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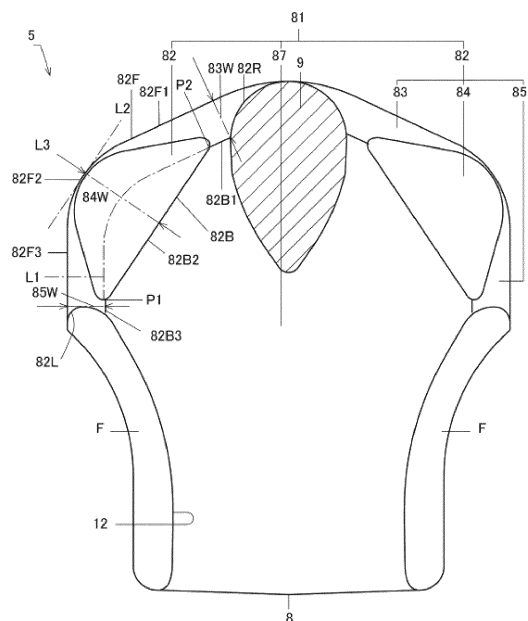
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(54) **SLIDER FOR SLIDE FASTENER, AND SLIDE FASTENER**

(57) This slider for a slide fastener comprises a slider body (6) that engages and separates a pair of element rows (4L, 4L). The slider body comprises a pair of blades (7, 8), a column (9) that connects the pair of blades, and an element passage (12) passing through the slider body in the longitudinal direction. At least one of the blades comprises guide surfaces (72, 82) on the left and right sides in relation to the column, which is the front edge of the facing surface of the blade, the guide surfaces (72, 82) guiding the separated pair of element rows. The guide surfaces are inclined surfaces that are inclined in relation to the horizontal from the front edge of the facing surface toward the rear side of the element passage, so as to narrow the vertical gap between the pair of blades, and the guide surfaces comprise first, second, and third inclined parts (73, 74, 75, 83, 84, 85) that are adjacently arranged in order in the direction separating from the column to the left and right. The inclination angle of the second inclined part is an acute angle nearer to the horizontal surface than the first and third inclined parts, and the maximum value of the depth of the second inclined part is greater than that of the first and third inclined parts.

FIG. 1



Description

Technical Field

[0001] The present invention relates to a slider used for a slide fastener and a slide fastener.

Background Art

[0002] The ease of closing a slide fastener is affected by the state of a pair of element rows. For example, a case where the slide fastener is easy to close generally refers to a state in which front and rear portions of the pair of element rows with a slider in the middle are on a horizontal plane. In this case, when the slider is moved forward to close the slide fastener, a part of the pair of element rows that is about to enter the slider, that is, a plurality of elements positioned on a front side of the slider becomes a state in which both sides thereof in the thickness direction are parallel to a horizontal plane. Hereinafter, this state is referred to as a state in which the posture of the elements is good. The elements meshed with each other in the slider are in a good posture.

[0003] The element includes a body fixed to the fastener tape and extending in a lateral width direction of the fastener tape, and a meshing portion protruding from the body toward a facing tape. When the posture of the element is good, the body and the meshing portion are in a state parallel to the horizontal plane.

[0004] However, at the time of closing the slide fastener, if the elements that is about to enter the slider is inclined with respect to the horizontal plane in the lateral width direction, in other words, if the meshing portion is located on the upper side or lower side with respect to the body, even if the slider is moved forward, the inclined elements may collide with facing surfaces of a pair of wing plates that face each other in the upper-lower direction in the slider, and therefore, it is more difficult for the elements to enter the slider as compare with a case where the elements are in the good posture.

[0005] In order to reduce the problem described above, as an example of a conventional slider, there is a slider as an example in related art in which inclined surface portions are provided at front edge portions of facing surfaces of a pair of wing plates that face with each other in an upper-lower direction, and a horizontal surface is provided at a rear side of the front edge portions in the facing surfaces of the wing plates (see Patent Literature 1). An inclination of the inclined surface is a slope in which a distance between the pair of wing plates in the upper-lower direction decreases toward the rear side, and has the following operation.

[0006] Even if the element is inclined at a predetermined angle with respect to a reference plane, when the slider is moved forward, the element is guided into the slider while in contact with the inclined surface, rotates such that the element gradually becomes a posture suitable for meshing, specifically, becomes horizontal, and

finally guided into the horizontal surface. The facing elements gradually approach and mesh with each other while keeping the horizontal between the upper and lower horizontal surfaces as the slider moves forward.

Citation List

Patent Literature

[0007] Patent Literature 1: WO2015/097793

Summary of Invention

Technical Problem

[0008] However, in the slider described in Patent Literature 1, the fastener stringers may be difficult to close, and it is desired that the fastener stringers can be closed more easily.

[0009] It is desired that the fastener stringers can be easily closed even in a case where, for example, when a pair of element rows enters a slider, a separation state (separating distance) between the pair of element rows is narrow and the pair of element rows is close to the pillar, or on the contrary, the pair of element rows is close to flanges located at the left and right end portions of the wing plates; or when the elements are inclined greatly, and a depth width (a width from a front edge portion of a facing surface to a rear side (back side) of an element passage) of the inclined surface is narrow with respect to the inclination angle while it is desired to rotate the element so that the inclination becomes horizontal.

[0010] Incidentally, when the depth width of the inclined surface is too narrow, it is desired to make the inclination angle of the inclined surface smaller and the inclined surface wider.

[0011] However, if the inclination angle of the inclined surface is reduced over the entire length of the front edge portion of the wing plate, the area of the horizontal surface in the facing surfaces of the wing plate decreases, and the elements are less likely to mesh with each other. Therefore, it is not desirable to reduce the inclination angle of the inclined surface over the entire length of the front edge portion of the wing plate.

[0012] The present invention has been made in view of the above circumstances, and an object thereof is to make it easier to close a pair of fastener stringers.

Solution to Problem

[0013] A slider for a slide fastener according to the present invention includes a slider body configured to mesh and separate a pair of element rows with and from each other, the pair of element rows extending in a front-rear direction and facing with each other in a left-right direction. The slider body includes a pair of wing plates having facing surfaces that face with each other in an upper-lower direction, a pillar connecting front portions

of the pair of wing plates with each other in the upper-lower direction at an intermediate portions of the wing plates in the left-right direction, and an element passage penetrating in the front-rear direction between the pair of wing plates, a front side of the element passage being bifurcated into left and right sides of the pillar. At least one of the wing plates is provide with guiding surfaces for guiding the pair of separated element rows on both left and right sides with respect to the pillar at a front edge portion of the facing surface thereof. The guiding surface is an inclined surface that is inclined with respect to a horizontal direction such that a distance between the pair of wing plates in the upper-lower direction decreases from the front edge portion of the facing surface toward a rear side of the element passage, and includes a first inclined surface portion, a second inclined surface portion, and a third inclined surface portion that are sequentially arranged adjacent to each other in a direction away from the pillar on the left side or right side. In addition, an inclination angle of the second inclined surface portion is an acute angle so that the second inclined surface portion is closer to a horizontal plane than the first inclined surface portion and the third inclined surface portion, and a maximum depth width of the second inclined surface portion is longer than a maximum depth width of the first inclined surface portion and a maximum depth width of the third inclined surface portion.

[0014] Incidentally, "a direction away from the pillar on the left side or right side" refers to the left side when the guiding surface is on the left side with respect to the pillar, and refers to the right side when the guiding surface is on the right side with respect to the pillar.

[0015] Regarding the area, a relationship between the first to third inclined surface portions is not limited, but in order to rotate the elements of the element row inclined with respect to the horizontal plane to the horizontal, an inclined surface with an inclination angle close to the horizontal plane is desirable, that is, a gentle inclined surface is preferably widen, and therefore, the relationship is made as follows.

[0016] That is, an area of the second inclined surface portion is larger than an area of the first inclined surface portion and an area of third inclined surface portion.

[0017] The shape of the second inclined surface portion is not limited, but the following is desirable in order to make the inclined surface portion as wide as possible and to make the posture of the inclined element horizontal.

[0018] The second inclined surface portion has a triangular shape.

[0019] In addition, in order to reliably guide the element rows by the guiding surfaces, the slider body preferably includes the following in addition to the pair of wing plates, the pillar, and the element passage.

[0020] That is, the slider body includes a pair of flanges protruding from left and right edge portions of at least one of the pair of wing plates in a direction in which the distance between the pair of wing plates in the upper-

lower direction is reduced. The wing plate provided with the guiding surfaces on both left and right sides with respect to the pillar is the wing plate from which the flange protrudes. In addition, the guiding surface is formed between the pillar and the flange.

[0021] At least one wing plate may include guiding surfaces on both left and right sides with respect to the pillar, but in order to enter the slider easily no matter how much the element is inclined so as to close the pair of fastener stringers easily, the following is desired.

[0022] That is, the pair of wing plates each include the guiding surfaces on both left and right sides with respect to the pillar.

[0023] Even though the slider is provided with guiding surfaces on both left and right sides with respect to the pillar on the pair of wing plates, it may also be difficult for the elements to enter the slider due to the structure of the element. It is desirable to use the slider described above for a slide fastener provided with such an element having a hard-to-enter structure, and an example thereof is as follows.

[0024] A slide fastener according to the present invention includes the slider described above, and a pair of fastener stringers to be guided by the slider. The pair of fastener stringers includes a pair of tapes extending in a front-rear direction, and a pair of element rows fixed to facing side edge portions of the pair of tapes. The element row includes a plurality of elements fixed along the tapes. The element includes an element body fixed to the tape, a meshing portion protruding from a lower portion of the element body to a lateral side and to be meshed with another element, and a concealing portion protruding from an upper portion of the element body to the lateral side and partially concealing the meshing portion. In addition, an upper surface of the element lowers the meshing portion in a stepped manner with respect to the element body and the concealing portion, and an upper surface of the element body and an upper surface of the concealing portion are formed in a single horizontal surface and in a rectangular shape parallel to front, rear, left and right directions, and a lower surface of the element is a horizontal surface.

Advantageous Effects of Invention

[0025] According to the slider of the present invention, in a case where the pair of element rows is close to or away from the pillar, or even in a case where the element rows are inclined greatly, when the element rows collides with the first inclined surface portion and the third inclined surface portion, the element rows can easily enter the slider, and the maximum depth width of the second inclined surface portion is larger than the maximum depth width of the first inclined surface portion and the third inclined surface portion, so that the area of the guiding surface can be reduced, and the pair of fastener stringers can be easily closed as compared with the case where the depth width over the entire length of the front edge

portion of the wing plate is set to be the same as the maximum depth width of the second inclined surface portion.

[0026] Further, when the slider is provided with the guiding surfaces on both left and right sides with respect to the pillar on the pair of wing plates, it is easy to enter the slider so as to close the pair of fastener stringers easily no matter how much the element is inclined.

[0027] In the slide fastener according to the present invention, the element includes the element body, the meshing portion, and the concealing portion, the lower surface of the element is a horizontal surface, the meshing portion is stepwise lowered with respect to the upper surface of the element, and the upper surface of the element body and the upper surface of the concealing portion are formed in a single horizontal surface and in a rectangular shape parallel to the front, rear, left and right directions. Therefore, as compared to the element whose upper surface and lower surface are merely horizontal surfaces for example, the element is less likely to enter the slider, but in the present invention, since the pair of wing plates of the slider each are provided with guiding surfaces on the left and right sides with respect to the pillar, the element can easily enter the slider no matter how much the element is inclined.

Brief Description of Drawings

[0028]

Fig. 1 is a cross-sectional view showing a slider body of a first embodiment used for a slide fastener of a first embodiment of the present invention.

Fig. 2 is a perspective view showing the slider body according to the first embodiment.

Fig. 3A is a front view showing the slider body according to the first embodiment, and Fig. 3B is a side view showing the slider body according to the first embodiment.

Fig. 4 is an illustrative view showing a state in which an element enters the slider body of the first embodiment horizontally.

Figs. 5A and 5B are illustrative views showing a state in which the element is inclined and enters the slider body of the first embodiment.

Fig. 6 is a cross-sectional view showing a modification of the slider body according to the first embodiment.

Fig. 7 is an illustrative view showing the slide fastener of the first embodiment.

Figs. 8A to 8D are views showing the element used in the slide fastener of the first embodiment, in which Fig. 8A is an upper view, Fig. 8B is a front view, Fig. 8C is a bottom view, and Fig. 8D is a right side view.

Description of Embodiments

[0029] As shown in Fig. 7, a slide fastener 1 according

to a first embodiment of the present invention includes a pair of fastener stringers 2, 2 extending in parallel on a surface, and a slider 5 that is arranged between side edge portions, which face with each other, of the pair of fastener stringers 2, 2 and that can move along the facing side edge portions. By moving the slider 5 in one direction of an extending direction of the fastener stringer 2, the pair of fastener stringers 2, 2 can be opened. Further, by moving the slider 5 in the other direction of the extending direction, the pair of fastener stringers 2, 2 can be closed.

[0030] Hereinafter, in order to explain the slide fastener 1, the directions are determined as follows.

[0031] A front-rear direction is a direction in which the fastener stringer 2 extends, and is also referred to as a longitudinal direction. A front direction is an upward direction in Fig. 7, and is the direction in which the slider 5 closes the pair of fastener stringers 2, 2. A rear direction is a downward direction in Fig. 7, and is the direction in which the slider 5 opens the pair of fastener stringers 2, 2.

[0032] A left-right direction is a direction orthogonal to the longitudinal direction (front-rear direction) and is a direction in which the pair of fastener stringers 2, 2 face each other, and is also referred to as a lateral width direction or a lateral side. A left direction is the left direction in Fig. 7, and a right direction is the right direction in Fig. 7.

[0033] The upper-lower direction is a direction orthogonal to the front-rear direction and the left-right direction, and is also called a thickness direction. An upper direction is a direction orthogonal to the paper surface of Fig. 7, that is, a direction facing a near side in the direction orthogonal to the front-rear direction and the left-right direction. A lower direction is a direction facing a far side in the direction orthogonal to the paper surface of Fig. 7.

[0034] The pair of fastener stringers 2, 2 includes a pair of tapes 3, 3 extending in the front-rear direction and facing with each other in the left-right direction, and a pair of element rows 4L, 4L fixed along the front-rear direction at left and right facing side edge portions of the pair of tapes 3, 3.

[0035] The tape 3 has a band shape in which a width in the longitudinal direction is longer than the lateral width, and a thickness direction thereof is the upper-lower direction.

[0036] The element row 4L is configured with a large number of elements 4 fixed at intervals in the front-rear direction along facing side edge portions of the tapes 3 in the present embodiment as shown in Fig. 7. Although not shown, the element row includes one in which a large number of elements are continuous, for example, one in which a monofilament is bent into a coil shape, and a large number of elements for one turn of the coil are continuous. When the slider 5 is moved toward the front direction to close the pair of fastener stringers 2, 2, the elements of the pair of element rows 4L, 4L mesh with each other. When the slider 5 is moved toward the rear direction to open the pair of fastener stringers 2, 2, the elements of the pair of element rows 4L, 4L are separated from each other in the left-right direction.

[0037] The details of the element 4 according to the present embodiment are shown in Fig. 8. The element 4 includes an element body 41 fixed in a state of sandwiching the tape 3, a meshing portion 45 that protrudes from a lower portion of the element body 41 to the lateral side and meshes with the other element 4, and a concealing portion 48 that protrudes from an upper portion of the element body 41 to the lateral side and partially conceals the meshing portion 45.

[0038] An upper surface 4U of the element 4 lowers the meshing portion 45 in a stepped manner with respect to the element body 41 and the concealing portion 48, and a lower surface 4D of the element 4 is a horizontal surface, more specifically, a single horizontal surface in which the element body 41 and the meshing portion 45 are continuous.

[0039] The element body 41 includes a front surface 41F and a rear surface 41B orthogonal to the front-rear direction, and the upper surface 41U and the lower surface 41D formed of the horizontal surface orthogonal to the upper-lower direction. The element body 41 has one surface (surface on one side) of left and right side surfaces 41L, 41R opposite to the meshing portion 45 as a surface orthogonal to the left-right direction. The element body 41 includes a body upper part 42 as an upper part thereof, and a body lower part 43 as a lower part thereof, the body lower part 43 being joined to the body upper part 42 on the side of the meshing portion.

[0040] The body lower part 43 includes a surface on the other side of the left and right side surfaces 41L, 41R of the lower part of the element body 41, and the meshing portion 45 protrudes from the surface on the other side (a side surface on an element side facing the lateral side).

[0041] The concealing portion 48 protrudes from the side surface of the body upper part 42 on a meshing portion side toward the meshing portion side. A protruding length of the concealing portion 48 corresponds to a part of the entire length of the meshing portion 45 in the lateral width direction.

[0042] An upper surface of the body upper part 42 is the upper surface 41U of the element body 41, and the upper surface 41U of the element body 41 and the upper surface 48U of the concealing portion 48 are one horizontal surface and have a rectangular shape parallel to the front, rear, left and right directions. Incidentally, the front, rear, left and right directions here are directions in a state where the elements 4 are meshed.

[0043] The meshing portion 45 has an upper surface 45U lower than the upper surface 48U of the concealing portion 48 in a stepped manner. A lower surface 45D of the meshing portion 45 and the lower surface 41D of the element body 41 (body lower part 43) are one horizontal surface.

[0044] The meshing portion 45 is configured such that a portion on the element body side of a total length in the lateral width direction is narrower in a width in the front-rear direction than a portion on a front portion side of the total length in the lateral width direction, and is arranged

below the concealing portion 48. When the meshing portion 45 is viewed from below, the concealing portion 48 protrudes in the front-rear direction with respect to the portion of the entire length of the meshing portion 45 in the lateral width direction on the element body side.

[0045] As shown in Fig. 7, the slider 5 opens and closes the pair of fastener stringers 2, 2 as described above. The slider 5 includes a slider body 6 that is configured to mesh and separate the pair of element rows 4L, 4L and is movable in the front-rear direction, and a handle (not shown) connected to the slider body 6.

[0046] As shown in Figs. 2 and 3, the slider body 6 includes upper and lower wing plates 7, 8 facing each other at intervals in the upper-lower direction, a pillar 9 sandwiched between the pair of element rows 4L, 4L, which is the pillar 9 connecting between the facing front portions of the upper and lower wing plates 7, 8 at intermediate portions of the upper and lower wing plates 7, 8 in the left-right direction, and a flange F protruding from left and right ends of at least one (both in the illustrated example) of the upper and lower wing plates 7, 8 in a direction in which a facing distance between the upper and lower wing plates 7, 8 is reduced.

[0047] The slider body 6 has, as an internal space thereof, an element passage 12 penetrating in the front-rear direction with a front side thereof being bifurcated into the left and right sides of the pillar 9, and a tape groove 13 communicating with the element passage 12 and opening in the left and right. The pair of element rows 4L, 4L is passed through the element passage 12, and a corresponding tape 3 is passed through each tape groove 13.

[0048] The slider body 6 includes a handle mounting portion 11 as a part thereof. In the illustrated example, the handle mounting portion 11 is provided to protrude upward from an upper surface of the upper wing plate 7 for guiding the upper side of the pair of element rows, and a through hole 11H penetrating in the left-right direction is formed. Then, the handle is connected to the slider body 6 by inserting a part of the handle into the through hole 11H.

[0049] The pair of wing plates 7 and 8 respectively includes facing surfaces 71 and 81 which face with each other in the upper-lower direction. In the illustrated example, each of the pair of wing plates 7 and 8 has the flange F protruding therefrom as described above. Since the pair of wing plates 7 and 8 are symmetrical in the upper-lower direction related to the facing surfaces 71 and 81, the description will be made centering on the facing surface 81 of the lower wing plate 8, and the facing surface 71 of the upper wing plate 7 will be described in a simplified manner.

[0050] As shown in Fig. 1, the facing surface 81 of the lower wing plate 8 includes a pair of guiding surfaces 82, 82 for guiding the pair of separated element rows at a front edge portion of the slider body 6, and a meshing surface 87 for meshing the pair of separated element rows (a pair of element rows passing backward through

the pair of guiding surfaces 82, 82).

[0051] The meshing surface 87 of the lower wing plate 8 is a horizontal surface, and is adjacent to the pair of guiding surfaces 82, 82 on the rear side.

[0052] The pair of guiding surfaces 82, 82 in the lower wing plate 8 are located at front edge portions of the facing surface 81, and are disposed on both sides of the pillar 9 in the left and right. More specifically, the left guiding surface 82 is a front edge portion of the facing surface 81 and is formed between the pillar 9 and the left flange F, and the right guiding surface 82 is a front edge portion of the facing surface 81 and is formed between the pillar 9 and the right flange F. Further, the guiding surface 82 is an inclined surface that is inclined with respect to the horizontal such that the distance between the pair of wing plates 7 and 8 in the upper-lower direction decreases from the front edge portion of the facing surface 81 toward the rear side of the element passage 12. The guiding surface 82 (inclined surface), when viewed from the thickness direction, includes a front side 82F and a rear side 82B separated in the front-rear direction, and a pair of lateral sides 82L, 82R separated in the left-right direction, and the guiding surface 82 has a shape surrounded by the front side 82F, the rear side 82B, and the pair of lateral sides 82L, 82R. Incidentally, the front side 82F is horizontal.

[0053] One of the pair of lateral sides 82L, 82R of the lower wing plate 8 corresponds to the position of the side surface of the pillar 9, and the other one corresponds to the position of the front edge portion of the flange F.

[0054] The front side 82F of the lower wing plate 8 matches the shape of the front edge portion of an outer shape of the wing plate 7 as viewed from the thickness direction, and has a shape with an end on the pillar side arranged at the front side of an end on the flange side among the entire length, and is located on the front side of a straight line connecting the end on the pillar side and the end on the flange side. More specifically, the front side 82F includes a first front side 82F1, a second front side 82F1, and a third front side 82F3 that are sequentially arranged adjacent to each other in a direction away from the pillar 9 on the left side or right side. In other words, the front side 82F includes the third front side 82F3, the second front side 82F1, and the first front side 82F1 that are sequentially arranged adjacent to each other in a direction of approaching the pillar 9 on the left side or right side.

[0055] The front side 82F is configured by three alternately connected (continuous) lines including a straight line from the pillar side to the flange side, and an arc-shaped curve bulging to the front side. More specifically, the front side 82F includes the first front side 82F1 and the third front side 82F3 which are straight lines, and the second front side 82F2 which is an arc-shaped curve.

[0056] The third front side 82F3 is a straight line substantially parallel to the front-rear direction.

[0057] The first front side 82F1 is a straight line that is inclined with respect to the front-rear direction in a state

of extending to the rear side as separating away from the pillar 9.

[0058] The second front side 82F2 has an arc shape as described above, and two tangent lines to both ends of the arc are the first front side 82F1 and the third front side 82F3.

[0059] The rear side 82B of the lower wing plate 8 is configured such that the end on the pillar side is arranged on the front side of the end on the flange side, and has a shape obtained by cutting a virtual line L1 (a virtual line parallel to the front side 82F) having a constant depth width with respect to the front side 82F of the wing plate 8 as viewed from the thickness direction by a straight line connecting two points P1 and P2 on the virtual line. Incidentally, the two points on the virtual line L1 are points located on both sides with respect to the middle point of the entire length of the virtual line L1. In the present embodiment, the two points P1 and P2 on the virtual line L1 are points located between the middle point of the entire length of the virtual line L1 and both end points of the entire length. The rear side 82B includes a first rear side 82B1, a second rear side 82B2, and a third rear side 82B3 that are sequentially arranged adjacent to each other in a direction away from the pillar 9 on the left side or right side.

[0060] The first rear side 82B1 is a straight line parallel to the first front side 82F1.

[0061] The third rear side 82B3 is a straight line parallel to the third front side 82F3.

[0062] The second rear side 82B2 is a straight line that is inclined with respect to the front-rear direction, and is a straight line that extends to the rear side as separating away from the pillar 9.

[0063] The guiding surface 82 of the lower wing plate 8 includes a first inclined surface portion 83, a second inclined surface portion 84, and a third inclined surface portion 85 that are sequentially arranged adjacent to each other in a direction away from the pillar 9 on the left side or right side. The first inclined surface portion 83, the second inclined surface portion 84, and the third inclined surface portion 85 are flat surfaces. An inclination angle of the second inclined surface portion 84 is an acute angle so that the second surface portion 84 is closer to the horizontal plane than the first inclined surface portion 83 and the third inclined surface portion 85. In other words, the second inclined surface portion 84 is a gentler slope than the first inclined surface portion 83 and the third inclined surface portion 85. Further, the maximum depth width 84W of the second inclined surface portion 84 is longer than the maximum depth width 83W of the first inclined surface portion 83, and the maximum depth width 85W of the third inclined surface portion 85.

[0064] The depth width and the inclination angle are determined as follows.

1) A tangent line L2 to any point on the front side 82F of the inclined surface as viewed in the thickness direction is drawn.

2) An orthogonal line L3 orthogonal to the tangent line L2 as viewed from the thickness direction is drawn from the point. The orthogonal line L3 is a line that determines the depth width.

When the maximum depth width 83W of the first inclined surface portion 83, the maximum depth width 84W of the second inclined surface portion 84, and the maximum depth width 85W of the third inclined surface portion 85 are obtained by the steps 1) and 2) described above, the maximum depth width 84W of the second inclined surface portion 84 is larger than maximum depth width 83W of the first inclined surface portion 83 and the maximum depth width 85W of the third inclined surface portion 85.

The inclination angle of the guiding surface 82 is determined as follows.

3) The wing plate is cut in the thickness direction along the orthogonal line to form a cut surface.

4) A horizontal line that intersects the orthogonal line in a plane including the cut surface is drawn. Then, an acute angle and an obtuse angle are formed. The acute angle is the inclination angle.

[0065] The second inclined surface portion 84 of the lower wing plate 8 has a triangular shape. In Figs. 1 to 5, vertices of the triangle are shown as bulging in an arc shape, but the vertices of the triangle are chamfered so as to be in contact with another adjacent surface on a curved surface. The area of the chamfered region is negligible with respect to the area of the second inclined surface portion 84. Therefore, it can be said that the second inclined surface portion 84 is formed between the second front side 82F2 and the second rear side 82B2. One side of the second inclined surface portion 84 occupies half of the rear side 82B of the inclined surface, more specifically 2/3 or more, and the second rear side 82B2 of the rear side 82B of the inclined surface becomes one side of the triangle, so that a shape is formed in which the width orthogonal to the depth direction as viewed from the thickness direction becomes wider toward the rear side. The area of the second inclined surface portion 84 is larger than the area of the first inclined surface portion 83 and the area of the third inclined surface portion 85.

[0066] The first inclined surface portion 83 and the second inclined surface portion 85 are shaped such that the width parallel to the front side 82F as viewed from the thickness direction becomes narrower toward the rear side 82B. Incidentally, as described above, the front side 82F is configured by three alternately connected (continuous) lines including a straight line from the pillar side to the flange side, and an arc-shaped curve bulging to the front side. For the first inclined surface portion 83, the width of the straight line parallel to the first front side 82F1 becomes narrower toward the first rear side 82B1, and for the second inclined surface portion 85, the width of the straight line parallel to the third front side 82F3 becomes narrower toward the third rear side 82B3. The first inclined surface portion 83 is formed between the first

front side 82F1, the second front side 82F2 and the first rear side 82B1. The third inclined surface portion 85 is formed between the second front side 82F2, the third front side 82F3 and the third rear side 82B3.

[0067] As described above, the facing surface 71 of the upper wing plate 7 has a symmetrical shape with respect to the facing surface 81 of the lower wing plate 8, and therefore includes a pair of guiding surfaces 72, 72 and a meshing surface 77. The guiding surface 72 of the upper wing plate 7 also includes a first inclined surface portion 72, a second inclined surface portion 73, and a third inclined surface portion 74.

[0068] The principle by which the slide fastener 1 according to the first embodiment of the present invention described above meshes with the pair of element rows 4L, 4L is as follows.

[0069] For example, when the pair of element rows 4L, 4L is approaching the flange F, the end of the element body 41 on the side opposite to the meshing portion 45 passes near the flange F as shown in Fig. 7. At this time, as shown in Fig. 5A, when the element 4 is inclined in a form in which the meshing portion side becomes higher than the element body side, the end of the lower surface 4D of the element 4 on the side opposite to the meshing portion contacts the third inclined surface portion of the lower wing plate 8 and enters the element passage 12, and the end of the upper surface 4U of the element 4 on the side of the meshing portion contacts the second inclined surface portion 74 of the upper wing plate 7 and enters the element passage 12. The end of the lower surface of the element 4 on the side opposite to the meshing portion moves on the lower third inclined surface portion toward the rear side, and the end of the upper surface of the element 4 on the meshing portion side moves on the upper second inclined surface portion 74 toward the rear side, so that the element 4 rotates to be in a state of good posture and horizontally parallel as shown in Fig. 4, enters the upper and lower meshing surfaces 77, 87, and the elements 4 that face each other in the left-right direction mesh with each other with the meshing portions 45 and enter toward the rear side of the element passage 12.

[0070] As shown in Fig. 5B, when the element 4 is inclined in a form in which the meshing portion side becomes lower than the element body side, the element rows 4L are meshed in a manner reverse to that shown in Fig. 5A. More specifically, the end of the upper surface 4U of the element 4 on the side opposite to the meshing portion contacts the third inclined surface portion of the upper wing plate 7 and enters the element passage 12, and the end of the lower surface 4D of the element 4 on the side of the meshing portion contacts the second inclined surface portion 84 of the lower wing plate 8 and enters the element passage 12. The end of the upper surface of the element 4 on the side opposite to the meshing portion moves on the upper third inclined surface portion toward the rear side, and the end of the lower surface 4D of the element 4 on the meshing portion side moves

on the lower second inclined surface portion 84 toward the rear side, so that the element 4 rotates to be in a state of good posture and horizontally parallel as shown in Fig. 4, enters the upper and lower meshing surfaces 77, 87, and the elements 4 that face each other in the left-right direction mesh with each other with the meshing portions 45 and enter toward the rear side of the element passage 12.

[0071] When the pair of element rows is close to the pillar 9, the end of the element body 41 on the side of the meshing portion passes near the pillar 9. In this case, the pair of element rows is meshed in a manner opposite to the case where the pair of element rows 4L, 4L is close to the flange F.

[0072] More specifically, when the element 4 is inclined in a form in which the meshing portion side becomes higher than the element body side, the end of the lower surface 4D of the element 4 on the side opposite to the meshing portion contacts the second inclined surface portion 84 of the lower wing plate 8 and enters the element passage 12, and the end of the upper surface 4U of the element 4 on the side of the meshing portion contacts the first inclined surface portion 73 of the upper wing plate 7 and enters the element passage 12. The end of the lower surface 4D of the element 4 on the side opposite to the meshing portion moves on the lower second inclined surface portion 84 toward the rear side, and the end of the upper surface 4U of the element 4 on the meshing portion side moves on the upper first inclined surface portion 83 toward the rear side, so that the element 4 rotates to be in a state of good posture and horizontally parallel, enters the upper and lower meshing surfaces 77, 87, and the elements 4, 4 that face each other in the left-right direction mesh with each other with the meshing portions 45, 45 and enter toward the rear side of the element passage 12.

[0073] The description of the case where the element 4 is inclined in a form in which the meshing portion side becomes lower than the element body side will be omitted.

[0074] In the slider 5 according to the first embodiment described above, the pair of wing plates 7, 8 each include the first to third inclined surface portions 73 to 75 and the first to third inclined surface portions 83 to 85 on the left and right with respect to the pillar 9, so that the element 4 can be placed in a good posture regardless of how the element 4 is inclined with respect to the horizontal. In the slider 5 according to the first embodiment, no matter the pair of element rows 4L, 4L is approaching the pillar 9 or is approaching the flange F (far away from the pillar 9), or even if the element row 4L is greatly inclined, the element 4 can easily enter the slider 5 as long as the element 4 collides with the first and third inclined surface portions 73, 75, and the first and third inclined surface portions 83, 85. Further, the maximum depth width 84W of the second inclined surface portion 84 in the lower wing plate 8 is longer than the maximum depth width 83W of the first inclined surface portion 83 and the max-

imum depth width 85W of the third inclined surface portion 85, and similarly, the maximum depth width of the second inclined surface portion 74 in the upper wing plate 7 is longer than the maximum depth width of the first inclined surface portion 73 and the maximum depth width of the third inclined surface portion 75, so that the area of the upper and lower guiding surfaces 72 and 82 can be reduced compared to the case where the depth width is the same as the maximum depth width of the second inclined surface portion over the entire length of the front side of the inclined surface, and therefore, the area of the upper and lower meshing surfaces 77, 87 can be increased, and the pair of fastener stringers 2, 2 can be easily closed. The pair of flanges F, F protrudes from left and right edge portions of each of the pair of wing plates 7, 8, so that the slider 5 of the first embodiment can reliably guide the element rows 4L to each of the guiding surfaces 72, 82.

[0075] In the slide fastener 1 according to the first embodiment described above, the element 4 includes the element body 41, the meshing portion 45, and the concealing portion 48, the lower surface 4D of the element 4 is a horizontal surface, the meshing portion 45 is stepwise lowered with respect to the upper surface 4U of the element 4, and the upper surface 41U of the element body 41 and the upper surface 48U of the concealing portion 48 are formed in a single horizontal surface and in a rectangular shape parallel to the front, rear, left and right directions. Therefore, as compared to the element 4 whose upper surface 4U and lower surface 4D are merely horizontal surfaces without a concealing portion for example, the element 4 is less likely to enter the slider 5, but in the present embodiment, since the pair of wing plates 7, 8 of the slider 5 each are provided with guiding surfaces 72, 82 on the left and right sides with respect to the pillar 9, the element 4 can easily enter the slider 5 no matter how much the element 4 is inclined.

[0076] In the slide fastener 1 according to the first embodiment of the present invention described above, the slider 5 of the first embodiment, more specifically, the slider 5 in which the front side 82F of the upper and lower guiding surfaces 72, 82 is formed by the linear first front side 82F1, the arc-shaped second front side 82F2, and the linear third front side 82F3 is adopted, but a slider 5A as an example of the modification (hereinafter, referred to as modification) of the slider 5 according to the first embodiment as shown in Fig. 6 may also be used.

[0077] Since the slider 5A as the modification also has a pair of facing surfaces that are symmetrical in the upper-lower direction, only the lower facing surface will be described here. A front side 82F of a guiding surface 82 of a lower facing surface 81 is formed by only one arc-shaped curve bulging to the front side.

[0078] The present invention is not limited to the above-described embodiment, and modifications can be made without departing from the scope thereof.

Reference Signs List

[0079]

1 slide fastener
 2 fastener stringer
 3 tape
 4 element
 4L element row
 4U upper surface
 4D lower surface
 41 element body
 41U upper surface
 41D lower surface
 41F front surface
 41B rear surface
 41L left side surface
 41R right side surface
 42 body upper part
 43 body lower part
 45 meshing portion
 45U upper surface
 45D lower surface
 48 concealing portion
 48U upper surface
 5, 5A slider
 6 slider body
 7 upper wing plate
 71 facing surface
 72 guiding surface
 73 first inclined surface portion
 74 second inclined surface portion
 75 third inclined surface portion
 77 meshing surface
 8 lower wing plate
 81 facing surface
 82 guiding surface
 82F front side
 82F1 first front side
 82F2 second front side
 82F3 third front side
 82B rear side
 82B1 first rear side
 82B2 second rear side
 82B3 third rear side
 82L lateral side
 82R lateral side
 83 first inclined surface portion
 83W maximum depth width
 84 second inclined surface portion
 84W maximum depth width
 85 third inclined surface portion
 85W maximum depth width
 87 meshing surface
 9 pillar
 F flange
 11 handle mounting portion 11H through hole
 12 element passage

13 tape groove
 L1 virtual line
 P1, P2 point on virtual line
 L2 tangent line
 L3 orthogonal line

Claims

10 **1.** A slider for a slide fastener, comprising:

a slider body (6) configured to mesh and separate a pair of element rows (4L, 4L) with and from each other, the pair of element rows extending in a front-rear direction and facing with each other in a left-right direction, wherein the slider body (6) includes a pair of wing plates (7, 8) having facing surfaces (71, 81) that face with each other in an upper-lower direction, a pillar (9) connecting front portions of the pair of wing plates (7, 8) with each other in the upper-lower direction at intermediate portions of the wing plates (7, 8) in the left-right direction, and an element passage (12) penetrating in the front-rear direction between the pair of wing plates (7, 8), a front side of the element passage (12) being bifurcated into left and right sides of the pillar (9),

at least one of the wing plates (7, 8) is provide with guiding surfaces (72, 82) for guiding the pair of separated element rows (4L, 4L) on both left and right sides with respect to the pillar (9) at a front edge portion of the facing surface (71, 81) thereof,

the guiding surface (72, 82) is an inclined surface that is inclined with respect to a horizontal direction such that a distance between the pair of wing plates (7, 8) in the upper-lower direction decreases from the front edge portion of the facing surface (71, 81) toward a rear side of the element passage (12), and includes a first inclined surface portion (73, 83), a second inclined surface portion (74, 84), and a third inclined surface portion (75, 85) that are sequentially arranged adjacent to each other in a direction away from the pillar (9) on a left side or right side, and

an inclination angle of the second inclined surface portion (74, 84) is an acute angle so that the second inclined surface portion (74, 84) is closer to a horizontal plane than the first inclined surface portion (73, 83) and the third inclined surface portion (75, 85), and a maximum depth width of the second inclined surface portion is longer than a maximum depth width of the first inclined surface portion (73, 83) and a maximum depth width of the third inclined surface portion (75, 85).

2. The slider for the slide fastener according to claim 1, wherein
an area of the second inclined surface portion (74, 84) is larger than an area of the first inclined surface portion (73, 83) and an area of the third inclined surface portion (75, 85). 5

3. The slider for the slide fastener according to claim 1 or 2, wherein
the second inclined surface portion (74, 84) has a triangular shape. 10

4. The slider for the slide fastener according to any one of claims 1 to 3, wherein
the slider body (6) includes a pair of flanges (F, F) protruding from left and right edge portions of at least one of the pair of wing plates (7, 8) in a direction in which the distance between the pair of wing plates (7, 8) in the upper-lower direction is reduced,
the wing plate (7, 8) provided with the guiding surfaces (72, 82) on both left and right sides with respect to the pillar (9) is the wing plate (7, 8) from which the flange (F) protrudes, and
the guiding surface (72, 82) is formed between the pillar (9) and the flange (F). 15 20 25

5. The slider for the slide fastener according to any one of claims 1 to 4, wherein
the pair of wing plates (7, 8) each include the guiding surfaces (72, 82) on both left and right sides with respect to the pillar (9). 30

6. A slide fastener comprising:

the slider (5) according to claim 5; and 35
a pair of fastener stringers (2, 2) to be guided by the slider (5), wherein
the pair of fastener stringers (2, 2) include a pair of tapes (3, 3) extending in a front-rear direction, and a pair of element rows (4L, 4L) fixed to facing side edge portions of the pair of tapes (3, 3),
the element row (4L) includes a plurality of elements (4) fixed along the tapes (3),
the element (4) includes an element body (41) fixed to the tape (3), a meshing portion (45) protruding from a lower portion of the element body (41) to a lateral side and to be meshed with another element (4), and a concealing portion (48) protruding from an upper portion of the element body (41) to the lateral side and partially concealing the meshing portion (45),
an upper surface (4U) of the element (4) lowers the meshing portion (45) in a stepped manner with respect to the element body (41) and the concealing portion (48), and an upper surface (41U) of the element body (41) and an upper surface (48U) of the concealing portion (48) are formed in a single horizontal surface and in a 40 45 50 55

rectangular shape parallel to front, rear, left and right directions, and
a lower surface (4D) of the element (4) is a horizontal surface.

FIG. 1

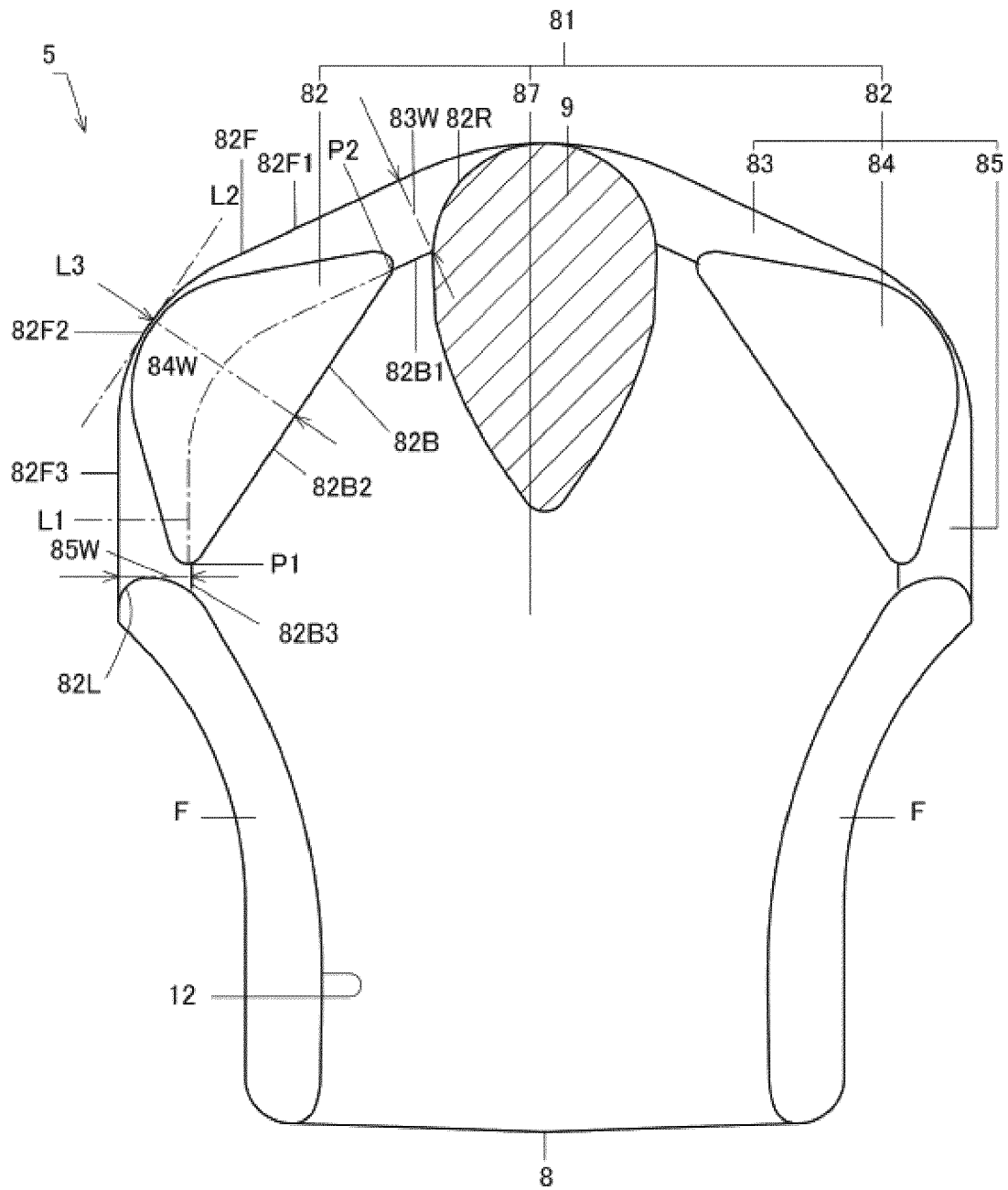


FIG. 2

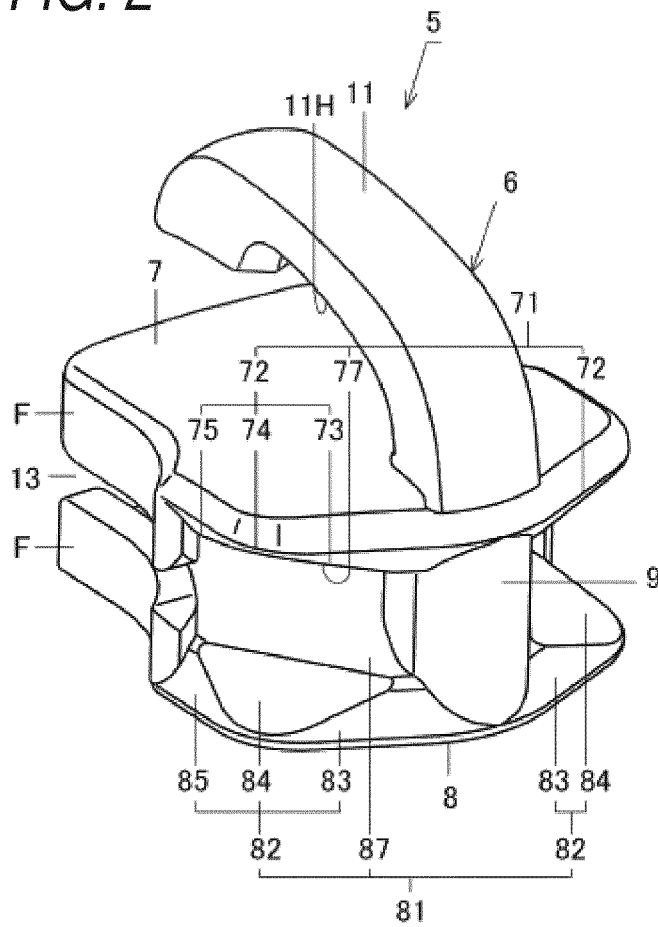
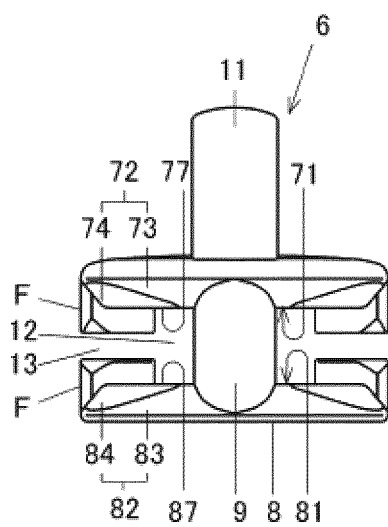


FIG. 3 (A)



(B)

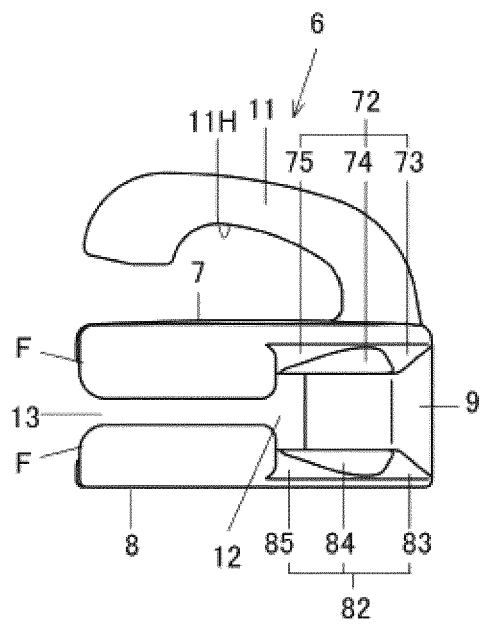


FIG. 4

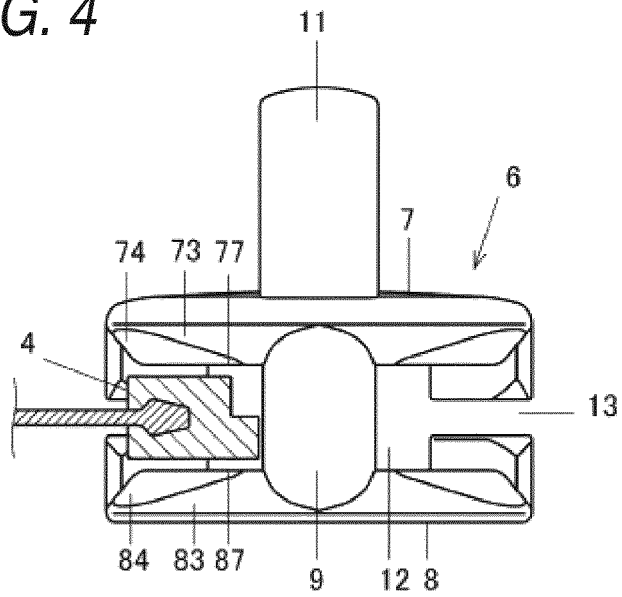
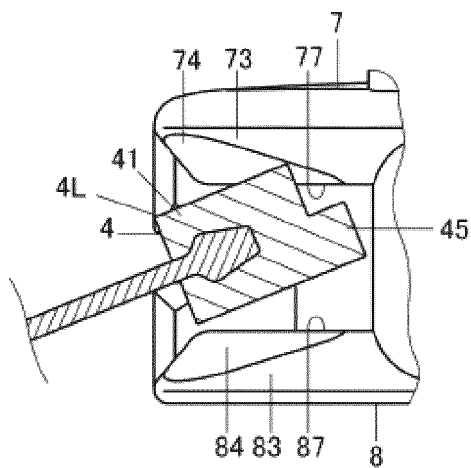


FIG. 5 (A)



(B)

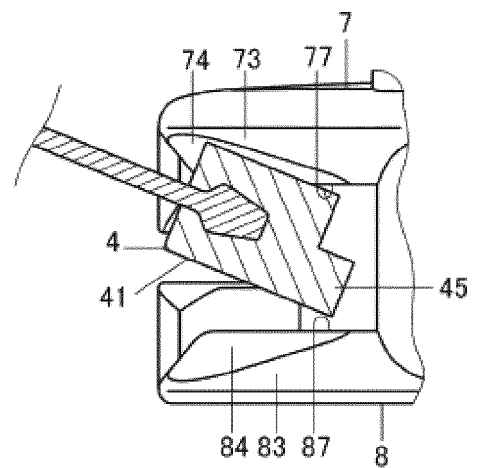


FIG. 6

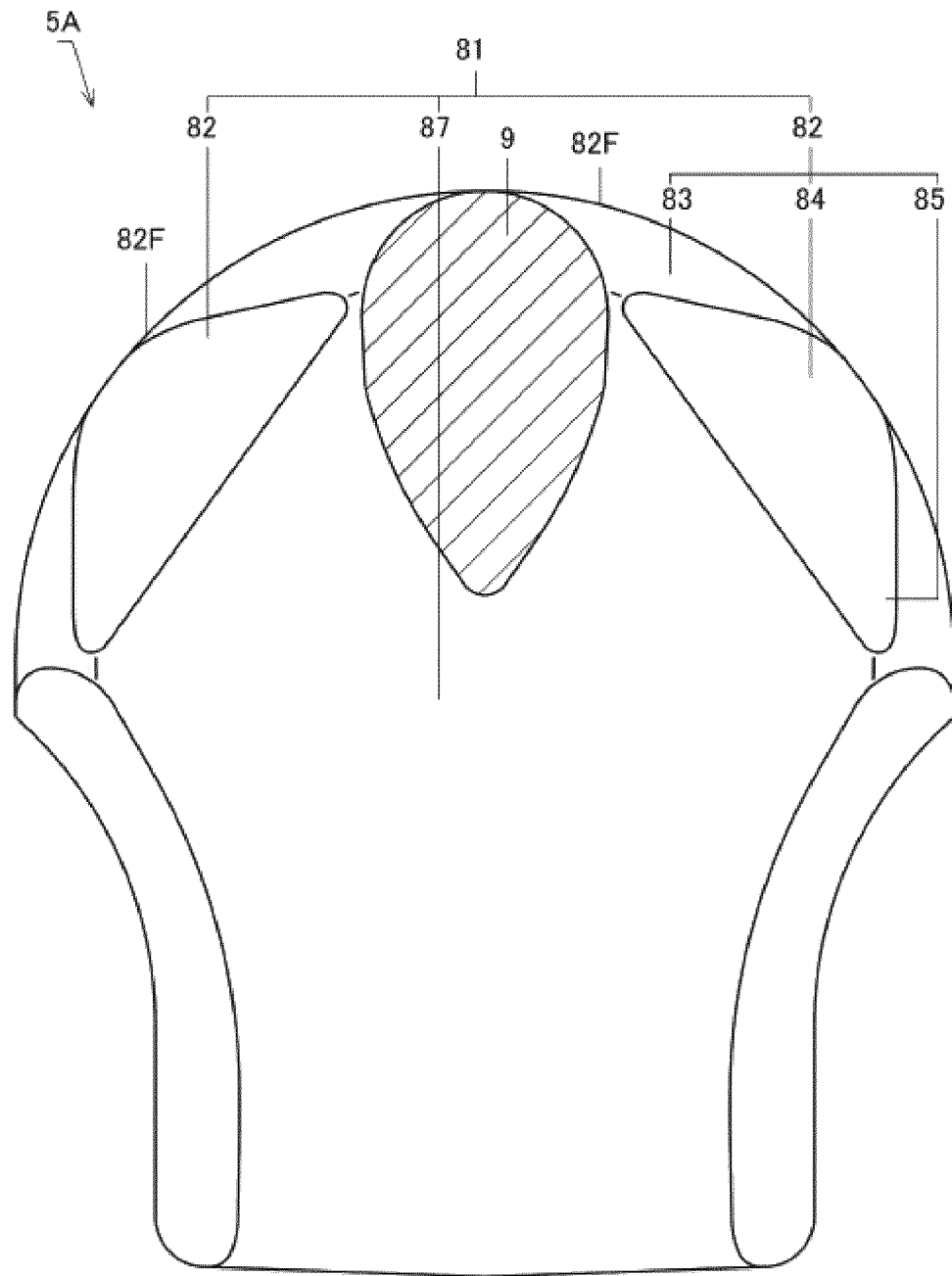


FIG. 7

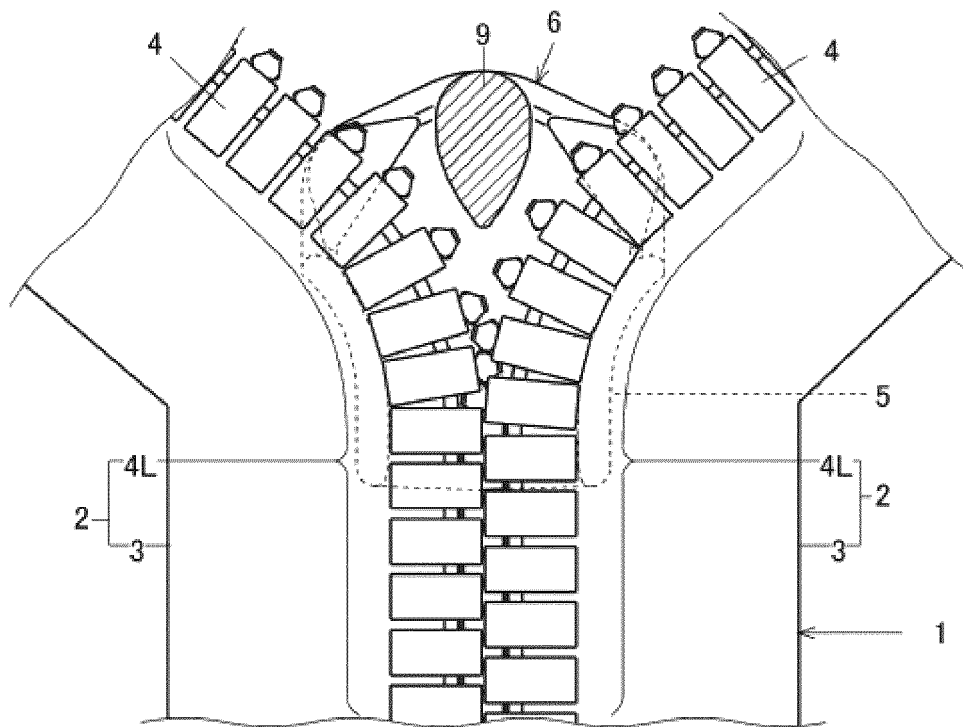
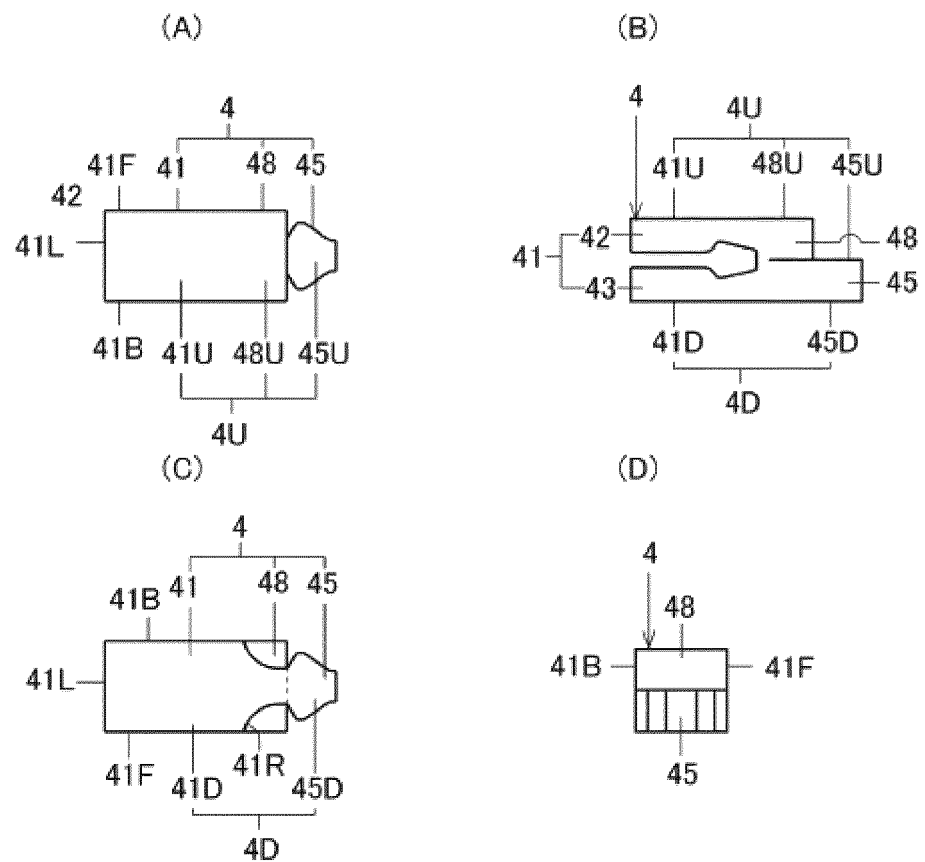


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/031608

A. CLASSIFICATION OF SUBJECT MATTER
A44B19/26(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)
A44B19/00-19/64

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 1996-2017
Kokai Jitsuyo Shinan Koho 1971-2017 Toroku Jitsuyo Shinan Koho 1994-2017

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 3202594 U (Chung Chwan Enterprise Co., Ltd.), 12 February 2016 (12.02.2016), & US 9370225 B1	1-6
A	JP 3203767 U (YKK Corp.), 14 April 2016 (14.04.2016), & US 2017/0224062 A1	1-6

☐ 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
29 September 2017 (29.09.17)

Date of mailing of the international search report
10 October 2017 (10.10.17)

Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2015097793 A [0007]