of claim 19, wherein said stiffening ribs are of a peak thickness which is approximately equal to, or greater than, the thickness of said side walls.

22. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls forming respective first and second shoulders extending inwardly toward each other, said first and second shoulders including respective first and second innermost ends, said first innermost end forming a first protruding portion jutting further inward toward the respective adjacent portion of the reclosable bag than a remainder of said first innermost end, said first and second innermost ends directly facing and contacting respective adjacent portions of the reclosable bag with no portion of said slider interposed between said respective adjacent portions, said respective adjacent portions of the reclosable bag being adjacent to each other along the entire length of said slider.

23. A slider for straddling relation with a profiled plastic zipper of a reclosable bag, said zipper having first and second interlocking profiles, said straddling slider closing and opening the interlocking profiles by movement along the zipper, comprising:

a transverse support member; and

a pair of side walls extending downward from opposing sides of said support member, said side walls forming respective first and second shoulders extending inwardly toward each other, said first and second shoulders including respective first and second innermost ends facing and contacting respective adjacent portions of the reclosable bag below the respective first and second interlocking profiles, said first innermost end forming a protrusion for at least part of its length, said second innermost end forming a recess for at least part of its length, said protrusion opposing said recess.

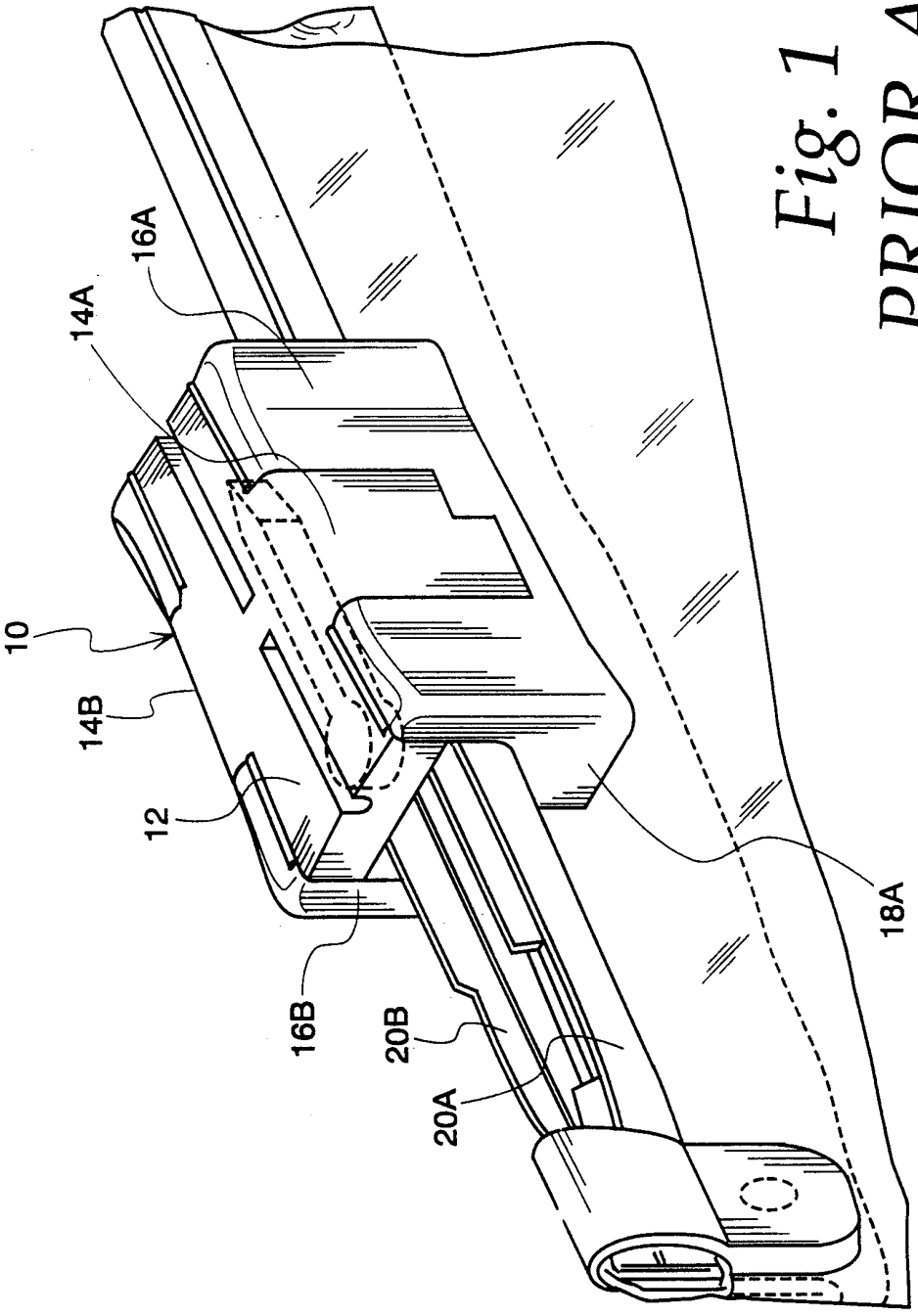


Fig. 1
PRIOR ART

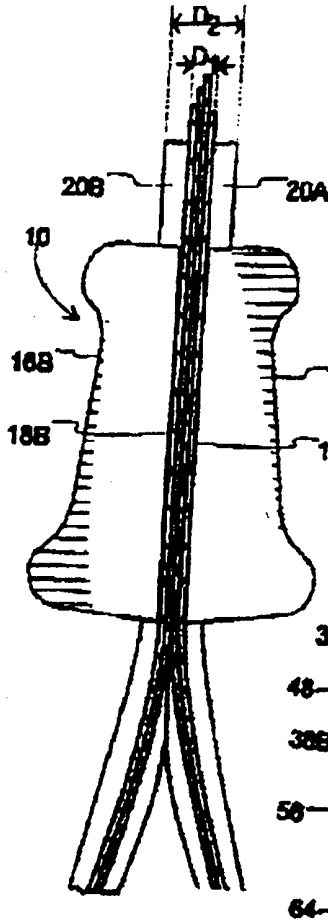
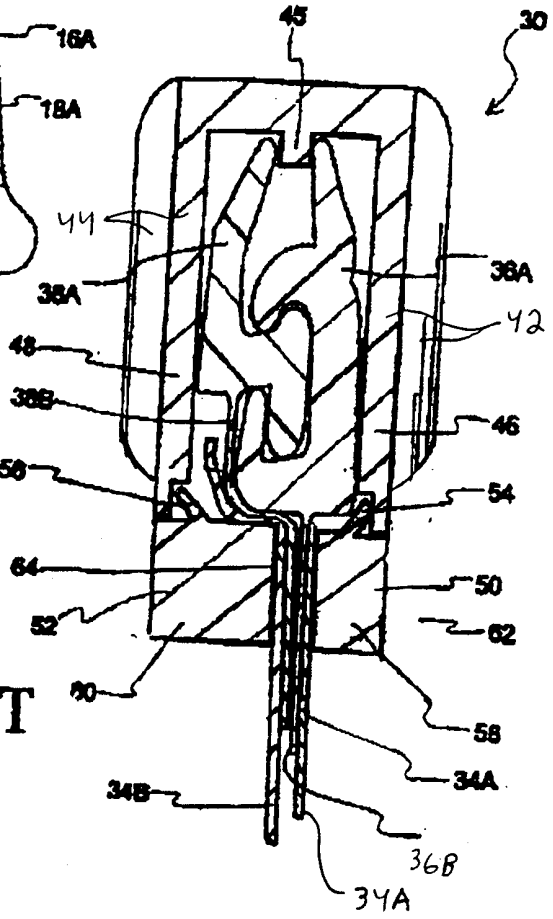


Fig. 2
PRIOR ART

Fig. 6



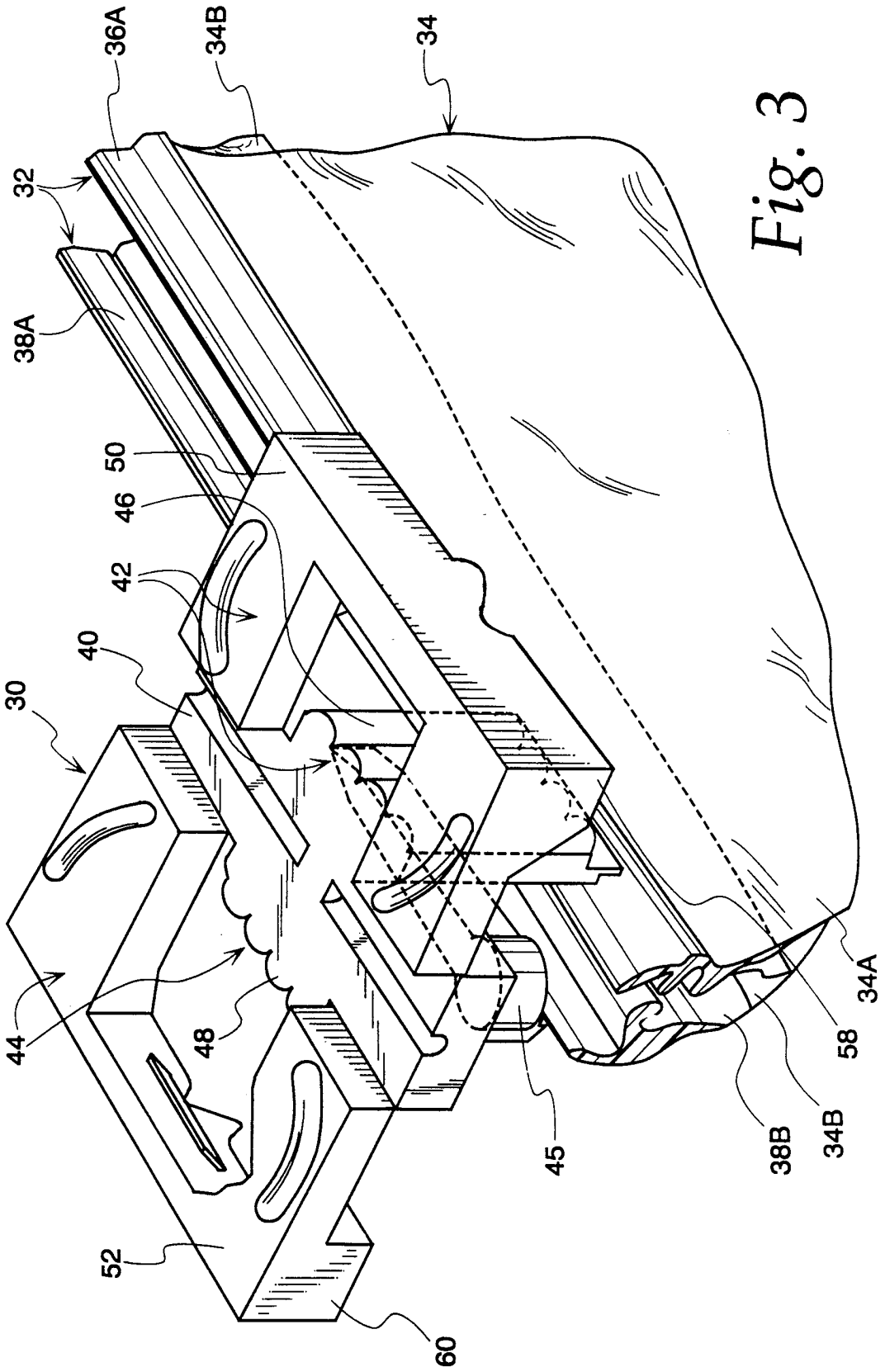


Fig. 3

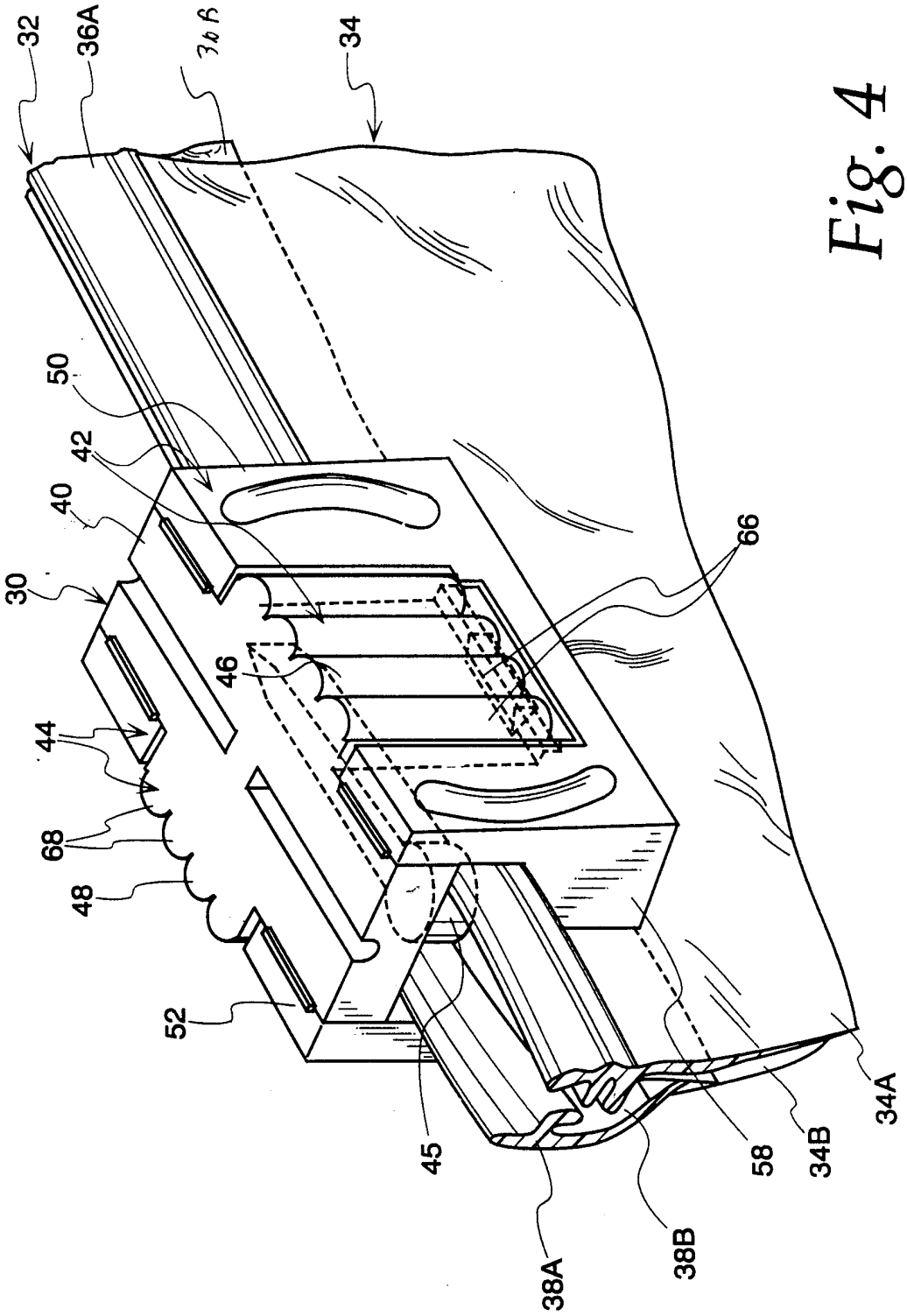


Fig. 4

Fig. 5

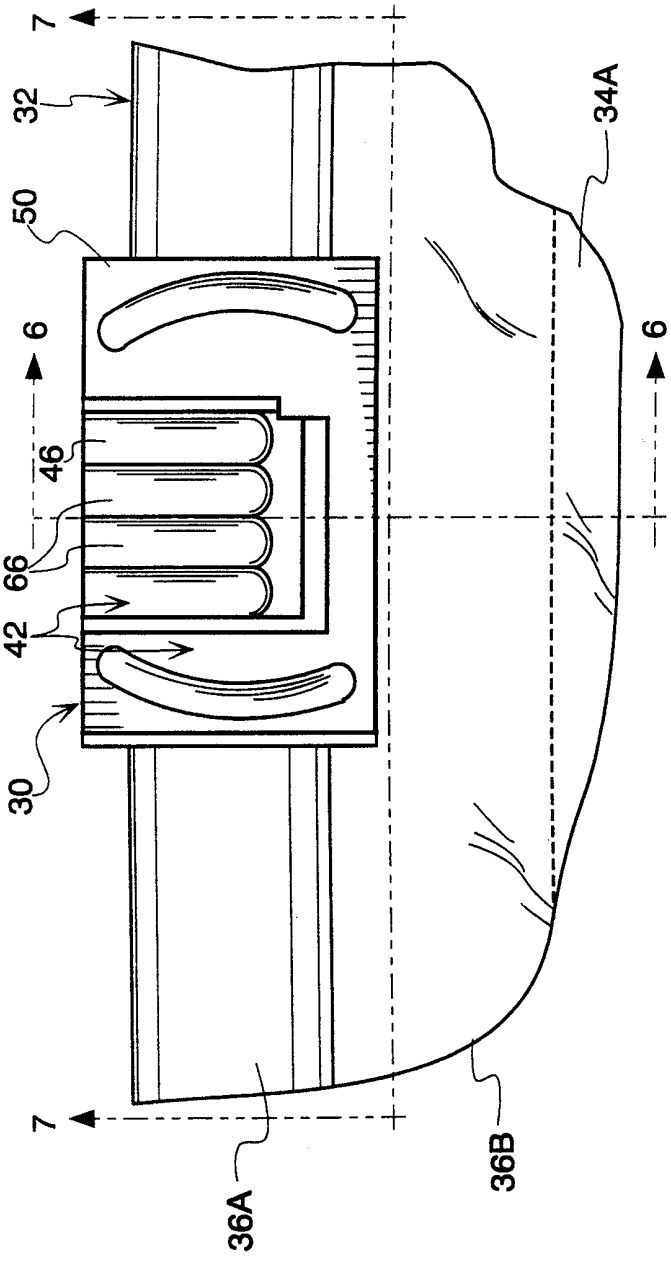
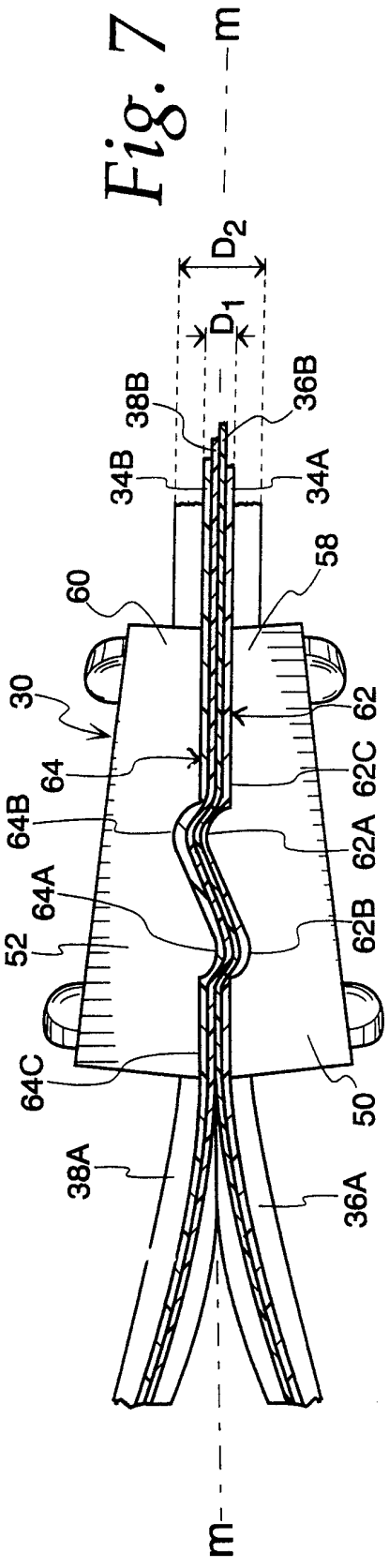

7
32
50
6
46
66
42
30
34A
36A
36B

Fig. 7


m
D_2
D_1
38B
36B
34B
34A
58
60
30
62
64
62C
64B
62A
64A
62B
52
64C
50
38A
36A

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/19909

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :A44B 19/16
US CL :24/400
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 24/400, 30.5R, 399, 587, 427; 383/63, 69, 64

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,262,395 A (KOSKY) 21 April 1981 (21.04.81), note the vertical ribs which would inherently act to reinforce the side walls 14 through added material.	19, 21 --- 20
Y	US 5,063,644 A (HERRINGTON et al.) 12 November 1991 (12.11.91), see figures 1, 2 which shows the hinged wings 21, 22.	20
A	US 5,517,733 A (CHAO) 21 May 1996 (21.05.96), see figures 3 and 4.	1-23

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search
03 DECEMBER 1998

Date of mailing of the international search report
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