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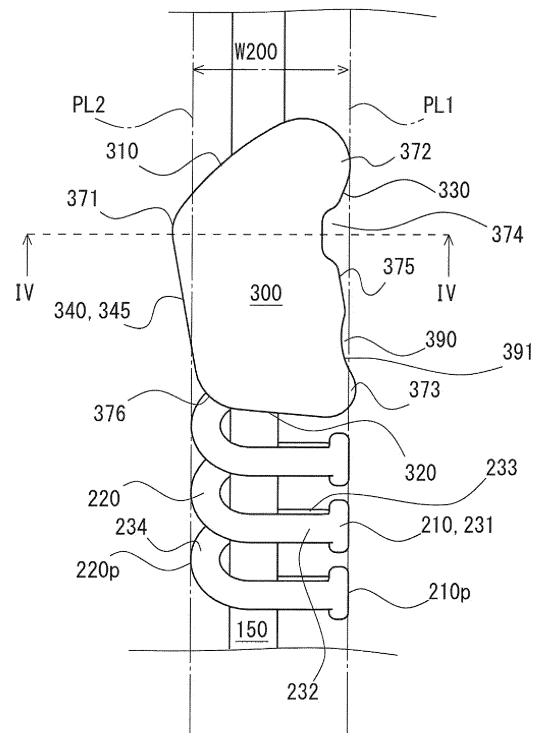
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(54) **FASTENER STRINGER AND SLIDE FASTENER**

(57) A width of the fastener element (200) is defined by a first imaginary plane (PL1) in which points or surfaces of the respective engaging portions (210) at the outer-most position outwardly of the fastener tape are arranged and a second imaginary plane (PL2) in which points or surfaces of the respective bases (220) at the inner-most position inwardly of the fastener tape are arranged, and the first imaginary plane (PL1) and the second imaginary plane (PL2) are in parallel one another. A rear region of the first side surface (330) of the front stop (300) is provided with a projected engaging portion (380) projected outwardly of the fastener tape beyond the first imaginary plane (PL1) or a recessed engaging portion (390) recessed inwardly of the fastener tape beyond the first imaginary plane (PL1). The second side surface (340) of the front stop (300) includes, from a front region to a rear region thereof, a slant surface (345) extending and being sloped to be closer to the second imaginary plane (PL2).

[Fig. 3]



Description

[Technical Field]

[0001] The present disclosure relates to a fastener stringer and a slide fastener.

[Background Art]

[0002] Patent literature 1 discloses front stops 1a, 1b in which lower portions 6a, 6b of the inner side surfaces 2a, 2b being opposed one another are shaped like a projection and a recess. The lower inner side surface 6a of the front stop 1a is provided with a projection 7a and a recess 8a, and the lower inner side surface 6b of the front stop 1b is provided with a recess 7b and a projection 8b. As shown in Fig. 3 of this literature, at least one of the projections 7a and 8b is provided to cross the center C for the engaging elements. As shown in Figs. 3 and Figs. 5-7 of this literature, the slider starts to move and the left and right fastener stringers are opened. It is described that the guide column 5 of the slider hits the projections 7a, 8b and the front stops 1a, 1b will be pushed and distanced in the left and right direction to initiate the separation of the element rows E1, E2, thereby ensuring a suitable initial movement of the slider. It is described that outer side surfaces 10a, 10b of the front stop 1a, 1b are provided with recesses 9a, 9b for easily separating the front stops 1a, 1b in the left and right direction at the time of the initial movement of the slider, thus facilitating the initial movement of the slider.

[0003] Patent literature 2 discloses a front stop in which a recessed surface region that does not touch a side wall of a separating column of a slider is provided at the center region of the inner side wall of the front stop which faces the side wall of the separating column, and projected surfaces regions are provided at the both sides of the recessed surface region which touch the side wall of the separating column.

[Citation List]

[Patent Literature]

[0004]

[PTL 1] Examined Utility-model Application Laid-open No. 57-40805

[PTL 2] Examined Utility-model Application Laid-open No. 56-37608

[Summary of Invention]

[Technical Problem]

[0005] Front stops may be provided between a first region of a fastener tape where fastener elements are not provided at the side edge and a second region of a fas-

tener tape where fastener elements are provided at the side edge. When these front stops are housed in a slider, an interspace may be caused between the respective first regions of the left and right fastener tapes. A solution to effectively reduce this interspace may be thus desired.

[Solution to Problem]

[0006] A fastener stringer according to one aspect of the present invention may include:

a fastener tape (100):

fastener elements (200) provided along a side edge (150) of the fastener tape (100);
a front stop (300) provided between a first region (110) of the fastener tape (100) where the fastener elements (200) are not provided at the side edge (150) and a second region (120) of the fastener tape (100) where the fastener elements (200) are provided at the side edge (150), the front stop (300) including a front surface (310) facing the first region (110), a rear surface (320) facing the second region (120), a first side surface (330) extending between the front surface (310) and the rear surface (320) and facing outwardly of the fastener tape, a second side surface (340) extending between the front surface (310) and the rear surface (320) and facing inwardly of the fastener tape, wherein the fastener element (200) includes an engaging portion (210) contactable with a guide column (530) of a slider (500) and a base (220) contactable with a flange portion (540) of the slider (500),

a width of the fastener element (200), which is equal to a width across the engaging portion (210) and the base (220), is defined by a first imaginary plane (PL1) in which points or surfaces of the respective engaging portions (210) at the outer-most position outwardly of the fastener tape are arranged and a second imaginary plane (PL2) in which points or surfaces of the respective bases (220) at the inner-most position inwardly of the fastener tape are arranged, the first imaginary plane (PL1) and the second imaginary plane (PL2) being in parallel one another,

a rear region of the first side surface (330) of the front stop (300) is provided with a projected engaging portion (380) projected outwardly of the fastener tape beyond the first imaginary plane (PL1) or a recessed engaging portion (390) recessed inwardly of the fastener tape beyond the first imaginary plane (PL1),
the second side surface (340) of the front stop (300) includes, from a front region to a rear region thereof, a slant surface (345) extending and

being sloped to be closer to the second imaginary plane (PL2).

[0007] In some embodiments, the slant surface (345) in the second side surface (340) of the front stop (300) crosses the second imaginary plane (PL2). 5

[0008] In some embodiments, the front stop (300) comprises a thinned portion (354) that is not provided on the fastener tape (100).

[0009] In some embodiments, the front stop (300) has a top surface (350) provided away from the top tape surface (101) of the fastener tape (100), and wherein an outer region, arranged outwardly of the fastener tape, in the top surface (350) of the front stop (300) is provided with a step (351). 10 15

[0010] In some embodiments, the step (351) extends along the side edge (150) of the fastener tape (100), and has a width that varies as the step (351) extends.

[0011] In some embodiments, the front stop (300) has a top surface (350) provided away from the top tape surface (101) of the fastener tape (100), and wherein an inner region, arranged inwardly of the fastener tape, in the top surface (350) of the front stop (300) is provided with a downward slant surface (352) sloped toward the fastener tape (100) to reach the second side surface (340). 20 25

[0012] A slide fastener according to another aspect of the present invention may be a slide fastener (700) including: 30

first and second fastener stringers (400) each being equal to the fastener stringer (400) above described; and

a slider (500) for opening and closing the first and second fastener stringers (400), wherein 35 the front stop (300) of the second fastener stringer (400) extends along the side edge (150) of the fastener tape (100) longer than the front stop (300) of the first fastener stringer (400), wherein the rear region of the first side surface (330) of the front stop (300) of the first fastener stringer (400) is provided with the projected engaging portion (380), and wherein 40 the rear region of the first side surface (330) of the front stop (300) of the second fastener stringer (400) is provided with the recessed engaging portion (390). 45

[0013] A slide fastener according to still another aspect of the present invention may include: 50

first and second fastener stringers (400); and a slider (500) for opening and closing the first and second fastener stringers (400), the first and second fastener stringers (400) each comprising: 55

a fastener tape (100):

fastener elements (200) provided along a side edge (150) of the fastener tape (100); and

a front stop (300) provided between a first region (110) of the fastener tape (100) where the fastener elements (200) are not provided at the side edge (150) and a second region (120) of the fastener tape (100) where the fastener elements (200) are provided at the side edge (150), the front stop (300) including a front surface (310) facing the first region (110), a rear surface (320) facing the second region (120), a first side surface (330) extending between the front surface (310) and the rear surface (320) and facing outwardly of the fastener tape, a second side surface (340) extending between the front surface (310) and the rear surface (320) and facing inwardly of the fastener tape; the fastener element (200) including an engaging portion (210) contactable with a guide column (530) of the slider (500) and a base (220) contactable with a flange portion (540) of the slider (500),

a width of the fastener element (200), which is equal to a width across the engaging portion (210) and the base (220), being defined by a first imaginary plane (PL1) in which points or surfaces of the respective engaging portions (210) at the outer-most position outwardly of the fastener tape are arranged and a second imaginary plane (PL2) in which points or surfaces of the respective bases (220) at the inner-most position inwardly of the fastener tape are arranged, the first imaginary plane (PL1) and the second imaginary plane (PL2) being in parallel one another,

(i) the first fastener stringer (400) being a fastener stringer in which one of a projected engaging portion (380) and a recessed engaging portion (390) is provided at a rear region of the first side surface (330) of the front stop (300), the projected engaging portion (380) being projected outwardly of the fastener tape beyond the first imaginary plane (PL1), and the recessed engaging portion (390) being recessed inwardly of the fastener tape beyond the first imaginary plane (PL1), and the second side surface (340) of the front stop (300) including, from a front region to a rear region thereof, a slant surface extending and being sloped to be closer to the second imaginary plane

(PL2), and
 (ii) the second fastener stringer (400) being a fastener stringer (400) in which, the other one of the projected engaging portion (380) and the recessed engaging portion (390) is provided at a rear region of the first side surface (330) of the front stop (300), and the second side surface (340) of the front stop (300) including, from a front region to a rear region thereof, a slant surface extending and being sloped to be closer to the second imaginary plane (PL2).

[Advantageous Effects of Invention]

[0014] According to an aspect of the present invention, a solution may be provided that may contribute in reducing the interspace between the respective first regions of the left and right fastener tapes.

[Brief Description of Drawings]

[0015]

[Fig. 1] Fig. 1 is a schematic top view of a slide fastener according to a first embodiment of the present invention, illustrating a condition in which left and right fastener stringers are not perfectly closed.

[Fig. 2] Fig. 2 is a schematic top view of a slide fastener according to a first embodiment of the present invention, illustrating a condition in which left and right fastener stringers are perfectly closed and a condition in which left and right front stops are perfectly housed in a slider.

[Fig. 3] Fig. 3 is a schematic expanded top view mainly illustrating a left-side front stop of a left-side fastener stringer of a slide fastener according to a first embodiment of the present invention.

[Fig. 4] Fig. 4 is a schematic cross-sectional view of a left-side front stop of a left-side fastener stringer of a slide fastener according to a first embodiment of the present invention, schematically illustrating a cross-section along IV-IV shown in Fig. 3.

[Fig. 5] Fig. 5 is a schematic top view of a left-side front stop of a left-side fastener stringer of a slide fastener according to a first embodiment of the present invention.

[Fig. 6] Fig. 6 is a schematic expanded top view mainly illustrating a right-side front stop of a right-side fastener stringer of a slide fastener according to a first embodiment of the present invention.

[Fig. 7] Fig. 7 is a schematic cross-sectional view of a right-side front stop of a right-side fastener stringer of a slide fastener according to a first embodiment of the present invention, schematically illustrating a cross-section along VII-VII in fig. 6.

[Fig. 8] Fig. 8 is a schematic top view of a right-side front stop of a right-side fastener stringer of a slide fastener according to a first embodiment of the present invention.

[Fig. 9] Fig. 9 is a schematic illustration for describing a closing action of a slide fastener according to a first embodiment of the present invention, in which disclosed by dotted lines are a guide column, a bottom wing, and flange portions.

[Fig. 10] Fig. 10 is a schematic illustration for describing a closing action of a slide fastener according to a first embodiment of the present invention, illustrating a condition in which the slider has been moved frontward from the position shown in Fig. 9 and the major portion of the respective front stops have been housed in the slider.

[Fig. 11] Fig. 11 is a schematic view illustrating a closing action of a slide fastener according to a first embodiment of the present invention, illustrating a condition in which the slider has been moved frontward from the position shown in Fig. 10 and the respective front stops have been perfectly housed in the slider.

[Fig. 12] Fig. 12 is a schematic cross-sectional view of a slide fastener according to a first embodiment of the present invention, schematically illustrating a cross-section along XII-XII shown in Fig. 11.

[Fig. 13] Fig. 13 is a schematic end view of a slide fastener according to a first embodiment of the present invention, illustrating a half of cross-section along XII-XII shown in Fig. 11.

[Description of Embodiments]

[0016] Hereinafter, non-limiting exemplary embodiments of the present invention will be described with reference to Figures. One or more embodiments and respective features included in the embodiment are not mutually exclusive. A skilled person could properly combine the respective embodiments and/or respective features without requiring excess descriptions, and could understand the synergic effects by such combinations. Overlapping descriptions among embodiments will be basically omitted. Referenced drawings are mainly for the purpose of illustrating the invention and may possibly be simplified for the sake of convenience of illustration.

[0017] Description will follow hereinafter while using "directional terms" defined as follows. A front-rear direction may be equal to a sliding direction of a slider. Forward movement of a slider may close left-right fastener stringers and thus left and right fastener elements may bite one another. Rearward movement of a slider may open left-right fastener stringers and thus left and right fastener elements may be disengaged one another. A left-right direction may be a direction perpendicular to the front-rear direction and may also be a direction perpendicular to a guide column of a slider. Up-down direction may be a direction perpendicular to the front-rear direc-

tion and the left-right direction. The top-down direction may be identical to an extending direction of a guide column of a slider. The top-down direction may also be a direction perpendicular to a tape surface of a fastener tape. A fastener tape may have a pair of tape surfaces as of top surface and bottom surface.

<First Embodiment>

[0018] Hereinafter, a first embodiment will be discussed with reference to Figs. 1-13. Fig. 1 is a schematic top view of a slide fastener, illustrating a condition in which left and right fastener stringers are not perfectly closed. Fig. 2 is a schematic top view of a slide fastener, illustrating a condition in which left and right fastener stringers are perfectly closed and a condition in which left and right front stops are perfectly housed in a slider. Fig. 3 is a schematic expanded top view mainly illustrating a left-side front stop of a left-side fastener stringer of a slide fastener. Fig. 4 is a schematic cross-sectional view of a left-side front stop of a left-side fastener stringer of a slide fastener, schematically illustrating a cross-section along IV-IV shown in Fig. 3. Fig. 5 is a schematic top view of a left-side front stop of a left-side fastener stringer of a slide fastener. Fig. 6 is a schematic expanded top view mainly illustrating a right-side front stop of a right-side fastener stringer of a slide fastener. Fig. 7 is a schematic cross-sectional view of a right-side front stop of a right-side fastener stringer of a slide fastener, schematically illustrating a cross-section along VII-VII in fig. 6. Fig. 8 is a schematic top view of a right-side front stop of a right-side fastener stringer of a slide fastener. Fig. 9 is a schematic illustration for describing a closing action of a slide fastener, in which disclosed by dotted lines are a guide column, a bottom wing, and flange portions. Fig. 10 is a schematic illustration for describing a closing action of a slide fastener, illustrating a condition in which the slider has been moved frontward from the position shown in Fig. 9 and the major portion of the respective front stops have been housed in the slider. Fig. 11 is a schematic view illustrating a closing action of a slide fastener, illustrating a condition in which the slider has been moved frontward from the position shown in Fig. 10 and the respective front stops have been perfectly housed in the slider. Fig. 12 is a schematic cross-sectional view of a slide fastener, schematically illustrating a cross-section along XII-XII shown in Fig. 11. Fig. 13 is a schematic end view of a slide fastener, illustrating a half of cross-section along XII-XII shown in Fig. 11.

[0019] As shown in Figs. 1 and 2, a slide fastener 700 has a left-right pair of fastener stringers 400 and a slider 500 for opening and closing the left-right paired fastener stringers 400. Each fastener stringer 400 may have a fastener tape 100, fastener elements 200 provided along a side edge 150 of the fastener tape 100, and a resin-made front stop 300 provided at the side edge 150 of the fastener tape 100, and a metal-made or resin-made rear stop 600 provided at the side edge 150 of the fastener

tape 100. The rear stop 600 may be common between the left and right fastener stringers 400, whereby the left and right fastener stringers 400 being coupled at the rear end side.

[0020] As shown in Fig. 11 and 12, the slider 500 may have a top wing 510, a bottom wing 520, a guide column 530, a flange portion 540, a pull-attachment column 550, and a pull 560. The top wing 510 and the bottom wing 520 are coupled via the guide column 530, and the top wing 510 and the bottom wing 520 are arranged in parallel one another. The shape of the top wing 510 viewed from above and the shape of the bottom wing 520 viewed from below may be identical. Y-shaped element path for the fastener elements 200 may be defined by the top wing 510, the bottom wing 520, the guide column 530, and the flange portion 540. The flange portion 540 may include top flange portions extending downward from left or right side edge of the top wing 510, and bottom flange portions extending upward from left or right side edge of the bottom wing 520. In some embodiments, one of the top flange portion and the bottom flange portion may be omitted. The pull-attachment column 550 may be provided as a cantilever on the top surface of the top wing 510. The pull may have a hole through which the pull-attachment column 550 is inserted.

[0021] Each fastener tape 100 may have a first region 110 where the fastener elements 200 are not provided at the side edge 150, a second region 120 where the fastener elements 200 are provided at the side edge 150, and a third region 130 where the front stop 300 is provided at the side edge 150. The third region 130 is provided between the first region 110 and the second region 120. That is, each front stop 300 is provided between the first region 110 where the fastener elements 200 are not provided at the side edge 150 and the second region 120 where the fastener elements 200 are provided at the side edge 150.

[0022] It is envisaged that each first region 110 of the fastener tape 100 may be useful for firmly sewing the slide fastener 700 onto other articles. Fig. 2 illustrates a condition where the left and right fastener stringers 400 are coupled to be a Y-shape, and an interspace W110 is caused between the left and right first regions 110. It is envisaged that this interspace W110 between the left and right first regions 110 may be reduced by employing the front stops 300 according to the present embodiment. It should be noted that the front-back lengths of the first regions 110 of the respective fastener tapes 100 are not necessarily the same. The front-back lengths of the second regions 120 of the respective fastener tapes 100 could be varied in various embodiments.

[0023] Each fastener tape 100 may be a cloth made from woven yarns or a knit fabric made from knitted yarns. Each fastener tape 100 may be a flexible member having a pair of tape surfaces as a top surface and a bottom surface. Each fastener tape 100 may include a tape main portion 140 and a side edge 150 provided at the hem of the tape main portion 140. The side edge 150 of each

fastener tape 100 may be opposed to the side edge 150 of the other left or right fastener tape 100, and thus this may sometimes be referred to as an opposed side edge. In some embodiments, the side edge 150 includes a portion thicker than the tape main portion 140 and, in some embodiments, the side edge 150 includes a core thread 155, not necessarily limited to though.

[0024] A direction directed to the inner side of the fastener tape 100 may be referred to as inward(ly) of the fastener tape, i.e. inward(ly) of tape. A direction directed to the outer side of the fastener tape 100 may be referred to as outward(ly) of the fastener tape, i.e. outward(ly) of tape. As a comprehensive example, the direction of inward(ly) of tape may be a direction directed from a point positioned external to the tape surface of the fastener tape 100 toward a point positioned over the tape surface of the fastener tape 100 while crossing the side edge of the fastener tape. The direction of outward(ly) of tape may be a direction directed from a point positioned over the tape surface of the fastener tape 100 toward a point positioned external to the tape surface of the fastener tape 100 while crossing the side edge of the fastener tape. The directions indicated by the terms of inward(ly) of tape and outward(ly) of tape may be applicable for a region inside the tape surface of the fastener tape.

[0025] The fastener elements 200 are provided at the side edge 150 of the fastener tape 100. A coil element is illustrated as a fastener element 200, but it should not be limited thereto. In some embodiments, resin elements or metal elements may be employed as a fastener element. It will be understood that the benefit of the present disclosed embodiment will be appreciated regardless of types of fastener element.

[0026] The fastener element 200 may have an engaging portion 210 and a base 220. The engaging portion 210 is a portion that can engage with the other one of the paired fastener elements 200. The base 220 is positioned inwardly of tape relative to the engaging portion 210 of the fastener element 200, and is a portion for ensuring attachment of the fastener element 200 to the fastener tape 100. As would be understood by a skilled person, the engaging portions 210 are contactable with the guide column 530 of the slider 500, and the bases 220 are contactable with the flange portion 540 of the slider 500.

[0027] The illustrated exemplary fastener element 200 is a coil element, and is configured from a helically wound monofilament. The fastener element 200 is configured by a series of fundamental units in the front-rear direction. Each fundamental unit may include an engaging head 231 configured wider in the front-rear direction, a top leg 232 coupled to the top end of the engaging head 231, a bottom leg 233 coupled to the bottom end of the engaging head 231, and a return portion 234 coupled to the other end of a bottom leg 233 and to the other end of a top leg of an adjacent fundamental unit. The engaging head 231 is not provided over the side edge 150 of the fastener tape 100. The top leg 232 and the bottom leg 233 extend

inwardly of tape while traversing the core thread 155 at the side edge 150 of the fastener tape 100.

[0028] The width W200 of the fastener element 200 may be defined by the first imaginary plane PL1 and the second imaginary plane PL2 which are in parallel one another. As shown in Figs. 3 and 6, points or surfaces of the respective engaging portions 210 at the outer-most position outwardly of the fastener tape are arranged in the first imaginary plane PL1. Points or surfaces of the respective bases 220 at the inner-most position inwardly of the fastener tape are arranged in coplanar fashion in the second imaginary plane PL2.

[0029] In other words, points or surfaces of the respective engaging portion 210 positioned farthest from the side edge 150 of the fastener tape 100 are arranged in the first imaginary plane PL1. Points or surfaces of the respective bases 220 positioned farthest from the respective engaging portions 210 are arranged in the second imaginary plane PL2.

[0030] In the illustrated exemplary coil element, the flat surfaces of the respective engaging portions 210 are arranged in the first imaginary plane PL1. Innermost points in the respective return portions 234 inwardly of the tape are arranged in the second imaginary plane PL2.

[0031] In a case where the slide fastener 700 is referenced as a premise, the first imaginary plane PL1 defines an inner boarder for the fastener elements 200 in the left and right direction. The second imaginary plane PL2 defines an outer boarder for the fastener elements 200 in the left and right direction.

[0032] Each front stop 300 may have a shape like a crescent when viewed from above. Each front stop 300 has a front surface 310 facing the first region 110, a rear surface 320 facing the second region 120, a first side surface 330 extending between the front surface 310 and the rear surface 320 and facing outwardly of the fastener tape, and a second side surface 340 extending between the front surface 310 and the rear surface 320 and facing inwardly of the fastener tape. Each front stop 300 has a top surface 350 provided away from the top tape surface 101 of the fastener tape 100 and a bottom surface 360 that is flush with the tape bottom surface 102 of the fastener tape 100. A rounded edge exists between the first side surface 330 and the front surface 310, and a rounded edge exists between the first side surface 330 and the rear surface 320.

[0033] In non-limited embodiments, each front stop 300 may be integrally molded to the side edge 150 of the fastener tape 100 through an insert molding. The front-rear length of the left-side front stop 300 may be greater than the front-rear length of the right-side front stop 300. The left-side front stop 300 extends along the side edge 150 of the fastener tape 100 longer than the right-side front stop 300.

[0034] A rear region of the first side surface 330 of the left-side front stop 300 shown in Fig. 3 is provided with a recessed engaging portion 390 recessed inwardly of the fastener tape beyond the first imaginary plane PL1.

The recessed engaging portion 390 has a side surface 391 that crosses the first imaginary plane PL1.

[0035] A rear region of the first side surface 330 of the right-side front stop 300 shown in Fig. 6 is provided with a projected engaging portion 380 projected outwardly of the fastener tape beyond the first imaginary plane PL1. The projected engaging portion 380 has two side surfaces 381 that cross the first imaginary plane PL1.

[0036] When the left and right front stops 300 are housed in the slider as a result of forward movement of the slider, the recessed engaging portion 390 of the left-side front stop 300 and the projected engaging portion 380 of the right-side front stop 300 are engaged or in contact one another, thereby clockwise rotational force being applied to the left-side front stop 300 and anticlockwise rotational force being applied to the right-side front stop 300. The second side surface 340 of each left or right front stop 300 includes, from the front region to the rear region thereof, a slant surface 345 extending and being sloped to be closer to the second imaginary plane PL2, allowing the rotation of each front stop 300 until the second side surfaces 340 of each front stop 300 touches the inner wall surface of the flange portion 540 of the slider 500.

[0037] It should be noted that front region and the rear region are determined relatively. For example, in the illustrated examples, the front region of the front stop 300 may be a region positioned forward from the center of the front stop 300 in the front-rear direction. The rear region of the front stop 300 may be a region positioned rearward from the center of the front stop 300 in the front-rear direction. The front and rear regions can be redefined relative to a point shifted forward or rearward from the center of the front stop 300 in the front-rear direction.

[0038] This rotation of each front stop 300 may reduce the interspace W110 shown in Fig. 2. The reduction of interspace W110 shown in Fig. 2 may improve the appearance of the slide fastener 700 under a closed state or may ensure easier sewing or may ensure improved initial movement of the slider 500. The initial movement of a slider may be equal to easiness of initial movement of a stopping slider.

[0039] As shown in Figs. 3 and 6, the illustrated exemplary front stop 300 each has a rounded first edge 371 between the front surface 310 and the second side surfaces 340 which is projected inwardly of tape beyond the second imaginary plane PL2. The first edge 371 is positioned inwardly of tape relative to the second side surfaces 340, and the second side surfaces 340 extends to be closer to the second imaginary plane PL2 as extending rearward. In the left-side front stop 300 illustrated in Fig. 3, the slant surface 345 of the second side surfaces 340 crosses the second imaginary plane PL2 while extending rearward. In this case, when an intersection between the slant surface 345 and the second imaginary plane PL2 is set, a frontward half of the slant surface 345 from the intersection is positioned inwardly of tape relative to the second imaginary plane PL2, and a rearward half of the

slant surface 345 from the intersection is positioned outwardly of tape relative to the second imaginary plane PL2. In the right-side front stop 300 illustrated in Fig. 6, the slant surface 345 of the second side surfaces 340 does not cross the second imaginary plane PL2 while extending rearward. However, the slant surface 345 of the right-side front stop 300 may cross the second imaginary plane PL2 in other embodiments.

[0040] The slant surface 345 of the second side surfaces 340 of the left-side front stop 300 illustrated in Fig. 3 is coupled to the rear surface 320 via a rounded second edge 376. The slant surface 345 of the second side surfaces 340 of the right-side front stop 300 illustrated in Fig. 6 is coupled to the rear surface 320 via a rounded second edge 376. The boarder 377 between the slant surface 345 of the second side surfaces 340 of the right-side front stop 300 and the second edge 376 may be located on the second imaginary plane PL2 or nearby the second imaginary plane PL2. The second edge 376 of the right-side front stop 300 may cross the second imaginary plane PL2.

[0041] As shown in Figs. 3 and 6, a front region of the first side surface 330 of each front stop 300 is provided with a rounded bulge 372 projected outwardly of tape. The bulge 372 is configured to be contactable with the guide column 530 of the slider 500. In the left-side front stop 300 illustrated in Fig. 3, the bulge 372 does not extend outwardly of tape beyond the first imaginary plane PL1, and the outer-most position of the bulge 372 outwardly of tape is located on the first imaginary plane PL1. In contrast, in the right-side front stop 300 illustrated in Fig. 6, the bulge 372 extends outwardly of tape beyond the first imaginary plane PL1. This may ensure that a space between the guide column 530 and the flange portion 540 of the slider is sufficiently closed.

[0042] The rear region of the first side surface 330 of each front stop 300 is provided with a projection projecting outwardly of tape beyond the first imaginary plane PL1. In the left-side front stop 300 illustrated in Fig. 3, the rear region of the first side surface 330 is provided with a projection 373, and the above-described recessed engaging portion 390 is provided adjacent to and at the front-side of the projection 373. The projection 373 projects outwardly of tape from the first imaginary plane PL1. A slant surface 375 is provided adjacent to and at the front-side of the recessed engaging portion 390. A recess 374 is provided adjacent to and at the front-side of the slant surface 375. The above-described bulge 372 is provided adjacent to and at the front-side of the recess 374.

[0043] In the right-side front stop 300 illustrated in Fig. 6, the rear region of the first side surface 330 is provided with the above-described projected engaging portion 380, and a slant surface 375 is provided adjacent to and at the front-side of the projected engaging portion 380. A recess 374 is provided adjacent to and at the front-side of the slant surface 375. The above-described bulge 372 is provided adjacent to and at the front-side of the recess

374.

[0044] The bulge 372 may close the mouth between the guide column 530 and the flange portion 540 of the slider 500. The bulge 372 is rounded when viewed from above, and thus small amount of contact drag between the bulge 372 and the guide column 530 may be achieved. The contact area between the first side surface 330 of the front stop 300 and the guide column 530 may be reduced by the recess 374. The stable displacement of the front stop 300 between the guide column 530 and the flange portion 540 may be achieved due to the slant surface 375.

[0045] The slant surface 375 of the first side surface 330 may be referred to as a first slant surface, and the slant surface 345 of the second side surfaces 340 may be referred to as a second slant surface; alternatively the slant surface 375 of the first side surface 330 may be referred to as a second slant surface, and the slant surface 345 of the second side surfaces 340 may be referred to as a first slant surface. In some embodiments, the first slant surface and the second slant surface are in parallel one another.

[0046] As shown in Figs. 4 and 7, each front stop 300 has a top surface 350 provided away from the top tape surface 101 of the fastener tape 100 and a bottom surface 360 that is flush with the tape bottom surface 102 of the fastener tape 100. At both sides of the core thread 155, the outer region of the front stop 300 outwardly of tape is provided with a step 351 and the inner region of the front stop 300 inwardly of tape is provided with a descent slant surface 352. The step 351 extends along the side edge 150 of the fastener tape 100, and has a left-right width W351 that varies as the step 351 extends. The descent slant surface 352 slants downward toward the fastener tape 100 to reach the second side surfaces 340. A curved surface 353 may be provided between the descent slant surface 352 and the step 351.

[0047] It should be noted that the inner region of the front stop 300 provided inwardly of tape and the outer region of the front stop 300 provided outwardly of tape are determined relatively. For example, in the illustrated exemplary case, the inner region of the front stop 300 inwardly of tape is a region provided inwardly of tape from the center of the front stop 300 in the left and right direction. The outer region of the front stop 300 outwardly of tape is a region provided outwardly of tape from the center of the front stop 300 in the left and right direction. The inner and outer regions inwardly and outwardly of tape can be redefined relative to a point shifted leftward or rightward from the center of the front stop 300 in the left-right direction.

[0048] The step 351 of each front stop 300 is provided for avoiding or suppressing an interference with the structure of the slider 500. The descent slant surface 352 of each front stop 300 is provided for avoiding or suppressing an interference with the structure of the slider 500.

[0049] As shown in Fig. 12, separation walls 570 for defining the left and right element passages may be pro-

vided at the top wing 510 and the bottom wing 520 respectively. Furthermore, pusher portions 580 for pushing the return portion 234 may be provided on the inner wall of the coupling portion between the top wing 510 and the flange portion 540.

[0050] The outer region of the front stop 300 outwardly of tape may be thinned by the above-described step 351, thereby suppressing an interference between the up or down separation wall 570 and the front stop 300. The front stop 300 is provided with a thinned portion 354 that is not provided on the fastener tape 100.

[0051] In the illustrated example, the thinned portion 354 is positioned outwardly of tape from the side edge 150 of the fastener tape 100. The thinned portion 354 may be thinner than the maximum width H300 of the front stop 300 by the depth D351 of the step 351. The left-right width W351 of the step 351 may vary in the front-rear direction. In the illustrated example, the left-right width W351 of the step 351 at the rear region of the front stop 300 is greater than the left-right width W351 of the step 351 at the front region of the front stop 300. In this case, the coupling strength of the front stop 300 to the core thread 155 at the front region of the front stop 300 may be suitably maintained. At the same time, the interference between the separation wall 570 and the front stop 300 at the rear region of the front stop 300 which enters further into the slider 500 may be effectively suppressed. The interference between the pusher portions 580 and the front stop 300 may be suppressed by the above-described descent slant surface 352.

[0052] In the present embodiment, rotational force may be given to each front stop 300 due to the engagement and contact between the projected engaging portion 380 and the recessed engaging portion 390. When an interference between the front stop 300 and the separation wall 570 or between the front stop 300 and the pusher portions 580 is caused, the rotation of this front stop 300 may possibly be hindered. In the present embodiment, the above-described step 351 and descent slant surface 352 are provided at the front stop 300 so that above problems may be avoided or suppressed to be caused actually.

[0053] In the illustrated example, $D351 < (H300/3)$ is satisfied, where D351 indicates the depth of the step 351, and H300 indicates the maximum thickness of the front stop 300. In other words, the depth of the step 351 is less than 1/3 of the maximum thickness of the front stop 300.

[0054] In the illustrated example, $D351 < (H300/4)$ is satisfied, where D351 indicates the depth of the step 351, and H300 indicates the maximum thickness of the front stop 300. In other words, the depth of the step 351 is less than 1/4 of the maximum thickness of the front stop 300.

[0055] In the illustrated example, $D351 < (H300/5)$ is satisfied, where D351 indicates the depth of the step 351, and H300 indicates the maximum thickness of the front stop 300. In other words, the depth of the step 351 is less than 1/5 of the maximum thickness of the front stop 300.

[0056] In the illustrated example, $D351 < (H300/6)$ is

satisfied, where D351 indicates the depth of the step 351, and H300 indicates the maximum thickness of the front stop 300. In other words, the depth of the step 351 is less than 1/6 of the maximum thickness of the front stop 300.

[0057] As shown in Fig. 5 and Fig. 8, the step 351 is provided across the front region and the rear region in the outer region of the front stop 300 outwardly of tape. Likewise, the descent slant surface 352 is provided across the front region and the rear region in the inner region of the front stop 300 inwardly of tape. The curved surface 353 is provided to be wider in the left and right direction from the rear side toward the front side. It is envisaged that this may serve to avoid or suppress the interferences with the separation walls 570 and the pusher portions 580 of the slider 500. Technical effects achieved by these structures would be immediately recognized by referring to Figs. 12 and 13.

[0058] Descriptions will be made with references to Figs. 9-11 about processes in which the slider 500 is moved frontward, the left-right pair of fastener stringers 400 are closed, the left-right pair of fastener elements 200 are coupled, and the left-right pair of front stops 300 are housed in the slider 500. Here, in the left-right pair of fastener stringers 400, the left-side front stop 300 of the left-side fastener stringer 400 extends along the side edge 150 of the fastener tape 100 longer than the right-side front stop 300 of the right-side fastener stringer 400. Furthermore, the recessed engaging portion 390 is provided at the rear region of the first side surface 330 of the left-side front stop 300, and the projected engaging portion 380 is provided at the rear region of the first side surface 330 of the right-side front stop 300.

[0059] While the slider 500 is moved frontward from the position illustrated in Fig. 9 to the position illustrated in Fig. 10, engaging portions 210 of each left or right fastener element 200 slide on the side surface of the guide column 530 of the slider 500, and the bases 220 slide on the inner side surface of the flange portion 540 of the slider 500. As would be understandable from Fig. 9, earlier than the right-side front stop 300, the left-side front stop 300 enters into the mouth between the guide column 530 and the flange portion 540 of the slider 500. It should be noted that, the slider 500 has a left-side mouth between the guide column 530 and the left-side flange portion 540 and a right-side mouth between the guide column 530 and the right-side flange portion 540.

[0060] While the slider 500 is moved frontward from the position illustrated in Fig. 10 to the position illustrated in Fig. 11, the projected engaging portion 380 of the right-side front stop 300 which has been entered into the slider 500 through the right-side mouth of the slider 500 touches the recessed engaging portion 390 of the left-side front stop 300 after crossing the center line CL of the slider 500 in the left-right direction, thereby causing the clockwise rotation of the left-side front stop 300 and anticlockwise rotation of the right-side front stop 300. At this moment, the projection 373 of the left-side front stop 300 that has entered into the slider 500 through the left-side

mouth is positioned rearward relative to the rear surface 320 of the right-side front stop 300 after crossing the center line CL of the slider 500 in the left-right direction. Each left or right front stop 300 is provided with the slant surface 345 as described above, allowing each front stop 300 to rotate by an appropriate amount. The space SP5 between the slant surface 345 of each front stop 300 and the inner wall surface of the flange portion 540 of the slider 500 may be reduced by the rotation of each front stop 300 and thus the interspace W110 illustrated in Fig. 2 may be reduced.

[0061] In one embodiment, the timing when the slant surface 345 of each front stop 300 hits the inner wall surface of the flange portion 540 of the slider 500 may be earlier than the timing when the bulge 372 of each front stop 300 hits the guide column 530. In other embodiments, the timing when the slant surface 345 of each front stop 300 hits the inner wall surface of the flange portion 540 of the slider 500 may be later than the timing when the bulge 372 of each front stop 300 hits the guide column 530. In yet other embodiments, the timing when the slant surface 345 of each front stop 300 hits the inner wall surface of the flange portion 540 of the slider 500 may be substantially the same as the timing when the bulge 372 of each front stop 300 hits the guide column 530.

[0062] As would be understood by referring to Fig. 11, in the illustrated example, when each front stop 300 is housed in the slider 500, the front surface 310 of each front stop 300 substantially or perfectly matches the contour of the bottom wing 520 of the slider 500. In other embodiments, it is envisaged that, when each front stop 300 is housed in the slider 500, the front surface 310 of each front stop 300 may be positioned frontward from the contour of the bottom wing 520 of the slider 500 by an arbitrary amount.

[0063] As would be understood by referring to Fig. 11, when each front stop 300 is housed in the slider 500, the second side surface 340 and the slant surface 345 of each front stop 300 faces the inner wall surface of the flange portion 540 of the slider 500. When each front stop 300 is housed in the slider 500, the front region of the first side surface 330 of each front stop 300 faces the guide column 530 of the slider 500, and the rear region of the first side surface 330 is positioned rearward from the guide column 530.

[0064] Given the above teachings, a skilled person in the art would be able to add various modifications to the respective embodiments. Reference codes included in claims are just for reference and should not be referenced for purposes of narrowly construing the scope of claims.

[Reference Signs List]

[0065]

100 fastener tape
200 fastener elements

210	engaging portion	
220	base	
300	front stop	
310	front surface	
320	rear surface	5
330	first side surface	
340	second side surface	
345	slant surface	
350	top surface	
351	step	10
352	descent slant surface	
353	curved surface	
360	bottom surface	
371	first edge	
372	bulge	15
373	projection	
374	recess	
375	slant surface	
376	second edge	20
400	fastener stringer	
500	slider	
600	rear stop	
700	slide fastener	25

Claims

1. A fastener stringer (400) comprising:

a fastener tape (100):

fastener elements (200) provided along a side edge (150) of the fastener tape (100); a front stop (300) provided between a first region (110) of the fastener tape (100) where the fastener elements (200) are not provided at the side edge (150) and a second region (120) of the fastener tape (100) where the fastener elements (200) are provided at the side edge (150), the front stop (300) including a front surface (310) facing the first region (110), a rear surface (320) facing the second region (120), a first side surface (330) extending between the front surface (310) and the rear surface (320) and facing outwardly of the fastener tape, a second side surface (340) extending between the front surface (310) and the rear surface (320) and facing inwardly of the fastener tape, wherein the fastener element (200) includes an engaging portion (210) contactable with a guide column (530) of a slider (500) and a base (220) contactable with a flange portion (540) of the slider (500), a width of the fastener element (200), which is equal to a width across the engaging por-

tion (210) and the base (220), is defined by a first imaginary plane (PL1) in which points or surfaces of the respective engaging portions (210) at the outer-most position outwardly of the fastener tape are arranged and a second imaginary plane (PL2) in which points or surfaces of the respective bases (220) at the inner-most position inwardly of the fastener tape are arranged, the first imaginary plane (PL1) and the second imaginary plane (PL2) being in parallel one another, a rear region of the first side surface (330) of the front stop (300) is provided with a projected engaging portion (380) projected outwardly of the fastener tape beyond the first imaginary plane (PL1) or a recessed engaging portion (390) recessed inwardly of the fastener tape beyond the first imaginary plane (PL1), the second side surface (340) of the front stop (300) includes, from a front region to a rear region thereof, a slant surface (345) extending and being sloped to be closer to the second imaginary plane (PL2).

2. The fastener stringer according to Claim 1, wherein the slant surface (345) in the second side surface (340) of the front stop (300) crosses the second imaginary plane (PL2).
3. The fastener stringer according to Claim 1 or 2, wherein the front stop (300) comprises a thinned portion (354) that is not provided on the fastener tape (100).
4. The fastener stringer according to any one of Claims 1 to 3, wherein the front stop (300) has a top surface (350) provided away from the top tape surface (101) of the fastener tape (100), and wherein an outer region, arranged outwardly of the fastener tape, in the top surface (350) of the front stop (300) is provided with a step (351).
5. The fastener stringer according to Claim 4, wherein the step (351) extends along the side edge (150) of the fastener tape (100), and has a width that varies as the step (351) extends.
6. The fastener stringer according to any one of Claims 1 to 5, wherein the front stop (300) has a top surface (350) provided away from the top tape surface (101) of the fastener tape (100), and wherein an inner region, arranged inwardly of the fastener tape, in the top surface (350) of the front stop (300) is provided with a downward slant surface (352) sloped toward the fastener tape (100) to reach the second side surface (340).

7. A slide fastener (700) comprising:

first and second fastener stringers (400) each being equal to the fastener stringer (400) according to Claim 1; and
 a slider (500) for opening and closing the first and second fastener stringers (400), wherein the front stop (300) of the second fastener stringer (400) extends along the side edge (150) of the fastener tape (100) longer than the front stop (300) of the first fastener stringer (400), wherein the rear region of the first side surface (330) of the front stop (300) of the first fastener stringer (400) is provided with the projected engaging portion (380), and wherein the rear region of the first side surface (330) of the front stop (300) of the second fastener stringer (400) is provided with the recessed engaging portion (390) .

8. A slide fastener (700) comprising:

first and second fastener stringers (400); and
 a slider (500) for opening and closing the first and second fastener stringers (400),
 the first and second fastener stringers (400) each comprising:

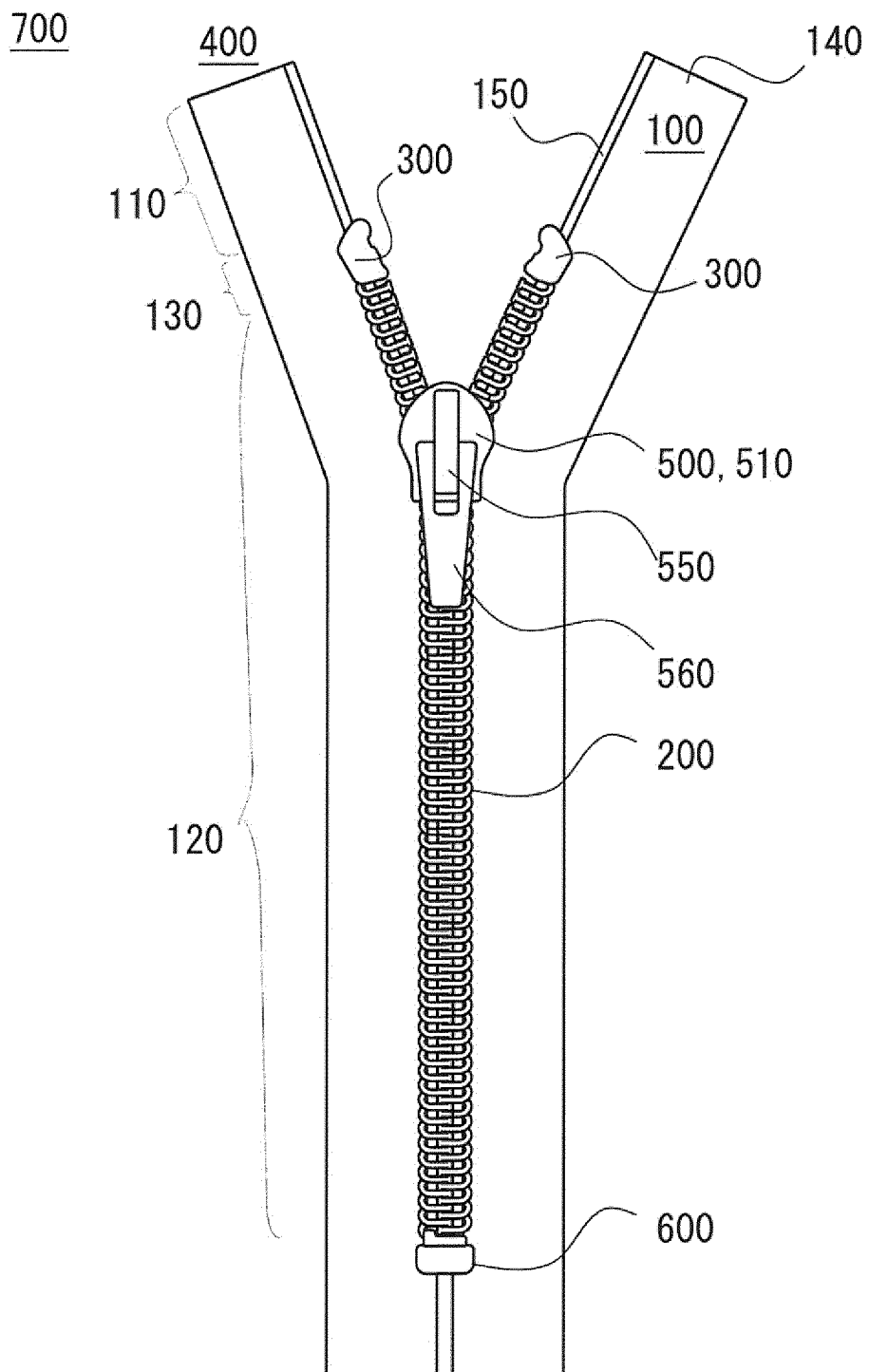
a fastener tape (100):

fastener elements (200) provided along a side edge (150) of the fastener tape (100); and
 a front stop (300) provided between a first region (110) of the fastener tape (100) where the fastener elements (200) are not provided at the side edge (150) and a second region (120) of the fastener tape (100) where the fastener elements (200) are provided at the side edge (150), the front stop (300) including a front surface (310) facing the first region (110), a rear surface (320) facing the second region (120), a first side surface (330) extending between the front surface (310) and the rear surface (320) and facing outwardly of the fastener tape, a second side surface (340) extending between the front surface (310) and the rear surface (320) and facing inwardly of the fastener tape; the fastener element (200) including an engaging portion (210) contactable with a guide column (530) of the slider (500) and a base (220) contactable with a flange portion (540) of the slider (500), a width of the fastener element (200), which is equal to a width across the en-

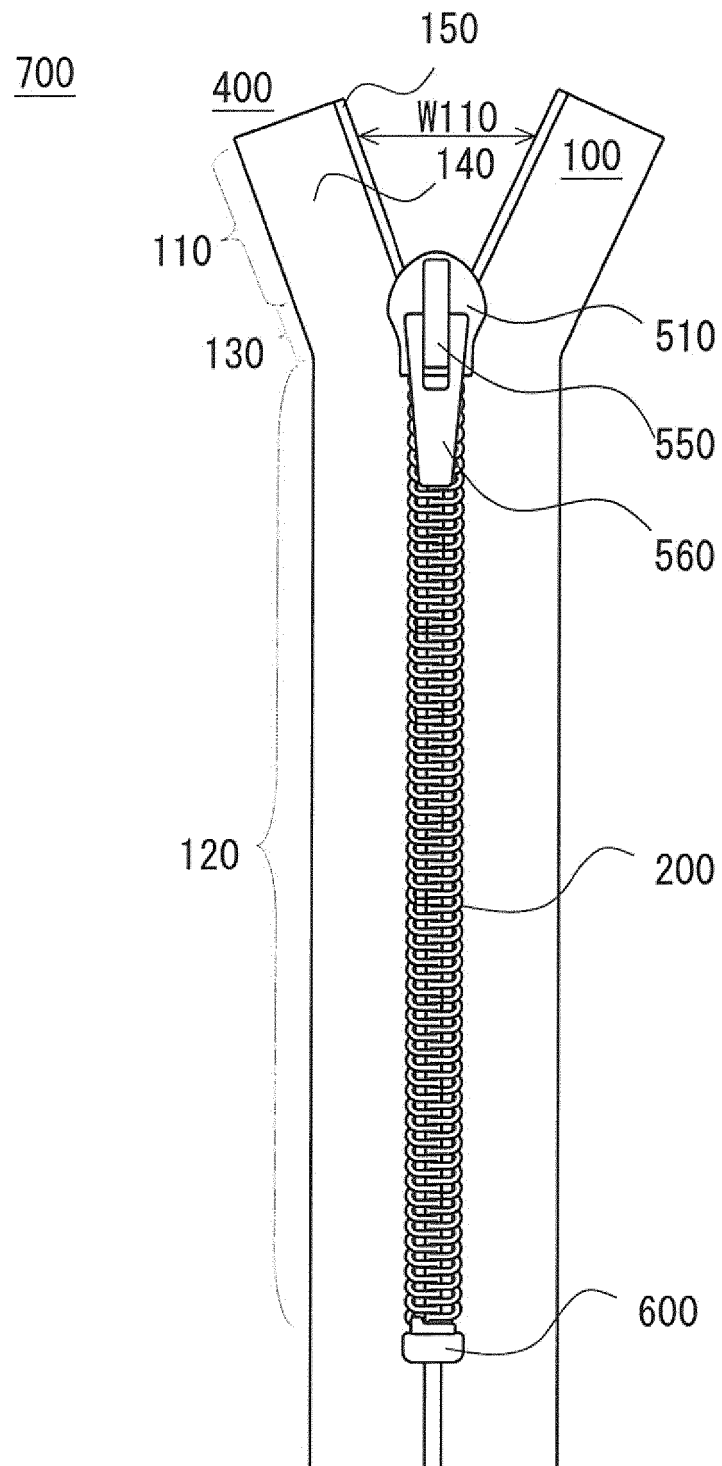
gaging portion (210) and the base (220), being defined by a first imaginary plane (PL1) in which points or surfaces of the respective engaging portions (210) at the outer-most position outwardly of the fastener tape are arranged and a second imaginary plane (PL2) in which points or surfaces of the respective bases (220) at the inner-most position inwardly of the fastener tape are arranged, the first imaginary plane (PL1) and the second imaginary plane (PL2) being in parallel one another,

(i) the first fastener stringer (400) being a fastener stringer in which one of a projected engaging portion (380) and a recessed engaging portion (390) is provided at a rear region of the first side surface (330) of the front stop (300), the projected engaging portion (380) being projected outwardly of the fastener tape beyond the first imaginary plane (PL1), and the recessed engaging portion (390) being recessed inwardly of the fastener tape beyond the first imaginary plane (PL1), and the second side surface (340) of the front stop (300) including, from a front region to a rear region thereof, a slant surface extending and being sloped to be closer to the second imaginary plane (PL2), and
 (ii) the second fastener stringer (400) being a fastener stringer (400) in which, the other one of the projected engaging portion (380) and the recessed engaging portion (390) is provided at a rear region of the first side surface (330) of the front stop (300), and the second side surface (340) of the front stop (300) including, from a front region to a rear region thereof, a slant surface extending and being sloped to be closer to the second imaginary plane (PL2).

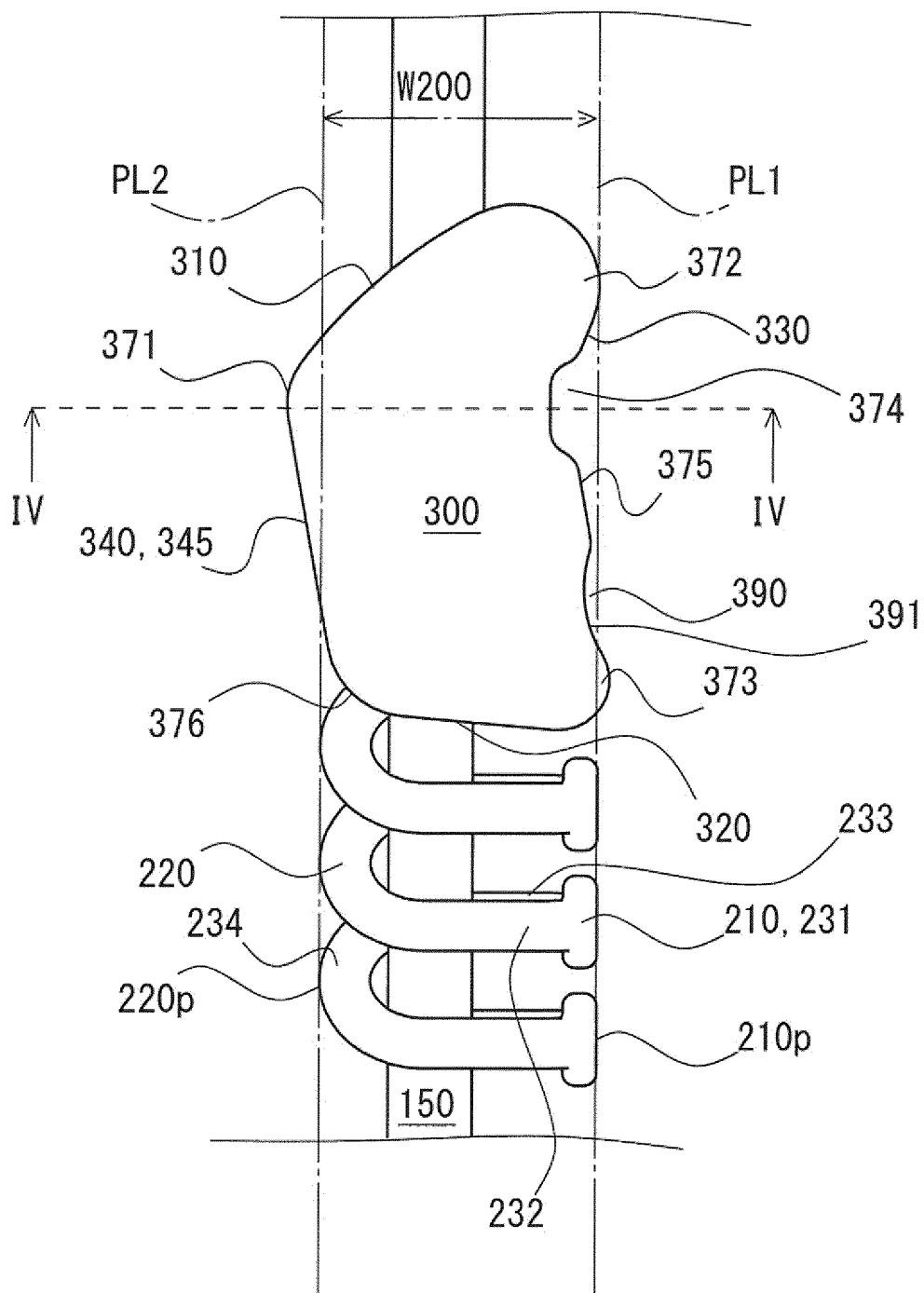
[Fig. 1]



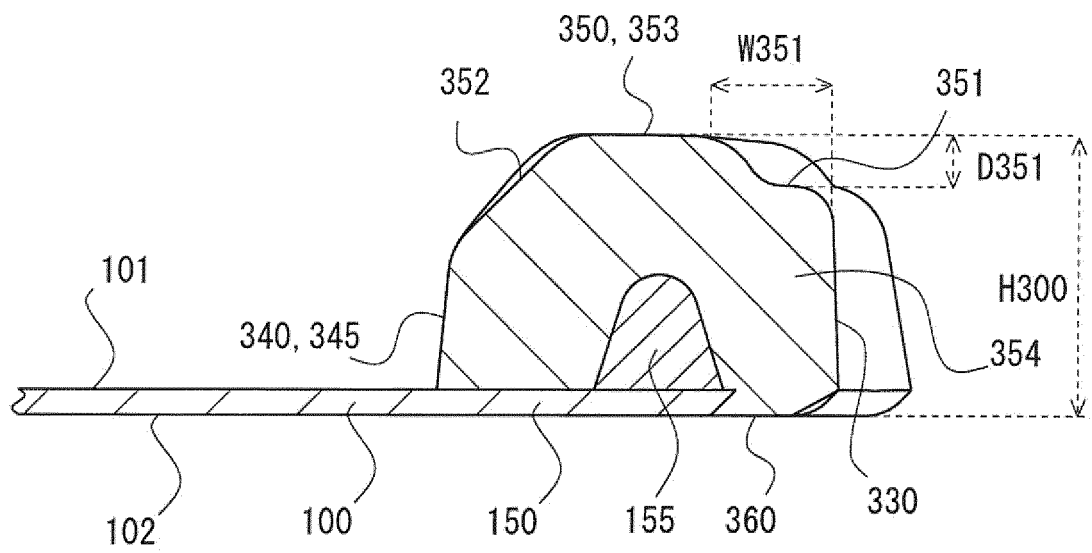
[Fig. 2]



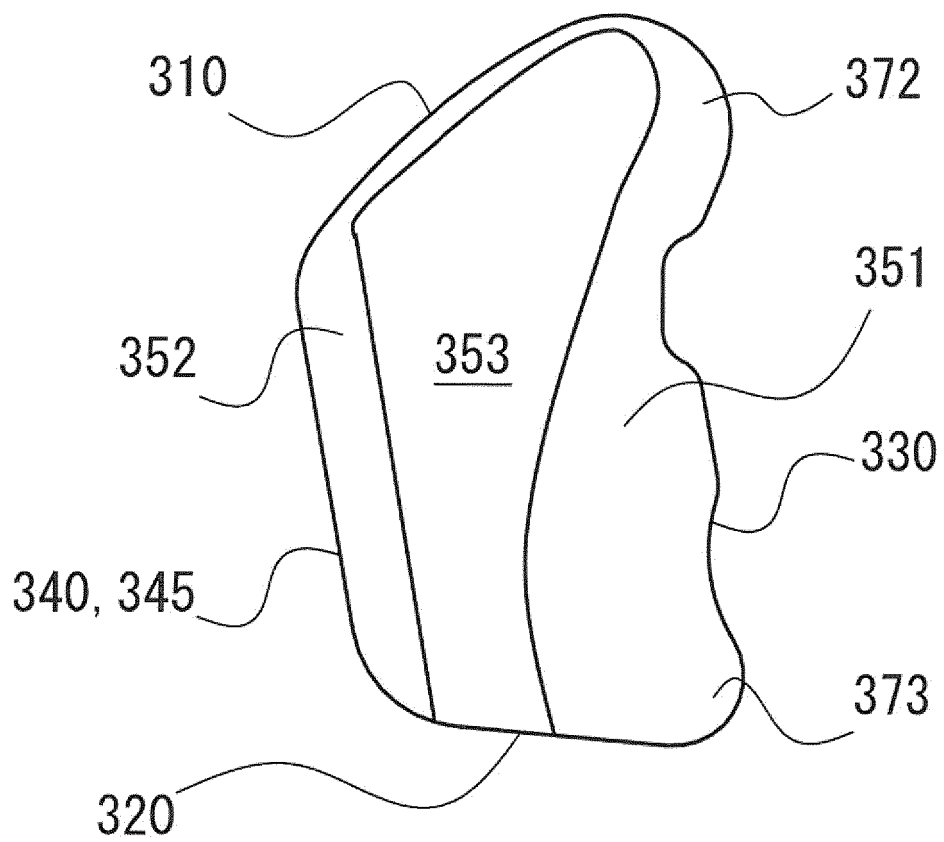
[Fig. 3]



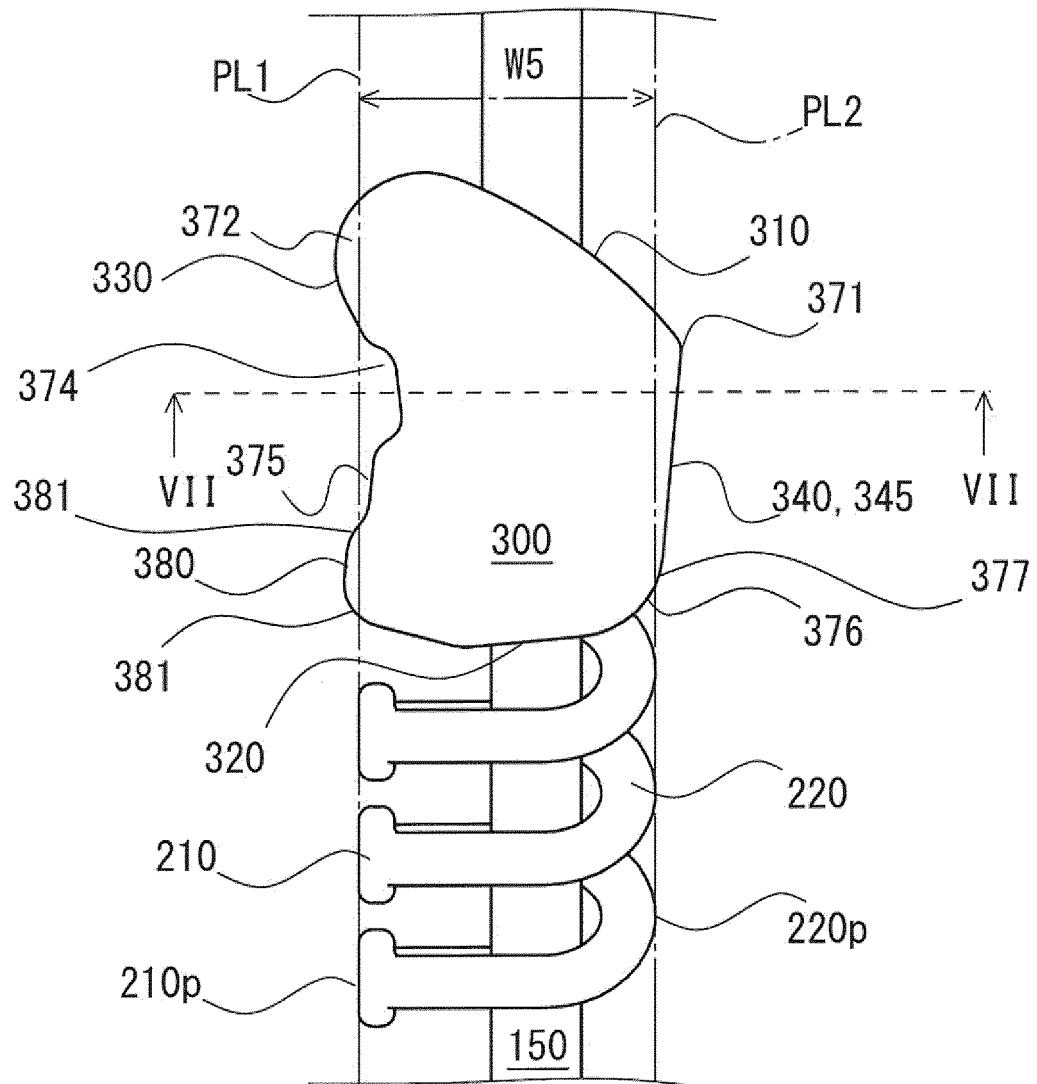
[Fig. 4]



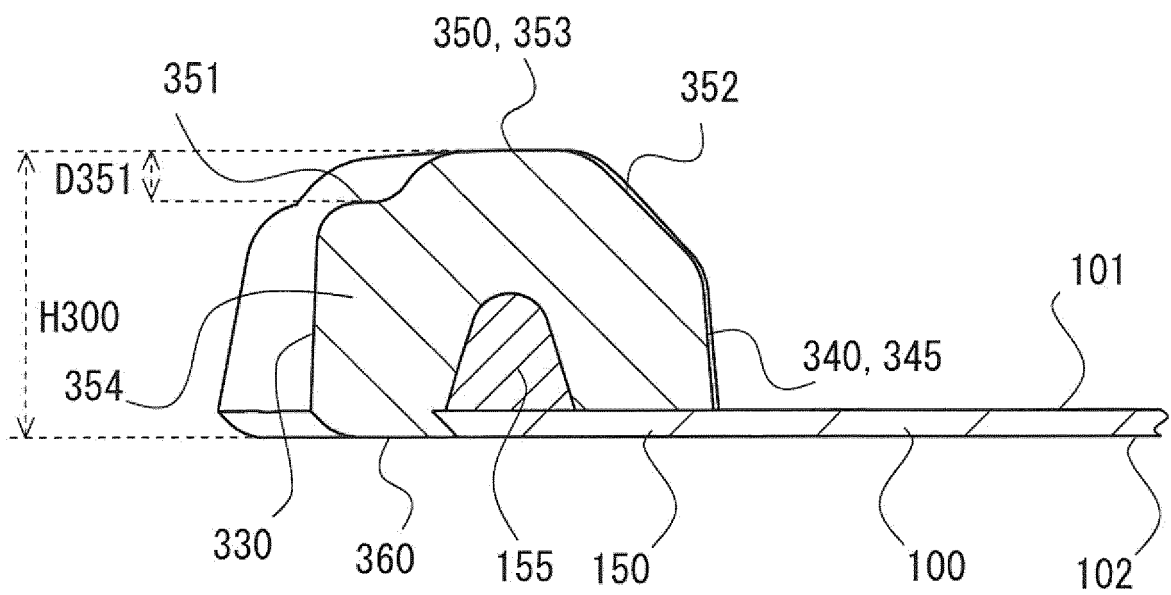
[Fig. 5]



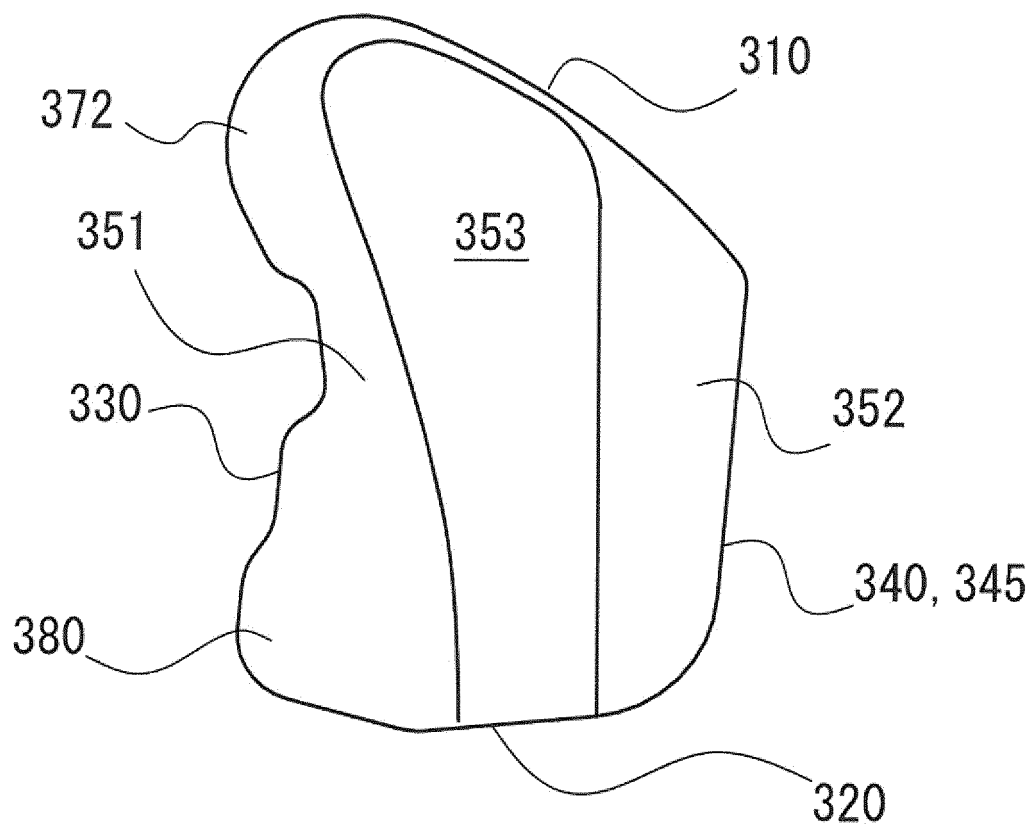
[Fig. 6]



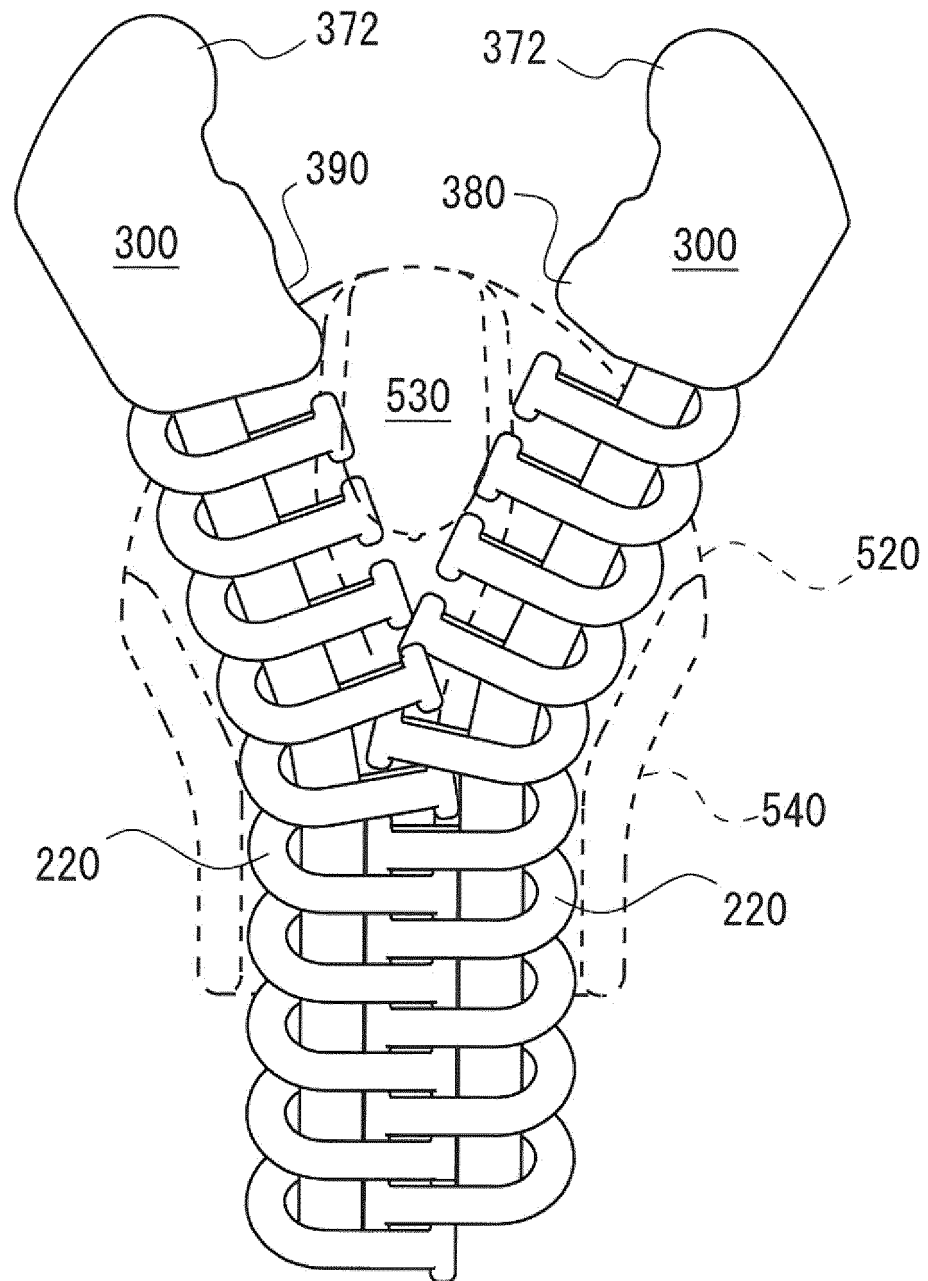
[Fig. 7]



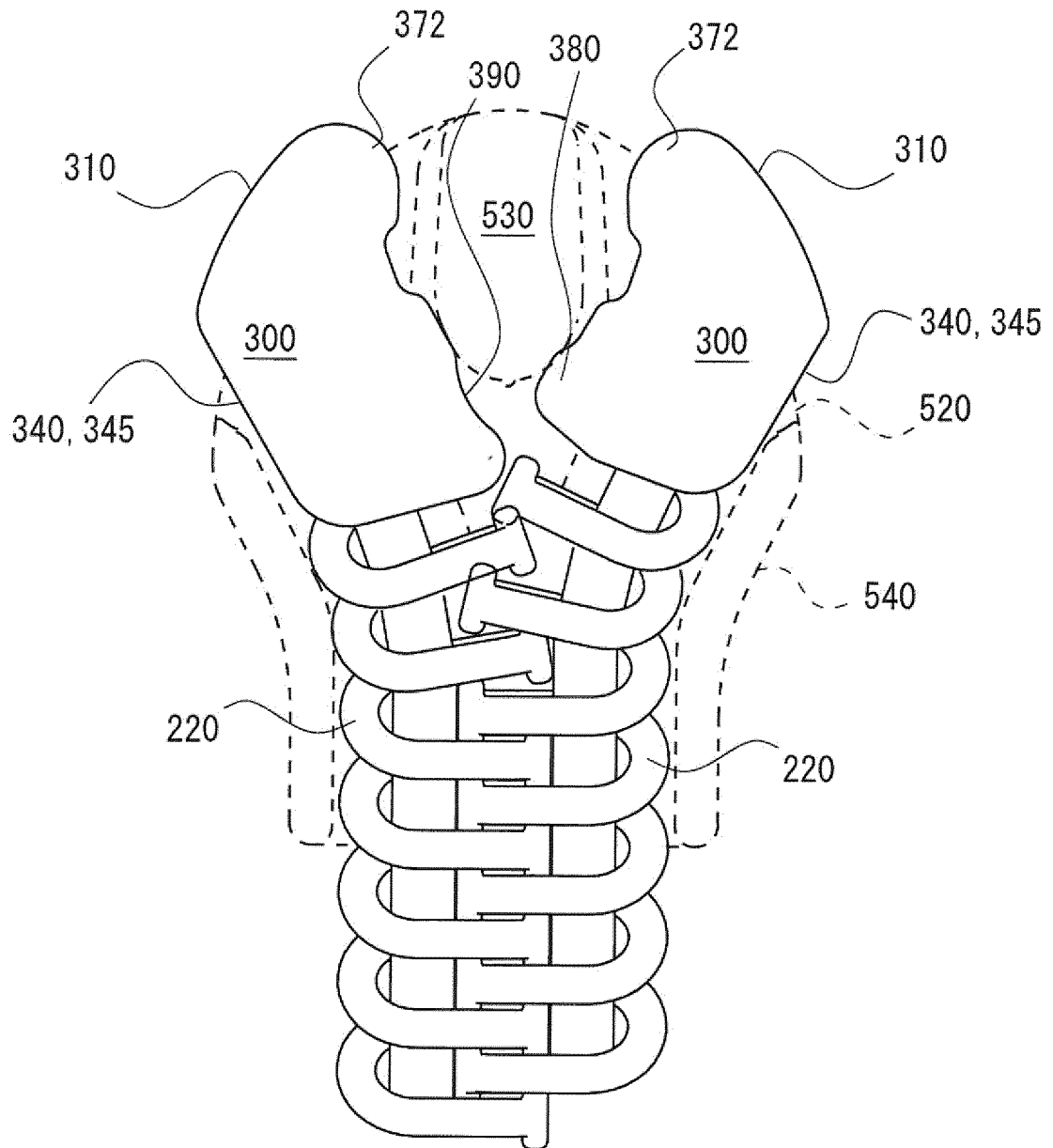
[Fig. 8]



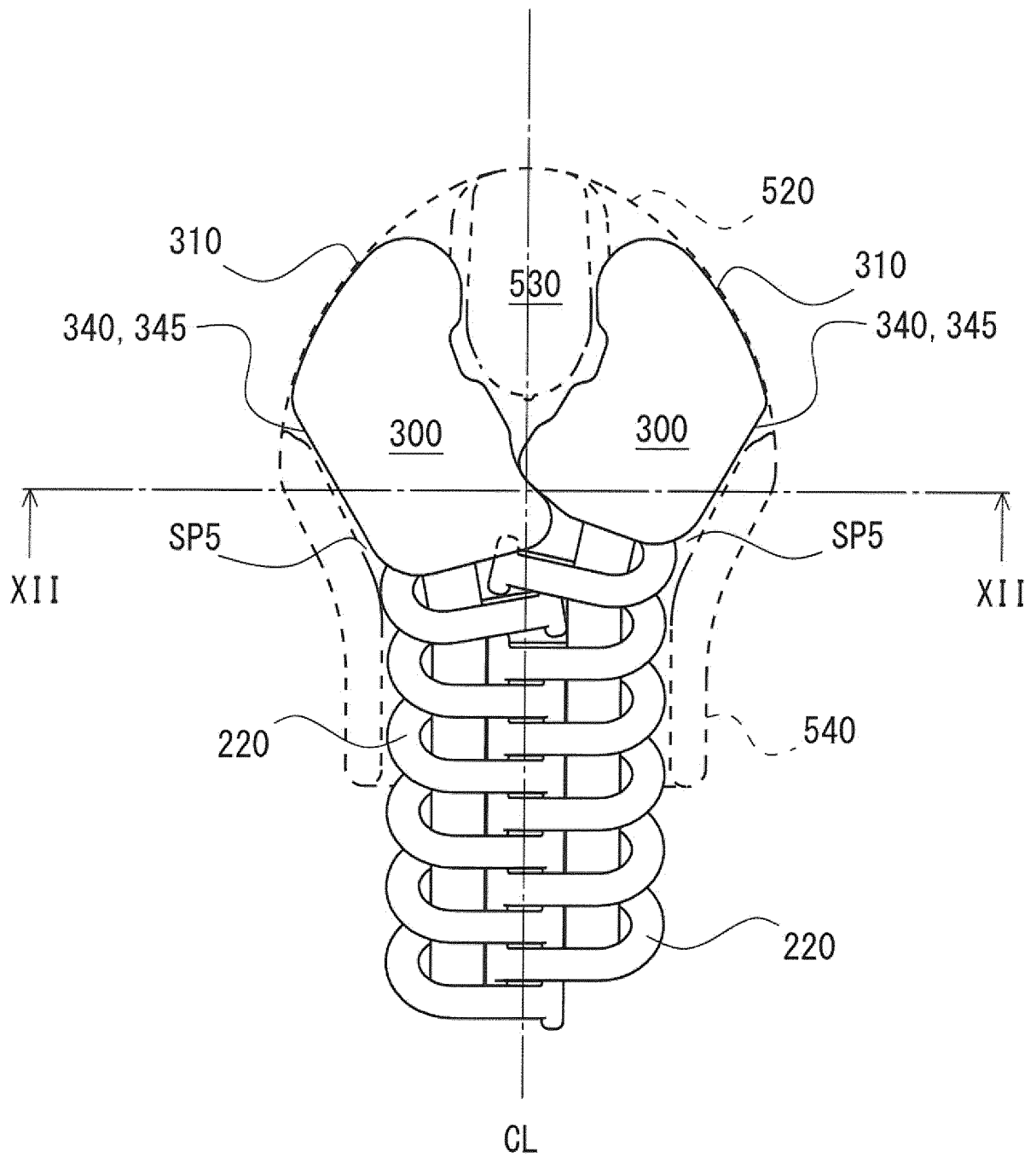
[Fig. 9]



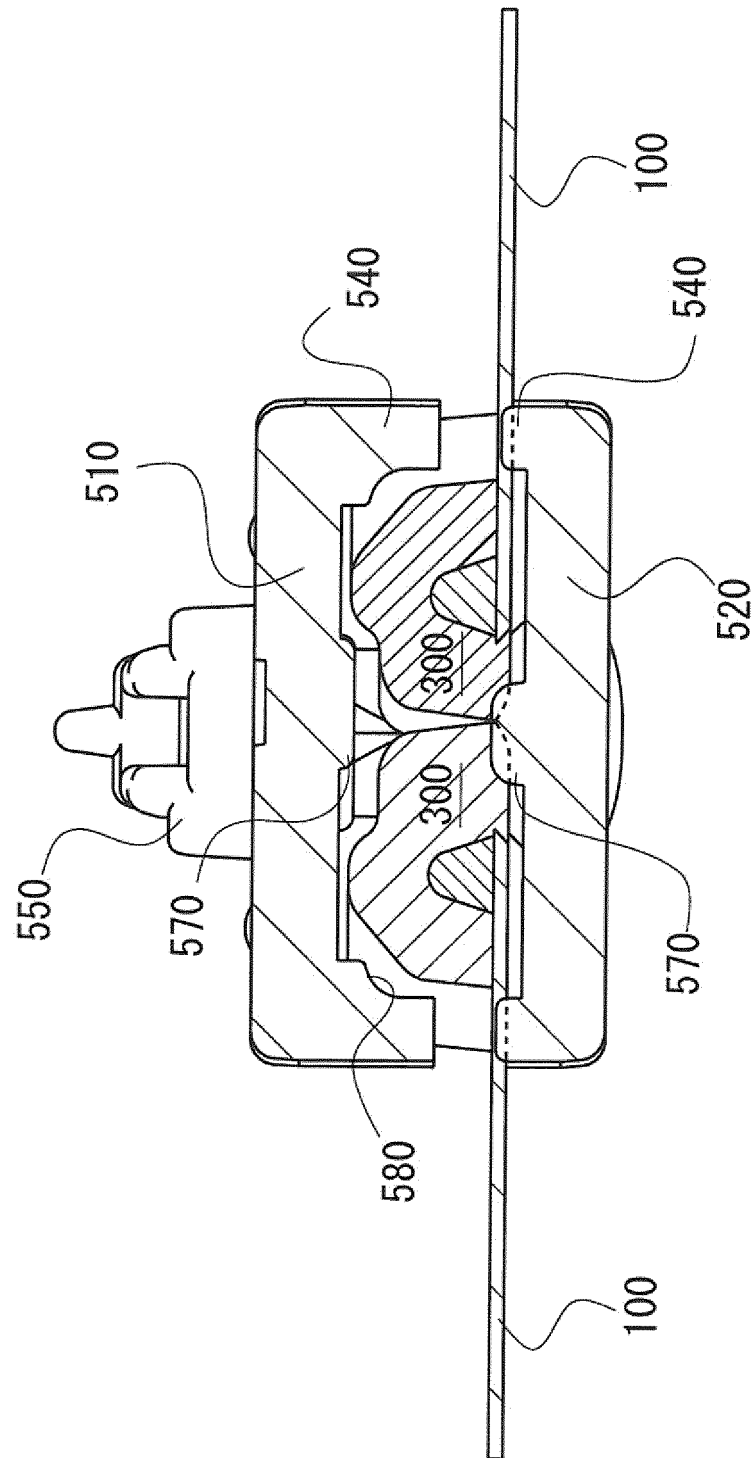
[Fig. 10]



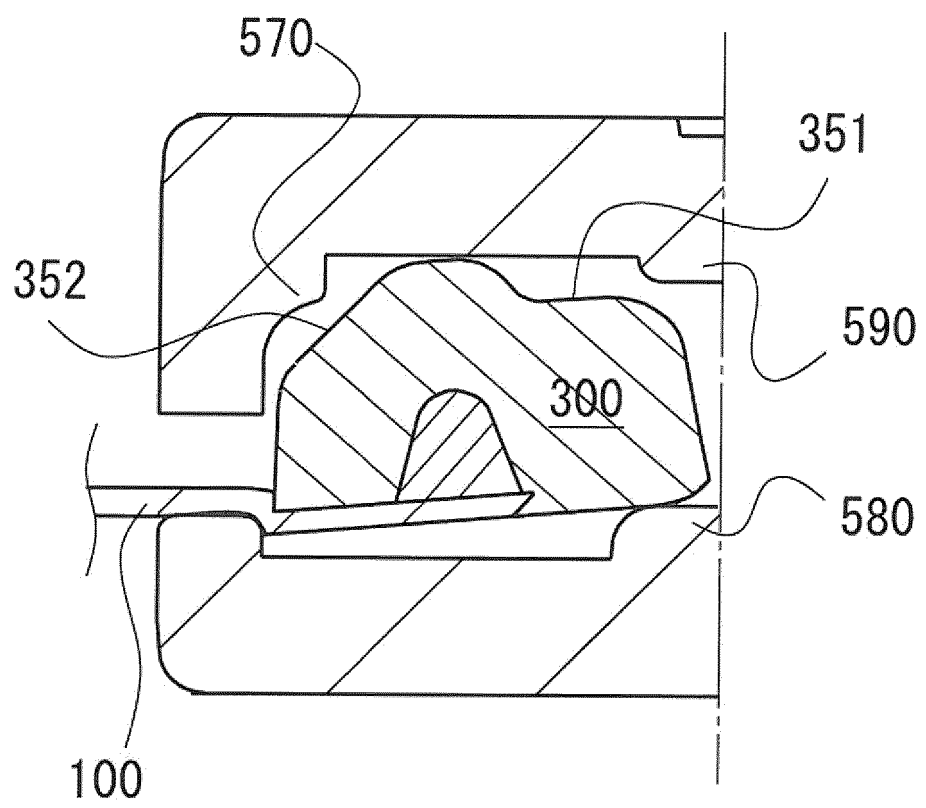
[Fig. 11]



[Fig. 12]



[Fig. 13]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/067642

A. CLASSIFICATION OF SUBJECT MATTER

A44B19/36(2006.01) i

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)

A44B19/36

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015

Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2007-050234 A (YKK Corp.), 01 March 2007 (01.03.2007), paragraphs [0050] to [0055]; fig. 9 to 13 & US 2007/0017071 A1 & EP 1745713 A1 & CN 1899149 A & KR 10-2007-0011123 A	1-6
X	US 2005/0060848 A1 (Chang-Wen TSAUR), 24 March 2005 (24.03.2005), paragraphs [0007] to [0029]; fig. 1 to 11 (Family: none)	1-5, 7, 8
A	JP 57-040805 Y2 (Yoshida Kogyo Co., Ltd.), 08 September 1982 (08.09.1982), entire text; all drawings & US 4223425 A	1-8

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

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Date of the actual completion of the international search
01 September 2015 (01.09.15)Date of mailing of the international search report
15 September 2015 (15.09.15)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/067642

5	C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	A	JP 56-037608 Y2 (Yoshida Kogyo Co., Ltd.), 03 September 1981 (03.09.1981), entire text; all drawings & US 4109349 A	1-8
10	A	JP 52-017945 A (Textron Inc.), 10 February 1977 (10.02.1977), entire text; all drawings & US 4163768 A	1-8
15	A	JP 2008-161522 A (YKK Corp.), 17 July 2008 (17.07.2008), entire text; all drawings & US 2008/0155797 A1 & EP 1938706 A1 & CN 101209142 A & KR 10-2008-0063134 A	1-8
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Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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- WO 5740805 A [0004]
- WO 5637608 A [0004]