(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 434 911 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
25.09.2024 Bulletin 2024/39

(21) Application number: **22895697.5**

(22) Date of filing: **18.11.2022**

(51) International Patent Classification (IPC):
B65D 33/25 *(2006.01)* ***A44B 19/16*** *(2006.01)*
A44B 19/34 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A44B 19/16; A44B 19/34; B65D 33/25

(86) International application number:
PCT/JP2022/042831

(87) International publication number:
WO 2023/090416 (25.05.2023 Gazette 2023/21)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **19.11.2021 JP 2021188637**

(71) Applicant: **Idemitsu Unitech Co., Ltd.**
Tokyo 108-0014 (JP)

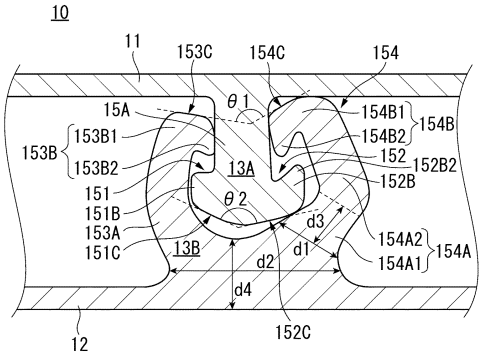
(72) Inventors:
- **TAKAMURA, Ikuo**
  Tokyo 108-0014 (JP)
- **OTOBUCHI, Akira**
  Tokyo 108-0014 (JP)
- **ITO, Shunichi**
  Tokyo 108-0014 (JP)

(74) Representative: **Gille Hrabal**
Partnerschaftsgesellschaft mbB
Patentanwälte
Brucknerstraße 20
40593 Düsseldorf (DE)

(54) ZIPPER TAPE, ZIPPER-TAPE-EQUIPPED CONTAINER, AND METHOD FOR PREVENTING FALSIFICATION

(57) A zipper tape is provided including: a first base; a male engagement portion protruding from the first base; a second base; and a female engagement portion protruding from the second base, in which the male engagement portion includes first and second hooks protruding outward, the female engagement portion includes third and fourth hooks protruding inward, the first hook is engaged with the third hook and the second hook is engaged with the fourth hook when the male engagement portion fits inside the female engagement portion, and a force required for causing the male engagement portion to fit inside the female engagement portion is in a range from 30 N/15mm to 100 N/15mm.

FIG. 1



EP 4 434 911 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a zipper tape, a zipper-tape-attached container, and a method of preventing falsification.

BACKGROUND ART

[0002] For instance, as described in Patent Literature 1, a known technology prevents falsification of contents in a zipper-tape-attached container by making engagement portions once closed of a zipper difficult to reopen. In a case of Patent Literature 1, a film is inserted in a zipper tape before the encapsulation of the contents so that that engagement portions are not closed.

CITATION LIST

PATENT LITERATURE(S)

[0003] Patent Literature 1: JP 2015-217980 A

SUMMARY OF THE INVENTION

PROBLEM(S) TO BE SOLVED BY THE INVENTION

[0004] In addition to the above case as in Patent Literature 1, it is desired to prevent engagement portions of a zipper from being closed in some cases. For instance, in a case where a zipper-tape-attached container is to be transported with engagement portions opened and then the engagement portions are to be closed after contents are encapsulated, it is necessary to prevent the engagement portions from being closed during the transportation. In these cases, the insertion of an additional member such as a film to prevent the engagement portions from being closed is not only a complicated step, but also unfavorable in terms of a reduction in waste plastics as the film is usually made of plastic.

[0005] Accordingly, an object of the invention is to provide a zipper tape, a zipper-tape-attached container, and a method of preventing falsification, which allow for preventing engagement portions from being closed by a simple configuration requiring no additional member.

MEANS FOR SOLVING THE PROBLEM(S)

[0006]

[1] A zipper tape includes: a first base; a male engagement portion protruding from the first base; a second base; and a female engagement portion protruding from the second base, in which the male engagement portion includes first and second hooks protruding outward, the female engagement portion includes third and fourth hooks protruding inward, the first hook is engaged with the third hook and the second hook is engaged with the fourth hook when the male engagement portion fits inside the female engagement portion, and a force required for engaging the male engagement portion with the female engagement portion is in a range from 30 N/15mm to 100 N/15mm.

[2] The zipper tape according to [1], in which each of the second hook and the fourth hook includes a barb portion at a distal end, and each of the first hook and the third hook includes, at a distal end, no barb portion or a barb portion having a larger angle than the barb portion of each of the second hook and the fourth hook, the fourth hook includes: a first raised portion that is raised obliquely with respect to the second base from a connection region of between the female engagement portion and the second base; a second raised portion that is continuous with the first raised portion and raised at an angle closer to a right angle than the first raised portion with respect to the second base; a bent portion that is continuous with the second raised portion; and the barb portion that is formed at a distal end of the bent portion, and the first raised portion has a width of 0.35 mm or more.

[3] The zipper tape according to [1] or [2], in which a minimum width of a connection region of between the female engagement portion and the second base is in a range from 1.0 mm to 1.8 mm.

[4] The zipper tape according to any one of [1] to [3], in which each of the second hook and the fourth hook includes a barb portion at a distal end, and each of the first hook and the third hook includes, at a distal end, no barb portion or a barb portion having a larger angle than the barb portion of each of the second hook and the fourth hook, the fourth hook includes: a first raised portion that is raised obliquely with respect to the second base from a connection

region of between the female engagement portion and the second base; a second raised portion that is continuous with the first raised portion and raised at an angle closer to a right angle than the first raised portion with respect to the second base; a bent portion that is continuous with the second raised portion; and the barb portion that is formed at a distal end of the bent portion, and the first raised portion has a length of 0.4 mm or less along a direction of erection.

[5] The zipper tape according to any one of [1] to [4], in which each of the third hook and the fourth hook includes a raised portion that is raised from a connection region of between the female engagement portion and the second base; a bent portion that is continuous with the raised portion; and a barb portion that is formed at a distal end of the bent portion, and the bent portions includes outer surfaces to be brought into contact with the first hook and the second hook, respectively, when the male engagement portion fits inside the female engagement portion, and the outer surfaces form an angle of 145 degrees or more on an outer side of the female engagement portion.

[6] The zipper tape according to any one of [1] to [5], in which a minimum distance from an inner space of the female engagement portion defined between the third hook and the fourth hook to an opposite surface of the second base from the female engagement portion is 0.50 mm or more.

[7] The zipper tape according to any one of [1] to [6], in which the male engagement portion includes a first slant surface and a second slant surface between the first hook and the second hook, the first slant surface being continuous with the first hook, the second slant surface being continuous with the second hook, and an angle formed by the first slant surface and the second slant surface inside the male engagement portion is 140 degrees or more.

[8] A zipper-tape-attached container includes: a container body; and the zipper tape according to any one of [1] to [6] with the first base and the second base being bonded to the container body.

[9] The zipper-tape-attached container according to [8], in which the container body is in a form of a bag.

[10] A method of preventing falsification of contents in the zipper-tape-attached container according to [8] or [9], the method including: making the force required for engaging the male engagement portion with the female engagement portion larger than a usually assumable force.

[0007] By virtue of above configuration, the force required for engagement between the male engagement portion and the female engagement portion of the zipper tape is larger than a force of a typical zipper tape, so that the engagement portions are less likely to be closed. This makes it possible to prevent the engagement portions from being closed by a simple configuration requiring no additional member.

BRIEF DESCRIPTION OF DRAWINGS

[0008]

Fig. 1 is an enlarged cross-sectional view of engagement portions of a zipper tape according to an exemplary embodiment of the invention.

Fig. 2 is an enlarged cross-sectional view of engagement portions of a typical zipper tape.

Fig. 3 is a plan view of a zipper-tape-attached container including the zipper tape illustrated in Fig. 1.

DESCRIPTION OF EMBODIMENT(S)

[0009] Fig. 1 is an enlarged cross-sectional view of engagement portions of a zipper tape according to an exemplary embodiment of the invention. Fig. 2 is an enlarged cross-sectional view of engagement portions of a typical zipper tape for comparison. A zipper tape 10 illustrated in Fig. 1 includes a first base 11, a second base 12, a male engagement portion 13A protruding from the first base 11, and a female engagement portion 13B protruding from the second base 12. The male engagement portion 13A includes hooks 151 and 152 protruding outward. More specifically, the hooks 151 and 152 include a common raised portion 15A raised from the first base 11 and respective protrusions 151B and 152B protruding on both sides from the raised portion 15A. The protrusion 152B includes a barb portion 152B2 formed at a distal end thereof.

[0010] The female engagement portion 13B includes hooks 153 and 154 protruding inward. More specifically, the hook 153 includes a raised portion 153A raised from the second base 12 and a protrusion 153B protruding from the raised portion 153A. The protrusion 153B includes a bent portion 153B1 formed continuously with the raised portion 153A and a barb portion 153B2 formed at a distal end of the bent portion 153B1. The hook 154 includes a raised portion 154A raised from the second base 12 and a protrusion 154B protruding from the raised portion 154A. The protrusion 154B includes a bent portion 154B1 formed continuously with the raised portion 154A and a barb portion 154B2 formed at a distal end of the bent portion 154B1.

[0011] It should be noted that "outward" and "inward" herein are defined with reference to a width direction of the zipper tape 10. In the illustrated example, for the male engagement portion 13A, a direction away from the single raised portion 15A is referred to as "outward." In contrast, for the female engagement portion 13B, a direction toward an inner

space sandwiched between the two raised portions 153A and 154A, in other words, a direction from one of the raised portions 153A and 154A to the other, is referred to as "inward."

[0012] The male engagement portion 13A and the female engagement portion 13B are configured such that the male engagement portion 13A fits inside the female engagement portion 13B as illustrated. When the male engagement portion 13A and the female engagement portion 13B are in engagement, the hook 151 of the male engagement portion 13A and the hook 153 of the female engagement portion 13B are in engagement and the hook 152 of the male engagement portion 13A and the hook 154 of the female engagement portion 13B are in engagement. It should be noted that a typical zipper tape 90 illustrated in Fig. 2 also has a configuration similar to the configuration as described so far.

[0013] In the zipper tape 10 according to the exemplary embodiment, the application of one, two or more, or all of the constituent elements described hereinbelow causes a force required for engaging the male engagement portion 13A with the female engagement portion 13B to fall within a range from 30 N/15mm to 100 N/15mm. The force required for engaging the male engagement portion 13A with the female engagement portion 13B is also referred to as a closure strength of the zipper tape 10 in the description hereinbelow. It is possible to calculate the closure strength by cutting the zipper tape in a width of 15 mm, opposing the first base 11 and the second base 12 to each other with the male engagement portion 13A and the female engagement portion 13B disengaged, placing and fixing an opposite surface of the second base 12 from the female engagement portion 13B on a stage or the like and then applying a compression force to an opposite surface of the first base 11 from the male engagement portion 13A, and measuring a maximum value of the compression force applied until the male engagement portion 13A and the female engagement portion 13B are engaged. The compression force may be measured using, for instance, a digital force gauge manufactured by IMADA CO., LTD. but this example is not exhaustive.

[0014] In the typical zipper tape 90 illustrated in Fig. 2, a closure strength is in a range from 10 N/15mm to 20 N/15mm, approximately. The closure strength of the zipper tape 10 according to the exemplary embodiment is 30 N/15mm or more, so that the engagement portions are less likely to be closed than those of the typical zipper tape 90. In other words, it is possible to prevent the engagement portions of the zipper tape 10 from being closed without the necessity of an additional member such as a film inserted between the engagement portions. The closure strength of the zipper tape 10 is preferably in a range from 35 N/15mm or more, and more preferably in a range from 40 N/15mm or more. In a case where the zipper tape 10 is used for the purpose of preventing falsification as described later, the closure strength may be 50 N/15mm or more, preferably 60 N/15mm or more.

[0015] Meanwhile, with the zipper tape 10 having the closure strength of 100 N/15mm or less, the engagement portions are allowed to be eventually closed. For instance, the zipper tape 10 may be designed to be closed only in a specific situation where, for instance, one of the first base 11 and the second base 12 is placed and fixed on a stage or the like after the zipper tape 10 is attached to a container body as described later. The closure strength of the zipper tape 10 is preferably in 85 N/15mm or less, and more preferably 70 N/15mm or less. In a case where the zipper tape 10 is used for the purpose of preventing falsification as described later and it is not necessary to, for instance, close the engagement portions once they are opened, the closure strength has no upper limit such as the above but the closure strength may be, for instance, 200 N/15mm or less so that the engagement portions are first closed.

[0016] Description is made below on applicable constituent elements for causing the closure strength of the zipper tape 10 according to the exemplary embodiment to fall within the range from 30 N/15mm to 100 N/15mm. Although all of the following constituent elements (1) to (5) are applied in the illustrated example, the exemplary embodiment of the invention is not limited to such an example. As already described, merely one, a plurality, or all of the constituent elements (1) to (5) may be applied.

(1) Width of Obliquely Raised Portion

[0017] In the zipper tape 10 according to the exemplary embodiment, a width d1 of an obliquely raised portion of the hook 154 included in the female engagement portion 13B is 0.35 mm or more. The hook 154 includes the raised portion 154A and the protrusion 154B as described above. The raised portion 154A includes a first raised portion 154A1 and a second raised portion 154A2. The first raised portion 154A1 is raised obliquely with respect to the second base 12 from a connection region of between the female engagement portion 13B and the second base 12. The second raised portion 154A2 is continuous with the first raised portion 154A1 and raised at an angle closer to a right angle than the first raised portion 154A1 with respect to the second base 12. The bent portion 154B1 of the protrusion 154B is formed continuously with the second raised portion 154A2. In the exemplary embodiment, the width d1 of the first raised portion 154A1 obliquely raised with respect to the second base 12 is 0.35 mm or more. The width d1 is a dimension in a direction perpendicular to a direction of the erection of the first raised portion 154A1. In a case where the width changes within the first raised portion 154A1, the width d1 is defined at a portion with the largest width. In the typical zipper tape 90, the width d1 of the first raised portion 154A1 is less than 0.35 mm. It is possible to enhance the closure strength by making the width d1 larger. In the zipper tape 10, the width d1 of the first raised portion 154A1 is preferably 0.4 mm or more, more preferably 0.45 mm or more, still more preferably 0.5 mm or more, and still further more preferably 0.6 mm

or more. In addition, in order to cause the closure strength to fall within a suitable range, the width d1 of the first raised portion 154A1 of the zipper tape 10 is, for instance, 1.0 mm or less, preferably 0.9 mm or less, and more preferably 0.8 mm or less. In a zipper-tape-attached container with the zipper tape 10 attached to a container body as described later, it does not matter whether the first raised portion 154A1 as described above is at a position near an opening or near a containing space in the container; however, it is preferable that the first raised portion 154A1 be located near the opening and it is more preferably that the first raised portion 154A1 be located near each of the opening and the containing space.

(2) Minimum Width of Connection Region of Female Engagement Portion

[0018] In the zipper tape 10 according to the exemplary embodiment, a minimum width d2 of the connection region of between the female engagement portion 13B and the second base 12 is in a range from 1.0 mm to 1.8 mm. Here, the connection region is a portion where the raised portions 153A and 154A of the female engagement portion 13B are raised from the second base 12. In other words, the connection region is a constricted region where a distance between outer sides of the raised portions 153A and 154A in the width direction of the zipper tape 10 is smaller than in any other portion. In the typical zipper tape 90, the minimum width d2 of the connection region is less than 1.0 mm. It is possible to enhance the closure strength by making the minimum width d2 larger. In the zipper tape 10, the minimum width d2 of the connection region of between the female engagement portion 13B and the second base 12 is preferably 1.1 mm or more, and more preferably 1.2 mm or more. In addition, in order to cause the closure strength to fall within a suitable range, the minimum width d2 in the zipper tape 10 is 1.8 mm or less, preferably 1.7 mm or less, and more preferably 1.6 mm or less.

(3) Length of Obliquely Raised Portion

[0019] In the zipper tape 10 according to the exemplary embodiment, the obliquely raised portion of the hook 154 included in the female engagement portion 13B, namely, the first raised portion 154A1 described in (1) above has a length d3 of 0.4 mm or less along a direction of the erection of the first raised portion 154A1. In the typical zipper tape 90, the length d3 of the first raised portion 154A1 exceeds 0.4 mm. It is possible to enhance the closure strength by making the length d3 shorter. In the zipper tape 10, the length d3 of the first raised portion 154A1 is preferably 0.35 mm or less, and more preferably 0.3 mm or less. A lower limit of the length d3 is not limited to a particular one.

(4) Angle of Outer Side of Bent Portion of Female Engagement Portion

[0020] In the zipper tape 10 according to the exemplary embodiment, an angle $\theta 1$ formed by outer sides of the respective bent portions 153B1 and 154B1 of the female engagement portion 13B is 145 degrees or more. The bent portions 153B1 and 154B1 are respectively formed at distal end portions of the hooks 153 and 154 of the female engagement portion 13B as described above. The bent portions 153B1 and 154B1 includes outer surfaces to be brought into contact with the hooks 151 and 152 of the male engagement portion 13A when the male engagement portion 13A fits inside the female engagement portion 13B. These surfaces are referred to as contact surfaces 153C and 154C hereinbelow. In the exemplary embodiment, the angle $\theta 1$ is made by the contact surfaces 153C and 154C on an outer side of the female engagement portion 13B, i.e., on an opposite side of the female engagement portion 13B from an inner space defined between the hooks 153 and 154, and the angle $\theta 1$ is 145 degrees or more. In the typical zipper tape 90, the angle $\theta 1$ is less than 145 degrees. It is possible to enhance the closure strength by making the angle $\theta 1$ larger. In the zipper tape 10, the angle $\theta 1$ is preferably 150 degrees or more, and more preferably 160 degrees or more. In addition, an upper limit of the angle $\theta 1$ is not limited to a particular one and may exceed 180 degrees, but is, for instance, 200 degrees or less.

(5) Thickness of Connection Region of Female Engagement Portion

[0021] In the zipper tape 10 according to the exemplary embodiment, a minimum distance d4 from the inner space of the female engagement portion 13B defined between the hooks 153 and 154 to an opposite surface of the second base 12 from the female engagement portion 13B is 0.50 mm or more. The distance d4 is a thickness of the connection region of between the female engagement portion 13B and the second base 12 and the thickness includes the second base 12. In the typical zipper tape 90, the distance d4 is less than 0.50 mm. It is possible to enhance the closure strength by making the distance d4 larger. In the zipper tape 10, the distance d4 is preferably 0.51 mm or more, and more preferably 0.52 mm or more. An upper limit of the distance d4 is not limited to a particular one and is, for instance, 1.00 mm or less.

(6) Angle Made by Slant Surfaces of Male Engagement Portion

[0022] In the zipper tape 10 according to the exemplary embodiment, an angle $\theta 2$ made by slant surfaces formed

between the hooks 151 and 152 of the male engagement portion 13A is 140 degrees or more. A slant surface 151C continuous with the protrusion 151B of the hook 151 and a slant surface 152C continuous with the protrusion 152B of the hook 152 form a chevron shape between the hooks 151 and 152 of the male engagement portion 13A. It should be noted that a connection portion between the slant surface 151C and the slant surface 152C, in other words, a corner of the chevron shape, may be angulated or, as in the illustrated example, rounded. The angle $\theta 2$ made by the slant surface 151C and the slant surface 152C on a side including the male engagement portion 13A (in other words, an internal angle side of the chevron shape) is 140 degrees or more. In the typical zipper tape 90, the angle $\theta 2$ is less than 140 degrees. It is possible to enhance the closure strength by making the angle $\theta 2$ larger. In the zipper tape 10, the angle $\theta 2$ is preferably 145 degrees or more, and more preferably 150 degrees or more. An upper limit of the angle $\theta 2$ is not limited to a particular one and may exceed 180 degrees, but is, for instance, 300 degrees or less.

[0023] The zipper tape 10 as described above is formed from a polyolefin resin, specifically, for instance, a resin composition whose main component is polypropylene. The resin composition may include a low-density polyethylene (LDPE) or a linear low-density polyethylene (LLDPE). At least a part of the LDPE or the LLDPE may be bio-polyethylene. The main component of the first resin composition, or polyolefin resin, is not limited to a resin derived from fossil fuel, and may be an environment-friendly bioplastic (a polyolefin resin such as bio-polypropylene or bio-polyethylene derived from biomass) or a mixture of a resin derived from fossil fuel and bioplastic. The first resin composition may be added with a known additive such as a stabilizer, an antioxidant, a lubricant, an antistatic agent, or a colorant, as necessary. The whole of the zipper tape 10 is not necessarily formed by the same resin composition. For instance, a resin composition forming the first base 11 and the second base 12 may be different from a resin composition forming the male engagement portion 13A and the female engagement portion 13B.

[0024] Rigidity of the male engagement portion 13A and the female engagement portion 13B changes depending on a component of the resin composition forming the male engagement portion 13A and the female engagement portion 13B and, accordingly, the closure strength of the zipper tape 10 also change. In the exemplary embodiment, the closure strength of the zipper tape 10 is caused to fall within the range from 30 N/15mm to 100 N/15mm by selectively employing the above configurations (1) to (5) in accordance with, for instance, the component of the resin composition forming the male engagement portion 13A and the female engagement portion 13B.

[0025] Fig. 3 is a plan view of a zipper-tape-attached container including the zipper tape illustrated in Fig. 1. In the illustrated example, a zipper-tape-attached container 100 includes a bag-shaped container body including a film 110 and the zipper tape 10 and the film 110 has a first surface 111A and a second surface 111B both facing a containing space SP. The zipper tape 10 is attached to the container body by bonding the first base 11 and the second base 12 to the first surface 111A and the second surface 111B, respectively.

[0026] It should be noted that although the bag-shaped container body is formed by bonding the two films 110 to each other at a bottom seal 112 and a side seal 113 in the illustrated example, the bag-shaped container body may be formed by folding a single film 110 at a portion corresponding to the side seal 113 in another example. Further, a part in which the film is folded inward, that is, a so-called gusset, may be provided in a part corresponding to the bottom seal 112 or the side seal 113. In this case, the gusset may be formed by the film 110 or may be formed by another film bonded to the film 110. The zipper-tape-attached container 100 may also be a stand up pouch capable of standing upright on the gusset provided at a bottom thereof. In the illustrated example, the first surface 111A and the second surface 111B of the film 110 on a side opposite the containing space SP with respect to the zipper tape 10 are not bonded to each other and an opening 101 is formed between the first surface 111A and the second surface 111B. However, the first surface 111A and the second surface 111B may be bonded to each other even on this side to form a top seal. An opening may be formed later by cutting between the top seal and the zipper tape 10.

[0027] In the above example, the film 110 includes, for example, a single-layer or multi-layer thermoplastic resin. More specifically, the film 110 is formed of, for instance, polypropylene, high-density polyethylene (HDPE), or linear low-density polyethylene (LLDPE). The polypropylene is, for instance, polypropylene homopolymer (HPP), polypropylene random copolymer (RPP), or polypropylene block copolymer (BPP). In a case where the film 110 is a multi-layered film, biaxially oriented polypropylene (OPP), biaxially oriented polyethylene terephthalate (OPET), or biaxially oriented nylon (ONy) may be used for a surface base material. These are not limited to a resin derived from fossil fuel, and may be an environment-friendly bioplastic (a polyolefin resin such as bio-polypropylene or bio-polyethylene derived from biomass) or a mixture of a resin derived from fossil fuel and bioplastic. The film 110 may include an inorganic material layer formed by aluminum vapor deposition or stacking of layers of aluminum foil.

[0028] In the zipper-tape-attached container 100 as described above, the closure strength of the zipper tape 10 is in the range from 30 N/15mm to 100 N/15mm and the engagement portions are less likely to be closed than those of a typical zipper tape. Thus, for instance, in a case where the zipper-tape-attached container 100 is to be transported with the engagement portions of the zipper tape 10 opened, it is possible to prevent the engagement portions from being closed without an additional member, such as a film, to be inserted between the engagement portions. Afterward, it is possible to encapsulate contents into the containing space SP through the opened zipper tape 10 and close the engagement portions.

[0029] Alternatively, a method of preventing falsification using the zipper-tape-attached container 100 as described above may be implemented. In the zipper tape 10, the closure strength is set at 30 N/15mm or more, so that it is possible to set a larger closure strength than a usually assumable force, for instance, a force for a person to apply to the zipper tape 10 from the outside of the first surface 111A and the second surface 111B for closing of the zipper tape 10 held between the first surface 111A and the second surface 111B. In this case, the engagement portions of the zipper tape 10 are not allowed to be easily closed once they are opened. Thus, for instance, in a case where somebody has falsified contents, the engagement portions of the zipper tape 10 are left open and, accordingly, the falsification is detectable.

Examples

[0030] For Example and Comparatives of the invention, a closure strength, i.e., a force required for engaging a male engagement portion with a female engagement portion, was measured in a zipper tape in which the engagement portions in a shape indicated in Table 1 below were formed. In Example, the closure strength was calculated by cutting the zipper tape in a width of 15 mm, opposing the bases to each other with the male and female engagement portions disengaged, placing and fixing an opposite surface of the female base from the female engagement portion on a stage and then applying a compression force to an opposite surface of the male base from the male engagement portion, and measuring a maximum value of the compression force applied until the male and female engagement portions were engaged using a digital force gauge (model name: ZTS-200N) manufactured by IMADA CO., LTD.

[0031] It should be noted that all of the width d1, the minimum width d2, the length d3, the distance d4, the angle $\theta 1$, and the angle $\theta 2$ in the table refer to the dimensions and angles of the portions of the engagement portions described above with reference to Fig. 1.

Table 1

	d1 (mm)	d2 (mm)	d3 (mm)	d4 (mm)	$\theta 1$ (degrees)	$\theta 2$ (degrees)	Closure Strength (N/15 mm)
Ex.	0.42	1.25	0.23	0.51	155	151	61.8
Comp. 1	0.31	0.68	0.45	0.43	142	132	16.5
Comp. 2	0.32	0.74	0.40	0.44	141	119	4.8

Table 1: Example and Comparative Examples

[0032] The above results have demonstrated that the configurations of the engagement portions of the zipper tape described as the exemplary embodiment of the invention are effective for enhancing the closure strength of the zipper tape.

[0033] Preferred exemplary embodiments of the invention have been described above in detail with reference to the accompanying drawings, but the invention is not limited to such exemplary embodiments. It is apparent that a skilled person in the art of the invention can arrive at various alterations and modifications within the scope of the technical idea recited in the appended claims, and it is understood that such alterations and modifications naturally fall within the technical scope of the invention.

EXPLANATION OF CODES

[0034] 10...zipper tape, 11...first base, 12...second base, 13A...male engagement portion, 13B...female engagement portion, 151, 152, 153, 154...hook, 15A, 153A, 154A...raised portion, 154A1...first raised portion, 154A2...second raised portion, 151B, 152B, 153B, 154B...protrusion, 153B1, 154B1...bent portion, 152B2, 153B2, 154B2...barb portion, 151C, 152C...slant surface, 153C, 154C...contact surface, 100...zipper-tape-attached container, 101...opening, 110...film, 111A...first surface, 111B...second surface, 112...bottom seal, 113...side seal, SP...containing space

Claims

1. A zipper tape comprising:

a first base;
a male engagement portion protruding from the first base;
a second base; and

a female engagement portion protruding from the second base, wherein
the male engagement portion comprises first and second hooks protruding outward,
the female engagement portion comprises third and fourth hooks protruding inward,
when the male engagement portion fits inside the female engagement portion, the first hook is engaged with the third hook and the second hook is engaged with the fourth hook, and
a force required for engaging the male engagement portion with the female engagement portion is in a range from 30 N/15mm to 100 N/15mm.

2. The zipper tape according to claim 1, wherein

each of the second hook and the fourth hook comprises a barb portion at a distal end, and each of the first hook and the third hook comprises, at a distal end, no barb portion or a barb portion having a larger angle than the barb portion of each of the second hook and the fourth hook,
the fourth hook comprises: a first raised portion that is raised obliquely with respect to the second base from a connection region of between the female engagement portion and the second base; a second raised portion that is continuous with the first raised portion and raised at an angle closer to a right angle than the first raised portion with respect to the second base; a bent portion that is continuous with the second raised portion; and the barb portion that is formed at a distal end of the bent portion, and
the first raised portion has a width of 0.35 mm or more.

3. The zipper tape according to claim 1 or 2, wherein a minimum width of a connection region of between the female engagement portion and the second base is in a range from 1.0 mm to 1.8 mm.

4. The zipper tape according to any one of claims 1 to 3, wherein

each of the second hook and the fourth hook comprises a barb portion at a distal end, and each of the first hook and the third hook comprises, at a distal end, no barb portion or a barb portion having a larger angle than the barb portion of each of the second hook and the fourth hook,
the fourth hook comprises: a first raised portion that is raised obliquely with respect to the second base from a connection region of between the female engagement portion and the second base; a second raised portion that is continuous with the first raised portion and raised at an angle closer to a right angle than the first raised portion with respect to the second base; a bent portion that is continuous with the second raised portion; and the barb portion that is formed at a distal end of the bent portion, and
the first raised portion has a length of 0.4 mm or less along a direction of erection.

5. The zipper tape according to any one of claims 1 to 4, wherein

each of the third hook and the fourth hook comprises a raised portion that is raised from a connection region of between the female engagement portion and the second base; a bent portion that is continuous with the raised portion; and a barb portion that is formed at a distal end of the bent portion, and
the bent portions of the third hook and the fourth hook include outer surfaces to be brought into contact with the first hook and the second hook, respectively, when the male engagement portion is to fit inside the female engagement portion, and the outer surfaces form an angle of 145 degrees or more on an outer side of the female engagement portion.

6. The zipper tape according to any one of claims 1 to 5, wherein a minimum distance from an inner space of the female engagement portion defined between the third hook and the fourth hook to an opposite surface of the second base from the female engagement portion is 0.50 mm or more.

7. The zipper tape according to any one of claims 1 to 6, wherein

the male engagement portion includes a first slant surface and a second slant surface between the first hook and the second hook, the first slant surface being continuous with the first hook, the second slant surface being continuous with the second hook, and
an angle formed by the first slant surface and the second slant surface inside the male engagement portion is 140 degrees or more.

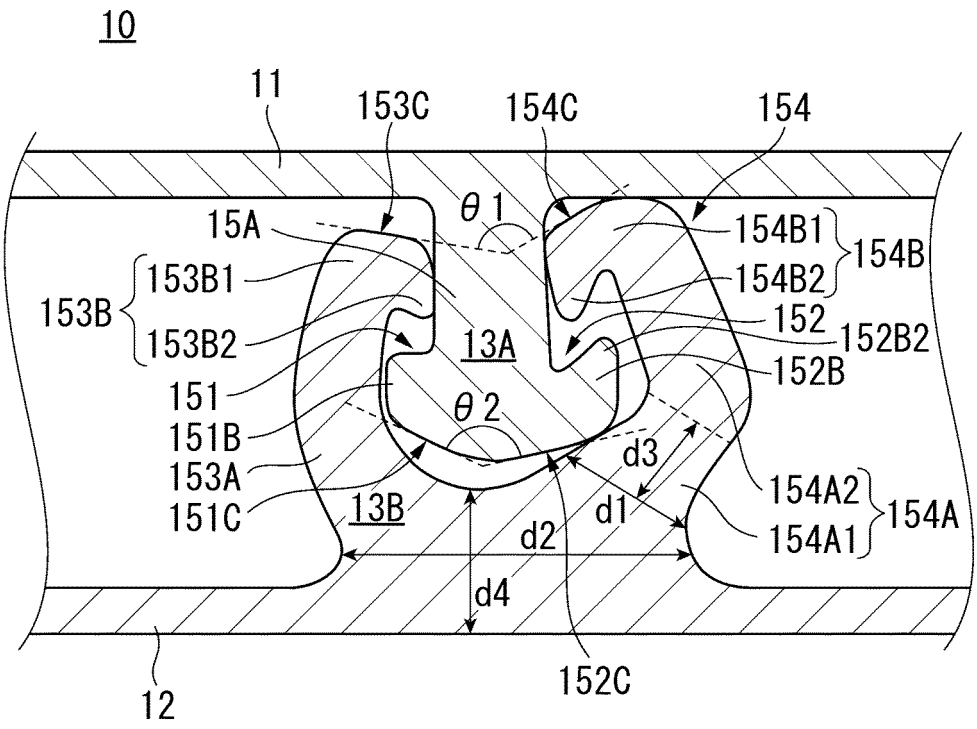
8. A zipper-tape-attached container comprising:

a container body; and
the zipper tape according to any one of claims 1 to 7 with the first base and the second base being bonded to the container body.

9. The zipper-tape-attached container according to claim 8, wherein the container body is in a form of a bag.

10. A method of preventing falsification of contents in the zipper-tape-attached container according to claim 8 or 9, the method comprising: making the force required for engaging the male engagement portion with the female engagement portion larger than a usually assumable force.

FIG. 1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154C
154
θ1
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154B
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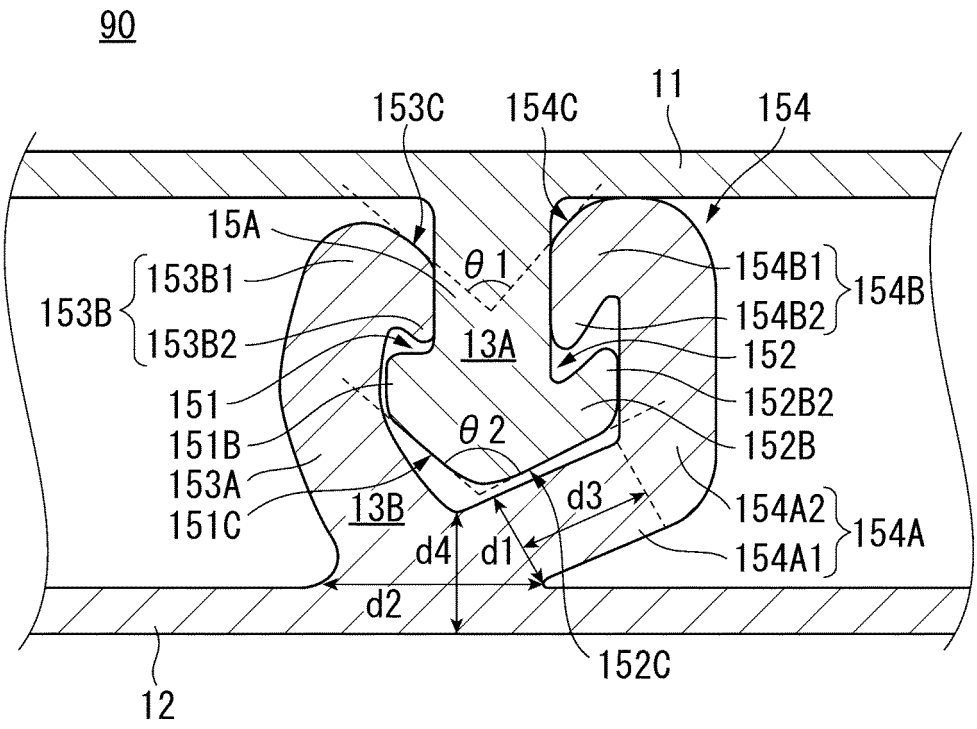
152B
151
θ2
151B
d3
153A
154A2
154A
151C
13B
d1
d2
154A1
d4
12
152C

FIG. 2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154C
11
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15A
θ1
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13A
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152B2
θ2
151B
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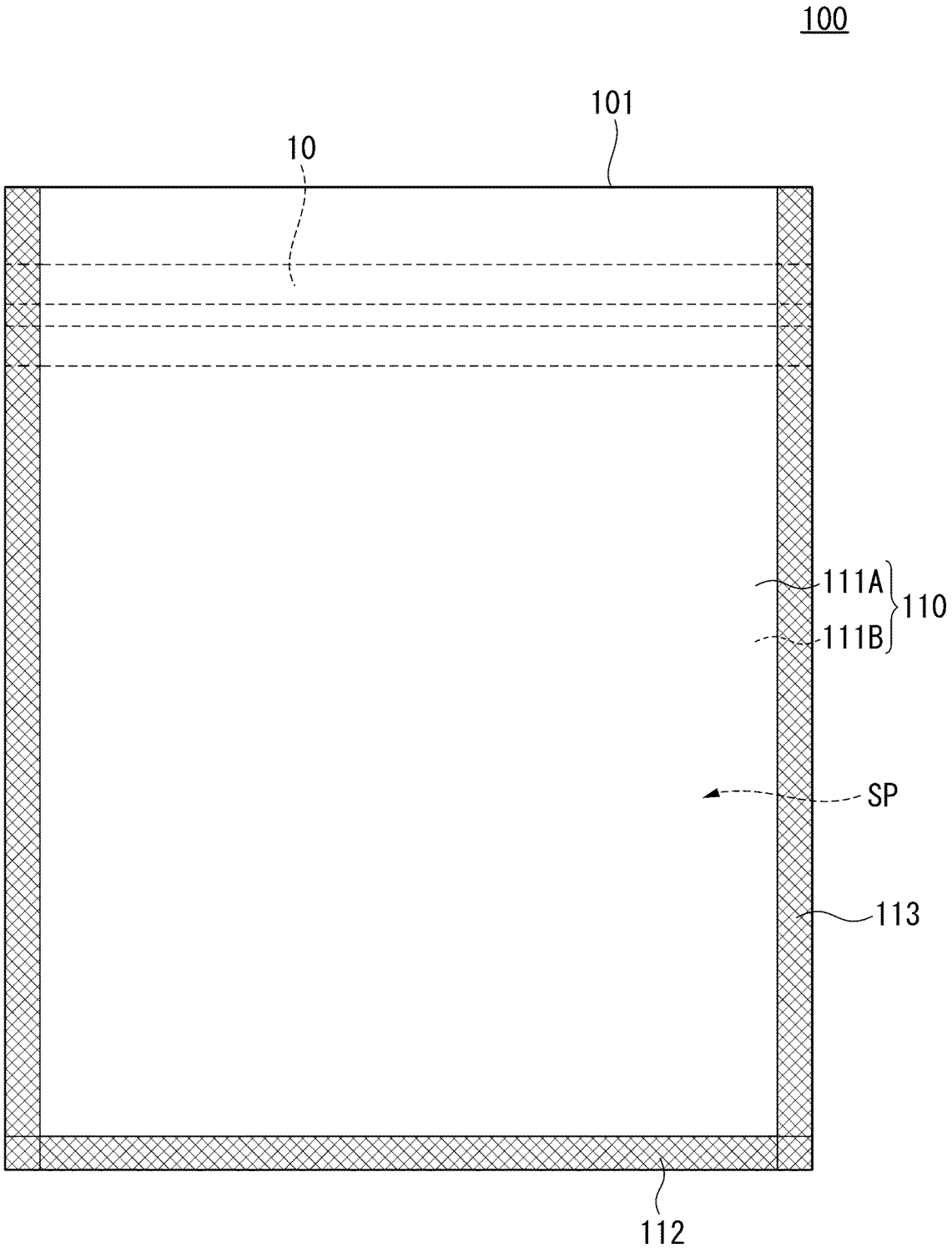
d4
d1
154A1
d2
152C
12

FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/042831

A. CLASSIFICATION OF SUBJECT MATTER

B65D 33/25(2006.01)i; ***A44B 19/16***(2006.01)i; ***A44B 19/34***(2006.01)i
FI: A44B19/34; A44B19/16; B65D33/25 A

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)

A44B19/00-19/64;B65D30/00-33/38

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

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

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.
A	JP 11-501890 A (DOW BRANDS INC.) 16 February 1999 (1999-02-16)	1-10
A	WO 2020/240448 A1 (3M INNOVATIVE PROPERTIES CO.) 03 December 2020 (2020-12-03)	1-10
A	US 2012/0251018 A1 (COONCE, Ryan J.) 04 October 2012 (2012-10-04)	1-10
A	JP 3225400 U (YANTAI BAGMART PACKAGING CO., LTD.) 05 March 2020 (2020-03-05)	1-10
A	JP 9-309546 A (DAIWA PACKAGE FILMS INC.) 02 December 1997 (1997-12-02)	1-10
A	JP 2007-130043 A (IDEMITSU UNITECH CO., LTD.) 31 May 2007 (2007-05-31)	1-10

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

* Special categories of cited documents:
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"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 January 2023	**31 January 2023**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/042831

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JP 9-309546 A	02 December 1997	(Family: none)	
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		WO 2007/055161 A1	
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		KR 10-2008-0066083 A	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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