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(54) **ZIPPER TAPE AND PACKAGING BAG WITH ZIPPER TAPE**

Publication Classification

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(57) **ABSTRACT**

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

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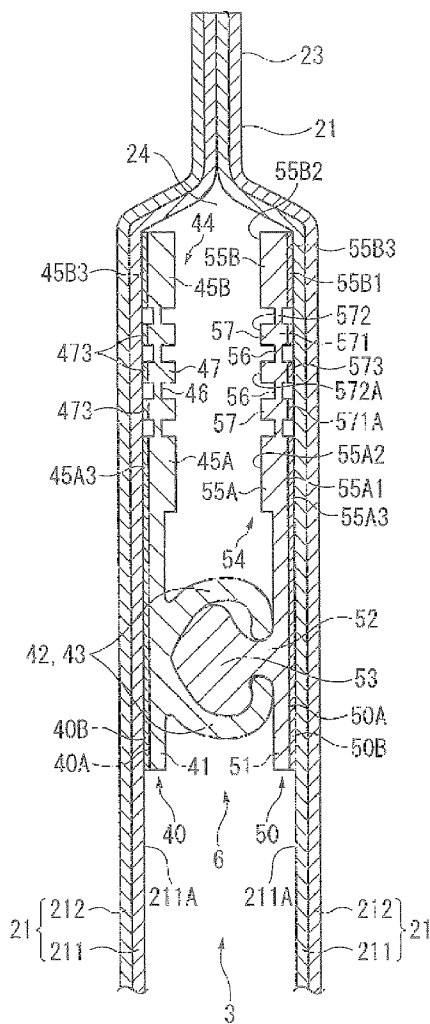


FIG. 1

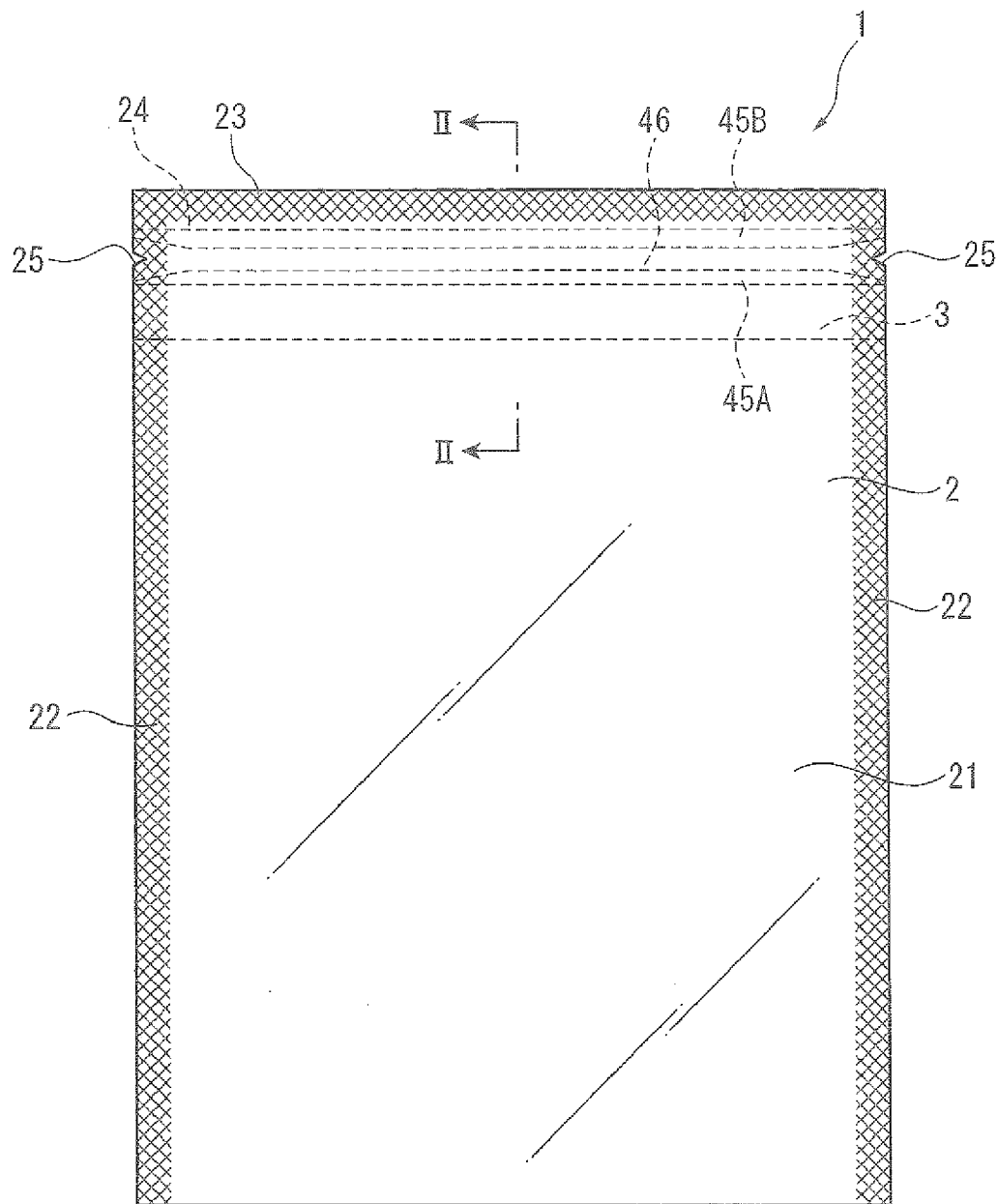


FIG. 2

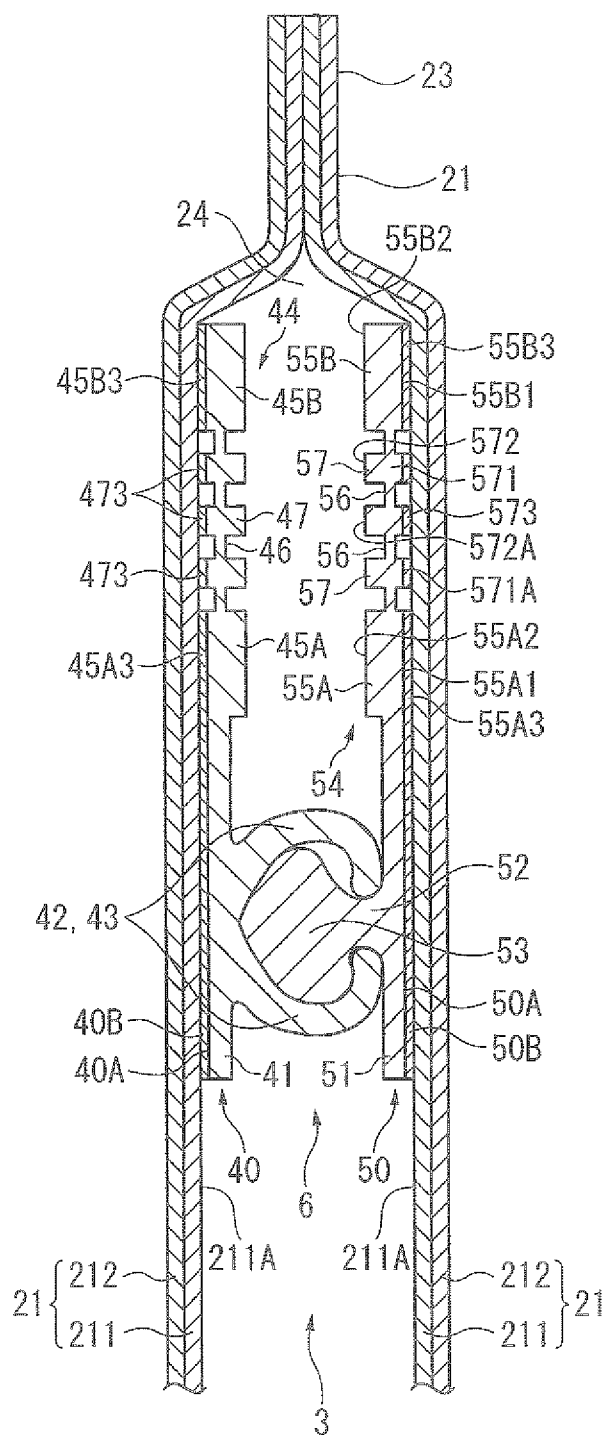


FIG. 3

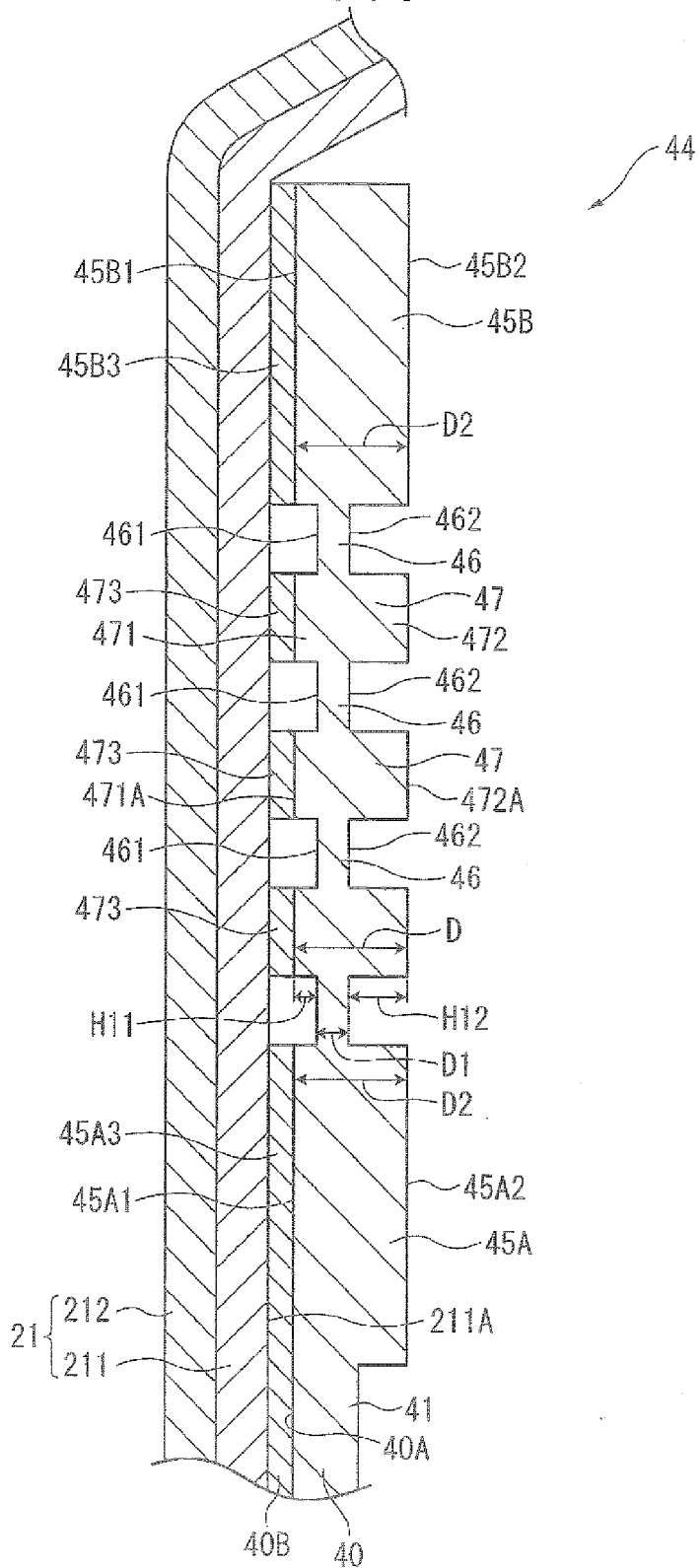


FIG. 4

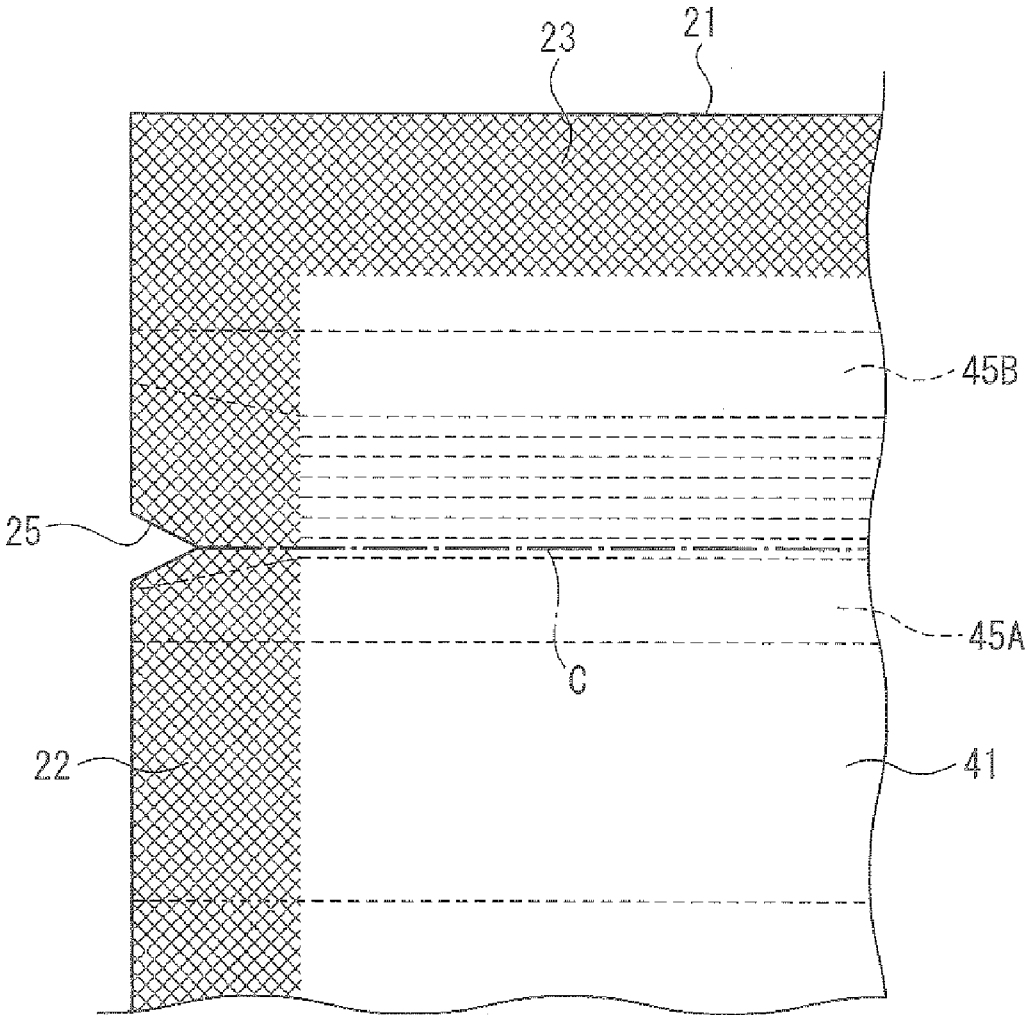


FIG. 5

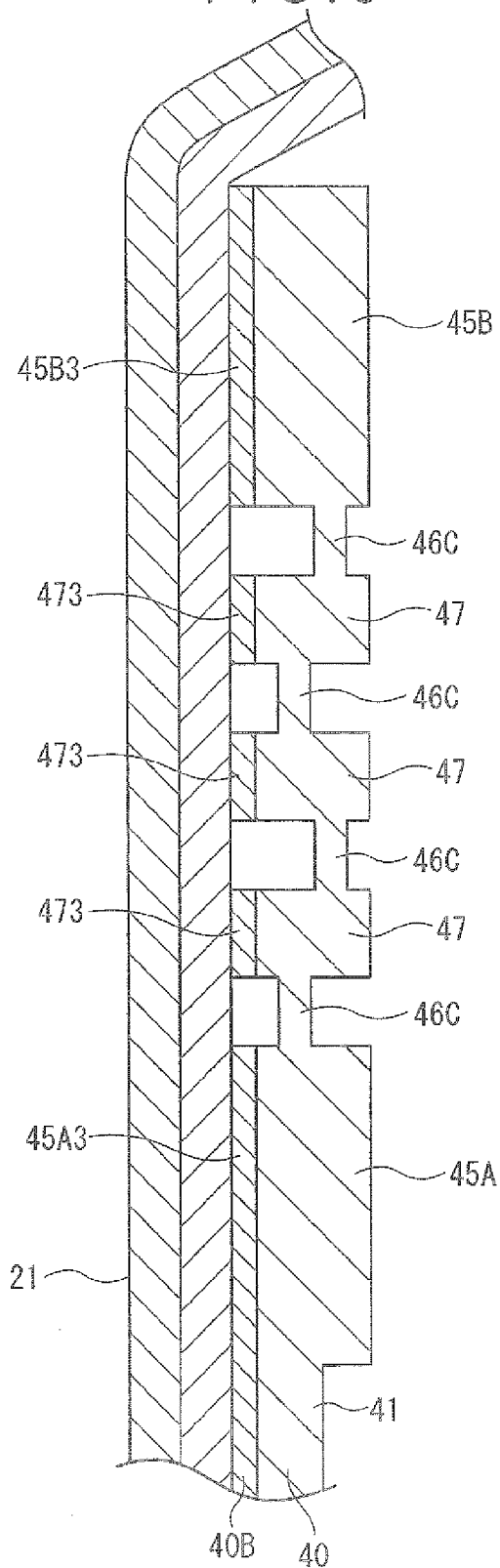


FIG. 6

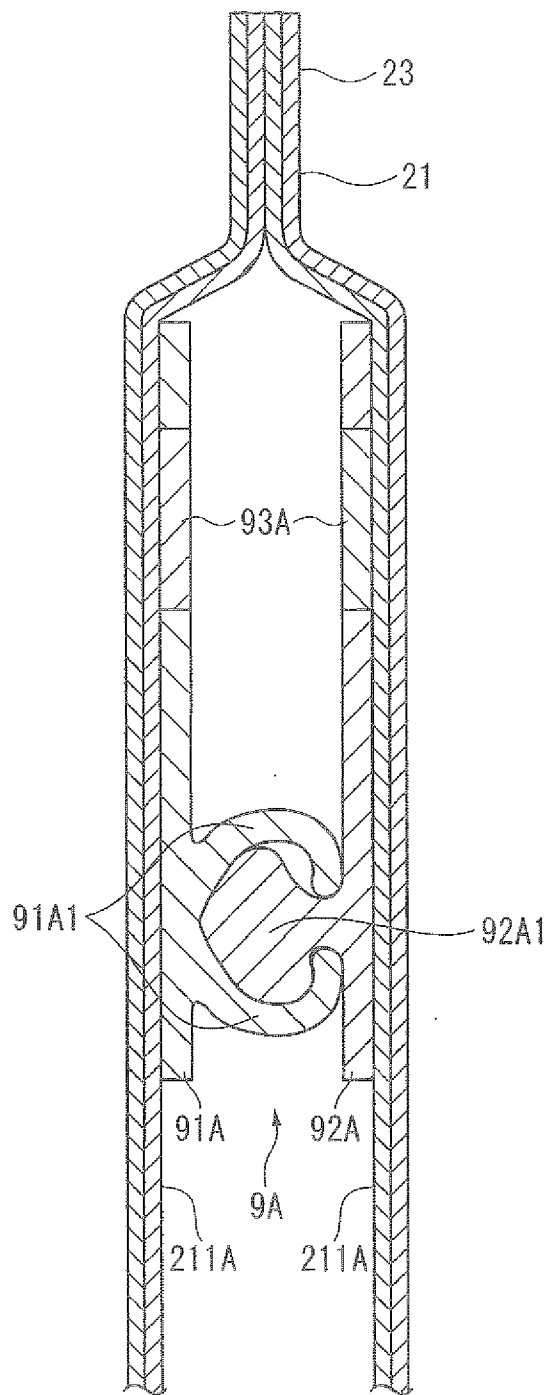
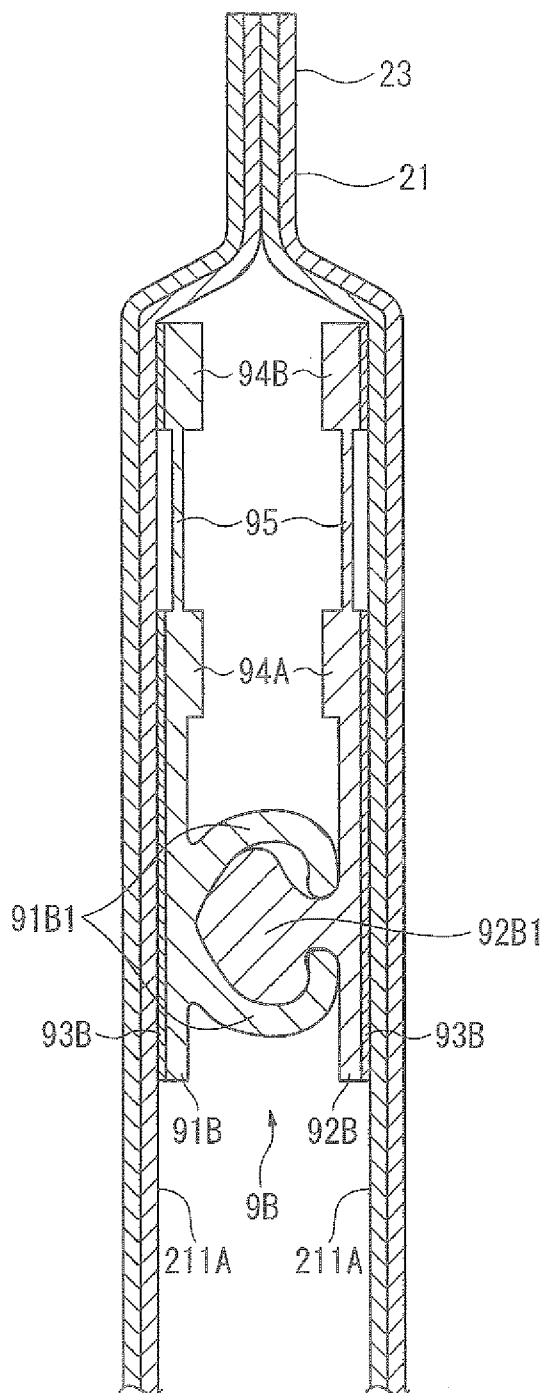


FIG. 7



ZIPPER TAPE AND PACKAGING BAG WITH ZIPPER TAPE

TECHNICAL FIELD

[0001] The present invention relates to a zipper tape and a packaging bag provided with the zipper tape.

BACKGROUND ART

[0002] 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.

[0003] 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.

[0004] 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).

[0005] 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.

[0006] 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

- [0007]** Patent Literature 1 JP-A-2004-244027
- [0008]** Patent Literature 2 WO2008/035494A1

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

[0009] 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.

[0010] 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.

[0011] An object of the invention is to provide an easily openable zipper tape and a packaging bag provided with the zipper tape.

Means for Solving the Problems

[0012] (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.

[0013] (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.

[0014] (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.

[0015] (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.

[0016] (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.

[0017] (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.

[0018] 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.

BRIEF DESCRIPTION OF DRAWINGS

[0019] FIG. 1 is a front view showing a packaging bag provided with a zipper tape according to an exemplary embodiment of the invention.

[0020] FIG. 2 is a cross sectional view taken along II-II in FIG. 1.

[0021] FIG. 3 is an enlarged cross-sectional view of a cutting portion of the packaging bag provided with the zipper tape.

[0022] FIG. 4 is an enlarged front view of the vicinity of a notch of the packaging bag provided with the zipper tape.

[0023] FIG. 5 is a cross sectional view showing a packaging bag provided with a zipper tape according to another exemplary embodiment.

[0024] FIG. 6 is a cross sectional view showing a packaging bag provided with a zipper tape according to Comparative 1.

[0025] FIG. 7 is a cross sectional view showing a packaging bag provided with a zipper tape according to Comparative 2.

DESCRIPTION OF EXEMPLARY EMBODIMENT(S)

[0026] Embodiment(s) of the invention will be described below with reference to the attached drawings.

Arrangement of Packaging Bag Provided With Zipper Tape

[0027] 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.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] 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.

[0032] 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.

[0033] Low-density polyethylene, polypropylene (CPP) and the like can be used as the sealant layer 211.

[0034] 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.

[0035] 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; 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.

[0036] 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 provide the female member. The first hook 42 and the second hook 43 are mutually faced.

[0037] 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.

[0038] 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 attaching the bag-side surface 40A to the inner surface 211A.

[0039] 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.

[0040] The first thick portion 45A is disposed near the engagement portion 6. The second thick portion 45B is disposed near the opening 24.

[0041] 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 elongated along a longitudinal direction of the belt-like base body 41.

[0042] 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.

[0043] 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.

[0044] The first and second thick portions 45A and 45B each have a thickness (D2).

[0045] 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.

[0046] 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.

[0047] 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**.

[0048] 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 μm or more, more preferably 60 μm or more.

[0049] When the thickness (D1) of the thin portion **46** is less than 50 μm , 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**.

[0050] 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**.

[0051] 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.

[0052] When the ratio ((D2)/(D1)) is less than 3, the thin portion **46** may be bonded to the inner surface **211A**.

[0053] 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.

[0054] 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.

[0055] 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**.

[0056] 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**.

[0057] 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**.

[0058] 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 thickness (D2) of the first or second thick portion **45A** or **45B** is preferably from 0.8 to 1.2, more preferably 1.

[0059] 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 surface **211A**.

[0060] The thickness (D) of the rib **47** is preferably in a range from 200 μm to 700 μm , more preferably from 300 μm to 600 μm .

[0061] When thickness (D) of the rib **47** is less than 200 μm , the thin portion **46** may be bonded to the inner surface **211A** to hamper easy opening.

[0062] 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-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 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**.

[0063] 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**.

[0064] 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**.

[0065] 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**.

[0066] 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.

[0067] 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 resin used for the male belt-like base **50** and the cutting portion **54**.

Manufacturing of Zipper Tape and Packaging Bag Provided with Zipper Tape

[0068] 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 manufacturing step can be simplified, the manufacturing cost can be lowered and the zipper tape **3** can be continuously manufactured in a stable manner.

[0069] 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.

[0070] 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.

[0071] 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.

[0072] 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.

Opening of Packaging Bag Provided with Zipper Tape

[0073] Next, an opening process of the packaging bag 1 according to the exemplary embodiment will be described below.

[0074] FIG. 4 is an enlarged front view of the vicinity of a notch of the packaging bag provided with the zipper tape.

[0075] 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.

[0076] 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.

Effects of Exemplary Embodiment(s)

[0077] According to the above-described zipper tape 3 and the packaging bag 1, following advantageous effects can be achieved.

[0078] 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 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.

[0079] 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 torn with a linear cutting performance.

[0080] 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 inner rib 472 is cut.

[0081] 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.

[0082] 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.

[0083] 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.

[0084] 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.

[0085] Since the thickness (D1) of the thin portion 46 is defined as 50 μm 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.

[0086] 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.

[0087] 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.

[0088] 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.

[0089] 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.

Modification(s)

[0090] 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.

[0091] FIG. 5 is a cross sectional view showing a packaging bag provided with a zipper tape according to another exemplary embodiment.

[0092] 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 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.

[0093] 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.

[0094] 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.

[0095] 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.

[0096] 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.

[0097] 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.

[0098] 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

[0099] 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.

[0100] 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.

Example 1

[0101] 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.

[0102] The base material film is a laminate of a 12- μ m polyethylene terephthalate film and a linear low-density polyethylene (LLDPE) film.

Constituent Material in Example 1

[0103] Male belt-like base and Female belt-like base: random polypropylene (density: 900 kg/m³, ethylene contents: 4%)

[0104] Seal layer: a metallocene-type linear low-density polyethylene resin (melting point: 95 degrees C., MFR: 3 g/10 minutes)

[0105] The melting point was measured by DSC and the maximum melting peak was defined as the melting point.

[0106] 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 μ m and the thickness (D1) of the thin portion was 60 μ m. The thin portion was not bonded to the inner surface of the bag body.

Example 2

[0107] 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.

Constituent Material in Example 2

[0108] Male belt-like base and Female belt-like base: a linear low-density polyethylene (LLDPE) resin (density: 913 kg/m³, MFR: 4 g/10 minutes)

[0109] Seal layer: a metallocene-type linear low-density polyethylene resin (melting point: 95 degrees C., MFR: 3 g/10 minutes)

Comparative 1

[0110] 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.

Constituent Material in Comparative 1

[0111] Female belt-like base 91A and Male belt-like base 92A: a linear low-density polyethylene (LLDPE) resin (density: 916 kg/m³, MFR: 8.5 g/10 minutes)

[0112] Cutting portion 93A: 80 mass % of a crystalline polyolefin resin (density: 916 kg/m³, MFR: 8.5 g/10 minutes) and 20 mass % of cyclic polyolefin (MFR: 30 g/10 minutes)

Comparative 2

[0113] 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

[0114] In Comparative 3, a zipper tape and a packaging bag were obtained in the same manner as in Example 1 except that the thickness (D1) of the thin portion was defined as 40 μ m.

Comparative 4

[0115] 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 μm.

Comparative 5

[0116] 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 μm.

TABLE 1

	Thickness (μm)		
	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

[0117] 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.

Appearance Test

[0118] 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

[0119] A: The cutting portion is always cut at a single position.

[0120] C: The cutting portion is cut at two or more positions to generate cutting fragments.

Openability Test

[0121] 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

[0122] A: easily openable without resistance (breaking strength: 5 N/60 mm or less)

[0123] C: difficult to open with a large resistance (breaking strength: 5 N/60 mm or more)

Linear Cutting Performance Test

[0124] 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

[0125] A: The zipper tape was completely linearly cut (positional deviation of the breaking point: less than 1 mm)

[0126] B: The zipper tape was linearly cut (positional deviation of the breaking point: from 1 mm to 3 mm)

[0127] C: The zipper tape was not linearly cut (positional deviation of the breaking point: more than 3 mm)

[0128] 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

[0129] A: No pinhole was generated.

[0130] C: Pinholes were generated.

[0131] 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.

Evaluation Standard for Bonding State of Thin Portion

[0132] A: The thin portion was not bonded to the inner surface of the bag body.

[0133] C: The thin portion was bonded to the inner surface of the bag body.

[0134] 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

[0135] A: The thin portion was not bent.

[0136] C: The thin portion was bent.

TABLE 2

	Appearance	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

[0137] 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.

[0138] 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.

[0139] It was found in Comparative 3 that, since the thickness of the thin portion was as thin as 40 μm , 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 μm , the thin portion was bonded in manufacturing the bag. It was found in Comparative 5 that, since the rib was as thick as 800 μm , 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 μm and the thickness (D) of the rib is desirably about 300 μm .

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

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 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 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 of the thickness of the rib to the thickness of each of the thick portions is from 0.8 to 1.2.

3. The zipper tape according to claim 1, wherein a ratio of the thickness of each of the thick portions to the thickness (D1) of the thin portion is from 3 to 12.

4. The zipper tape according to claim 1, 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 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 claim 1, 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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