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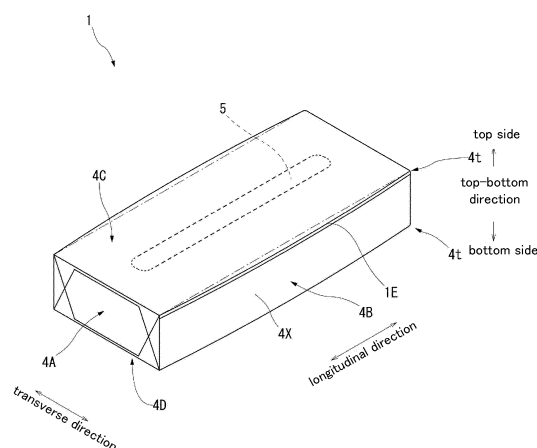
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(54) **FILM PACKAGING FOR TISSUE**

(57) Provided is a film-packaged tissue product which allows easy withdrawal of tissues of 3- or more plies. Solution is provided by the film-packaged tissue product which is a bundle of tissues packed with a flexible packaging film made of resin, and has a dispenser-hole forming portion in its top face, wherein the tissues are 3- or 4-ply tissues having a basis weight of 12.5 to 22.5 g/m² per ply and a paper thickness of 185 to 285 μ m, wherein the dispenser-hole-forming portion is formed with an easy tear line arranged annularly, the easy tear line having alternately arranged cut portions and uncut portions, and the dispenser-hole-forming portion extends widthwise in the top face in a middle of the depth direction, and has an elongated shape with its ends convexing outwards, and arrangements of the cut portions and the uncut portions are different between the widthwise ends, wherein the dispenser-hole-forming portion has a widthwise dimension of 60 to 75 % the width of the top face, and the maximum depthwise dimension of 6 to 15 % the depthwise dimension of the top face of the film-packaged tissue product.

Fig. 1



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DescriptionTechnical Field

- 5 **[0001]** The present invention relates to a film-packaged tissue product in which a bundle of interfolded and stacked tissues is packed with a flexible packaging film.

Background Art

- 10 **[0002]** Tissue paper generally has a layered structure wherein a plurality of plies is stacked. Conventionally, for example in Japan, tissue paper has been in use mainly for facial use, such as for blowing one's nose or wiping one's mouth at meals, so that double-layered tissues, referred to as 2-ply tissues, having superior softness and pliancy have been the mainstream products (see, for example, Patent Literatures 1 and 2 mentioned below).

- 15 **[0003]** On the other hand, in Asian countries other than Japan, the US, and the European countries, tissue paper is used not only for facial use, but also often used for wiping one's skin other than face skin or cleaning up goods, so that "qualities of strength, thickness, and resistance to tear" are desired, and tissues with a larger number of stacked plies, such as of 3-ply or 4-ply, are popularly demanded. Such more than two, multi-ply tissue paper has a larger mass per sheet and a higher stiffness.

- 20 **[0004]** On the other hand, tissue paper is available for use in the form of a tissue package, which is a bundle of a plurality of sheets stacked and packaged. As such a tissue package, there is known a tissue package which is a bundle of tissues packed with a flexible packaging film made of resin, also referred to as a film-packaged tissue product. As such a film-packaged tissue product, portable products, referred to as pocket tissues, are popular, while some others are used in place, like a so-called box tissues, which are a bundle of tissues enclosed in a paper-made storage box called a carton (referred to sometimes as a boxed product hereinbelow), or used as a refill of a bundle in a boxed product.

- 25 **[0005]** In the film-packaged tissue product used in place or the like manner, the enclosed bundle is of a so-called pop-up type, wherein withdrawal of the top sheet leads to withdrawal of part of the subsequent sheet in turn. This film-packaged tissue product is advantageous over the boxed products in reduction of packaging material, as well as transportation cost and portability due to compactification.

- 30 **[0006]** In conventional film packages of tissues, the perforated line formed in the top face for forming a dispenser hole was usually a perforated line arranged in the form of a simple straight slit for the purpose of cost reduction.

- [0007]** However, a dispenser hole in the form of a slit formed by tear-opening such a perforated line may have a problem with a longer slit in that the sheets may fall inside when only a small number of sheets are left inside, and a problem with a shorter slit in that the first sheet after the opening is hard to be withdrawn out of the film, and the removal resistance in the beginning of use is so high that the exterior film is also lifted upon withdrawal of a sheet.

- 35 **[0008]** In order to solve these problems, the perforated line for forming a dispenser hole is placed in an elongated annular shape extending in the longitudinal direction, by die cutting or the like technique, to make the opening of the dispenser hole broader in the depth direction with a certain width (see Patent Literatures 1 and 2 below).

- [0009]** The conventional elongated annular dispenser hole is suitably designed for 2-ply tissues having superior softness and pliancy and, in Patent Literature 1, for example, the depthwise dimension of the dispenser hole is 15 to 28 % of the depthwise dimension of the tissue paper bundle. However, the dispenser hole adapted mainly for 2-ply tissues is not always suitable for 3- or 4-ply tissues, which are relatively high in stiffness. In particular, for the 3- or 4-ply tissues, which are higher in stiffness compared to the 2-ply tissues, the width of the opening needs to be larger for good dispensability, but the balance between the dispensability and anti-fall property is different from that for the 2-ply tissues, so that the design is hard to be the same as that for the 2-ply tissues.

- 45 **[0010]** Hygienic concepts and lifestyles vary from state to state or from region to region. For example, in People's Republic of China, where strong tissues, such as of three or four plies, are popular, the die-cut opening area having a certain depthwise dimension as shown in Patent Literature 2, is not preferred since many people feel that the opening is too large and prone to entry of foreign matters. In view of such market, it may be desired to reduce the opening area, but mere reduction of the opening area may deteriorate dispensability or openability.

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Prior Art LiteraturePatent Literature

- 55 **[0011]**

Patent Literature 1: JP 2018-052559 A

Patent Literature 2: JP 2018-058654 A

Summary of InventionProblems to be Solved by the Invention

[0012] It is a primary object of the present invention to provide, in view of the above problems, a film-packaged tissue product which gives an impression that foreign matters are hard to enter, may be used in a sanitary manner, is excellent in openability, and is easily dispensable even with three or more ply tissues with a high mass per sheet and stiffness.

Means for Solving the Problem

[0013] Means for solving the above problems are as follows.

[0014] The first means is a film-packaged tissue product which is a bundle of tissues packed with a flexible packaging film made of resin,

wherein the tissues are 3- or 4-ply tissues having a basis weight of 12.5 to 22.5 g/m² per ply and a paper thickness of 185 to 285 μm,

wherein the film-packaged tissue product has a dispenser-hole-forming portion in its top face, the dispenser-hole-forming portion being formed with an easy tear line arranged annularly, the easy tear line having alternately arranged cut portions and uncut portions, and the dispenser-hole-forming portion extends widthwise in the top face in a middle of a depth direction, and has an elongated shape with its ends convexing outwards, and

wherein the dispenser-hole-forming portion has a widthwise dimension of 60 to 75 % a width of the top face, and a maximum depthwise dimension of 6 to 15 % a depthwise dimension of the top face.

[0015] The second means is the film-packaged tissue product according to the first means,

wherein the packaging film in the top face has a B value of 0.093 gf × cm²/cm or less, and a 2HB value of 0.033 gf × cm/cm or less, as measured using KES-FB2-S bending tester, and

wherein the tissue has a B value of 0.010 to 0.022 gf × cm²/cm, and a 2HB value of 0.012 to 0.029 gf × cm/cm, as measured using KES-FB2-S bending tester.

[0016] The third means is the film-packaged tissue product according to the first or second means,

wherein the dispenser-hole-forming portion has a shape comprising a smaller width portion extending longitudinally in a middle of a width direction, increasing width portions each communicating with either end of the smaller width portion and gradually flaring with increasing distance from the smaller width portion outwards in a width direction, and convex portions each communicating with either increasing width portion and bulged convexly outwards in the width direction.

[0017] The fourth means is the film-packaged tissue product according to the third means,

wherein the smaller width portion has a widthwise dimension of 35 to 65 % a length of the top face, and a depthwise dimension of 3 to 7 % a depthwise dimension of the top face.

[0018] The fifth means is the film-packaged tissue product according to the third means,

wherein at least one of two ends of the dispenser-hole-forming portion, a continuous cut portion is formed from a middle of one side in a depth direction of the increasing width portion around an outer side edge of the convex portion.

[0019] The sixth means is the film-packaged tissue product according to the first to fifth means,

wherein in the dispenser-hole-forming portion, arrangements of the cut portions and the uncut portions are different between widthwise ends, and a cut portion is located on an outer side edge at at least one of two ends.

[0020] The seventh means is the film-packaged tissue product according to the first to sixth means,

wherein the film-packaged tissue product is an overlap-wrapped bundle of a plurality of interfolded and stacked sheets of tissues, the bundle being in an approximate cuboid shape, wherein end faces each formed by closure of an opening of a cylinder are located facing to respective shorter lateral faces of the bundle, and an adhered portion of the packaging film overlapped and adhered together is located facing to one of the longer lateral faces.

Effect of the Invention

[0021] According to the present invention, a film-packaged tissue product is provided which gives an impression that foreign matters are hard to enter, may be used in a sanitary manner, are excellent in openability, and is easily dispensable even with three- or more ply tissues with a high mass per sheet and stiffness.

Brief Description of the Drawings**[0022]**

Fig. 1 is a perspective view for explaining a film-packaged tissue product according to the present invention.

Fig. 2 is a perspective view for explaining the package structure of the overlap wrapping.

Fig. 3 is a perspective view for explaining a tissue paper bundle.

Fig. 4 is a top plan view for explaining a dispenser-hole-forming portion.

Fig. 5 is a top plan view for explaining another dispenser-hole-forming portion.

Fig. 6 illustrates views for explaining other dispenser-hole-forming portions.

Fig. 7 illustrates views for explaining arrangements of other cut portions and uncut portions of other dispenser-hole-forming portion.

Fig. 8 is a view for explaining a B-value and a 2HB-value of pure bending stiffness according to the present invention.

Embodiments of the Invention

[0023] Embodiments of the present invention will now be explained below with reference to Figs. 1 to 7. Note, in the present invention and the present specification, that the directions, such as the top-bottom or left-right directions, may vary suitably depending on the orientation of the film-packaged tissue product, and do not refer to the absolute directions.

[0024] A film-packaged tissue product 1 according to the present embodiment is a bundle 3 of a plurality of interfolded and stacked sheets of tissues 2 packed with a flexible packaging film 4. This film-packaged tissue product 1 has been produced by subjecting the bundle 3 to pillow wrapping or overlap wrapping, and has a top face 4C with a dispenser-hole-forming portion 5. The film-packaged tissue product is, preferably, in the form of an approximate hexahedron having a bottom face 4D opposed to the top face 4C, and end faces 4A and longitudinal lateral faces 4B located between the top face 4C and the bottom face 4D. More preferably, the film-packaged tissue product has been produced by overlap wrapping of the bundle 3.

[0025] The overlap wrapping is a mode of wrapping, also referred to as caramel wrapping or overlaid wrapping, according to which, as shown in particular in Figs. 1 and 2, a packaging film 4 is rolled around and wrapped cylindrically around the bundle 3, which is an article to be wrapped, so that an opening 4Z is formed at each longitudinal end, a portion 4X overlapped in the rolling direction is adhered by heat sealing or with an adhesive, each portion 4Y extending beyond the bundle 3 is folded along near the opposed two edges of each end surface of the bundle 3 onto the end surface, and the resulting approximate triangular or trapezoidal pieces are overlapped at least in their respective free edge portions, and adhered by heat sealing or with an adhesive, to thereby close each opening 4Z of the cylinder into an end face 4A.

[0026] According to the overlap wrapping, the end face 4A is rendered approximately flat, so that the exterior made of the packaging film 4 is rendered approximately hexahedral, which is more like a box shape. Further, the end face 4A is formed by a plurality of layers of the packaging film 4 stacked and bonded together to have a high stiffness, which makes the approximately hexahedral shape hard to collapse in the top-bottom direction and likely to be maintained. In addition, with the portion 4X which is overlapped in the rolling direction and adhered by heat sealing or with an adhesive, positioned in a longitudinal lateral face as shown in the figures, rather than the top or bottom face, the stiffness of the three lateral faces between the top face and the bottom face is improved, which makes the approximately hexahedral shape still harder to collapse in the top-bottom direction and more likely to be maintained.

[0027] The bundle 3 of the tissues is of a so-called pop-up type, as shown in Fig. 3. This bundle is formed by folding a tissue 2 in half, and placing inside 2A the folded tissue folded halves 2B of other tissues 2 arranged above and below, so that a plurality of tissues 2 is interfolded and stacked to form an approximate cuboid shape having a pair of longer lateral faces 3B in each of which the folded edges 2C of the tissues 2 are arranged, a pair of shorter lateral faces 3A in each of which the folded edges 2C are not arranged, and a pair of planes (top and bottom faces) 3C contiguous to the shorter lateral faces 3A and the longer lateral faces 3B.

[0028] The number of sheets of the tissues 2 constituting the bundle 3 is not particularly limited in the present invention, and may be 30 to 240 sheets, counting 3 plies (three stacked layered) or 4 plies (four stacked layered) as one sheet. Also, the size of the bundle 3 is not limited, and may roughly have a height of 40 to 50 mm by a longitudinal dimension (width) of 100 to 200 mm by a transverse dimension (depth) of 90 to 120 mm, when 100 sheets of tissues are bundled. Note that, as indicated by such dimensions, the film-packaged tissue product 1 according to the present invention is not a portable product, such as so-called pocket tissues, in which about 10 to 12 sheets of tissues are enclosed in a height of about 10 mm.

[0029] In this film-packaged tissue product 1, the end faces 4A each formed by closing the opening 4Z of the cylinder are located facing to the respective shorter lateral faces 3A of the bundle 3, the adhered portion 4X of the packaging film overlapped and adhered together is located facing to one of the longer lateral faces 3B, and the dispenser-hole-

forming portion 5 is formed in a location of the packaging film 4 facing to the topmost tissue 2 in the bundle 3. The filling rate of the bundle is not necessarily limited, and the gap between the bundle and the packaging film is preferably in the range of 0 to 5 mm. The bundle may be packed with the packaging film slightly compressed in the top-bottom direction, the depth direction, and/or the width direction. The bundle may be compressed in all or any one or two of the directions, provided that the degree of compression is not so high as to excessively influence on withdrawability.

[0030] The dispenser-hole-forming portion 5 is formed by arranging an easy tear line 50 annularly, the easy tear line 50 having alternately arranged cut portions 50C and uncut portions 50U, which are also referred to as tied portions. The dispenser-hole-forming portion 5 extends widthwise in the top face 4C in the middle of the depth direction, and has an elongated shape, in particular, with its widthwise ends 5A, 5B convexing outwards.

[0031] With this dispenser-hole-forming portion 5, by tear-opening the easy tear line 50 and removing the portion bounded by the easy tear line 50, an opening acting as a dispenser hole for withdrawing tissues 2 is formed in the top face 4C of the film-packaged tissue product 1. With the dispenser hole being formed, withdrawal of the topmost tissue 2 of the bundle 3 leads to exposure of part of the subsequent tissue which is located immediately below, out of the dispenser hole.

[0032] The easy tear line 50 may be a perforated line, a slit cut line having uncut portions, or the like, but is not limited thereto. Perforated lines and slit cut lines having uncut portions may be distributed from part to part. The easy tear line may be formed by a manner such as die cutting. The type of the perforated line is not limited, and may be a standard perforated line wherein the cut portions are straight lines, a microperforated line wherein the cut portions are pores, or a perforated line wherein each cut portion is Y-shaped, approximate L-shaped, or laterally-facing V-shaped, with the standard perforated line being preferred. A slit cut line refers to a slit-like portion cut in a film, and by leaving uncut portions, the cut portions and the uncut portions are alternately arranged. Incidentally, a slit cut line having uncut portions may be referred to simply as a slit cut line. Perforated lines and slit cut lines having uncut portions may be formed by die cutting at a time and continuously with intervening uncut portions therebetween. These two may not sometimes be distinguished from each other, but as used herein, a slit cut line refers to less than three pitches of cut portions, i.e., a line in which three consecutive cut portions of the same length are not present. In general, a slit cut line has cut portions of a larger length compared to those of a perforated line.

[0033] A cut/tie ratio of a perforated line or a slit cut line having uncut portions for forming the dispenser-hole-forming portion 5 may be decided with suitable intervals, depending on easiness of fracture of the film used, and the length of each cut portion may suitably be designed to fall within a range of 0.8 mm or longer and 20.0 mm or shorter, and the length of each uncut portion (or tied portion) within a range of 0.3 mm or longer and 5.0 mm or shorter.

[0034] Each of the tissues 2 making up the bundle 3 is of 3 ply or 4 ply in which three or four plies are stacked into a layered structure. This tissue 2 has a basis weight per ply of 12.5 to 22.5 g/m², and a mass per sheet of preferably 1.2 to 2.4 g. Tissues made up of three or four plies of the above-mentioned basis weight have "pliancy and softness" applicable to facial use, while they are readily rendered "strong, thick, and resistant to tear", so that the tissues are useful not only in facial use but also in wiping goods. Further, the paper thickness per sheet of the tissues is 185 to 285 μm. With the number of plies and the basis weight, as well as the paper thickness in the above-mentioned range, the tissues are cushioned thicknesswise, have sensible softness, are slightly thicker than the 2-ply tissues mainly for facial use, and tend to give an impression that the tissues are hard to tear in wiping goods other than skin.

[0035] Note that the basis weight is determined in accordance with JIS P 8124 (1998). The basis weight per ply is calculated by the formula: basis weight = weight per sheet / (area of sheet × number of plies). The paper thickness is a value determined by subjecting a specimen to sufficient moisture conditioning under the conditions prescribed in JIS P 8111 (1998), and then measuring the thickness of a plurality of plies under the same conditions, using a dial thickness gauge (thickness measuring device), PEACOCK Model G (OZAKI MFG. CO., LTD.) or its equivalent.

[0036] The tissues 2 according to the present invention are of a dry type, not a so-called wet type impregnated with liquid chemical. Thus, the above-mentioned bundle 3 made up of the tissues 2 entrains a large amount of air. Among such dry type tissues 2, some are of liquid-chemical-applied type, which has liquid chemical, such as a moisturizer including polyols or the like, applied thereto to increase moisture content by moisture absorption, typically glycerin, and the tissues may be of this type.

[0037] The raw material pulp of the tissue paper constituting the tissues 2 is a blend of NBKP and LBKP. The raw material pulp may contain de-inked pulp, but may preferably be made up only of NBKP and LBKP in view of texture or the like factors. The mixing ratio is preferably NBKP : LBKP = 20 : 80 to 80 : 20, more preferably NBKP : LBKP = 30 : 70 to 60 : 40.

[0038] Here, the dispenser-hole-forming portion 5 according to the present invention characteristically has a widthwise dimension L1 of 60 to 80 % the width L2 of the top face 4C of the film-packaged tissue product 1, and a maximum depthwise dimension L3 of 6 to 15 % the depthwise dimension L4 of the top face 4C of the film-packaged tissue product 1. Preferably, the widthwise dimension is 63 to 73 % the width of the top face of the bundle, and the maximum depthwise dimension is 6 to 12 % the depthwise dimension of the top face of the bundle. The minimum depthwise dimension is not limited, but the dispenser-hole-forming portion 5 according to the present invention is formed with an easy tear line

arranged annularly as mentioned above, and thus is not at least a slit formed by tear-opening a single, simple perforated line, but has a certain width between the two easy tear lines spaced apart depthwise from each other. By continuously pulling the dispenser-hole-forming portion 5 from one end 5A toward the other end 5B, the film within the area of the dispenser-hole-forming portion 5 may be removed, so that the dispenser-hole-forming portion 5 has excellent openability. Further, while the 3- or 4-ply tissues having the above-mentioned basis weight and paper thickness have a higher stiffness compared to 2-ply tissues intended mainly for facial use, the dispenser hole formed by the dispenser-hole-forming portion 5 having the widthwise dimension L1 and the maximum depthwise dimension L3 within the above-mentioned ranges with respect to the top face 4C, allows smooth withdrawal of the tissues 2. Moreover, the depthwise dimension of the dispenser-hole-forming portion 5 with respect to the dispenser-hole-forming portion 5 of the top face 4C is remarkably smaller than that of conventional ones, so that the present film-packaged tissue product gives an impression that foreign matters are hard to enter, and may be used in a sanitary manner.

[0039] Further, as the dispenser-hole-forming portion 5 has an elongated shape with its ends 5A, 5B particularly convexing outwards, the dispenser-hole-forming portion may easily be grasped at one end, and the action of continuous pulling from one end 5A toward the other end 5B, or from the other end 5B toward the one end 5A may be made easily. With both ends 5A, 5B convexing outwards, the root portions on both edges of a tissue 2 partially exposed out of the dispenser hole are deformed to roll inwards along the convexed portions, so that the tissue tends to raise itself and is hard to fall inside. Specific examples of the configuration of the ends 5A, 5B convexing outwards may include a configuration in which the easy tear line 50 at both longitudinal ends 5A, 5B is arranged with curvature to convex and bulge longitudinally outwards, as shown in Figs. 4 and 5, and a configuration in which the easy tear line at both longitudinal ends 5A, 5B is arranged in a V-shape, wedge shape, or W-shape, convexing longitudinally outwards, as shown in Fig. 6.

[0040] On the other hand, the film-packaged tissue product 1 particularly with an overlap wrapping according to the present invention has a structure wherein the tissues 2 are stacked in the upright direction of the highly stiff end faces 4A and adhered portion 4X, so that the bundle 3 is hard to be compressed and fluffiness is hard to be deteriorated even under the compressive force in the stacking direction (top-bottom direction) of the bundle 3. As the packaging film in the film-packaged tissue product 1 is flexible, when a tissue 2 is withdrawn, its resisting force causes the packaging film 4 in the top face 4C to be pulled upwards and deformed or distorted. In particular, the periphery of the dispenser hole, which is an opening formed by tear-opening and removing the area bounded by the easy tear line 50, is prone to deformation. However, in the overlap wrapping configuration with increased stiffness in three of the faces, wherein the end faces 4A are facing to the shorter lateral faces 3A of the bundle 3, and the adhered portion 4X is facing to one of the longer lateral faces 3B, the packaging film in the top face is hard to be deformed and likely to be maintained in a planar state, compared to the pillow wrapping or the like. As a result, the dispenser hole, which is an opening formed by tear-opening the dispenser-hole-forming portion 5, is also hard to be distorted by deformation. This hard-to-distort property assists exhibition of the effects obtained by narrowing the maximum depthwise length L1 of the dispenser-hole-forming portion 5, to thereby facilitate particularly stable withdrawal of each sheet of tissues.

[0041] In the film-packaged tissue product 1 according to the present invention, the packaging film 4 in at least the top face 4C preferably has a B value of $0.085 \text{ gf} \times \text{cm}^2/\text{cm}$ or less and a 2HB value of $0.030 \text{ gf} \times \text{cm}/\text{cm}$ or less, as measured using a KES-FB2-S bending tester. Combined with such a packaging film 4, the tissue 2 preferably has a B value of 0.013 to $0.020 \text{ gf} \times \text{cm}^2/\text{cm}$ and a 2HB value of 0.018 to $0.028 \text{ gf} \times \text{cm}^2/\text{cm}$, as measured using a KES-FB2-S bending tester. In the structure of the dispenser-hole-forming portion 5, the above-mentioned combination of stiffnesses of the packaging film 4 and of the tissue 2 allows ready formation of the dispenser hole in the packaging film 4 and gives a touch of strength to the tissues 2, and further in cooperation with the maximum depthwise dimension and the widthwise dimension of the dispenser-hole-forming portion 5, particularly increases dispensability of the tissues 2. Note that the B value and the 2HB value of the packaging film are determined as an average of the longitudinal bending stiffnesses of the film measured three times, whereas the B value and the 2HB value of the tissue are determined as an average of the transverse bending stiffnesses of the paper measured three times. The directions of the measurement of the packaging film and of the tissue are decided as above, taking the directions of deformation of the packaging film and of the tissue upon dispensing of a tissue.

[0042] For measurements using the KES-FB2-S bending tester, specimens are used, which have been subjected to moisture conditioning in a constant-temperature, constant-humidity room at 23°C and 50% for 3 hours or longer, the size of each specimen is 100 mm wide, the number of measurements is $N = 3$, and an average thereof is taken as a measured value. Further, the conditions for the measurements are as follows:

SENS: 4

Environmental temperature: $20 \pm 1^\circ\text{C}$

Environmental humidity: $60 \pm 1\%$

Bending rate: SET ($0.5 \text{ cm}^{-1}/\text{sec}$)

Curvature: SET ($\pm 2.5 \text{ cm}^{-1}$)

[0043] Here, as shown in Fig. 7, a B value is a slope in the bending curvature range of 0.5 to 1.5 / -0.5 to -1.5, whereas a 2HB value is hysteresis (width) in the bending curvature range of 1.0 / -1.0, as measured using a KES-FB2-S bending tester. The B value is associated with softness/stiffness felt by a person bending an article, and a larger B value represents hardness to bend, while a smaller B value represents softness. The 2HB value is correlated with tactile sensation of force to return to the initial state after being bent by a person, i.e., recoverability (resilience), and a larger 2HB value (larger width of 2HB) represents less recoverability, while a smaller 2HB value (smaller width of 2HB) represents more recoverability. Note the KES-FB2-S bending tester is different from, for example, KES-FB2-A bending tester in the direction of bending of the specimen upon measurement.

[0044] The packaging film 4 made of a flexible resin and forming the exterior of the film-packaged tissue product 1 may specifically be, for example, a single layer film of polyethylene film, polypropylene film, polyester film, polyethylene terephthalate film, nylon film, polyvinylidene chloride film, or an ethylene-vinyl alcohol copolymer; a laminate film wherein films including any of these are suitably layered; or a gas barrier film obtained by subjecting any of these films to surface treatment, such as aluminum deposition. Further, biomass films may also be used, which derive from plant materials, such as sugar cane, potato (starch), or corn. Use of such biomass films is preferred in light of environmental protection.

[0045] In light of cost, polypropylene film or polyethylene film is preferred. Further, the packaging film 4 may be a matte film having excellent designability and hand feel properties. The melting point of the film is preferably 150 °C or lower. Note that a lower melting point of the packaging film allows heat sealing treatment at a lower temperature, but the practical lower limit is 80 °C. Polypropylene may be cast polypropylene film (CPP), whereas polyethylene film may be linear low-density polyethylene film (LLDPE), low-density polyethylene film (LDPE), or medium-density polyethylene film (MDPE).

[0046] For packing odorous products, such as scented tissues, ethylene-vinyl alcohol copolymer resin film or polyethylene terephthalate resin film, both having excellent aroma retention, is preferred. Multi-layered resin films with improved heat sealability having a polyethylene resin film or a polypropylene resin film laminated on one or both of the surfaces of an ethylene-vinyl alcohol copolymer resin film or a polyethylene terephthalate resin film may also be used.

[0047] The thickness of the packaging film 4 may suitably be selected, and preferably 25 to 75 μm as measured in accordance with JIS P 8118 (1998). With the thickness of 25 to 75 μm, the stiffness of the end faces 4A may readily be improved particularly in overlap wrapping. Polypropylene film and polyethylene film may be used in this thickness. Further, with such a thickness and softness, the packaging film 4 is hard to be torn, and may easily be given excellent dispensability, in particular, pop-up property, of tissues. Note that the thickness is measured using a dial thickness gauge (thickness measuring device), PEACOCK Model G-1A (OZAKI MFG CO., LTD.) or its equivalent, after the specimen is subjected to sufficient moisture conditioning under the conditions prescribed in JIS P 8111 (1998).

[0048] A particularly preferred shape of the dispenser-hole-forming portion 5 has, as shown in Fig. 5, a smaller width portion 51 extending widthwise in the top face 4C in the middle of the depth direction, increasing width portions 52 each communicating with either end of the smaller width portion 51 and gradually flaring with longitudinally increasing distance from the smaller width portion 51, and curved portions 53 each continuous to either increasing width portion and bulged convexly outwards in the longitudinal direction. Here, the smaller width portion 51 preferably has a widthwise dimension L5 of 40 to 65 % the length of the top face, and a depthwise dimension L6 of 3 to 7 % the depthwise dimension of the top face. The specific depthwise dimension of the smaller width portion 51 is 8 mm or less, preferably 6 mm or less, in the transverse direction.

[0049] With the dispenser hole formed in the form of the dispenser-hole-forming portion 5 as shown in Fig. 5, portions 51A near the edges of the smaller width portion 51 becomes free edge flaps movable in the top-bottom direction, so that, when a sheet of tissue 2 is withdrawn from the bundle 3, the edge flaps deform in the direction of the withdrawal to lean against and support the subsequently exposed sheet of tissue 2. This behavior is particularly effectively exhibited with the B values and 2HB values of the above-discussed packaging film and tissues.

[0050] Further, with the dispenser hole formed by the dispenser-hole-forming portion 5, the next tissue partially exposed out of the dispenser hole subsequent to the tissue withdrawn from the bundle 3 is rolled on both widthwise edges along the edges of the curved portions 53, and is deformable into a shape which is highly capable of raising itself up. In particular, with the dispenser-hole-forming portion 5 shown in Fig. 5, fall of the tissues into the interior space, which tends to occur with overlap wrapping having an exterior in the form of a rectangular hexahedron, is hard to occur.

[0051] Further, the dispenser-hole-forming portion 5 may have longitudinal ends 5A, 5B each formed by a slit cut line having uncut portions, and the portion between the two ends formed by perforated lines. Alternatively, only one of the longitudinal ends may be formed by a slit cut line, while the remaining portions may be formed by perforated lines. The smaller width portion and the increasing width portions may be formed by perforated lines, while the curved portions 53 may be formed by slit cut lines with partially arranged uncut portions. One of the longitudinal ends 5A may be formed by a slit cut line, while the remaining portions up to the other of the longitudinal ends 5B may be formed by perforated lines. In the dispenser-hole-forming portion 5, the intervals and the length of the cut portions and the uncut portions may vary from part to part. In this case, naturally the cut/tie ratio also varies from part to part. Even with various intervals and lengths of cut portions and uncut portions, it is preferred to adjust the cut portions and the uncut portions to fall within

the lengths discussed above.

[0052] Here, in the dispenser-hole-forming portion 5 according to the present invention, it is preferred that: the longitudinal ends 5A, 5B, as discussed above, have a shape convexing outwards; the arrangements of the cut portions and the uncut portions are different between the widthwise ends 5A and 5B; and at least one end 5A or the other end 5B has an outer side edge on which a cut portion is located. The one end or the other end with the cut portion may easily be grasped, which improves openability. In this case, one of the ends with the cut portion preferably has a slit cut line with a slightly longer cut portion.

[0053] However, for example, when the packaging film 4 is an uniaxially oriented film oriented orthogonal to the longitudinal direction of the dispenser-hole-forming portion, or depending on the film thickness, the action of grasping the one end 5B and tearing off the dispenser-hole-forming portion 5 toward the other end 5A may result, with an uncut portion 50C present at the end on the side of the end 5A, in failure to break the uncut portion, and cause tearing of the packaging film 4 from this uncut portion. In this case, both longitudinal ends may be formed as cut portions.

[0054] Further, when the dispenser-hole-forming portion 5 is formed particularly in the shape as shown in Fig. 5 having a smaller width portion 51, increasing width portions 52 each communicating with either end of the smaller width portion 51 and gradually flaring with increasing distance from the smaller width portion 51 outwards in the width direction, and convex portions 53 each continuous to either increasing width portion 52 and bulged convexly outwards in the width direction, at at least one of the ends (5A in Figs. 5 and 7) of the dispenser-hole-forming portion 5, a continuous cut portion 53C is preferably formed from the middle of one side in the depth direction of an increasing width portion 52A around the outer side edge 53t of the convex portion 53, as shown in Fig. 7(C). With such an arrangement of the cut portion 53U, a free flap is formed in the area Z at an end of the dispenser-hole-forming portion 5 from one depthwise side around the outer side edge, as shown in Fig. 7(D), so that the action of opening by grasping and turning over the area Z as shown in Fig. 7 (E) is facilitated.

[0055] Also, with regard to a dispenser hole formed by the preferred dispenser-hole-forming portion according to the present invention as discussed above, the ratio of the width of the smaller width portion (represented as [D] in Table 1 below) / the maximum depthwise dimension of the dispenser-hole-forming portion (represented as [A] in Table 1 below) is preferably 3.5 to 20.0. The present inventor has found out that, with regard to the preferred dispenser-hole-forming portion according to the present invention as discussed above, the ratio of the width of the smaller width portion / the maximum depthwise dimension of the dispenser-hole-forming portion affects the dispensability of tissues, and the withdrawability of tissues is good in the above-mentioned range. With the ratio of the width of the smaller width portion / the maximum depthwise dimension of the dispenser-hole-forming portion being 3.5 or higher, the maximum depthwise dimension of the dispenser-hole-forming portion with respect to the width of the smaller width portion is proper, which particularly improves the retainability of a tissue at both widthwise ends of the dispenser hole. With the ratio being 20.0 or lower, the maximum depthwise dimension of the dispenser-hole-forming portion with respect to the width of the smaller width portion is proper, which improves the support force on a tissue at both widthwise ends of the dispenser hole and the anti-collapse property of a tissue exposed through the dispenser hole.

[0056] Furthermore, with regard to a dispenser hole formed by the preferred dispenser-hole-forming portion according to the present invention as discussed above, it is preferred that the value of the ratio of the width of the dispenser-hole-forming portion (represented as [B] in Table 1 below) / the width L8 of the bulging convex portion (represented as [E] in Table 1 below) is higher than 4.0, and the value of the ratio of the width of the smaller width portion (represented as [D] in Table 1 below) / the width L8 of the bulging convex portion (represented as [E] in Table 1 below) is higher than 2.0. The present inventor has found out that, with regard to the preferred dispenser-hole-forming portion according to the present invention as discussed above, the ratio of the maximum depthwise dimension of the dispenser-hole-forming portion / the width L8 of the bulging convex portion, and the ratio of the width of the smaller width portion / the width L8 of the bulging convex portion, both affect the dispensability of tissues, and particularly, the dispensability of tissues is good when both ratios fall within the above-mentioned ranges. With the value of the ratio of the width of the dispenser-hole-forming portion / the width L8 of the bulging convex portion exceeding 4.0 and the value of the ratio of the width of the smaller width portion / the width L8 of the bulging convex portion exceeding 2.0, the amount of deformation of the tissue partially exposed out of the dispenser hole by the edges of the dispenser hole is proper, so that the tissue is withdrawn smoothly.

Examples

[0057] Next, Examples 1 to 4 according to the present invention and Comparative Example 1 were produced, and along with Conventional Examples 1 to 3, tested for dispensability of the first tissue, the number of falls, and openability.

[0058] For evaluation of "dispensability of the first tissue", a sample of each example was actually used by panels, and evaluated as to whether the first tissue was easily withdrawn or not. The values in the table are averages of N = 10. Evaluation was rated on a five-point scale from easy to dispense represented as 5 points, slightly easy to dispense represented as 4 points, neither easy nor hard represented as 3 points, slightly hard to dispense represented as 2 points,

down to hard to dispense represented as 1 point.

[0059] For evaluation of "the number of falls", the number of falls actually occurred upon complete withdrawal of a tissue was counted.

[0060] For evaluation of "openability", a sample of each example was opened by panels by grasping one of the ends of the dispenser-hole-forming portion and pulling it toward the other end, and evaluated as to whether the sample was easy to open or not. The values in the table are averages of $N = 10$. Evaluation was rated on a five-point scale from easy to open represented as 5 points, slightly easy to open represented as 4 points, neither easy nor hard represented as 3 points, slightly hard to open represented as 2 points, down to hard to open represented as 1 point.

[0061] The dispenser-hole-forming portions in Example 1, Example 2, Example 3, Conventional Example 1, and Comparative Example 2 have shapes having the smaller width portion, the increasing width portions, and the bulging curved convex portions as shown in Fig. 5, with various dimensions of the parts. The dispenser-hole-forming portion in Comparative Example 1 has a shape similar to the one shown in Fig. 4, without the smaller width portion and the increasing width portions. The sample of Conventional Example 3 has a dispenser-hole-forming portion in the form of a single, simple perforated line and the dispenser hole in the form of a slit. In each Example and Comparative Example, the end on the opening side was formed with a cut portion. In particular, in Examples 1 and 2, the cut portions and the uncut portions at one end were arranged as shown in Fig. 7 to broaden the area of the free flap Z.

[0062] Further, the B value and the 2HB value of the packaging film and the tissue were measured using KES-FB2-S bending tester manufactured by KATO TECH CO., LTD. under the conditions as mentioned above.

[0063] The dimensions and ratios of the dispenser-hole-forming portion with respect to the depthwise or widthwise dimensions of the top face in each Example, properties of tissues, or the like, as well as the results of the tests, are shown in Tables 1 and 2 below. In Table 1, the ratio of the width of the smaller width portion / the maximum depthwise dimension of the dispenser-hole-forming portion is represented as $[D]/[A]$, the ratio of the width of the dispenser-hole-forming portion / the width of the bulging convex portion is represented as $[B]/[E]$, and the ratio of the width of the smaller width portion / the width of the bulging convex portion is represented as $[D] / [E]$.

Table 1

	Evaluation			Dimensions													
	Dispensability of first tissue	Number of falls	Openability	Top face size		Dispenser-hole-forming portion		Smaller width portion		Bulging convex portion	Dispenser-hole-forming portion / Top face		Smaller width portion / Top face		[D]/ [A]	[B]/ [E]	[D]/ [E]
				Depth	Width	Depth (Max) [A]	Width [B]	Depth (Max) [C]	Width [D]		Width [E]	Depth (Max)	Width	Depth (Max)			
Conventional Example 1	5	Three times	4	103	181	19	107		5	39							
Conventional Example 2	2	Twice	1	97	138	5	121		5	121							
Conventional Example 3	3	Fifteen times	2	120	278	0	269		0	269							
Comparative Example 1	2	Twice	4	98	150	19	88		5	23							
Example 1	4	Once	5	98	135	10	97		5	71							
Example 2	4	Once	5	98	150	10	97		5	71							
Example 3	4	Once	3	98	150	10	107		5	81							
Example 4	4	Once	3	98	150	15	101		5	53							

Table 2

	Sheets and Bundle							Packaging mode	B value (Bending stiffness)		2HB value (Bending recovery)	
	Basis weight	Paper thickness	Sheet size		Number of plies	Number of sheets	Mass per sheet		Tissue (Transverse)	Packaging film (Longitudinal)	Tissue (Transverse)	Packaging film (Longitudinal)
			MD	CD								
			(g/m ²)	(μm)								
Conventional Example 1	14.6	130	198	180	2	120	1.041	0.0093	-	0.0104	-	
Conventional Example 2	17.2	180	185	138	3	120	1.321	0.0232	0.0948	0.0300	0.0345	
Conventional Example 3	16.4	130	230	210	2	200	1.584	0.0360	-	0.0317	-	
Comparative Example 1	17.5	235	195	147	3	100	1.505	0.0161	0.0823	0.0250	0.0283	
Example 1	17.5	235	195	133	3	40	1.362	0.0161	0.0823	0.0250	0.0283	
Example 2	17.5	235	195	147	3	100	1.505	0.0161	0.0823	0.0250	0.0283	
Example 3	17.5	235	195	147	3	100	1.505	0.0161	0.0823	0.0250	0.0283	
Example 4	17.5	235	195	147	3	100	1.505	0.0161	0.0823	0.0250	0.0283	

[0064] From Table 1 and 2, it is seen that, first in Conventional Example 3, in which the dispenser-hole-forming portion is in the form of a single perforated line and the dispenser hole is a slit, fifteen falls were observed even with 2-ply soft tissues.

[0065] Conventional Example 2, in which the depthwise dimension is small and the widthwise dimension is large, gave excellently sanitary impression for its small depthwise dimension, but had poorer dispensability of the first tissue compared to Examples, and for the openability, in particular, all the panels evaluated this product as hard to open (1 point) as the edge of the dispenser-hole-forming portion was hard to grasp.

[0066] The 2-ply conventional product 1 gave less sanitary impression for its larger depthwise dimension compared to Examples. Further, the widthwise dimension is smaller but with larger number of falls, compared to Examples.

[0067] From these results, it is seen that the present Examples are improved compared to Conventional Examples.

[0068] Next, Examples according to the present invention were evaluated as slightly easy to dispense for dispensability of first tissue, and the openability was evaluated as excellent. The number of falls was once in all Examples, which is the smallest value in all of the examples.

[0069] In contrast, in Comparative Example 1, the depthwise dimension of the dispenser-hole-forming portion is larger compared to Examples, but with lower evaluations. By increasing the depthwise dimension to make up for the smaller width, a larger portion of a tissue gathers upon withdrawal so as to leave through the dispenser hole, but with a higher stiffness of 3-ply tissues compared to 2-ply tissues, an excessive length beyond proper length, in combination with the width, rather causes stuck to deteriorate dispensability.

[0070] Further, in Examples 1 to 4 according to the present invention, sufficient results were obtained in dispensability of first tissue, the number of falls, and openability. In Examples 1 and 2, openability is particularly excellent.

[0071] As discussed above, the film-packaged tissue product according to the present invention gives an impression that foreign matters are hard to enter, may be used in a sanitary manner, is excellent in openability, has a high mass per sheet, and is easily dispensable even with three or more ply tissues with stiffness.

Description of Reference Signs

[0072]

1: film-packaged tissue product

2: tissue

2A: inside the folded sheet

2B: folded half

2C: folded edge

3: bundle of tissues

3A: shorter lateral face

3B: longer lateral face

3C: top and bottom faces of bundle

4: packaging film

4A: end face

4B: longitudinal lateral face

4C: top face

4D: bottom face

4X: overlapped portion of packaging film

4Y: extended portion of packaging film

4Z: opening of packaging film cylinder

5: dispenser-hole-forming portion

5A, 5B: longitudinal end

50: easy tear line

50C: cut portion

50U uncut portion (tied portion)

L1: widthwise (longitudinal) dimension of dispenser-hole-forming portion 5

L2: widthwise (longitudinal) dimension of top face of film-packaged tissue product

L3: maximum depthwise (transverse) dimension of dispenser-hole-forming portion 5

L4: depthwise (transverse) dimension of top face of film-packaged tissue product

L5: depthwise (transverse) dimension of smaller width portion

L6: depthwise dimension of smaller width portion

L7: extent from middle of one side in depth direction of increasing width portion 52A around outer side edge 53t of convex portion 53

L8: width of bulging convex portion
 51: smaller width portion
 51A: portion near edges of smaller width portion
 52: increasing width portion
 53: curved portion

Claims

1. A film-packaged tissue product comprising:

a flexible packaging film made of resin; and
 a bundle of tissues packed with the flexible packaging film,
 wherein the tissues are 3- or 4-ply tissues having a basis weight of 12.5 to 22.5 g/m² per ply and a paper
 thickness of 185 to 285 μ m,
 the film-packaged tissue product has a dispenser-hole-forming portion in its top face, the dispenser-hole-forming
 portion being formed with an easy tear line arranged annularly, the easy tear line having alternately arranged
 cut portions and uncut portions, and the dispenser-hole-forming portion extends widthwise in the top face in a
 middle of a depth direction, and has an elongated shape with its ends convexing outwards, and
 the dispenser-hole-forming portion has a widthwise dimension of 60 to 75 % a width of the top face, and a
 maximum depthwise dimension of 6 to 15 % a depthwise dimension of the top face.

2. The film-packaged tissue product according to claim 1,

wherein the packaging film in the top face has a B value of 0.093 gf $\times$ cm²/cm or less, and a 2HB value of 0.033
 gf $\times$ cm/cm or less, as measured using KES-FB2-S bending tester, and
 the tissue has a B value of 0.010 to 0.022 gf $\times$ cm²/cm, and a 2HB value of 0.012 to 0.029 gf $\times$ cm/cm, as
 measured using KES-FB2-S bending tester.

3. The film-packaged tissue product according to claim 1 or 2,

wherein the dispenser-hole-forming portion has a shape comprising a smaller width portion extending longitudinally
 in a middle of a width direction, increasing width portions each communicating with either end of the smaller width
 portion and gradually flaring with increasing distance from the smaller width portion outwards in a width direction,
 and convex portions each communicating with either increasing width portion and bulged convexly outwards in the
 width direction.

4. The film-packaged tissue product according to claim 3,

wherein the smaller width portion has a widthwise dimension of 35 to 65 % a length of the top face, and a depthwise
 dimension of 3 to 7 % a depthwise dimension of the top face.

5. The film-packaged tissue product according to claim 3,

wherein at least one of two ends of the dispenser-hole-forming portion, a continuous cut portion is formed from a
 middle of one side in a depth direction of the increasing width portion around an outer side edge of the convex portion.

6. The film-packaged tissue product according to any one of claims 1 to 5,

wherein in the dispenser-hole-forming portion, arrangements of the cut portions and the uncut portions are different
 between widthwise ends, and a cut portion is located on an outer side edge at at least one of two ends.

7. The film-packaged tissue product according to claims 1 to 6,

wherein the film-packaged tissue product is an overlap-wrapped bundle of a plurality of interfolded and stacked
 sheets of tissues, the bundle being in an approximate cuboid shape, wherein end faces each formed by closure of
 an opening of a cylinder are located facing to respective shorter lateral faces of the bundle, and an adhered portion
 of the packaging film overlapped and adhered together is located facing to one of the longer lateral faces.

Fig. 1

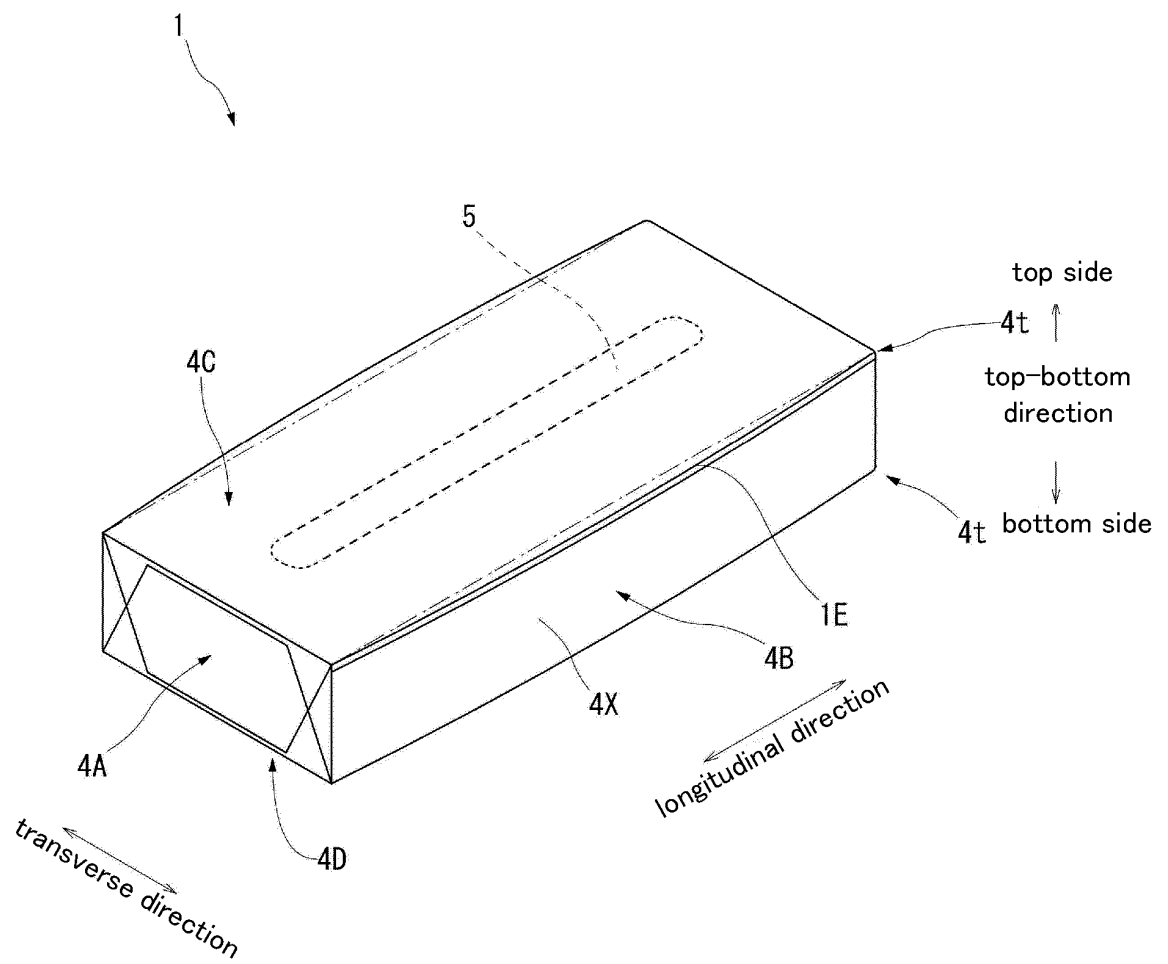


Fig. 2

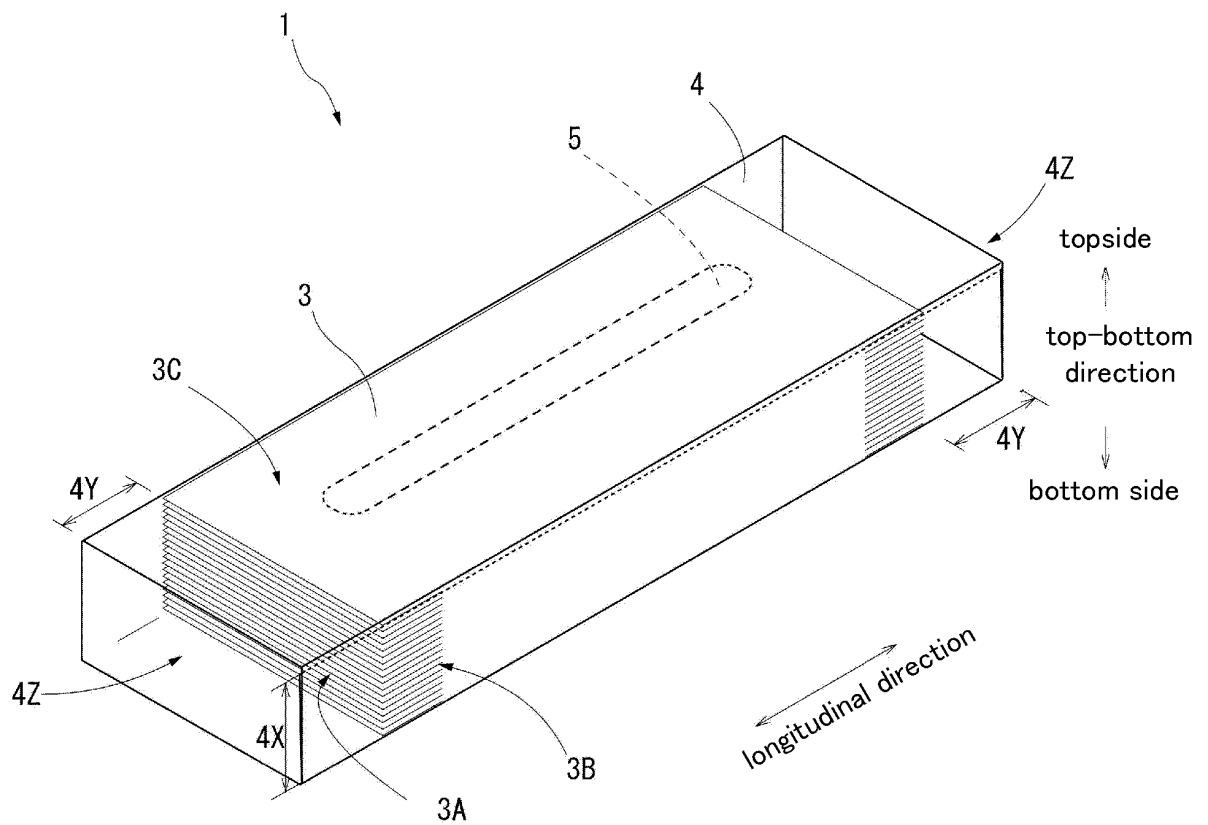


Fig. 3

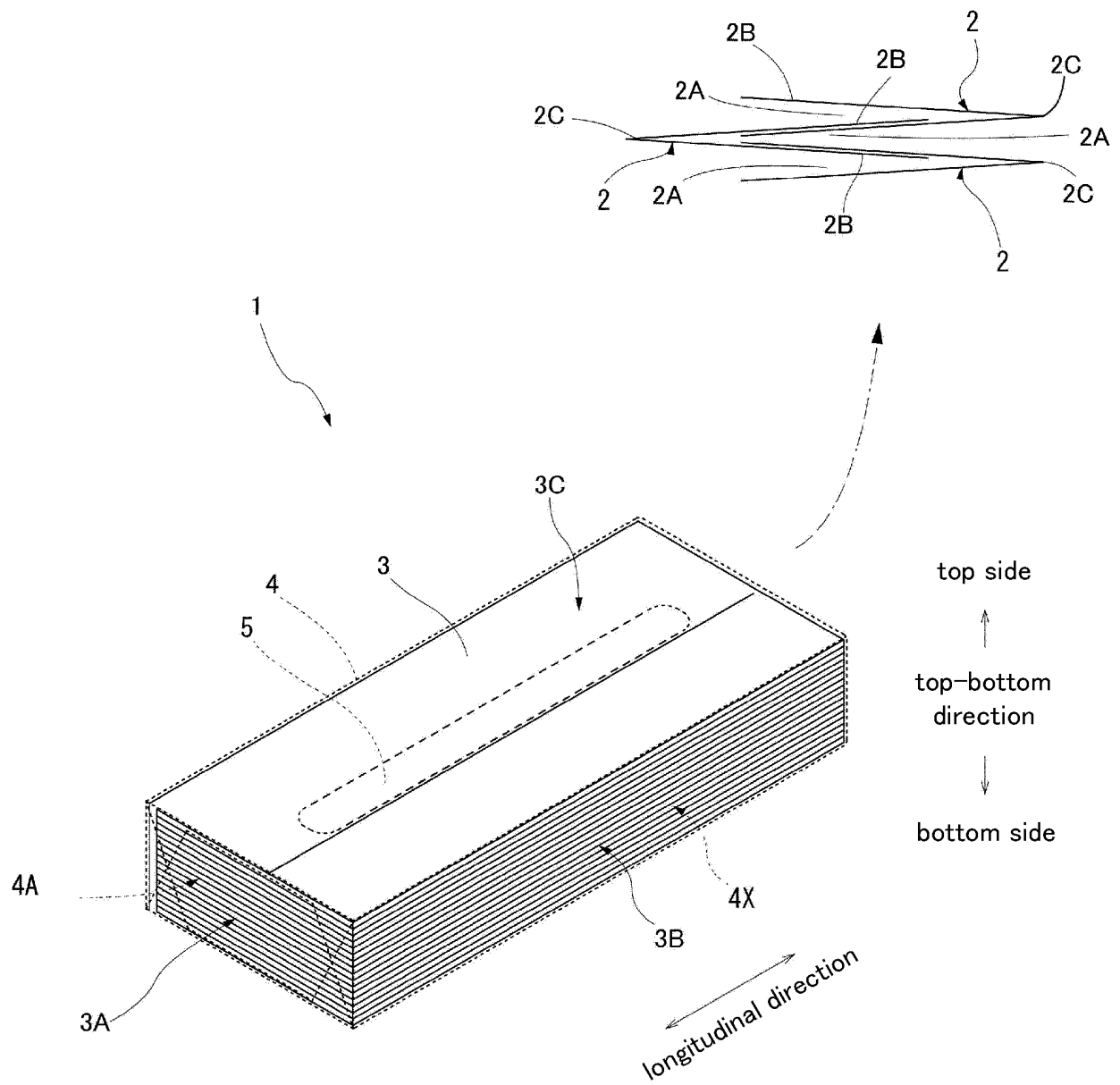


Fig. 4

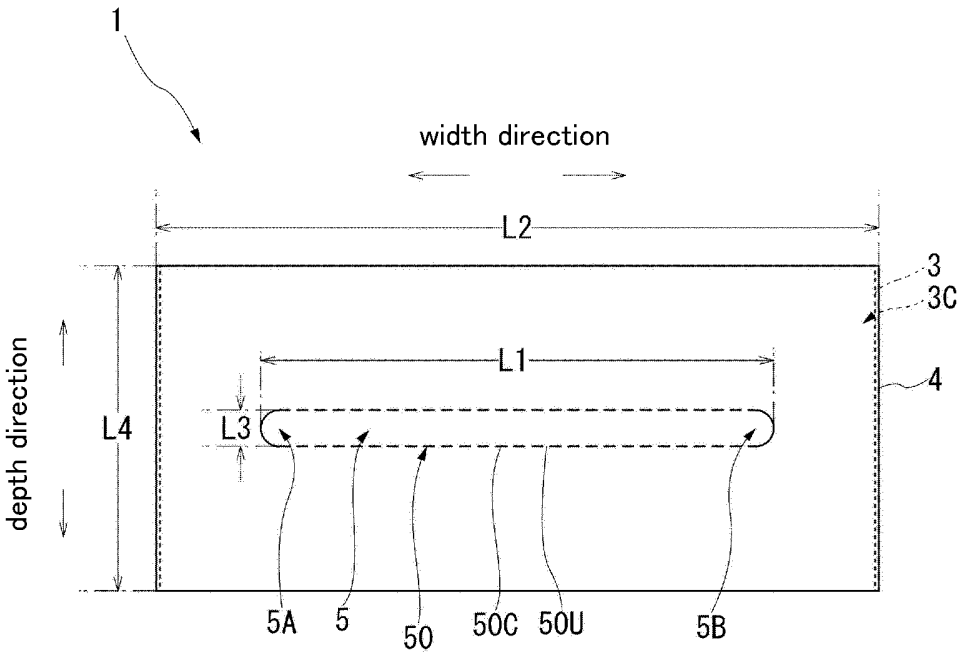


Fig. 5

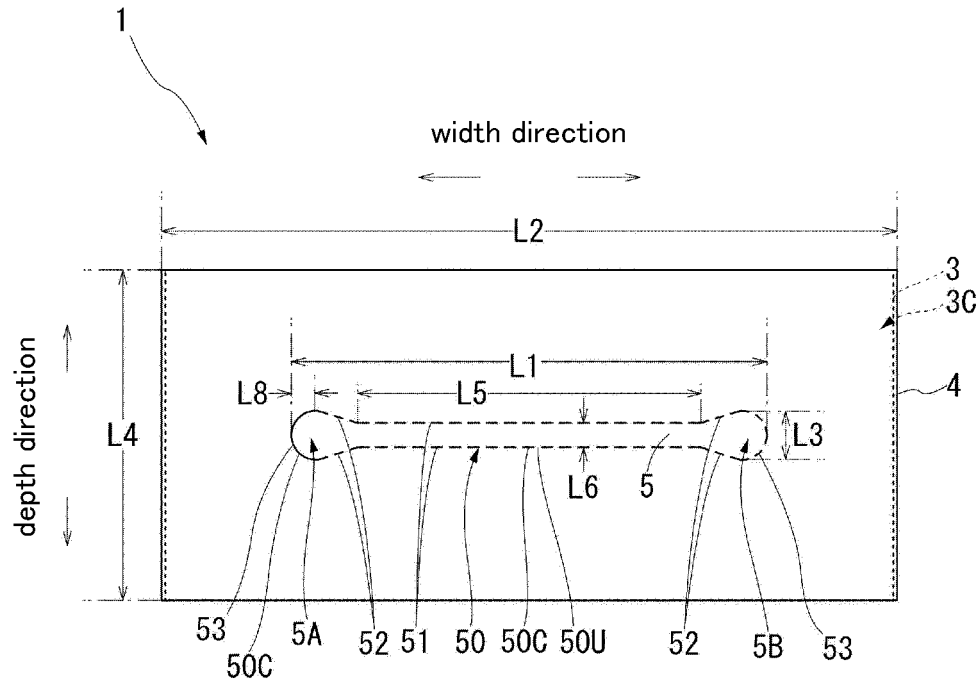
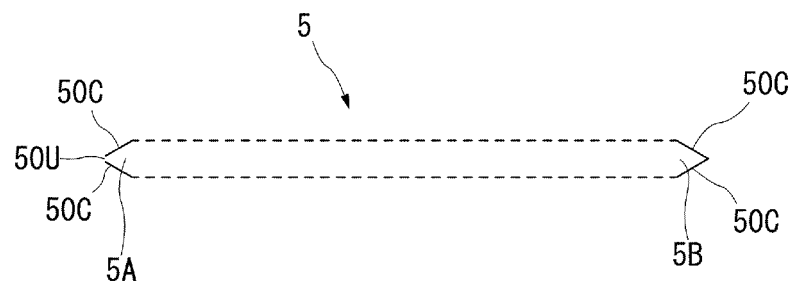


Fig. 6

(A)



(B)

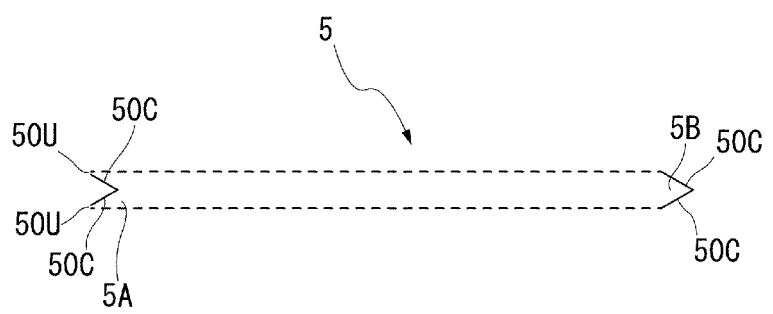


Fig. 7

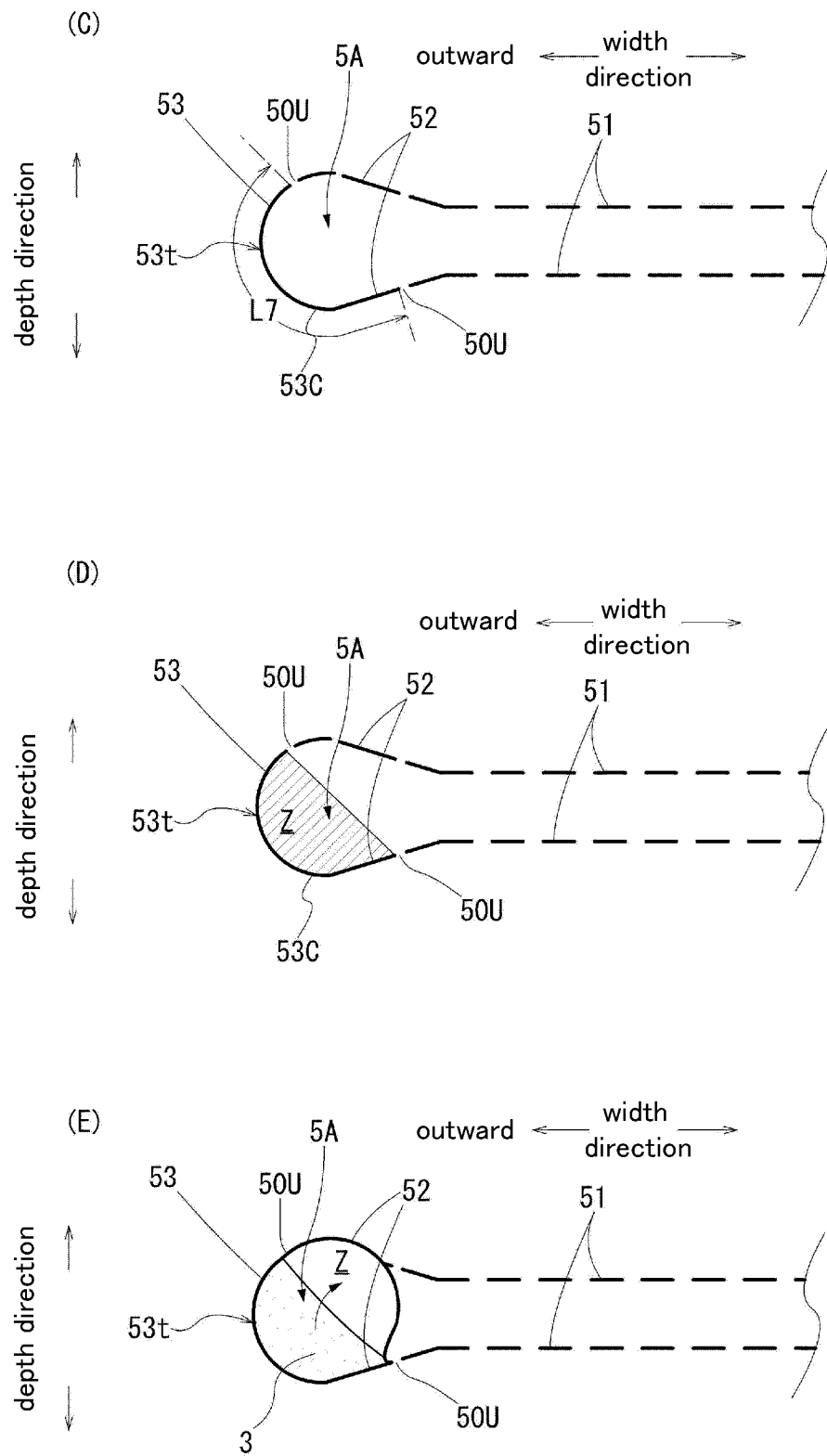
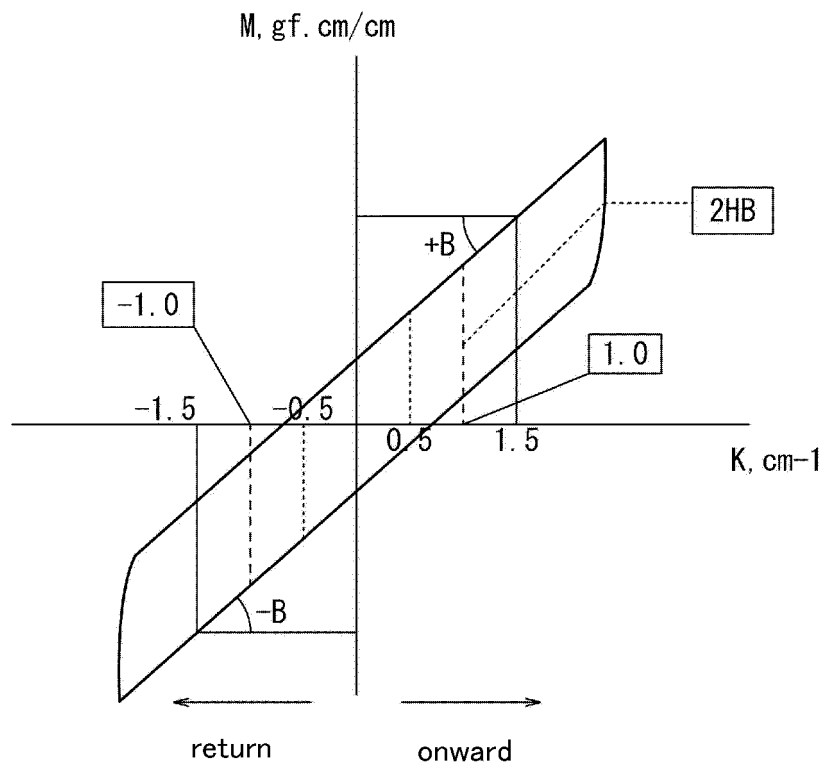


Fig. 8



B (bending stiffness) = slope in bending curvature range of 0.5 to 1.5 / -0.5 to -1.5

$2HB$ (bending recovery) = hysteresis in bending curvature range of 1.0 / -1.0 (width)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/029107

10

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. B65D83/08 (2006.01) i, A47K10/16 (2006.01) i, A47K10/42 (2006.01) i, B65D75/60 (2006.01) i

FI: B65D83/08 B, B65D75/60, A47K10/16 C, A47K10/42 B

According to International Patent Classification (IPC) or to both national classification and IPC

15

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl. B65D83/08, A47K10/16, A47K10/42, B65D75/60

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 1971-2021

Registered utility model specifications of Japan 1996-2021

Published registered utility model applications of Japan 1994-2021

20

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

25

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2020/110835 A1 (DAIO PAPER CORP.) 04 June 2020	1, 3-7
A	(2020-06-04), paragraphs [0015], [0016], [0019], [0020], [0033]-[0042], fig. 1-7	2
Y	JP 2020-11742 A (DAIO PAPER CORP.) 23 January 2020	1, 3-7
	(2020-01-23), paragraph [0024]	
P, A	JP 2020-133011 A (MIYOSHI YUSHI KK) 31 August 2020	2
	(2020-08-31), paragraphs [0002], [0115]-[0121]	

40



Further documents are listed in the continuation of Box C.



See patent family annex.

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* 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

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02.09.2021

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Name and mailing address of the ISA/
Japan Patent Office
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/JP2021/029107

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
WO 2020/110835 A1	04.06.2020	(Family: none)	
JP 2020-11742 A	23.01.2020	WO 2020/012856 A1	
JP 2020-133011 A	31.08.2020	(Family: none)	

REFERENCES CITED IN THE DESCRIPTION

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- JP 2018052559 A [0011]
- JP 2018058654 A [0011]