

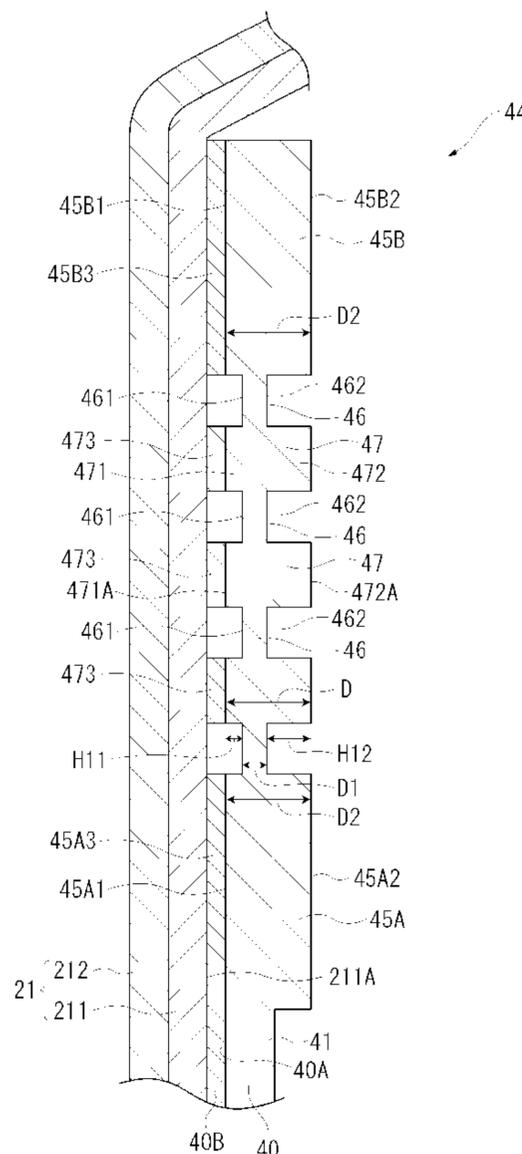


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(54) Titre : BANDE DE FERMETURE A GLISSIERE ET SAC D'EMBALLAGE DOTE DE LADITE BANDE DE FERMETURE A GLISSIERE  
 (54) Title: ZIPPER TAPE AND PACKAGING BAG WITH ZIPPER TAPE

[Fig. 3]



(57) **Abrégé/Abstract:**

Given that ribs (47), having a thickness (D) substantially identical to the thickness (D2) of first and second thick portions (45A, 45B) thereof, are disposed upon cut portions of zipper tape (44), it is possible for the first and second thick portions (45A, 45B) and the



(57) **Abrégé(suite)/Abstract(continued):**

ribs (47) to be attached upon an inner surface (211A) when the zipper tape is attached to a bag body. Consequently, when tearing open a container bag (1), stress is concentrated upon thin portions (46) with low tensile strength, allowing breaking at the thin portions (46), resulting in a single break site and no waste products. When tearing the container bag (1), the tearing line is positioned by the ribs (47), allowing straight tearing without the tearing line becoming erratic, and tearing with ease.

## ABSTRACT

Since a rib (47) having a thickness (D) substantially equal to a thickness (D2) of each of first and second thick portions (45A, 45B) is provided in a cutting portion (44) of a zipper tape, the first and second thick portions (45A, 45B) and the rib (47) can be bonded to an inner surface (211A) when the zipper tape is bonded to a bag body. Accordingly, when tearing a packaging bag (1) for opening, stress concentrates on a thin portion (46) having a small tensile strength, so that the packaging bag (1) can be cut at a single cutting position in the thin portion (46). Consequently, no cutting fragment is generated. Moreover, since a cutting line is positioned by the rib (47) when tearing the packaging bag (1), the cutting line is not waved, so that the packaging bag (1) can easily be torn with a linear cutting performance.

## DESCRIPTION

## ZIPPER TAPE AND PACKAGING BAG WITH ZIPPER TAPE

## TECHNICAL FIELD

[0001]

5           The present invention relates to a zipper tape and a packaging bag provided with the zipper tape.

## BACKGROUND ART

[0002]

10           As a packaging material for packaging various articles such as food, medicine, medical products and miscellaneous goods, a packaging bag provided with a zipper tape (hereinafter, occasionally abbreviated as a "packaging bag") have been used, in which a pair of belt-like zipper tapes respectively including a male member and a female member that are mated with each other are disposed on an opening of a bag body, the zipper tapes capable of being opened from the mated state and closable again.

15           Such a packaging bag is tightly closed by sealing the opening. The packaging bag is openable by removing a seal portion in a manner to tear a base material film of the bag body from a cut or a notch formed on an edge of the packaging bag.

20           In recent years, a packaging bag easily openable for everyone has been developed and there has been demanded a packaging bag having an excellent easy-openability in which a base material film is easily tearable (see, for instance, Patent Literatures 1 and 2).

[0003]

          A zipper disclosed in Patent Literature 1 includes: a tape bonded to a bag body; and an easily cuttable resin layer with a predetermined width that stretches over a full length of the tape. The resin layer is formed of a resin different from that of the tape.

25           A zipper tape disclosed in Patent Literature 2 includes a cutting portion along one widthwise edge of each of a male member and a female member. The cutting portion includes: a first thick portion; a second thick portion; and a thin portion between the first and second thick portions, the thin portion being thinner than the first and second thick

portions. With this arrangement, the thin portion is torn in opening, thereby providing a holding portion of the bag body enough to release engagement of the zipper tape.

#### CITATION LIST

##### PATENT LITERATURES

5 [0004]

Patent Literature 1 JP-A-2004-244027

Patent Literature 2 WO2008/035494A1

##### SUMMARY OF THE INVENTION

##### PROBLEMS TO BE SOLVED BY THE INVENTION

10 [0005]

However, in the resin layer having an easy cutting performance as described in Patent Literature 1, an area as the cutting portion becomes broad since the resin layer has a predetermined width. Accordingly, depending on a manner for applying a force on the resin layer for tearing, a cutting line may be waved, so that the resin layer may not be easily torn. Moreover, in tearing the resin layer, the resin layer may be torn from two positions at both widthwise ends. In such a case, the resin layer may produce cutting fragments in a form of a fiber or a string, so that appearance may be deteriorated, or a sufficient sealing may not be obtained because the cutting fragment impairs engagement.

Also in the thin portion of Patent Literature 2, a cutting line may be waved since the thin portion has a predetermined width, or may be torn from plural positions to produce cutting fragments.

[0006]

An object of the invention is to provide an easily openable zipper tape and a packaging bag provided with the zipper tape.

##### 25 MEANS FOR SOLVING THE PROBLEMS

[0007]

(1) A zipper tape according to an aspect of the invention includes: a pair of belt-like bases respectively having a male member and a female member, the male member and the female member being engageable to each other, in which at least one of the pair of

belt-like bases is provided with a cutting portion at an end thereof, the cutting portion including: a pair of thick portions that are thicker than a thickness of the at least one of the pair of belt-like bases; a thin portion that is provided between the pair of thick portions and is thinner than a thickness of each of the thick portions; and a rib that projects from the thin portion and has substantially the same thickness as the thickness of each of the thick portions.

[0008]

(2) In the zipper tape according to the above aspect of the invention, it is preferable that the thickness (D) of the rib is defined as a sum of a height of the rib projecting from the thin portion and the thickness of the thin portion, and a ratio ((D)/(D2)) of the thickness (D) of the rib to the thickness (D2) of each of the thick portions is from 0.8 to 1.2.

(3) In the zipper tape according to the above aspect of the invention, it is preferable that a ratio ((D2)/(D1)) of the thickness (D2) of each of the thick portions to the thickness (D1) of the thin portion is from 3 to 12.

(4) In the zipper tape according to the above aspect of the invention, it is preferable that a bonding layer is provided on a surface of each of the belt-like bases, the pair of thick portions and the rib.

(5) In the zipper tape according to the above aspect of the invention, it is preferable that the bonding layer is formed of a polyolefin resin having a melting point lower than that of a resin for the belt-like bases and the cutting portion.

[0009]

(6) A packaging bag provided with a zipper tape includes: a bag body having an opening through which contents are capable of being inserted; and the zipper tape according to any one of the above aspect of the invention, in which the surface of each of the belt-like bases, the thick portions and the rib of the zipper tape are bonded to an inner surface of the opening.

[0010]

According to the above aspect of the invention, the zipper tape has the rib having substantially the same thickness as that of the thick portion. Accordingly, when bonding the zipper tape to the bag body, the thick portion and the rib can be bonded to the inner surface of the bag body. Consequently, when tearing the packaging bag provided with the zipper tape for opening, the packaging bag is cut at a single cutting position in the thin portion having a smaller tensile strength than those of the thick portion and the rib. Consequently, cutting fragments are not generated. Moreover, since a cutting line is positioned by the rib, the cutting line is not waved, so that the packaging bag can easily be torn with an excellent linear cutting performance.

#### 10 BRIEF DESCRIPTION OF DRAWINGS

[0011]

Fig. 1 is a front view showing a packaging bag provided with a zipper tape according to an exemplary embodiment of the invention.

Fig. 2 is a cross sectional view taken along II-II in Fig. 1.

15 Fig. 3 is an enlarged cross-sectional view of a cutting portion of the packaging bag provided with the zipper tape.

Fig. 4 is an enlarged front view of the vicinity of a notch of the packaging bag provided with the zipper tape.

20 Fig. 5 is a cross sectional view showing a packaging bag provided with a zipper tape according to another exemplary embodiment.

Fig. 6 is a cross sectional view showing a packaging bag provided with a zipper tape according to Comparative 1.

Fig. 7 is a cross sectional view showing a packaging bag provided with a zipper tape according to Comparative 2.

#### 25 DESCRIPTION OF EXEMPLARY EMBODIMENT(S)

[0012]

Embodiment(s) of the invention will be described below with reference to the attached drawings.

Arrangement of Packaging Bag Provided With Zipper Tape

Fig. 1 is a front view showing a packaging bag provided with a zipper tape according to an exemplary embodiment of the invention. Fig. 2 is a cross sectional view taken along II-II line in Fig. 1. Fig. 3 is an enlarged cross-sectional view of a cutting portion of the packaging bag provided with the zipper tape.

5 [0013]

As shown in Figs. 1 and 2, a packaging bag 1 provided with a zipper tape according to this exemplary embodiment (hereinafter, occasionally abbreviated as a "packaging bag 1") includes a bag body 2 and a zipper tape 3 bonded to an inner surface 211A of the bag body 2.

10 The bag body 2 is formed by superposing base material films (wrapping material) 21 and includes side seal portions 22 and a top seal portion 23 on the periphery thereof. The top seal portion 23 is formed by sealing an opening 24 through which contents is inserted into the bag body 2.

15 A V-shaped notch 25 as a tearing start position is formed at an end of each of the side seal portions 22 near the top seal portion 23.

[0014]

20 The base material film 21 is not limited to a single layer film, but may be a laminated film in which a sealant layer 211 is laminated on a base material layer 212. However, in accordance with the performance desired, a laminated film in which an intermediate layer such as a gas-barrier layer, a light-shielding layer or a strength-improving layer is laminated between the base material layer 212 and the sealant layer 211 may alternatively be used.

25 Besides a biaxially-oriented polypropylene film (OPP film), a biaxially-oriented polyethylene terephthalate film (PET film), a biaxially-oriented polyester film, a biaxially-oriented polyamide film and the like can be suitably used as the base material layer 212. Various engineering-plastic films can also be used according to the need.

Low-density polyethylene, polypropylene (CPP) and the like can be used as the sealant layer 211.

[0015]

The zipper tape 3 is bonded on the inner surface 211A of the opening 24 from one of the side seal portions 22 to the other thereof.

The zipper tape 3 includes: a female belt-like base 40 having a female member; a cutting portion 44 connected to an end of the female belt-like base 40 near the opening 24; 5 a male belt-like base 50 having a male member; and a cutting portion 54 connected to an end of the male belt-like base 50 near the opening 24.

[0016]

The female belt-like base 40 includes: a belt-like base body 41; and a first hook 42 and a second hook 43 that are integrally connected to the belt-like base body 41 and 10 provide the female member. The first hook 42 and the second hook 43 are mutually faced.

The first hook 42 and the second hook 43 are detachably engaged with a head 53 of the male belt-like base 50, thereby providing an engagement portion 6.

The female belt-like base 40 has a bag-side surface 40A facing the inner surface 211A. On the bag-side surface 40A, a seal layer 40B is laminated as a bonding layer for 15 attaching the bag-side surface 40A to the inner surface 211A.

[0017]

As shown in Figs. 2 and 3, the cutting portion 44 includes a first thick portion 45A, a thin portion 46, a rib 47 and a second thick portion 45B in sequence from the engagement portion 6 toward the opening 24.

20 The first thick portion 45A is disposed near the engagement portion 6. The second thick portion 45B is disposed near the opening 24.

[0018]

A pair of the first and second thick portions 45A and 45B are formed thicker than the belt-like base body 41. The first and second thick portions 45A and 45B are formed 25 elongated along a longitudinal direction of the belt-like base body 41.

The first thick portion 45A has a first bag-side surface 45A1 that faces the inner surface 211A and a first inner surface 45A2 that is opposite to the first bag-side surface 45A1 and faces the male belt-like base 50. On the first bag-side surface 45A1, a seal layer

45A3 is laminated for attaching the first bag-side surface 45A1 to the inner surface 211A. The seal layer 45A3 is continuously integrated with the seal layer 40B.

The first thick portion 45B also has a second bag-side surface 45B1 that faces the inner surface 211A and a second inner surface 45B2 that is opposite to the second bag-side surface 45B1 and faces the male belt-like base 50. On the second bag-side surface 45B1, a seal layer 45B3 is laminated for attaching the second bag-side surface 45B1 to the inner surface 211A.

The first and second thick portions 45A and 45B each have a thickness (D2).

[0019]

The elongated thin portion 46 is disposed between the pair of the first and second thick portions 45A and 45B. Both longitudinal ends of the thin portion 46 are disposed correspondingly to the notches 25.

The thin portion 46 has a bag-side thin-portion surface 461 that faces the inner surface 211A and an inner thin-portion surface 462 that is opposite to the bag-side thin-portion surface 461. The bag-side thin-portion surface 461 is located at a position recessed relative to the first and second bag-side surfaces 45A1 and 45B1 in a thickness direction and toward an inside of the bag body 2. In other words, the bag-side thin-portion surface 461 of the thin portion 46 is stepped from the first and second bag-side surfaces 45A1 and 45B1 to have a predetermined distance from the inner surface 211A, so that the bag-side thin-portion surface 461 is not bonded to the inner surface 211A.

The inner thin-portion surface 462 is also located at a position recessed relative to the first and second inner surfaces 45A2 and 45B2 in a thickness direction and toward the inner surface 211A. In other words, the inner thin-portion surface 462 of the thin portion 46 is stepped from the first and second inner surfaces 45A2 and 45B2.

[0020]

The thin portion 46 is substantially linearly connected to the first and second thick portions 45A and 45B through the rib 47 substantially in the middle of a thickness direction of each of the first and second thick portions 45A and 45B. The thin portion 46 is formed thinner than the belt-like base body 41 and the first and second thick portions

45A and 45B. A thickness (D1) of the thin portion 46 is preferably 50  $\mu\text{m}$  or more, more preferably 60  $\mu\text{m}$  or more.

When the thickness (D1) of the thin portion 46 is less than 50  $\mu\text{m}$ , the thin portion 46 may be bent when the zipper tape 3 is bonded to the inner surface 211A. In such a case, the rib 47 is not sufficiently bonded to the inner surface 211A, which may hamper a linear tearing of the thin portion 46.

[0021]

A width of the thin portion 46 is preferably in a range from 0.5 mm to 5 mm, more preferably from 1 mm to 3 mm. When the width of the thin portion 46 is less than 0.5 mm, the rib 47 is difficult to form. On the other hand, when the width of the thin portion 46 is more than 5 mm, a cutting line C (see Fig. 4) may not be guided along the rib 47.

A ratio ((D2)/(D1)) of the thickness (D2) of each of the first and second thick portions 45A and 45B to the thickness (D1) of the thin portion 46 is preferably from 3 to 12, more preferably from 5 to 10.

When the ratio ((D2)/(D1)) is less than 3, the thin portion 46 may be bonded to the inner surface 211A.

On the other hand, when the ratio ((D2)/(D1)) is more than 12, the thin portion 46 is easily bendable to cause the above problem.

[0022]

The rib 47 includes: a plurality of bag-side ribs 471 that project from the bag-side thin-portion surface 461; a plurality of inner ribs 472 that project from the inner thin-portion surface 462; and the thin portion 46 that is interposed between the bag-side ribs 471 and the inner ribs 472. Three bag-side ribs 471 and three inner ribs 472 are formed.

Each of the bag-side ribs 471 is positioned to substantially correspond to each of the inner ribs 472 in the width direction of the thin portion 46.

Each of the bag-side ribs 471 has a bag-side rib surface 471A facing the inner surface 211A. On the bag-side rib surface 471A, a seal layer 473 is laminated for attaching the bag-side rib surface 471A to the inner surface 211A.

The inner rib 472 has an inner rib surface 472 facing the male belt-like base 50. Each of the bag-side ribs 471 and each of the inner ribs 472 are integrated with the thin portion 46 and are elongated in a longitudinal direction of the first and second thick portions 45A and 45B.

5 [0023]

The rib 47 has a thickness (D) substantially equal to the thickness of each of the first and second thick portions 45A and 45B. The thickness (D) is defined as the sum of a height (H11) of the bag-side rib 471, a height (H12) of the inner rib 472 and the thickness (D1) of the thin portion 46. A ratio ((D)/(D2)) of the thickness (D) of the rib 47 to the  
10 thickness (D2) of the first or second thick portion 45A or 45B is preferably from 0.8 to 1.2, more preferably 1.

When the ratio ((D)/(D2)) is more than 1.2, the first and second thick portions 45A and 45B become difficult to bond to the inner surface 211A. On the other hand, when the ratio ((D)/(D2)) is less than 0.8, the bag-side ribs become difficult to bond to the inner  
15 surface 211A.

The thickness (D) of the rib 47 is preferably in a range from 200  $\mu\text{m}$  to 700  $\mu\text{m}$ , more preferably from 300  $\mu\text{m}$  to 600  $\mu\text{m}$ .

When thickness (D) of the rib 47 is less than 200  $\mu\text{m}$ , the thin portion 46 may be bonded to the inner surface 211A to hamper easy opening.

20 [0024]

The male belt-like base 50 includes: a belt-like base body 51; and the head 53 (a male member) connected to the belt-like base body 51 through a connecting portion 52, the head 53 being substantially arrow-head shaped in cross section. The male belt-like base 50 includes the belt-like base body 51 and the cutting portion 54 at an end of the belt-  
25 like base body 51 near the opening 24 in the same manner as the cutting portion 44 of the female belt-like base 40. The cutting portion 54 includes: a pair of first and second thick portions 55A and 55B, a thin portion 56, a rib 57, a bag-side rib 571 and an inner rib 572, which respectively correspond to the pair of the first and second thick portions 45A and 45B, the thin portion 46, the rib 47, the bag-side rib 471 and the inner rib 472.

The bag-side rib 571 and the inner rib 572 of the cutting portion 54 respectively have a bag-side rib surface 571A and an inner rib surface 572A which correspond to the bag-side rib surface 471A and the inner rib surface 472A of the cutting portion 44.

The male belt-like base 50 has a bag-side surface 50A and first and second bag-side surfaces 55A1 and 55B1 which correspond to the bag-side surface 40A and the first and second bag-side surfaces 45A1 and 45B1.

Seal layers 50B, 55A3, 573 and 55B3 respectively corresponding to the seal layer 40B, 45A3, 473 and 45B3 are laminated on the bag-side surface 50A, the first and second bag-side surfaces 55A1 and 55B1, and the bag-side rib surface 571A.

10 [0025]

A resin for the female belt-like base 40, the cutting portion 44, the male belt-like base 50 and the cutting portion 54 is a crystalline polyolefin resin. Examples of the crystalline polyolefin resin include low-density polyethylene (LD), linear low-density polyethylene (LL), polypropylene (PP) and a mixture thereof.

15 The resin for the seal layers 40B, 45A3, 473 and 45B3 is preferably a polyolefin resin. The polyolefin resin preferably has a melting point lower than that of the crystalline polyolefin resin used for the female belt-like base 40 and the cutting portion 44. A resin for the seal layer 50B, 55A3, 573 and 55B3 is also preferably a polyolefin resin. The polyolefin resin preferably has a melting point lower than that of the crystalline polyolefin  
20 resin used for the male belt-like base 50 and the cutting portion 54.

[0026]

#### Manufacturing of Zipper Tape and Packaging Bag Provided With Zipper Tape

The zipper tape 3 can be integrally manufactured by a co-extrusion molding. With the use of co-extrusion molding for manufacturing the zipper tape 3, the  
25 manufacturing step can be simplified, the manufacturing cost can be lowered and the zipper tape 3 can be continuously manufactured in a stable manner.

[0027]

The package bag 1 is manufactured using the base material film 21 and the zipper tape 3 by a zipper-tape-attaching three-side seal bag-making machine and the like.

For instance, the zipper-tape-attaching three-side seal bag-making machine positions the zipper tape 3 fed from a tape feeder between the base material films 21 fed from a wrapping material feeder. A pair of seal bars bond the zipper tape 3 and the base material films 21 to each other by pressing the base material films 21 onto the female belt-like base 40, the cutting portion 44, the male belt-like base 50 and the cutting portion 54.

The delivered base material films 21 are thermally bonded at a predetermined interval in a deliver direction of the base material films 21 to form a side seal portion 22. Subsequently, the base material films 21 were cut on the side seal portion 22 to form the packaging bag 1.

10 When the side seal portion 22 of the packaging bag 1 is formed, a point seal process for collapsing the zipper tape 3 is performed.

[0028]

#### Opening of Packaging Bag Provided With Zipper Tape

Next, an opening process of the packaging bag 1 according to the exemplary embodiment will be described below.

Fig. 4 is an enlarged front view of the vicinity of a notch of the packaging bag provided with the zipper tape.

For opening the bag, the base material film 21 near the opening 24 above the notch 25 and the base material film 21 near the contents below the notch 25 are held to tear the bag in opposed directions from the notch 25 (cut start position). Since the rib 47 is bonded to the inner surface 211A, stress concentrates on the thin portions 46 and 56 each having a small tensile strength, so that the base material films 21 are cut at the thin portions 46 and 56 on which the stress concentrates. Accordingly, since the thin portions 46 and 56 on which the stress concentrates are cut, cutting is made only at a single position. In other words, only a single cutting line C (a chain line) is made. Since positioned by the ribs 47 and 57, the cutting line C becomes linear instead of waving.

Then, the engagement portion 6 of the zipper tape 3 is disengaged to open the packaging bag 1. When re-closing the packaging bag 1, the first and second hooks 42 and 43 are engaged with the head 53 to bring the engagement portion 6 into an engaged state.

[0029]

Effects of Exemplary Embodiment(s)

According to the above-described zipper tape 3 and the packaging bag 1, following advantageous effects can be achieved.

5           Since the rib 47 having the thickness (D) substantially equal to the thickness (D2) of the first and second thick portions 45A and 45B is provided in the cutting portion 44 of the zipper tape 3, the first and second thick portions 45A and 45B and the rib 47 can be bonded to the inner surface 211A when the zipper tape 3 is bonded to the bag body 2. Accordingly, when tearing the packaging bag 1 for opening, the stress concentrates on the  
10 thin portion 46 having a small tensile strength, so that the packaging bag 1 can be cut at the thin portion 46. Accordingly, cutting is made at a single cutting position to generate no cutting fragments.

Moreover, since the cutting line C is positioned by the rib 47 when tearing the packaging bag 1, the cutting line is not waved, so that the packaging bag 1 can easily be  
15 torn with a linear cutting performance.

[0030]

Since the inner rib 472 is also provided opposite to the bag-side rib 471 such that the thin portion 46 is interposed between the bag-side rib 471 and the inner rib 472, the thin portion 46 can be reliably cut. In other words, neither the bag-side rib 471 nor the  
20 inner rib 472 is cut.

[0031]

Furthermore, since the thin portion 46 is located at a position recessed relative to the first and second bag-side surfaces 45A1 and 45B1, the thin portion 46 is not bonded to the inner surface 211A, so that the thin portions 46 and 56 can easily be cut.

25           [0032]

Since the ratio ((D)/(D2)) of the thickness (D) of the rib 47 to the thickness (D2) of the first and second thick portions 45A and 45B is defined from 0.8 to 1.2, the bag-side rib 471 and the first and second thick portions 45A and 45B can be favorably bonded to the inner surface 211A.

Moreover, since the ratio of the thickness (D) of the rib 47 to the thickness (D2) of the first and second thick portions 45A and 45B is defined within the above range, the thin portion 46 is prevented from being bonded to the inner surface 211A when manufacturing a bag. Generation of pin holes at the collapsed portion can also be prevented in the point seal process when manufacturing the bag.

[0033]

Since the ratio ((D2)/(D1)) of the thickness (D2) of each of the first and second thick portions 45A and 45B to the thickness (D1) of the thin portion 46 is defined from 3 to 12, the thin portion 46 is prevented from being bonded to the inner surface 211A and from being bent.

[0034]

Since the thickness (D1) of the thin portion 46 is defined as 50  $\mu\text{m}$  or more, the thin portion 46 is prevented from being bent when the zipper tape 3 is bonded to the inner surface 211A. Accordingly, the bag-side rib 471 can favorably be bonded to the inner surface 211A. Consequently, the packaging bag 1 exhibits an excellent linear cutting performance when being torn.

[0035]

Since the polyolefin resin having a melting point lower than that of the female belt-like base 40 and the cutting portion 44 is used as the resin for the seal layer 40B, 45A3, 45B3 and 473, the zipper tape 3 can be bonded to the bag body 2 at a relatively low temperature in manufacturing the bag. Accordingly, deterioration of the base material layer 212 forming the base material film 21 of the bag body 2 can be inhibited.

[0036]

The resin for the female belt-like base 40 is the crystalline polyolefin resin. Since the crystalline polyolefin resin is a specific resin such as polypropylene, the rib 47 can easily be molded.

[0037]

Since the zipper tape 3 is provided to the bag body 2, the packaging bag 1 can easily be torn with a linear cutting performance without generation of cutting fragments.

The cutting portion 54 of the male belt-like base 50 of the zipper tape 3 produces the same effects as those of the cutting portion 44.

[0038]

Modification(s)

5 It should be understood that the scope of the invention is not limited to the above-described exemplary embodiment(s) but includes modifications and improvements as long as the modifications and improvements are compatible with the invention. In addition, specific arrangements and profiles when implementing the present invention may be altered as long as an object and an advantage of the present invention can be achieved.

10 Fig. 5 is a cross sectional view showing a packaging bag provided with a zipper tape according to another exemplary embodiment.

[0039]

For instance, the thin portion 46 substantially linearly connects the first thick portion 45A to the second thick portion 45B in the exemplary embodiment. However, the  
15 thin portion 46 may be provided in a non-linear manner (e.g., in a wavy manner) as shown in Fig. 5. For instance, one end of a thin portion 46C connected to the first thick portion 45A may be disposed near the inner surface 211A while the other end of the thin portion 46C connected to the second thick portion 45B may be near the inside of the bag body 2, i.e., near the male belt-like base 50.

20 [0040]

Although the female belt-like base 40 is bonded to the inner surface 211A through the seal layer 40B, the female belt-like base 40 may be directly bonded to the inner surface 211A.

25 Even when cutting the packaging bag 1 having such an arrangement, since the rib 47 is bonded to the inner surface 211A, stress concentrates on the thin portion 46 having a small tensile strength, so that the packaging bag 1 can be cut at the thin portion 46.

[0041]

Although the bag-side rib 471 and the inner rib 472 are provided to the thin portion 46, only the bag-side rib 471 may be provided to the thin portion 46 while the

inner rib 472 may not be provided thereto. Such a thin portion 46 may be disposed to face the male belt-like base 50. In other words, the thin portion 46 is formed such that the inner thin-portion surface 462 is not at a position recessed relative to the first inner surface 45A2 and the second inner surface 45B2, that is, the inner thin-portion surface 462 is substantially aligned with the first inner surface 45A2 and the second inner surface 45B2

In Figs. 2 and 3, three of each of the bag-side rib 471 and the inner rib 472 are provided to the thin portion 46. However, a single bag-side rib 471 and a single inner rib 472 may be provided, or plural bag-side ribs 471 and plural inner ribs 472 may be provided.

Moreover, although three of each of the bag-side rib 471 and the inner rib 472 are provided, the number of the bag-side rib 471 may be different from the number of the inner rib 472.

The cutting portions 44 and 54 are respectively provided to the female belt-like base 40 and the male belt-like base 50. However, only the female belt-like base 40 may be provided with the cutting portion 44, or only the male belt-like base 50 may be provided with the cutting portion 54.

#### Examples

[0042]

The invention will more specifically be described by providing examples and comparisons, while the present invention will not be limited to the content of the examples and the like.

Fig. 6 is a cross sectional view of a zipper tape according to Comparative 1. Fig. 7 is a cross sectional view of a zipper tape according to Comparative 2.

[0043]

#### Example 1

A zipper tape in Example 1 was formed by extrusion with a commercially available extruding machine from the following constituent material. A package bag of Example 1 as shown in Fig. 2 was manufactured using the obtained zipper tape and a base material film with a zipper-tape-attaching three-side seal bag-making machine and the like.

The base material film is a laminate of a 12- $\mu\text{m}$  polyethylene terephthalate film and a linear low-density polyethylene (LLDPE) film.

[0044]

Constituent Material in Example 1

5 Male belt-like base and Female belt-like base: random polypropylene (density:  $900 \text{ kg/m}^3$ , ethylene contents: 4%)

Seal layer: a metallocene-type linear low-density polyethylene resin (melting point: 95 degrees C, MFR: 3g/10 minutes)

10 The melting point was measured by DSC and the maximum melting peak was defined as the melting point.

[0045]

15 The zipper tape manufactured under the above conditions was shaped such that the thickness (D) of the rib and the thickness (D2) of the thick portion each were  $300 \mu\text{m}$  and the thickness (D1) of the thin portion was  $60 \mu\text{m}$ . The thin portion was not bonded to the inner surface of the bag body.

[0046]

Example 2

20 A zipper tape and a packaging bag were obtained in the same manner as in Example 1 except that the following constituent materials were used for the zipper tape in Example 2.

[0047]

Constituent Material in Example 2

Male belt-like base and Female belt-like base: a linear low-density polyethylene (LLDPE) resin (density:  $913 \text{ kg/m}^3$ , MFR: 4g/10 minutes)

25 Seal layer: a metallocene-type linear low-density polyethylene resin (melting point: 95 degrees C, MFR: 3g/10 minutes)

[0048]

Comparative 1

In Comparative 1, a zipper tape and a packaging bag were obtained in the same manner as in Example 1 except that the following constituent materials were used. As shown in Fig. 6, a zipper tape 9A of Comparative 1 includes: a female belt-like base 91A having a female member 91A1; a male belt-like base 92A having a male member 92A1; and a cutting portion 93A that is provided to each of the female belt-like base 91A and the male belt-like base 92A and is bonded to the inner surface 211A of the bag body 2.

[0049]

#### Constituent Material in Comparative 1

Female belt-like base 91A and Male belt-like base 92A: a linear low-density polyethylene (LLDPE) resin (density:  $916 \text{ kg/m}^3$ , MFR: 8.5g/10 minutes)

Cutting portion 93A: 80 mass% of a crystalline polyolefin resin (density:  $916 \text{ kg/m}^3$ , MFR: 8.5 g/10 minutes) and 20 mass% of cyclic polyolefin (MFR: 30 g/10 minutes)

[0050]

#### Comparative 2

In Comparative 2, a zipper tape and a packaging bag as shown in Fig. 7 were obtained in the same manner as in Example 1 except that a rib was not formed. A zipper tape 9B of Comparative 2 includes: a female belt-like base 91B having a female member 91B1; and a male belt-like base 92B having a male member 92B1, the female belt-like base 91B and the male belt-like base 92B being bonded through a seal layer 93B. Each of the female belt-like base 91B and the male belt-like base 92B has a pair of thick portions 94A and 94B and a thin portion 95 connecting the pair of thick portions 94A and 94B to each other.

#### Comparative 3

In Comparative 3, a zipper tape and a packaging bag were obtained in the same manner as in Example 1 except that the thickness (D2) of the thin portion was defined as  $40 \mu\text{m}$ .

[0051]

#### Comparative 4

In Comparative 4, a zipper tape and a packaging bag were obtained in the same manner as in Example 1 except that the thickness (D) of the rib was defined as 100  $\mu\text{m}$ .

#### Comparative 5

In Comparative 5, a zipper tape and a packaging bag were obtained in the same manner as in Example 1 except that the thickness (D) of the rib was defined as 800  $\mu\text{m}$ .

[0052]

[Table 1]

	Thickness ( $\mu\text{m}$ )		
	Rib (D)	Thin portion (D1)	Thick portion (D2)
Example 1	300	60	300
Example 2	300	60	300
Comparative 1	—	—	—
Comparative 2	—	60	300
Comparative 3	300	40	300
Comparative 4	100	60	300
Comparative 5	800	60	300

[0053]

10 With respect to the zipper tapes and the packaging bags in Examples 1 to 2 and Comparatives 1 to 5, an appearance test, an openability test, a linear cutting performance test, a pinhole test, a thin-portion bonding test and a thin-portion bending test were conducted.

[0054]

#### 15 Appearance Test

A notch was formed on an end of each of the packaging bags. Each of the packaging bags was torn from the notch. The packaging bags were evaluated in accordance with the following evaluation standard. The results are shown in Table 2.

#### Evaluation Standard for Appearance Test

20 A: The cutting portion is always cut at a single position.

C: The cutting portion is cut at two or more positions to generate cutting fragments.

[0055]

### Openability Test

A notch was formed on an end of each of the packaging bags. In each of the packaging bags, a breaking strength until a tensile speed reached 300 m/min and a breaking length reached 60 mm was measured by a digital force gauge (manufactured by IMADA, Incorporated). The measurement results were evaluated in accordance with the following evaluation standard. The results are shown in Table 2.

#### Evaluation Standard for Openability Test

A: easily openable without resistance (breaking strength: 5 N/60 mm or less)

C: difficult to open with a large resistance (breaking strength: 5 N/60 mm or more)

10 [0056]

### Linear Cutting Performance Test

A notch was formed on an end of each of the packaging bags. Each of the packaging bags was torn from the notch. Here, a positional deviation of a breaking point from the notch was measured and evaluated in accordance with the following evaluation standard. The results are shown in Table 2.

#### Evaluation Standard for Linear Cutting Performance Test

A: The zipper tape was completely linearly cut (positional deviation of the breaking point: less than 1 mm)

20 B: The zipper tape was linearly cut (positional deviation of the breaking point: from 1mm to 3 mm)

C: The zipper tape was not linearly cut (positional deviation of the breaking point: more than 3 mm)

[0057]

25 With respect to each of the packaging bags, it was measured whether pinholes were generated or not and evaluated in accordance with the following evaluation standard. The results are shown in Table 2.

#### Evaluation Standard for Pinholes

A: No pinhole was generated.

C: Pinholes were generated.

[0058]

With respect to each of the packaging bags, it was measured whether the thin portion was bonded to the inner surface of the bag body or not and evaluated in accordance with the following evaluation standard. The results are shown in Table 2.

5 Evaluation Standard for Bonding State of Thin Portion

A: The thin portion was not bonded to the inner surface of the bag body.

C: The thin portion was bonded to the inner surface of the bag body.

[0059]

10 With respect to each of the zipper tapes, it was measured whether the thin portion was bendable or not and evaluated in accordance with the following evaluation standard. The results are shown in Table 2.

Evaluation Standard for Bending State of Thin Portion

A: The thin portion was not bent.

C: The thin portion was bent.

15 [0060]

[Table 2]

	Apperance	Openability	Linear Cutting Performance	Pinholes	Bonding of thin portion	Bending of thin portion
Example 1	A	A	A	A	A	A
Example 2	A	A	A	A	A	A
Comparative 1	C	A	B	C	—	—
Comparative 2	C	A	B	A	A	A
Comparative 3	A	A	A	A	A	C
Comparative 4	A	C	B	A	C	A
Comparative 5	A	A	A	C	A	A

[0061]

20 It was found from the above tests that the cutting portion was always cut at a single position to generate no cutting fragments and provide a good appearance in the packaging bag provided with the zipper tape in each of Examples 1 and 2. In addition, it was found that the packaging bag provided with the zipper tape in each of Examples 1 and 2 exhibited excellent openability and linear cutting performance without pinholes and bonding and bending of the thin portion.

On the other hand, it was found that cutting fragments were generated to deteriorate appearance in the packaging bag of each of Comparatives 1 and 2.

It was found in Comparative 3 that, since the thickness of the thin portion was as thin as 40  $\mu\text{m}$ , the thin portion was bent to cause the rib to be difficult to bond to the base material film. It was found in Comparative 4 that, since the rib was as thin as 100  $\mu\text{m}$ , the thin portion was bonded in manufacturing the bag. It was found in Comparative 5 that, since the rib was as thick as 800  $\mu\text{m}$ , pinholes were generated in forming the side seal portions. In other words, it was found that the thickness (D1) of the thin portion of the zipper tape of the invention is desirably about 60  $\mu\text{m}$  and the thickness (D) of the rib is desirably about 300  $\mu\text{m}$ .

#### INDUSTRIAL APPLICABILITY

[0062]

The invention is widely applicable to a zipper tape and a packaging bag provided with the zipper tape for packaging various articles such as food, medicine, medical products and miscellaneous goods.

#### EXPLANATION OF CODES

[0063]

1	packaging bag provided with zipper tape
2	bag body
20	3 zipper tape
40	female belt-like base
40B,45A3,473,45B3	seal layer as bonding layer
44,54	cutting portion
50	male belt-like base
25	50B,55A3,573,55B3 seal layer as bonding layer
45A,55A	first thick portion
45B,55B	second thick portion
46,56	thin portion
47	rib

471,571 bag-side rib

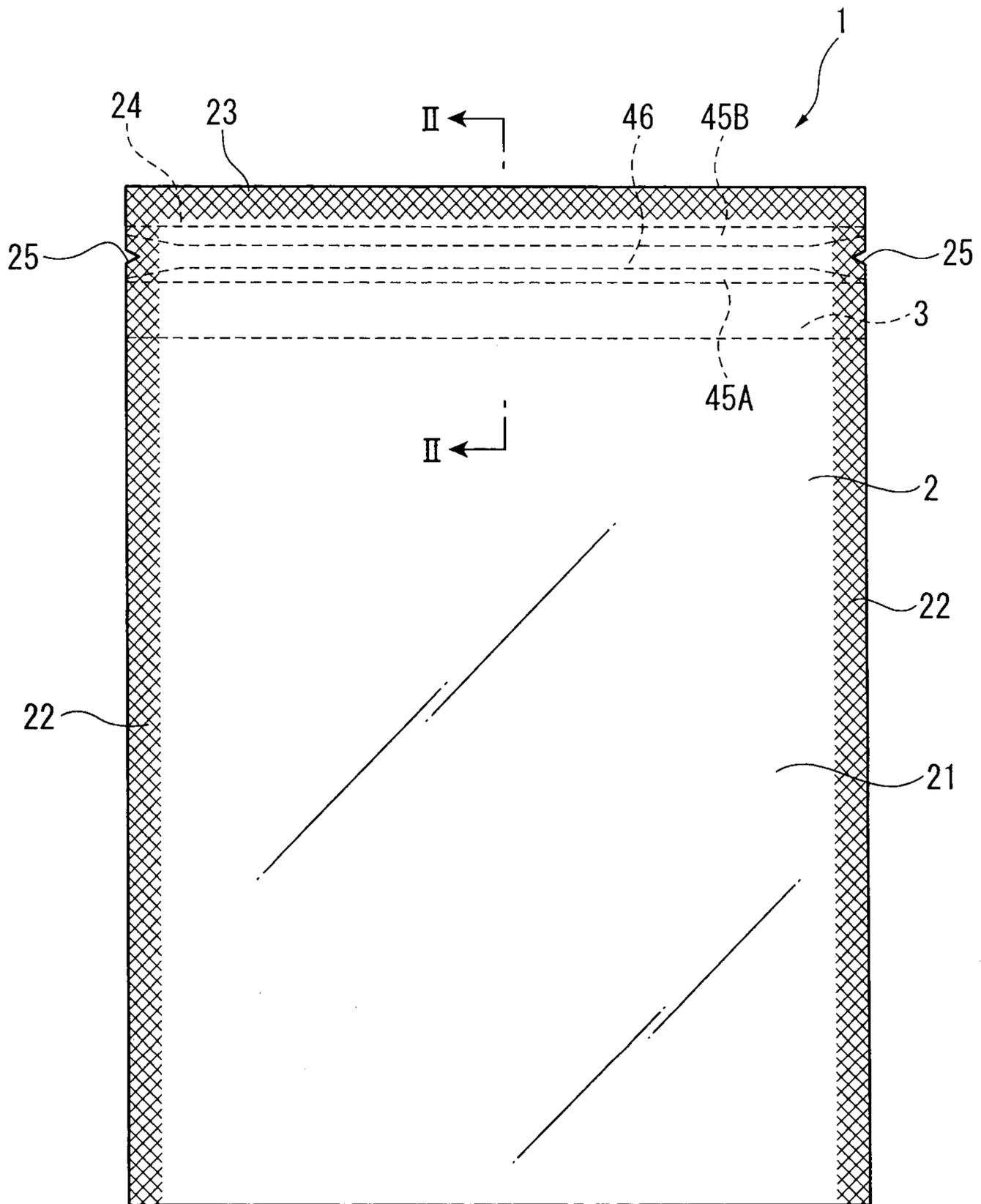
472,572 inner rib

## CLAIM(S)

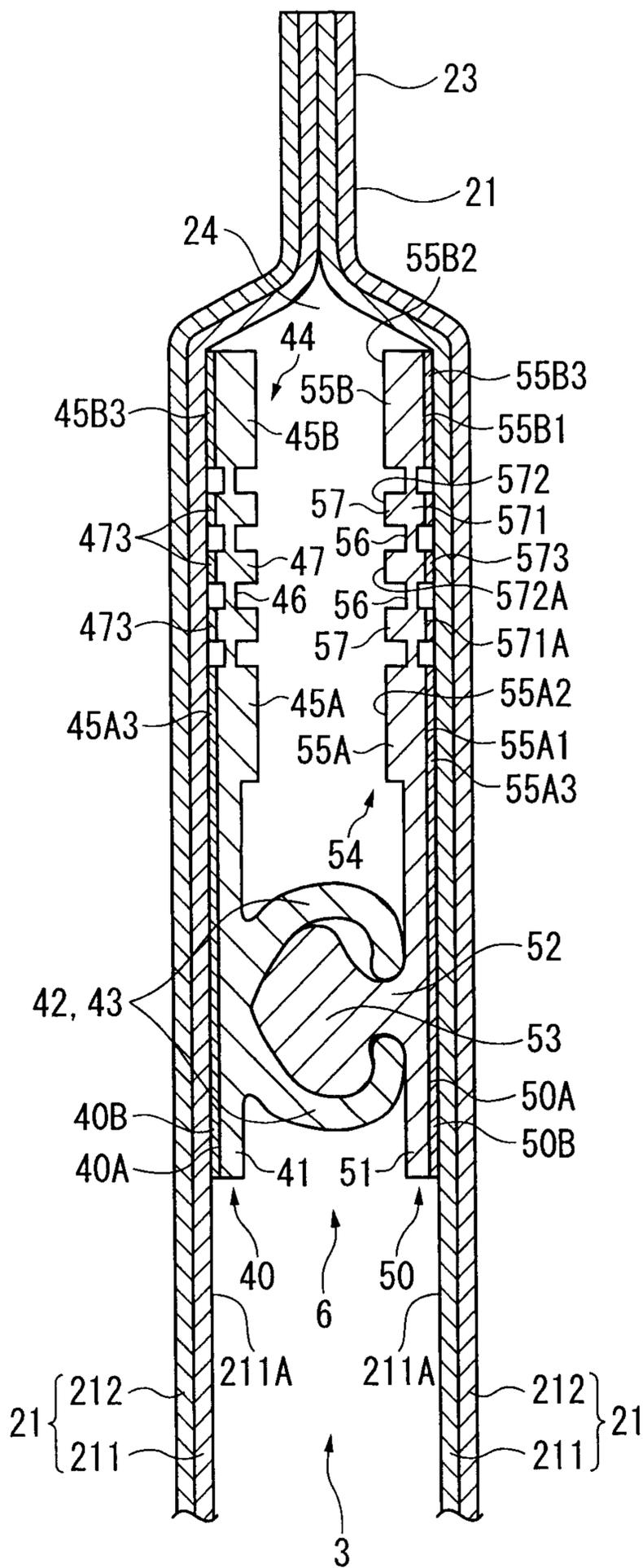
1. A zipper tape comprising a pair of belt-like bases respectively having a male member and a female member, the male member and the female member being engageable to each other, wherein  
5 at least one of the pair of belt-like bases is provided with a cutting portion at an end thereof, the cutting portion comprising:
  - a pair of thick portions that are thicker than a thickness of the at least one of the pair of belt-like bases;
  - a thin portion that is provided between the pair of thick portions and is thinner  
10 than a thickness of each of the thick portions; and
  - a rib that projects from the thin portion and has substantially the same thickness as the thickness of each of the thick portions.
2. The zipper tape according to claim 1, wherein  
the thickness (D) of the rib is defined as a sum of a height of the rib projecting  
15 from the thin portion and the thickness of the thin portion, and  
a ratio ((D)/(D2)) of the thickness (D) of the rib to the thickness (D2) of each of the thick portions is from 0.8 to 1.2.
3. The zipper tape according to claim 1 or 2, wherein  
a ratio ((D2)/(D1)) of the thickness (D2) of each of the thick portions to the  
20 thickness (D1) of the thin portion is from 3 to 12.
4. The zipper tape according to any one of the claims 1 to 3, wherein  
a bonding layer is provided on a surface of each of the belt-like bases, the pair of thick portions and the rib.
5. The zipper tape according to claim 4, wherein  
25 the bonding layer is formed of a polyolefin resin having a melting point lower than that of a resin for the belt-like bases and the cutting portion.
6. A packaging bag provided with a zipper tape comprising: a bag body having an opening through which contents are capable of being inserted; and the zipper tape according to any one of claims 1 to 5, wherein

the surface of each of the belt-like bases, the thick portions and the rib of the zipper tape are bonded to an inner surface of the opening.

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FIG. 1

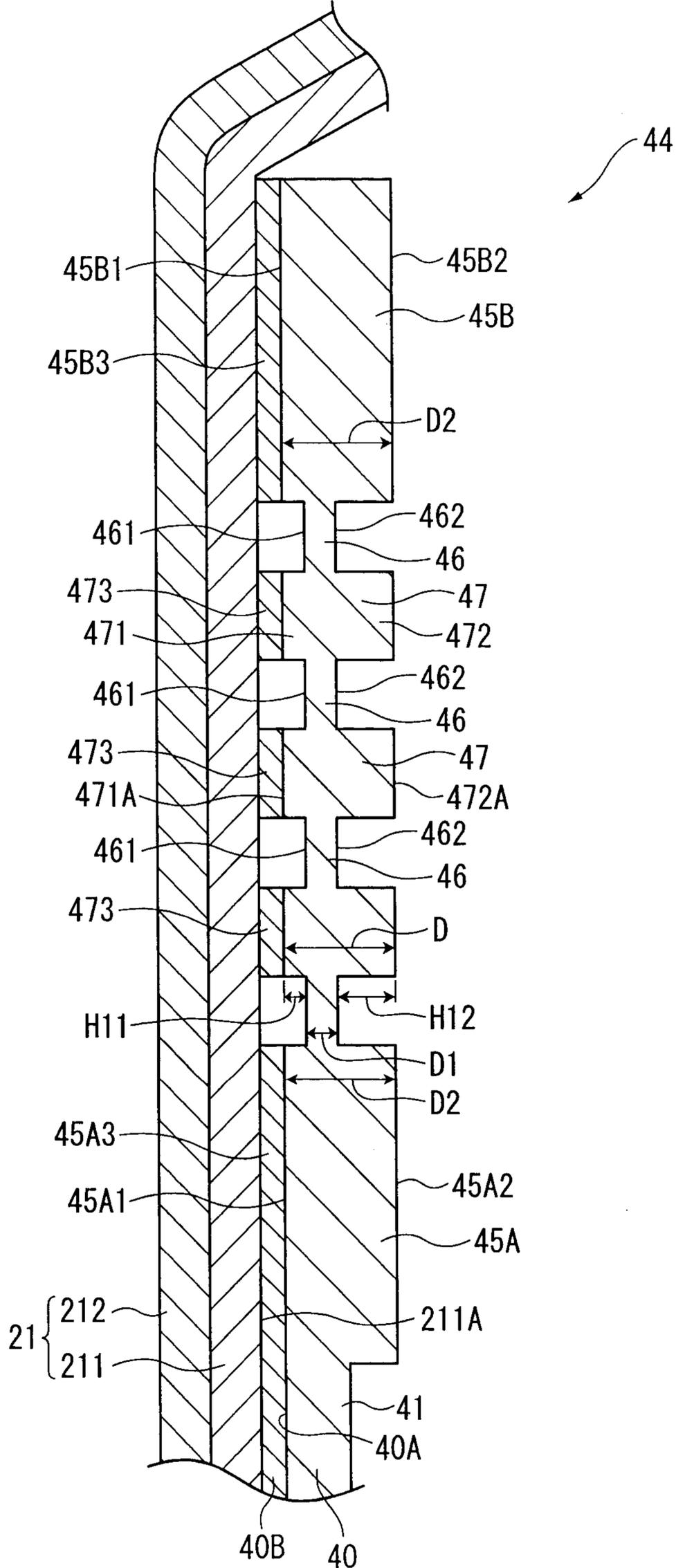


217  
 FIG. 2

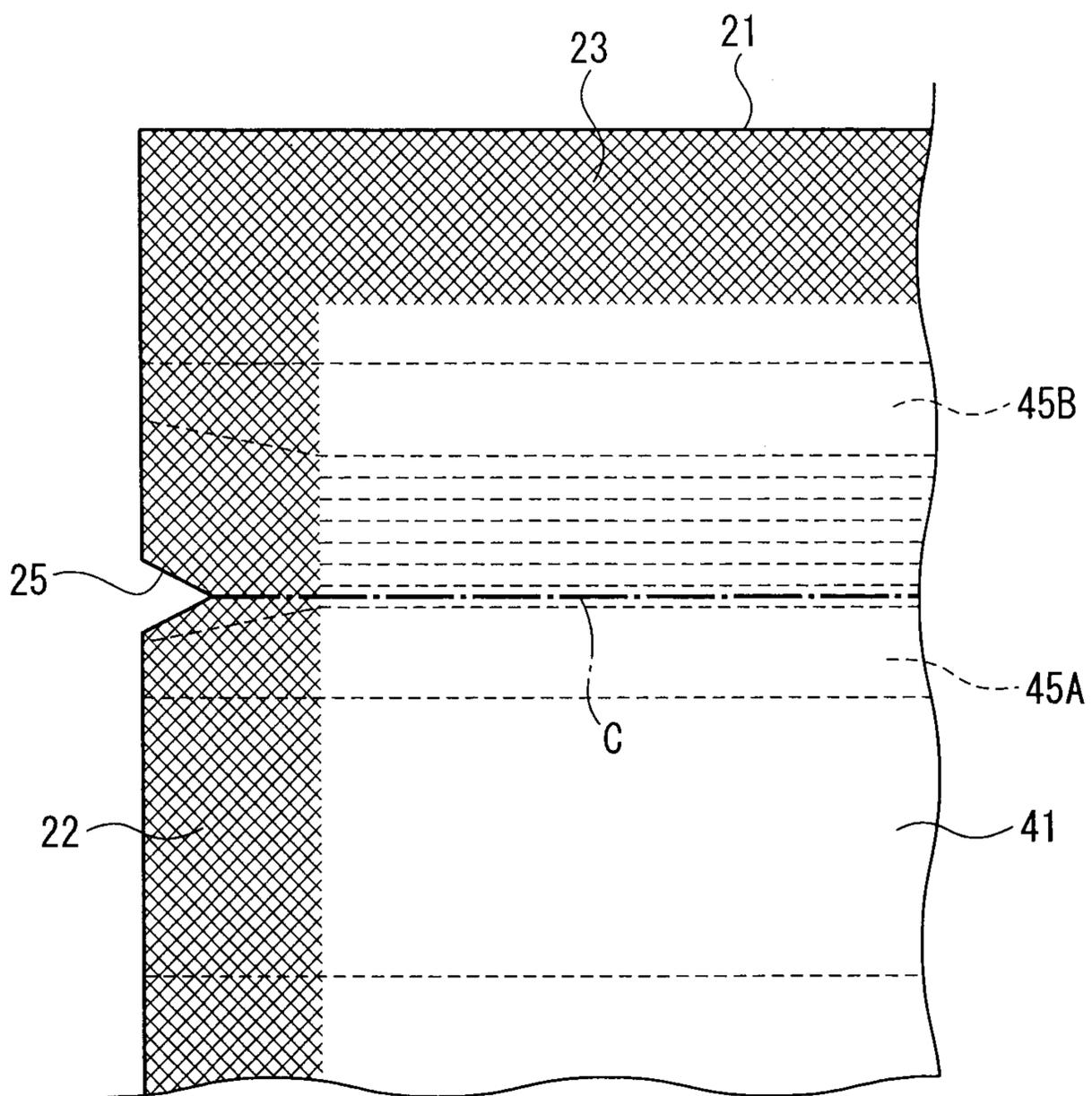


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FIG. 3

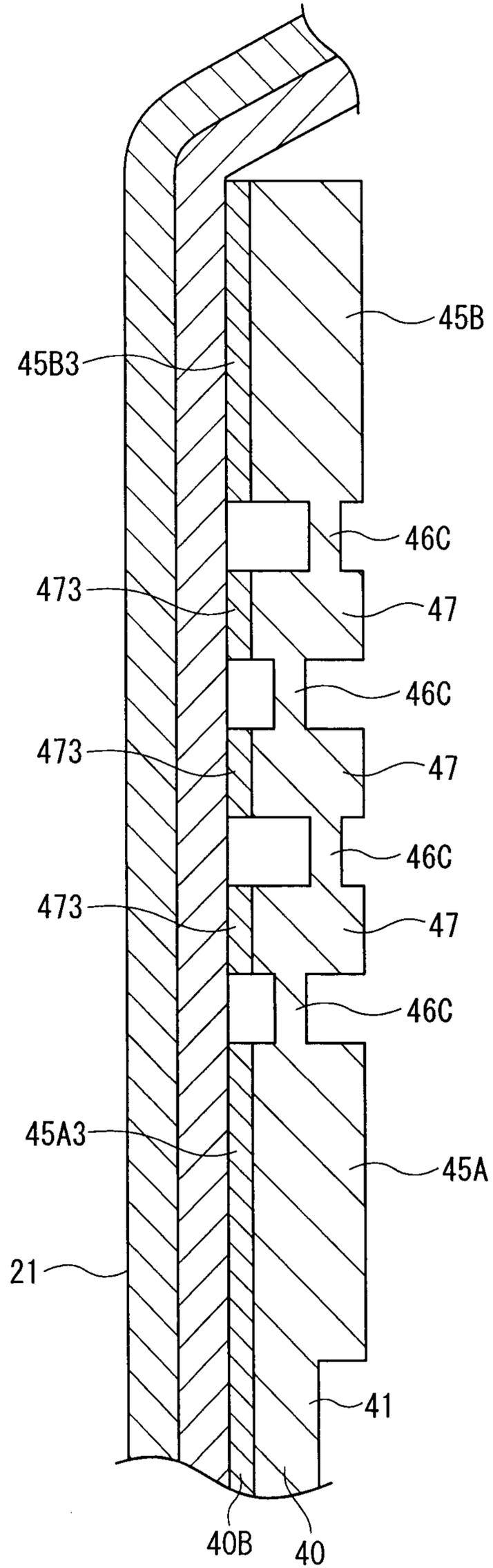


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FIG. 4

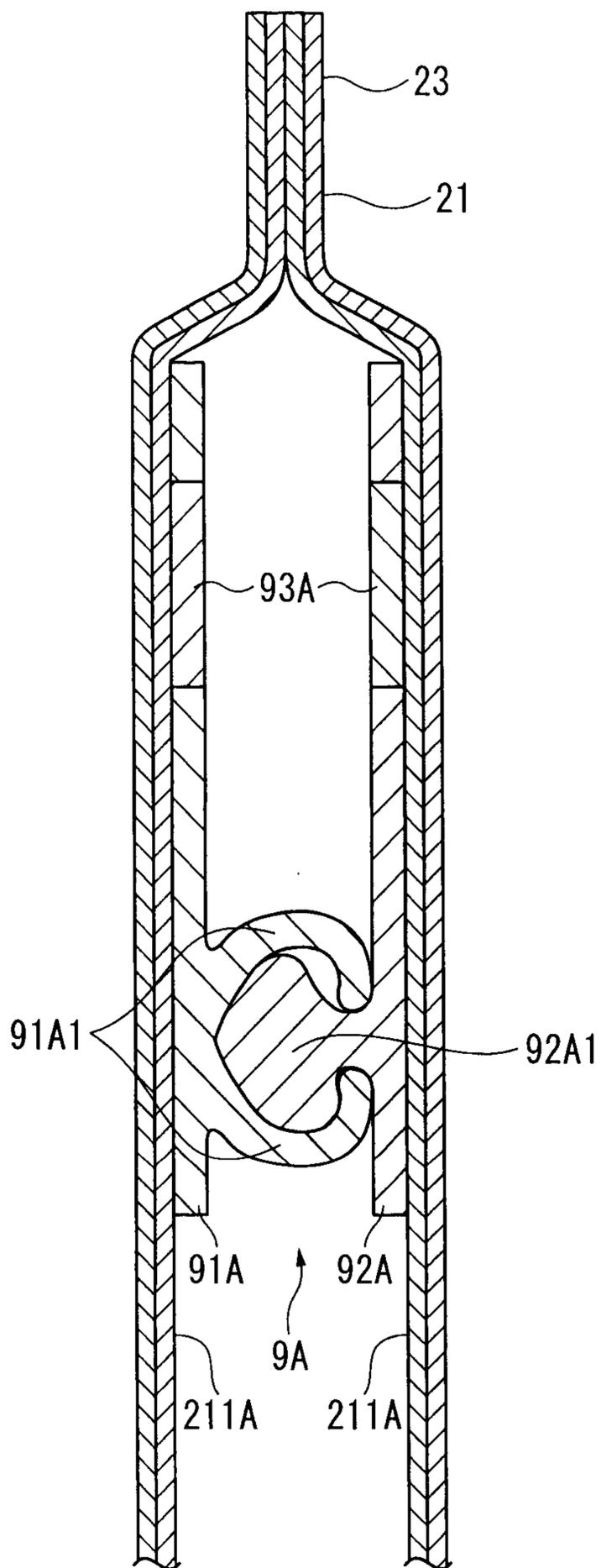


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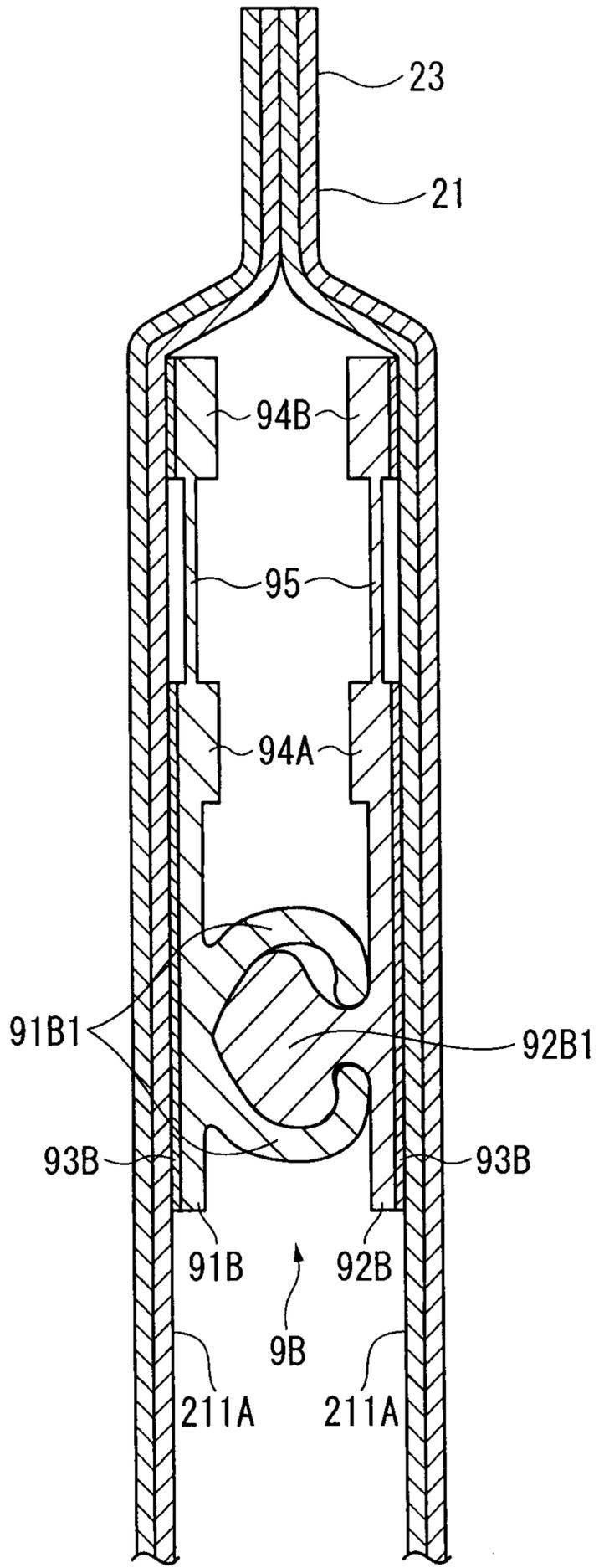
FIG. 5



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FIG. 6



717  
FIG. 7



[圖3]

