

FIG. 2

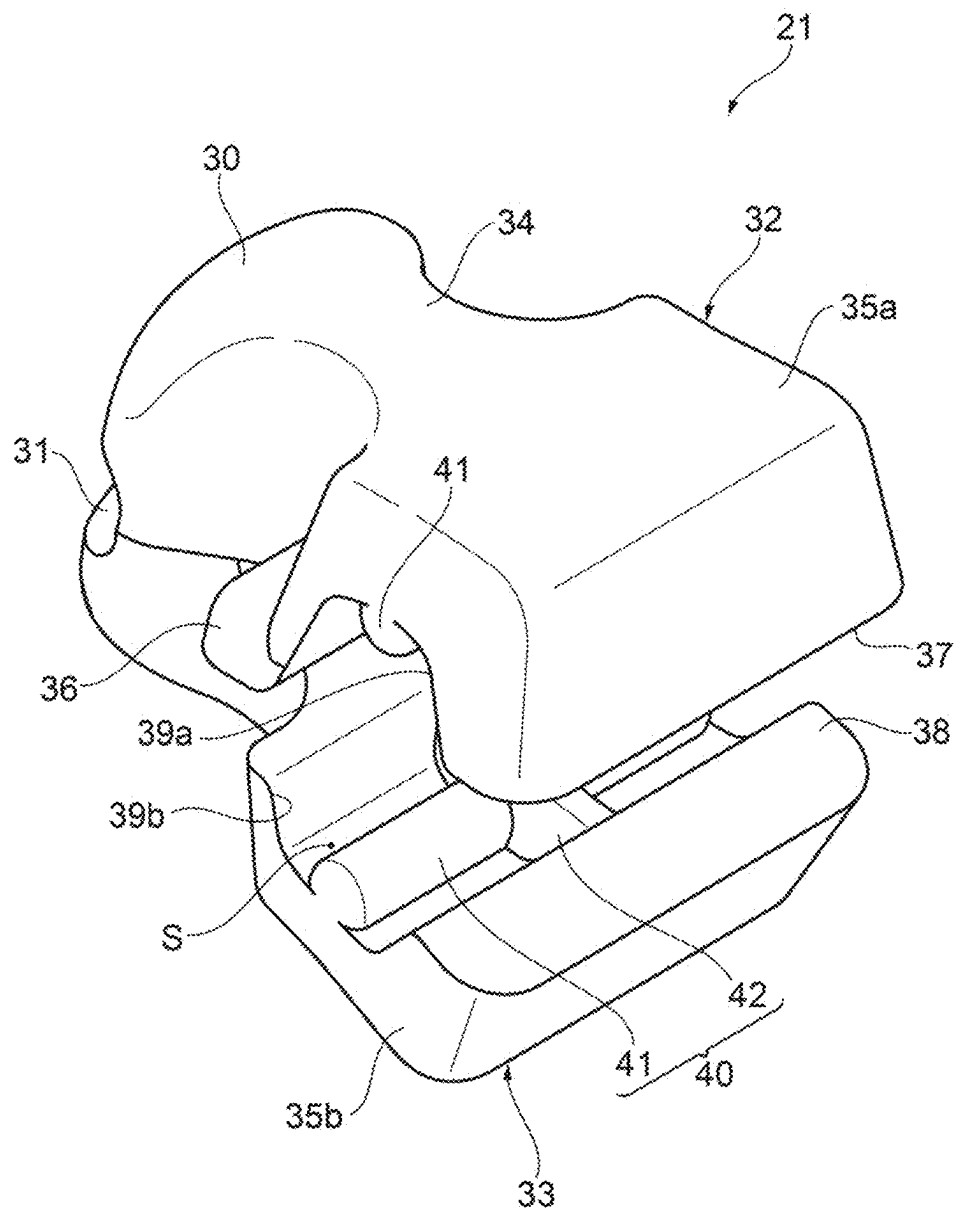


FIG. 3

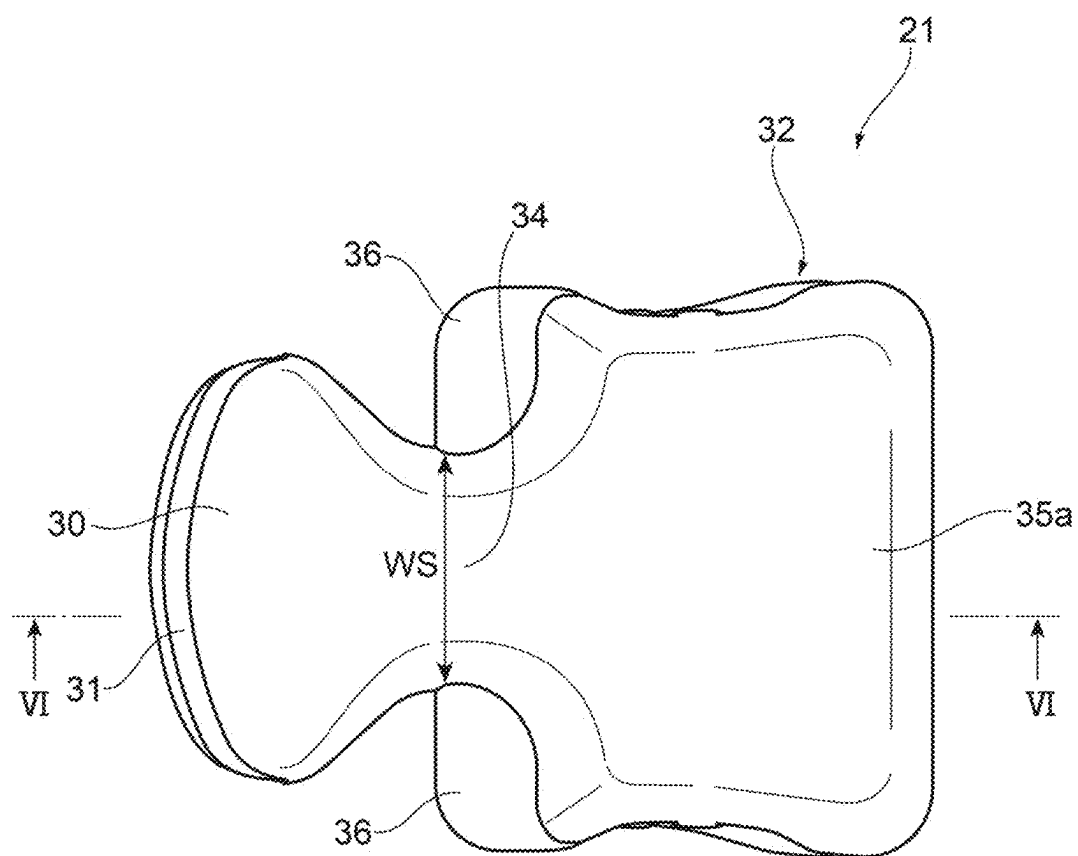


FIG. 4A

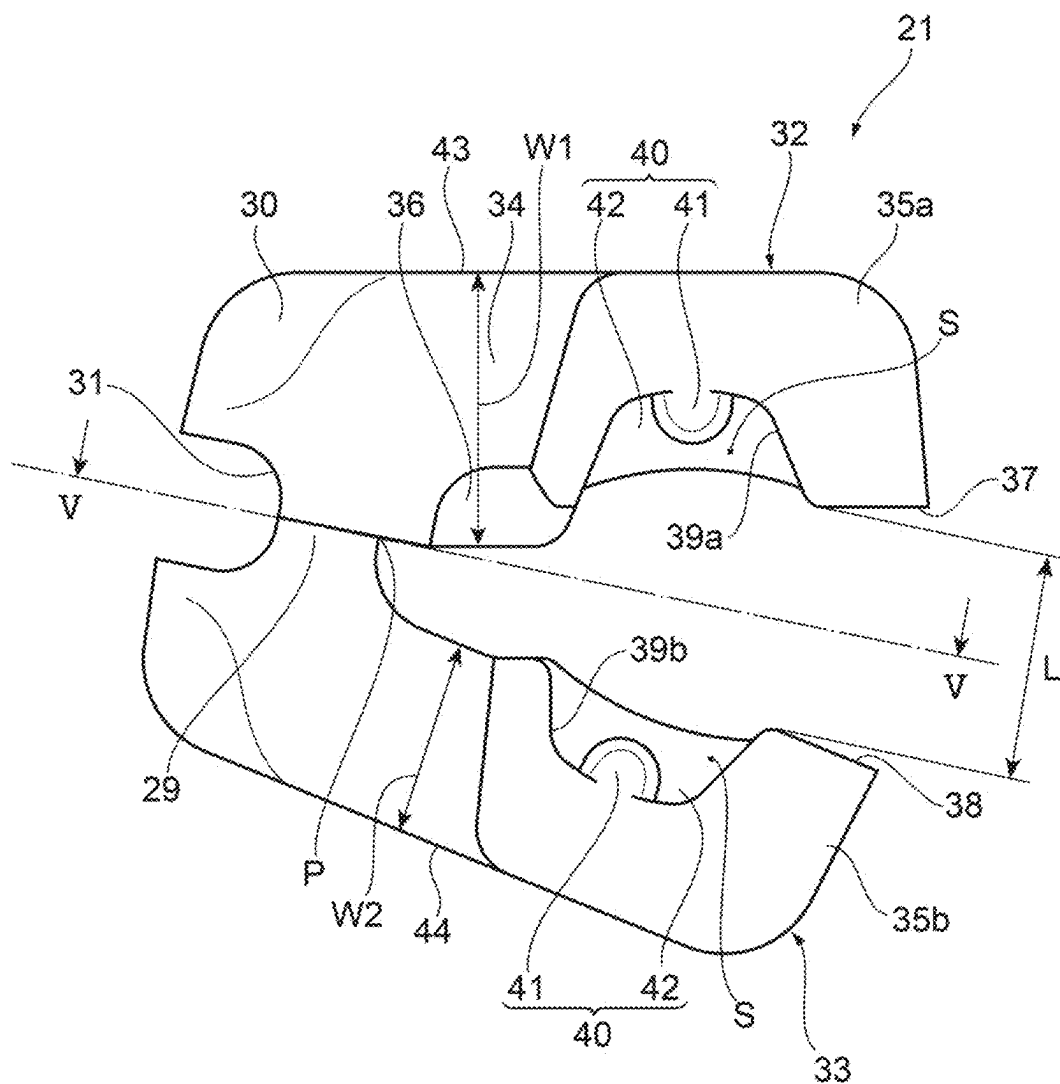


FIG. 4B

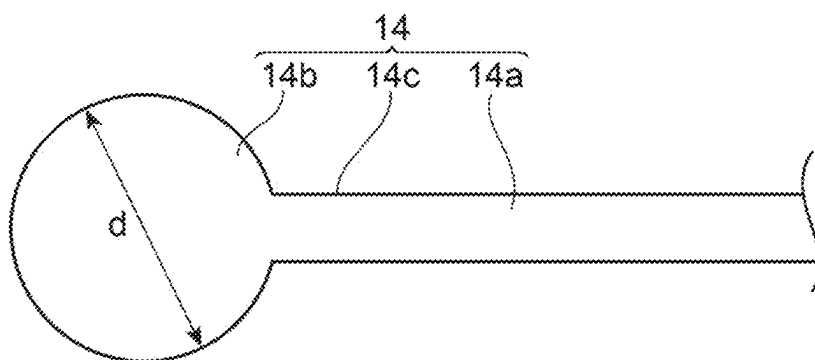


FIG. 5

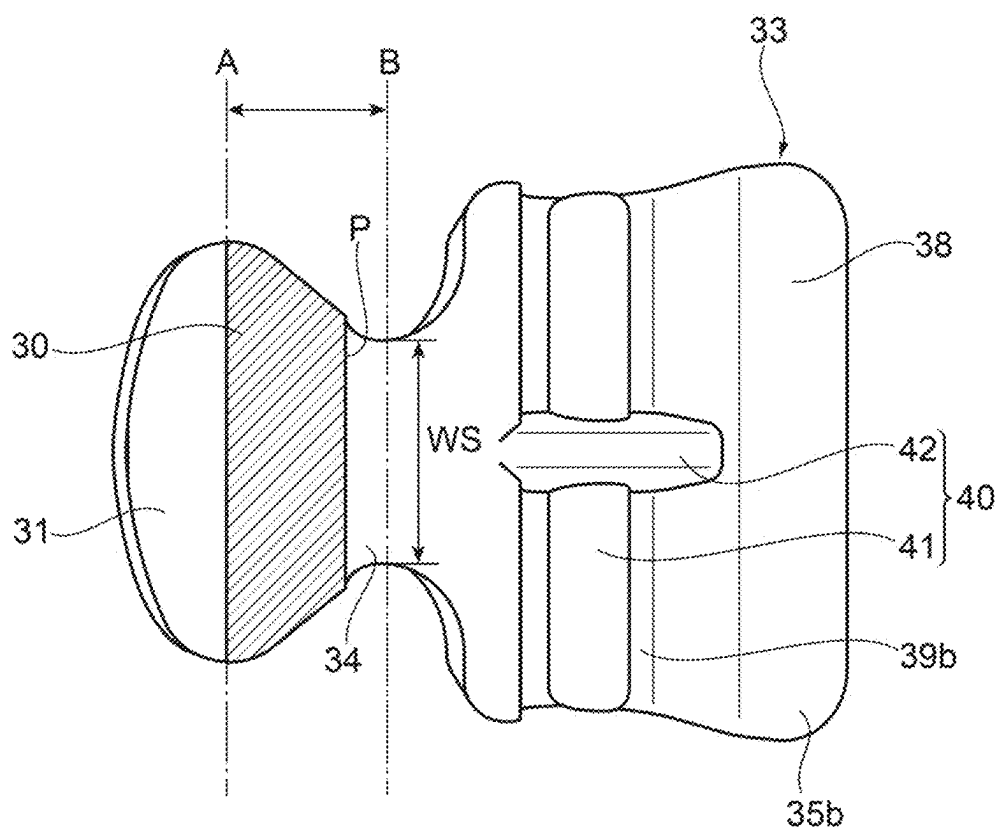


FIG. 6

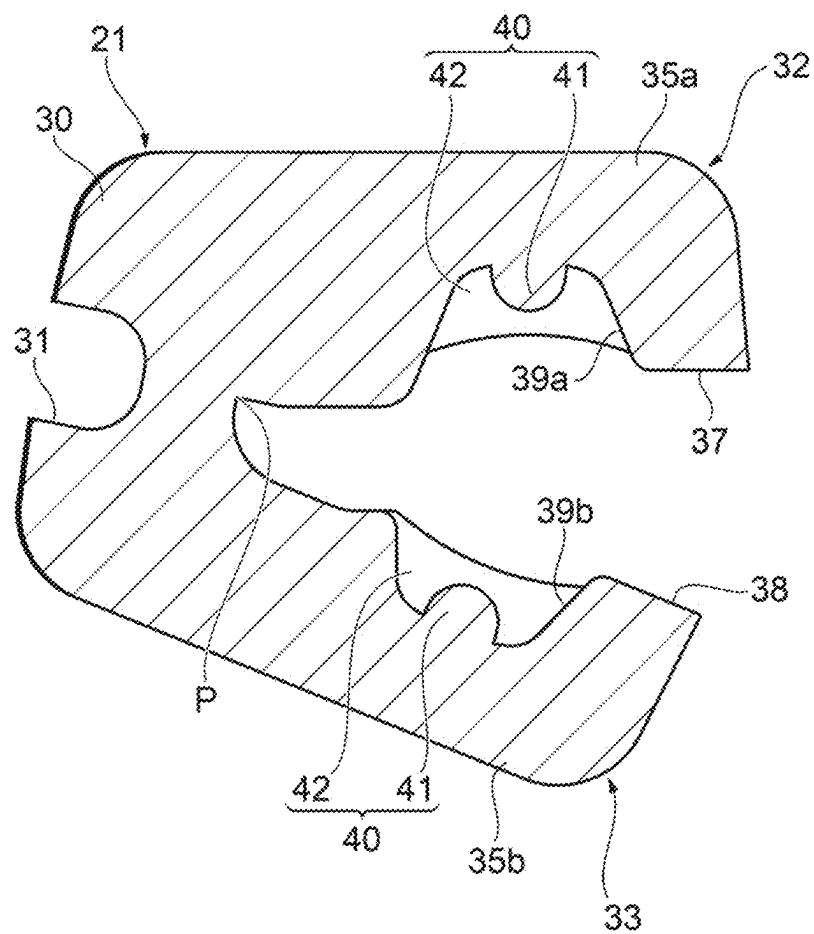


FIG. 7

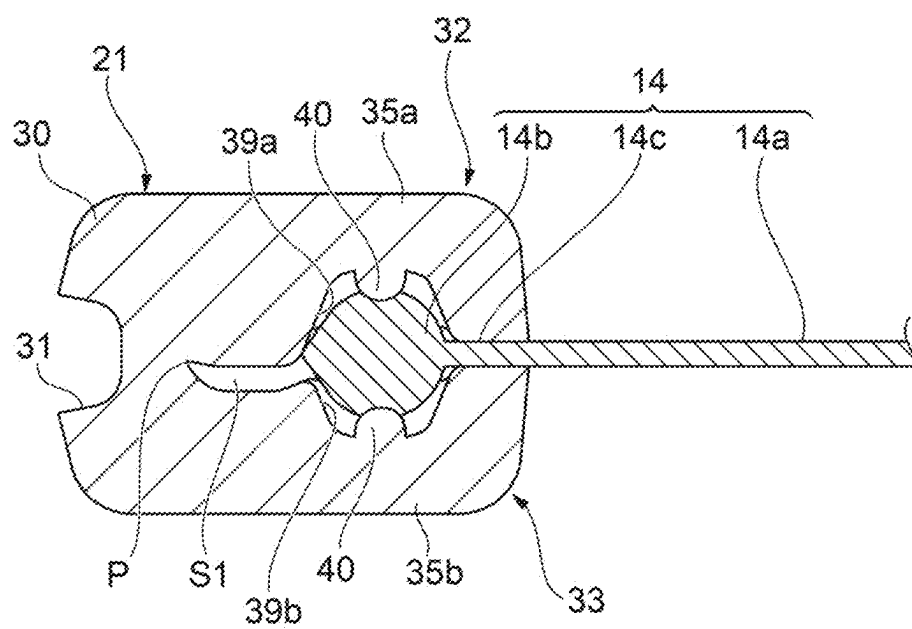


FIG. 8

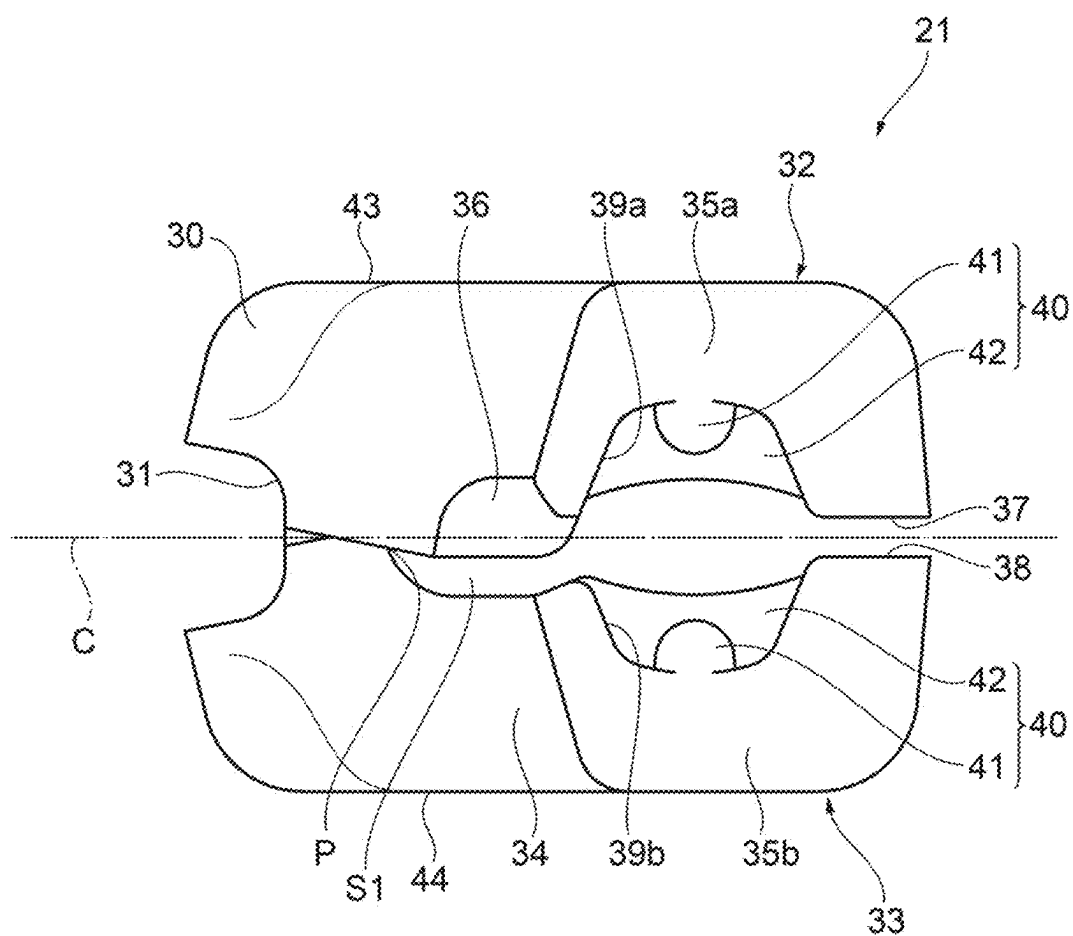


FIG. 9

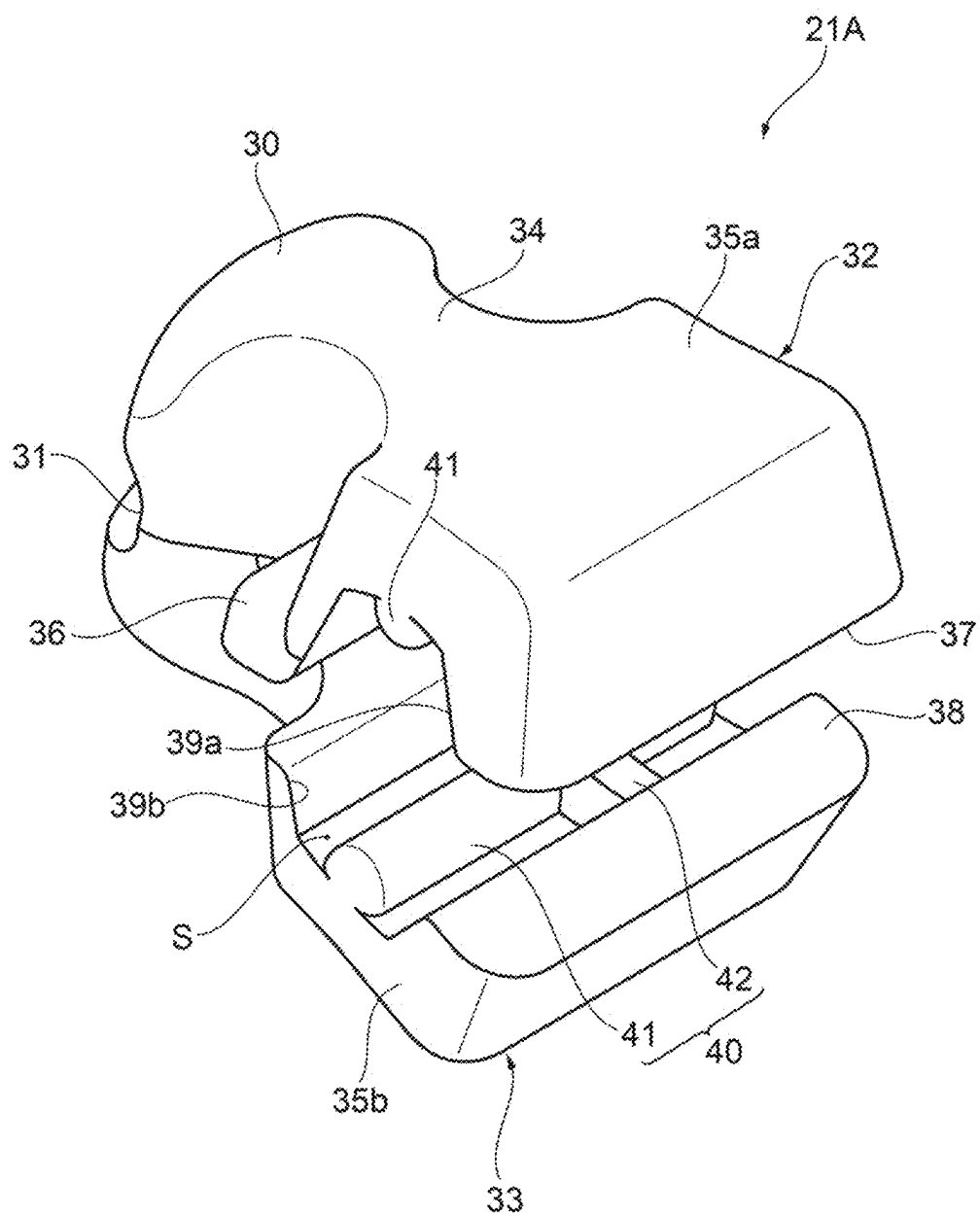


FIG. 10

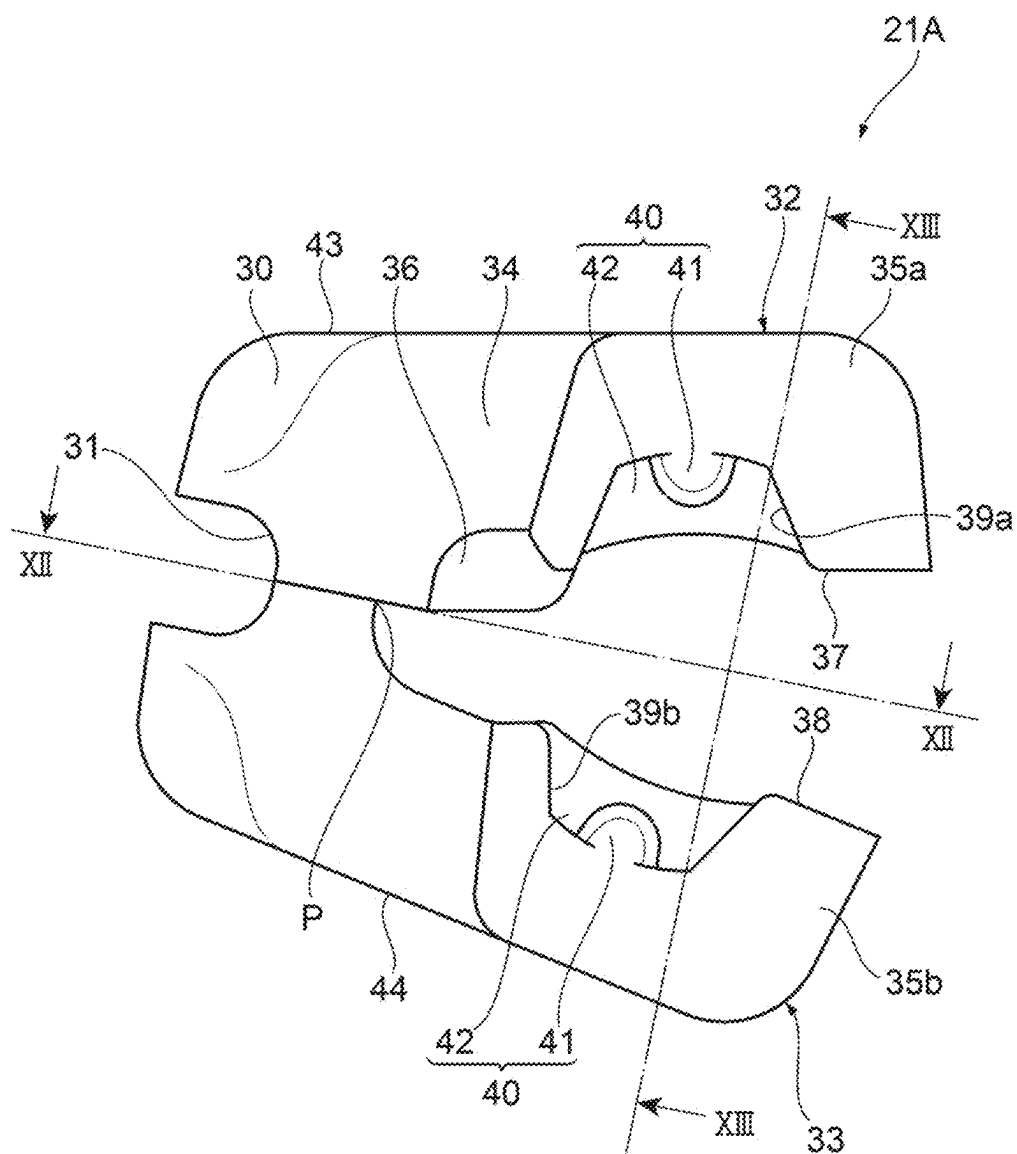


FIG. 11

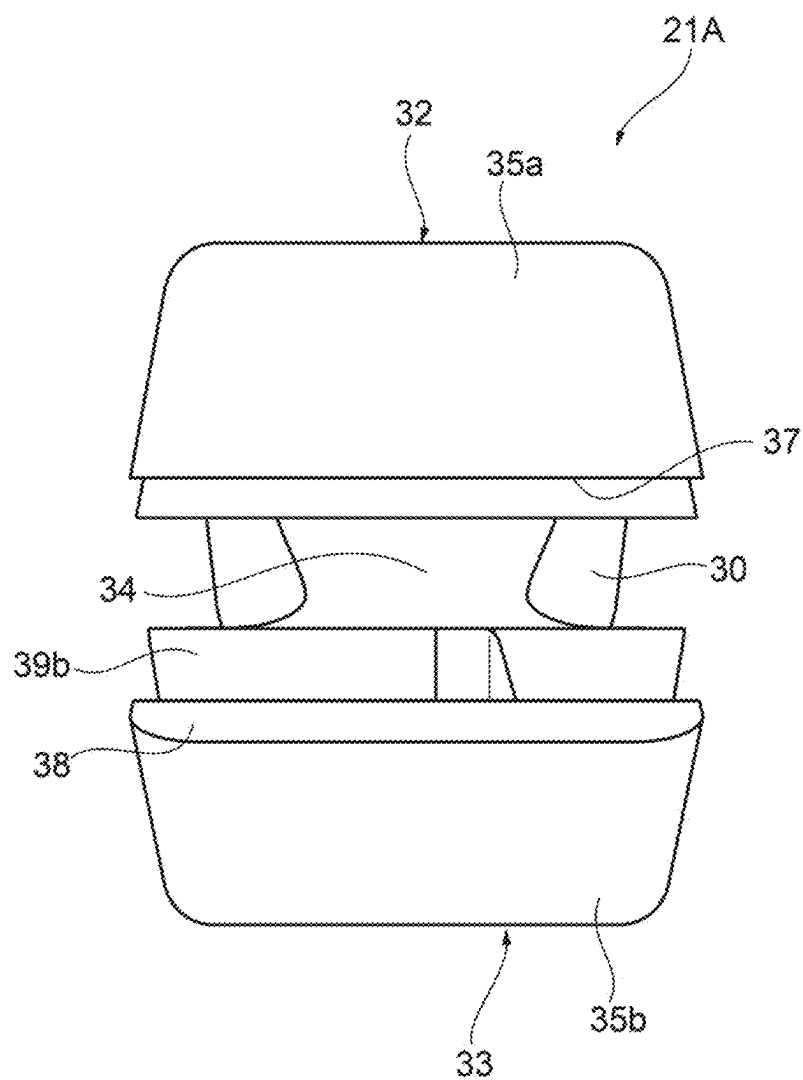


FIG. 12

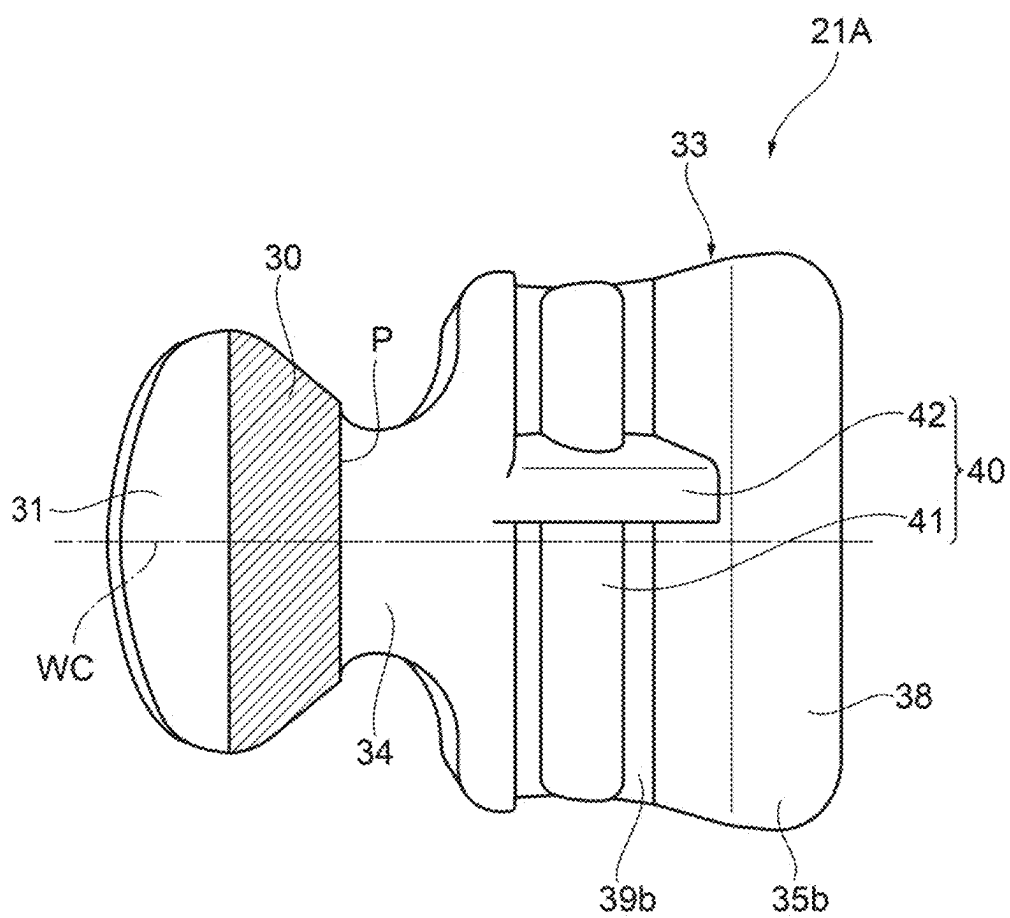


FIG. 13

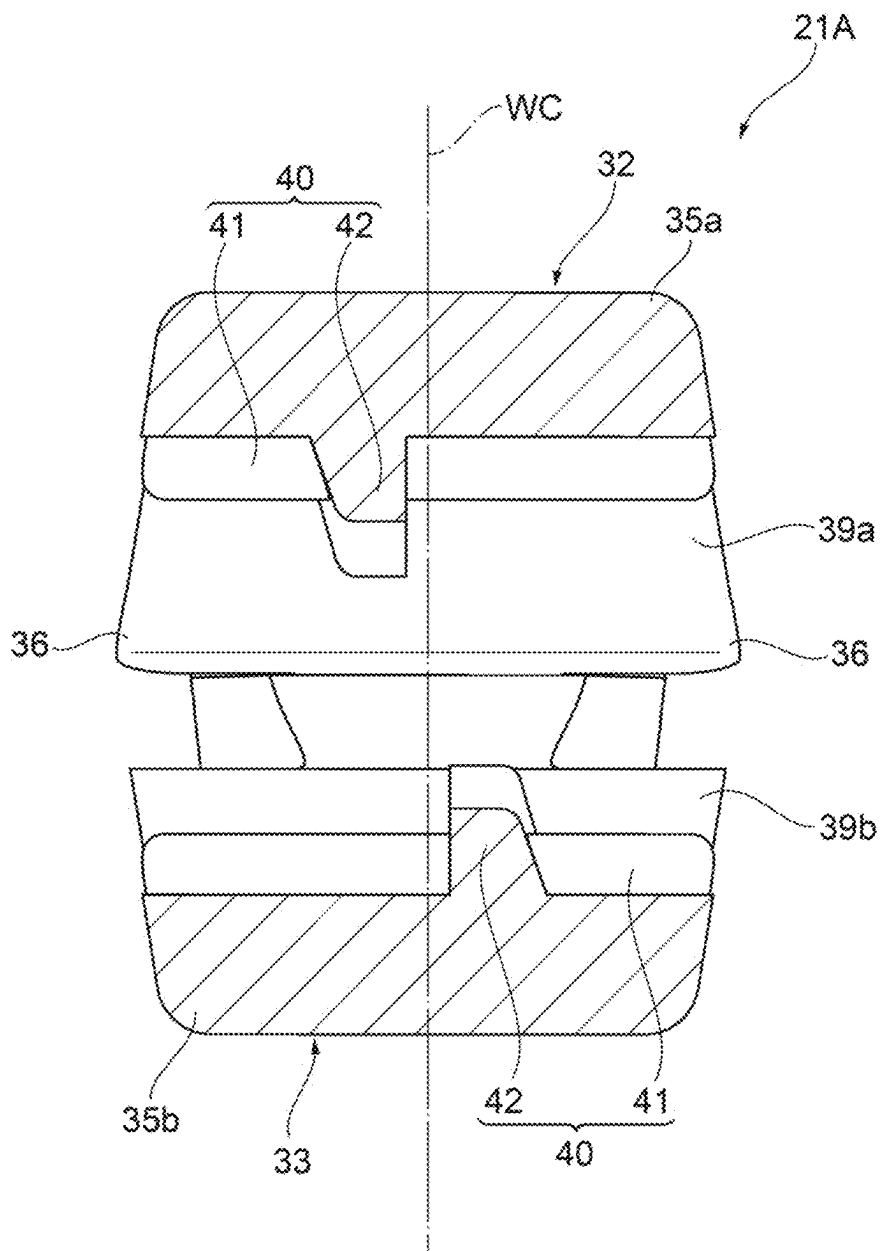


FIG. 14

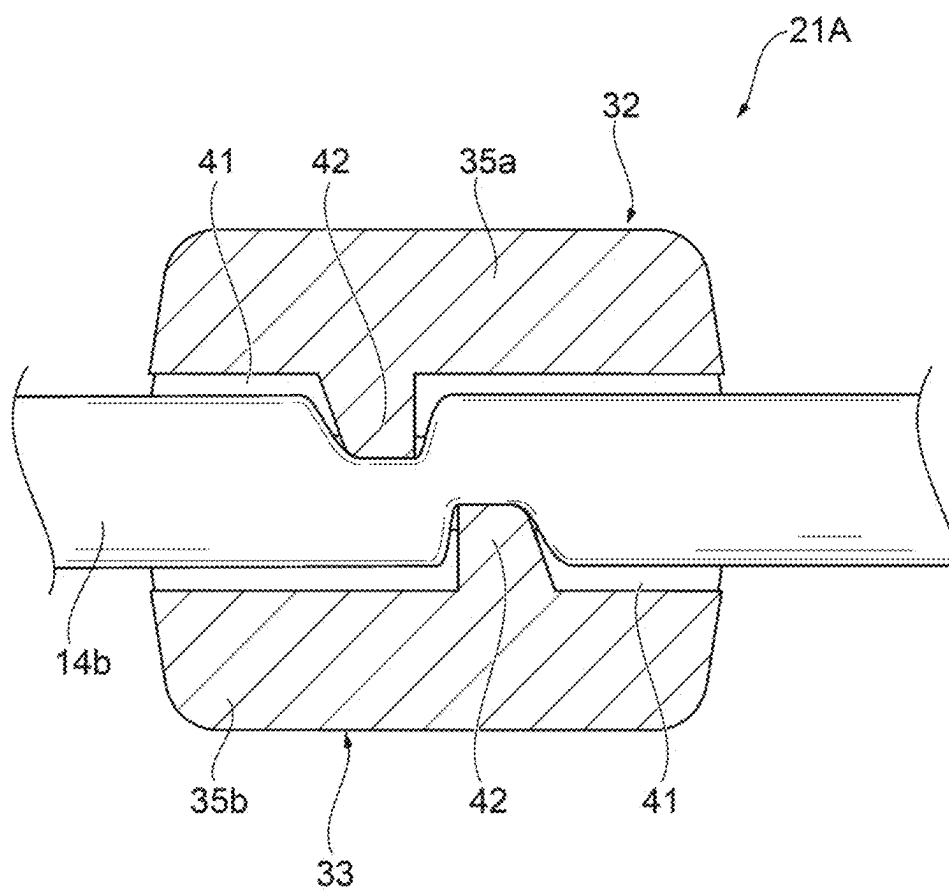


FIG. 16

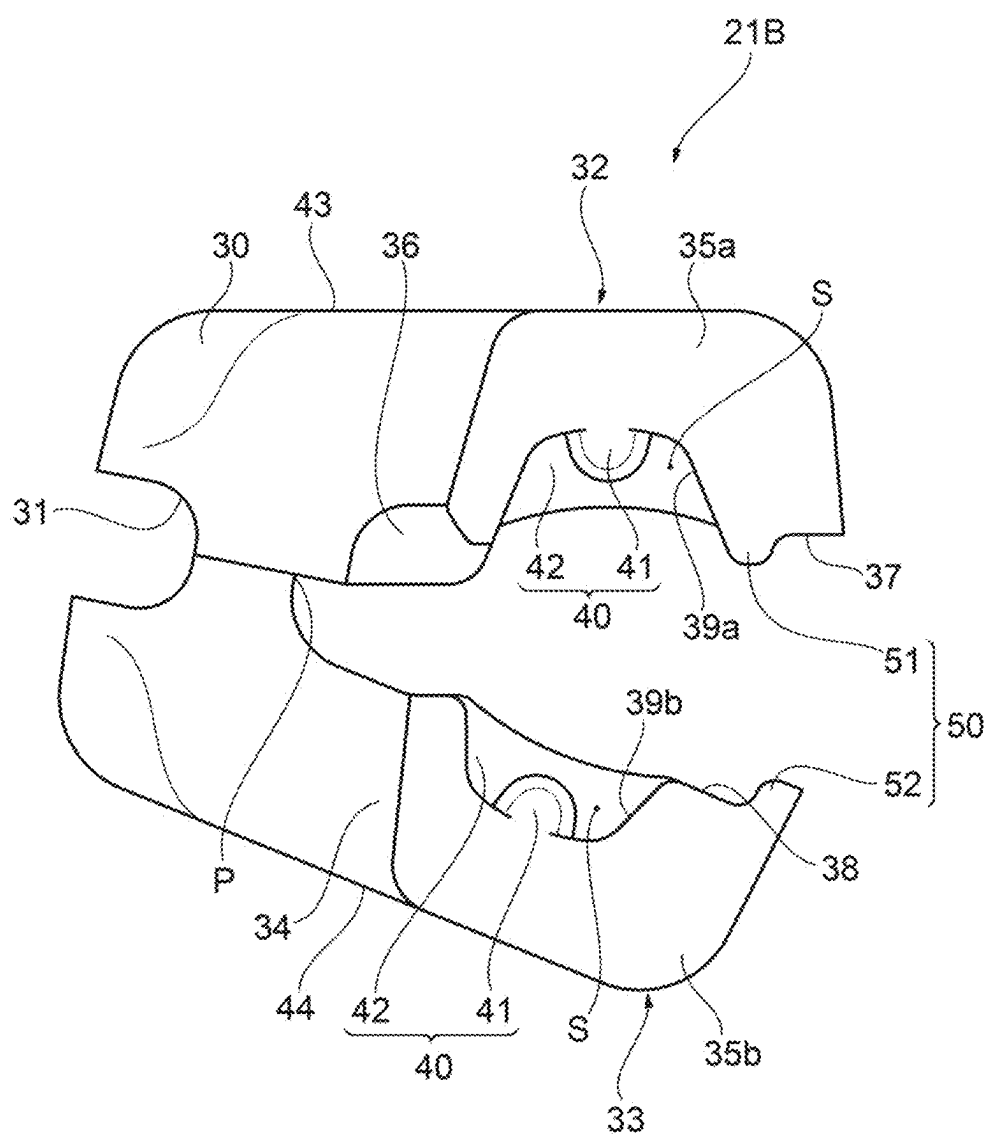


FIG. 17

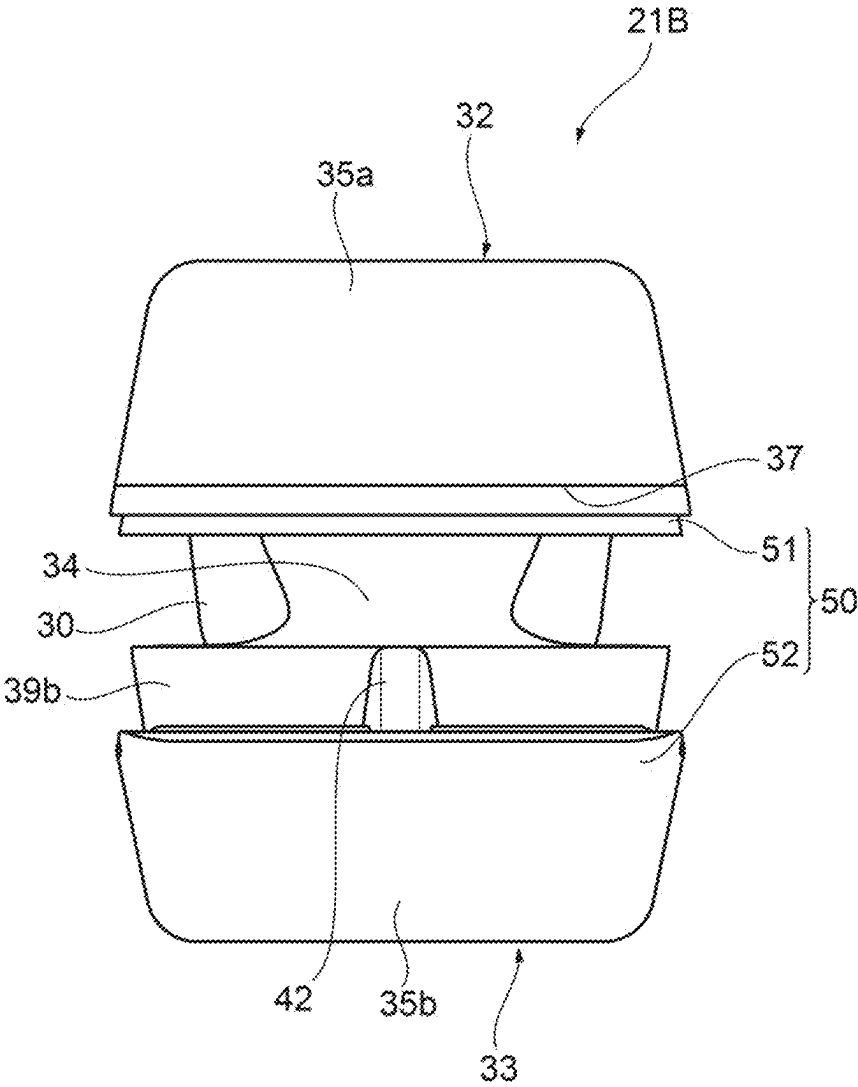


FIG. 18

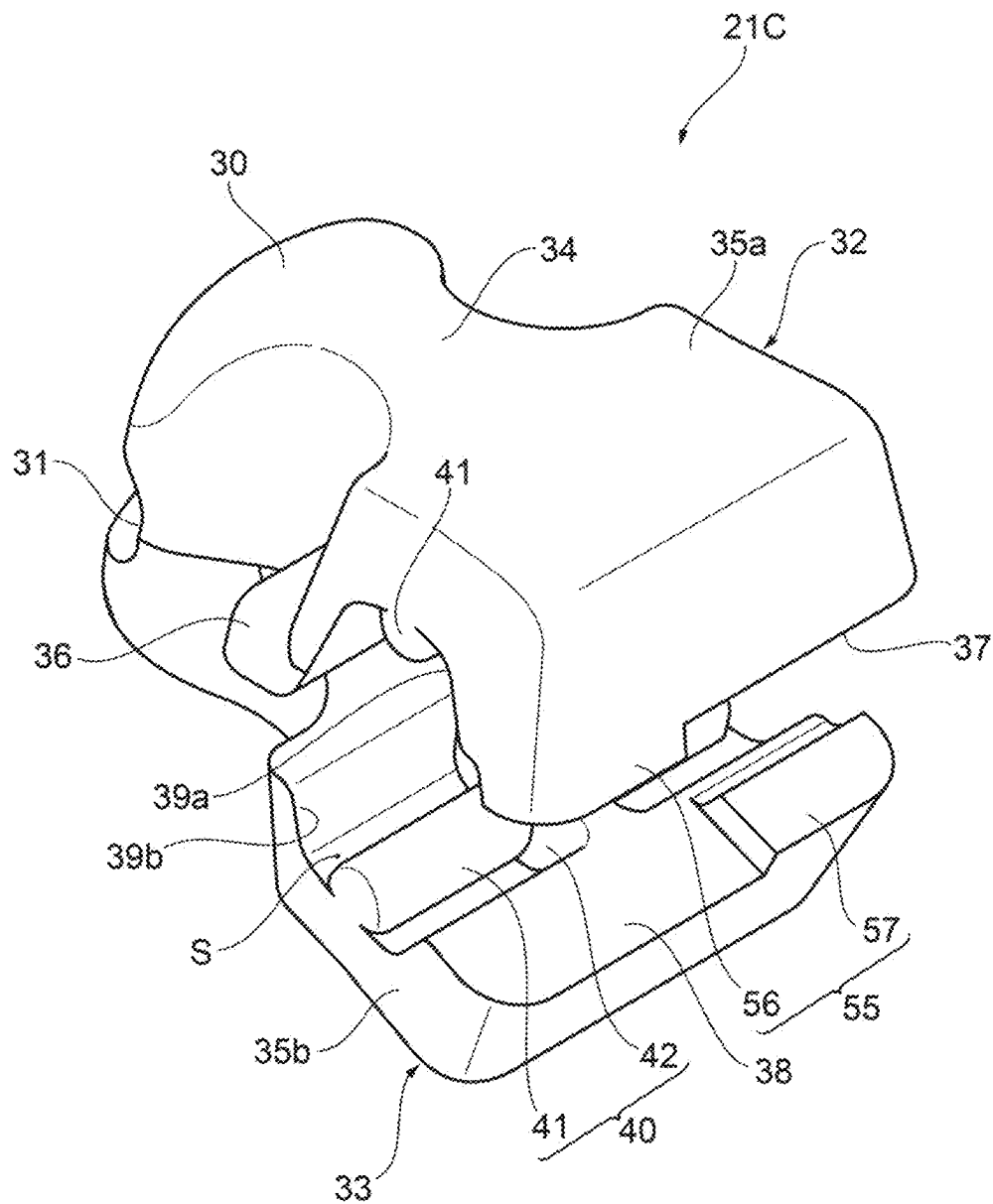


FIG. 19

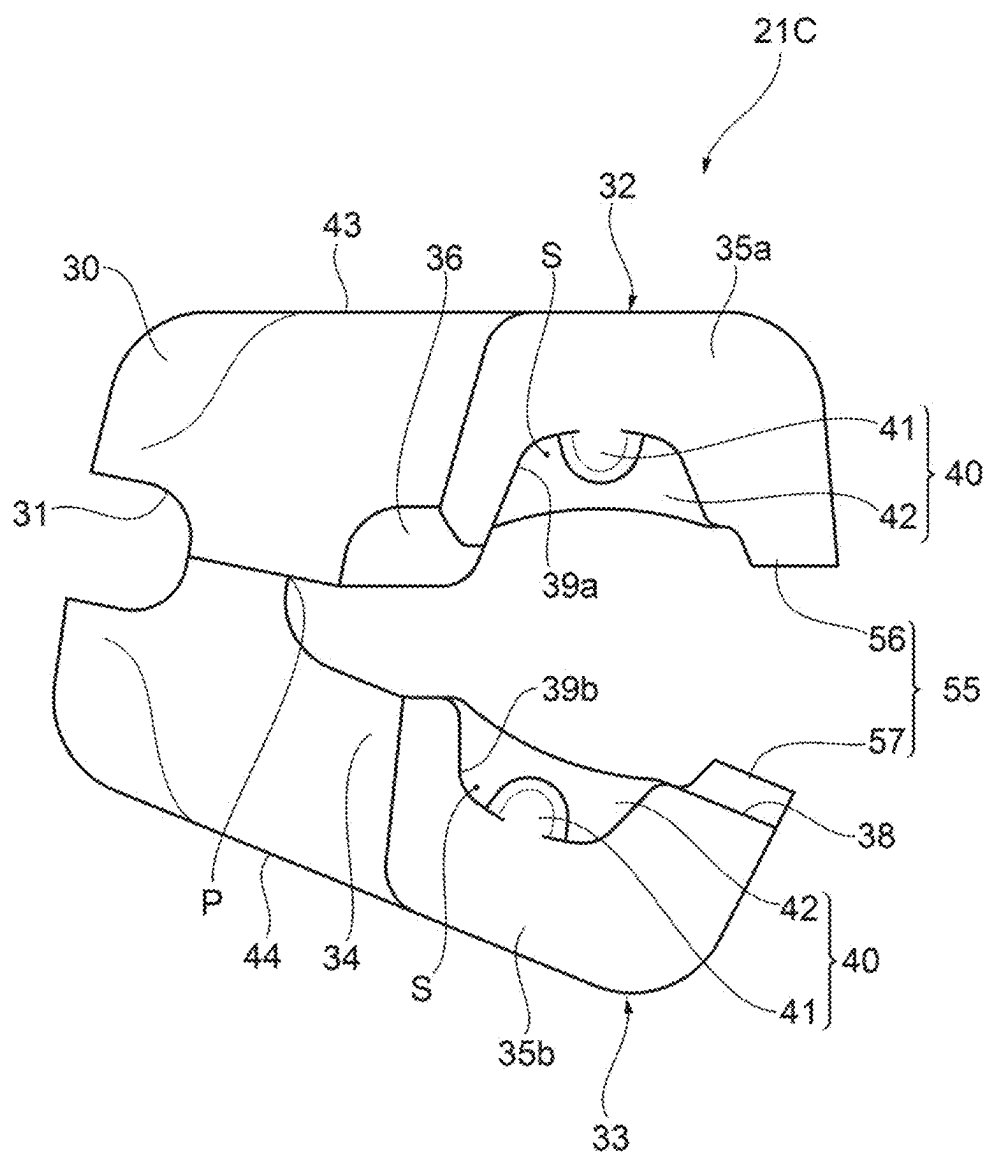


FIG. 20

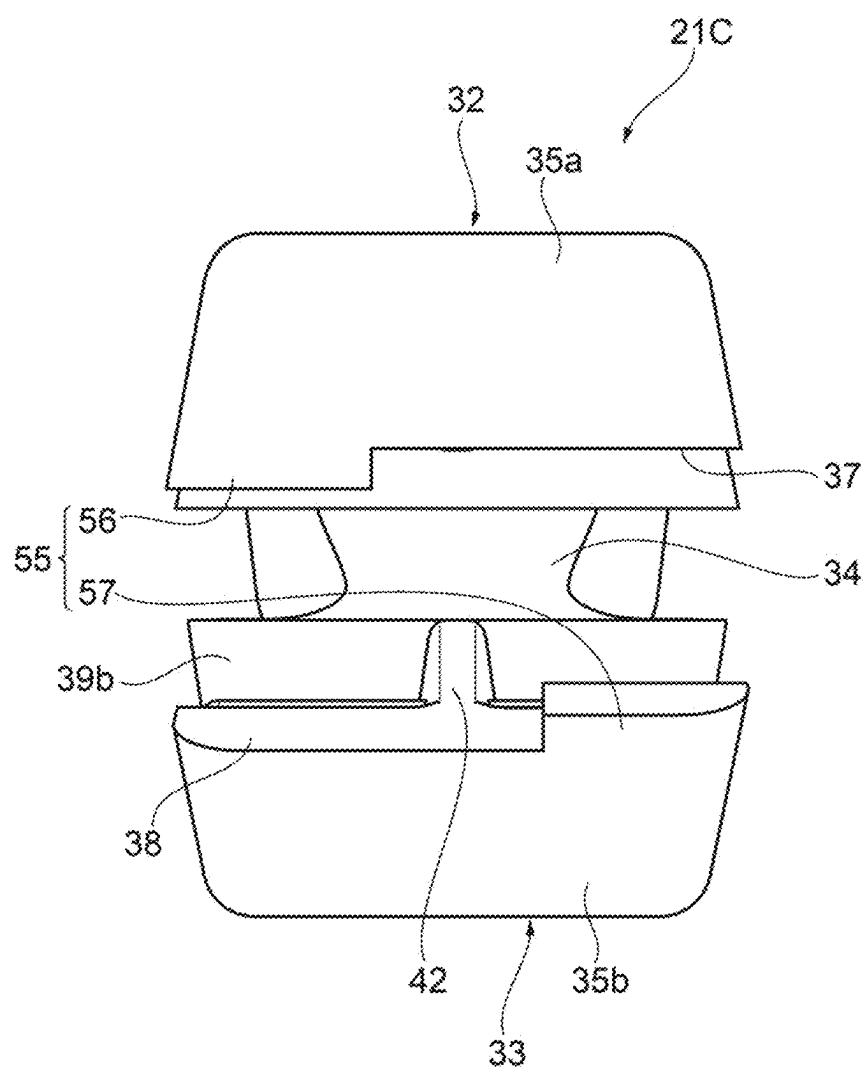


FIG. 21

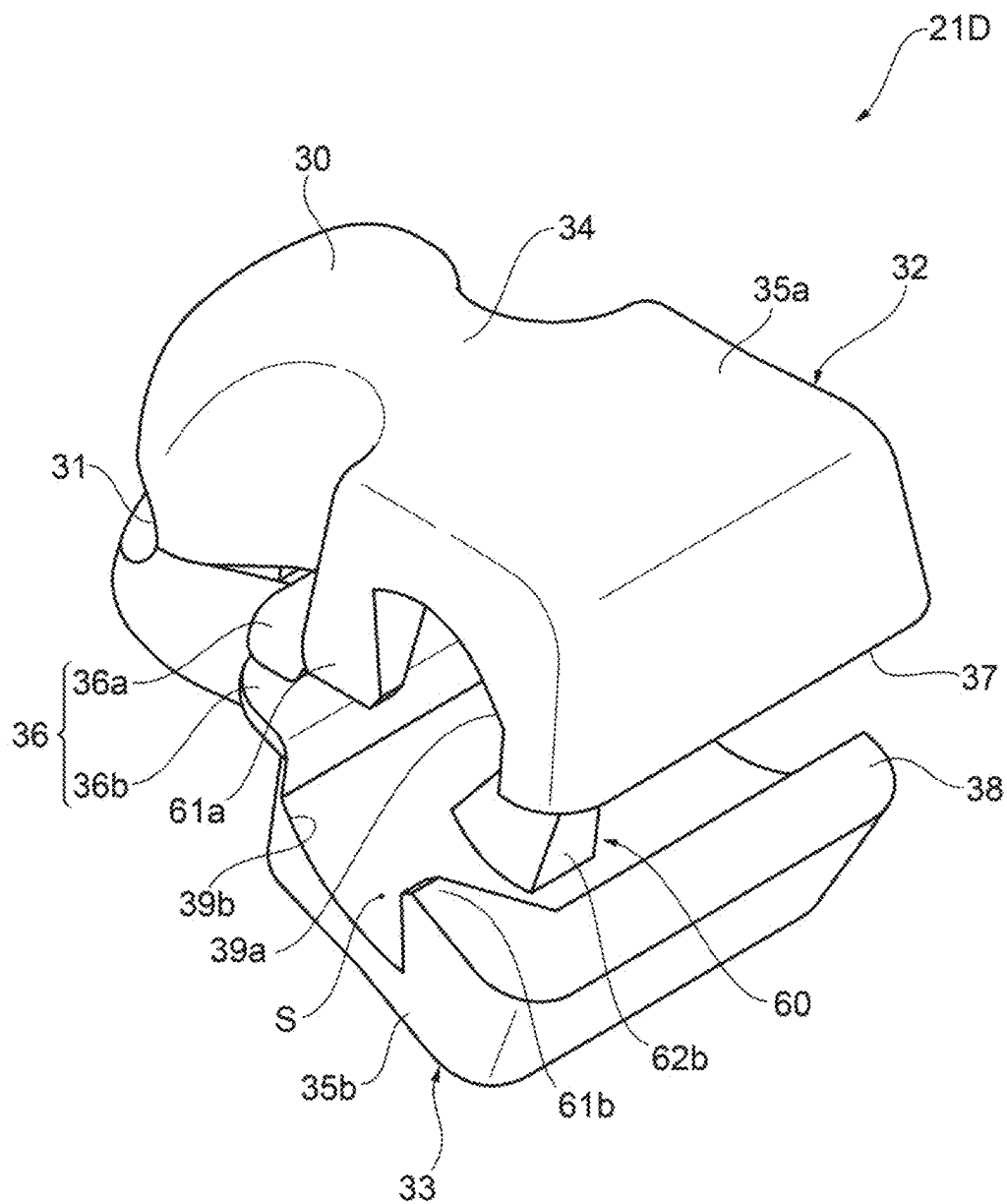


FIG. 22

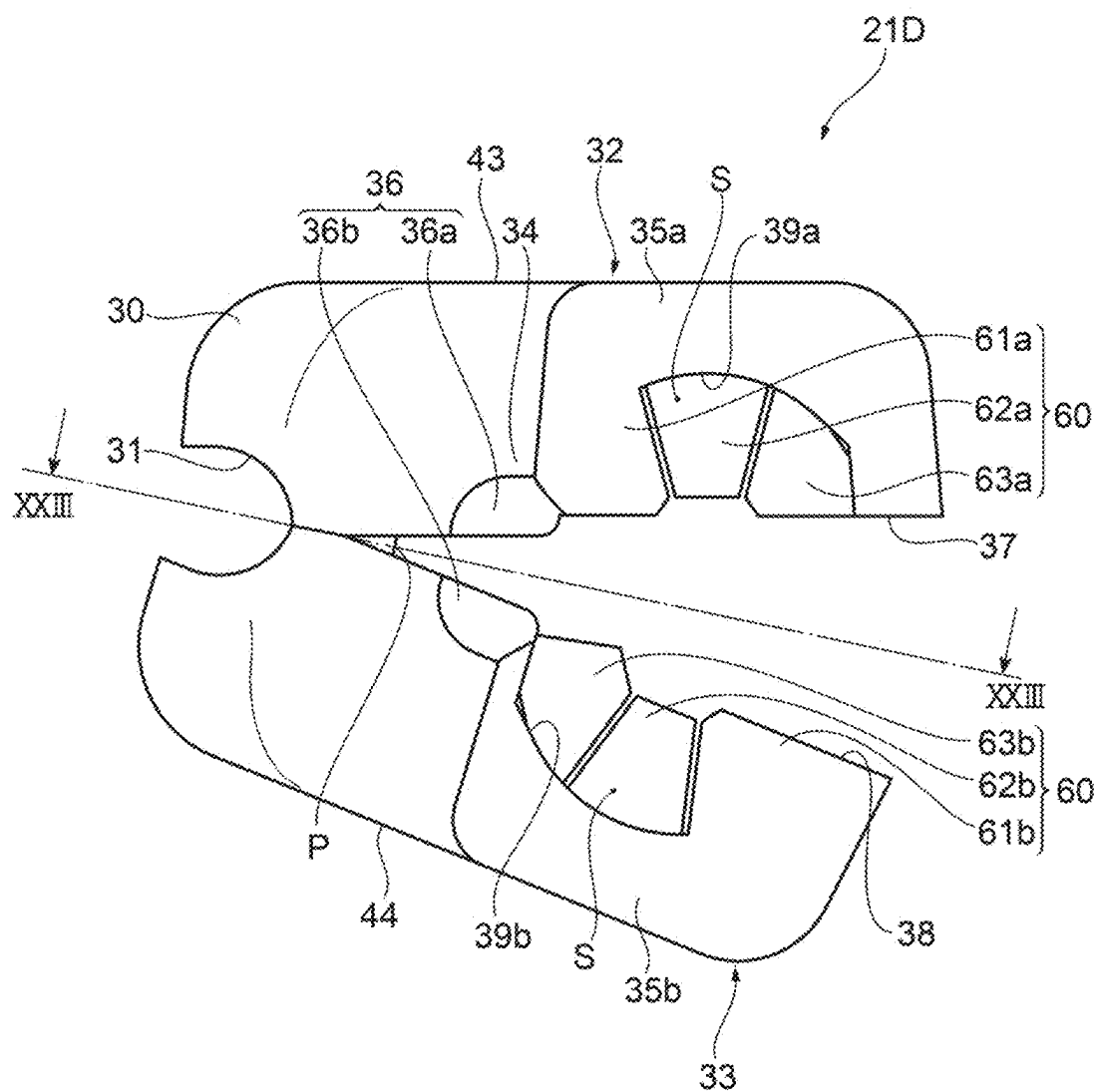


FIG. 23

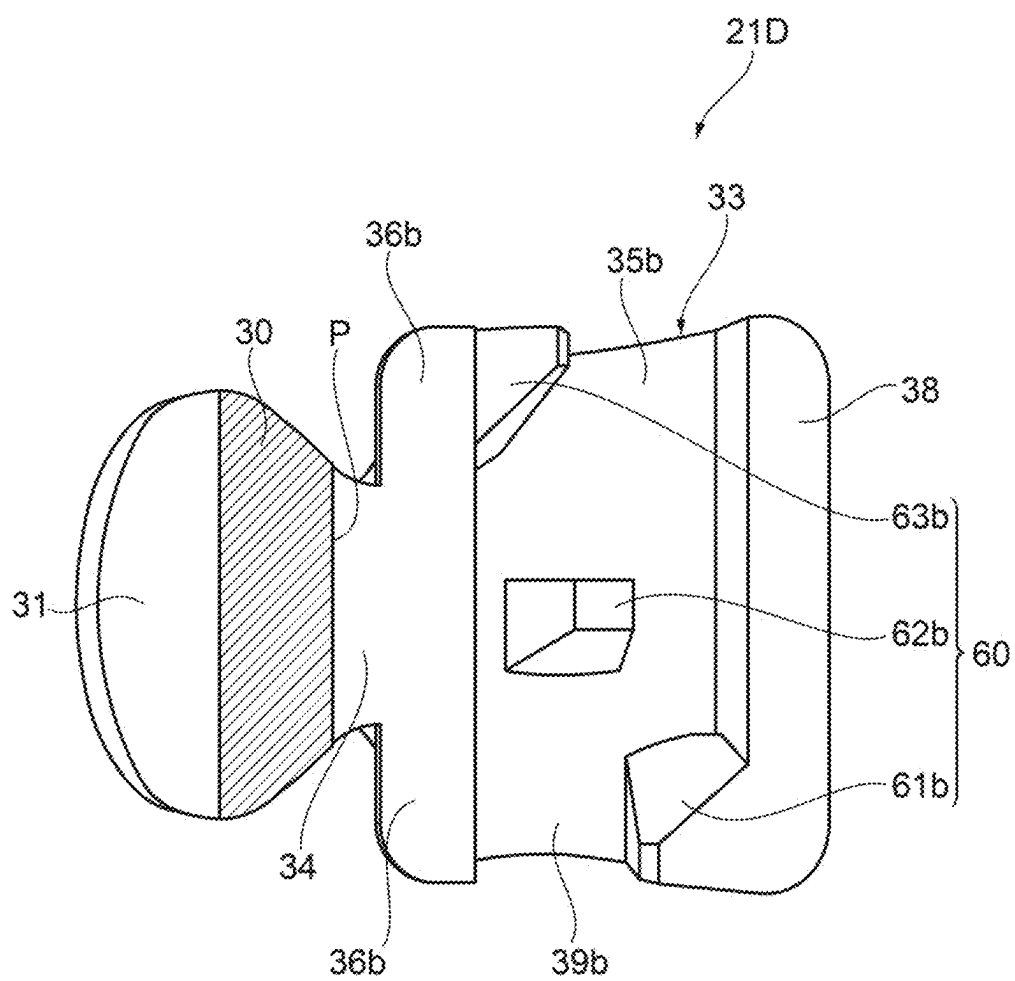


FIG. 24

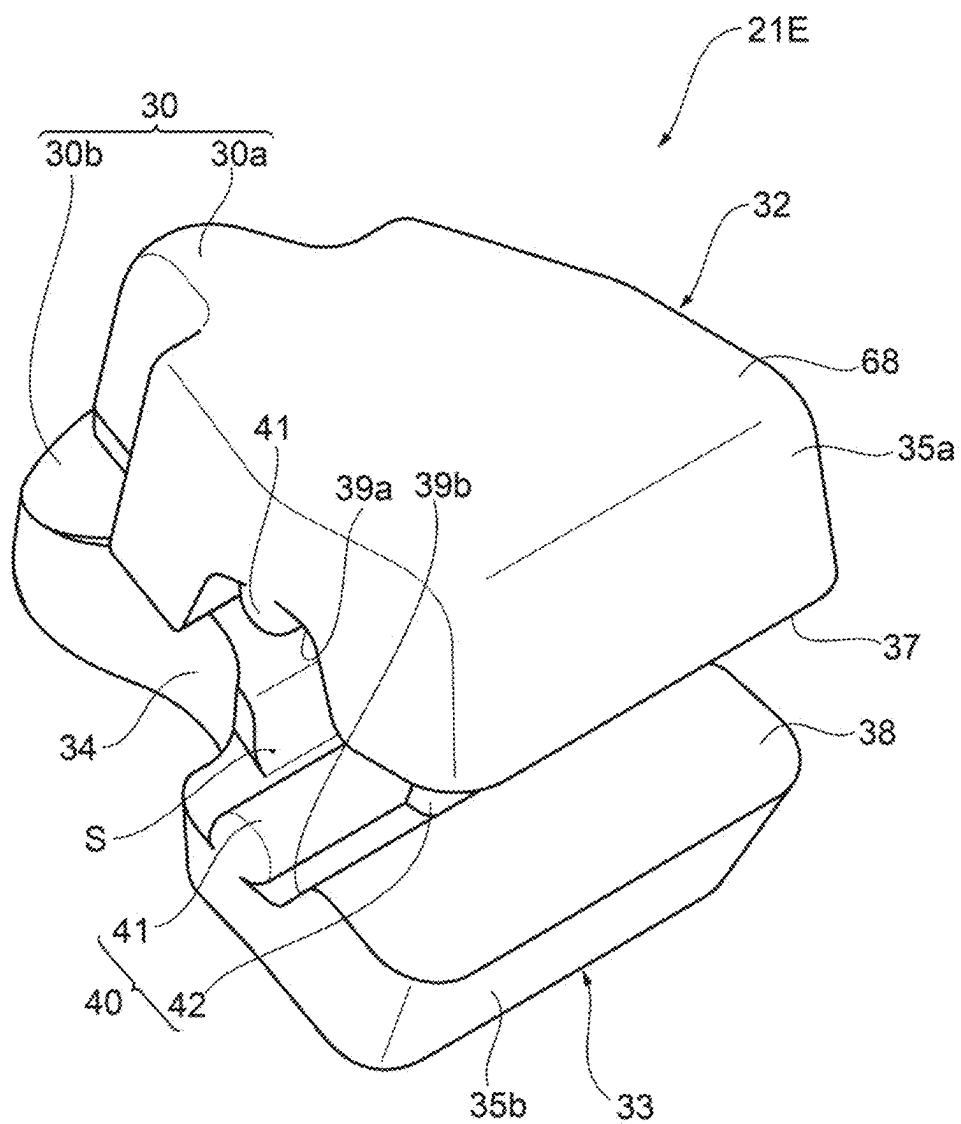


FIG. 25

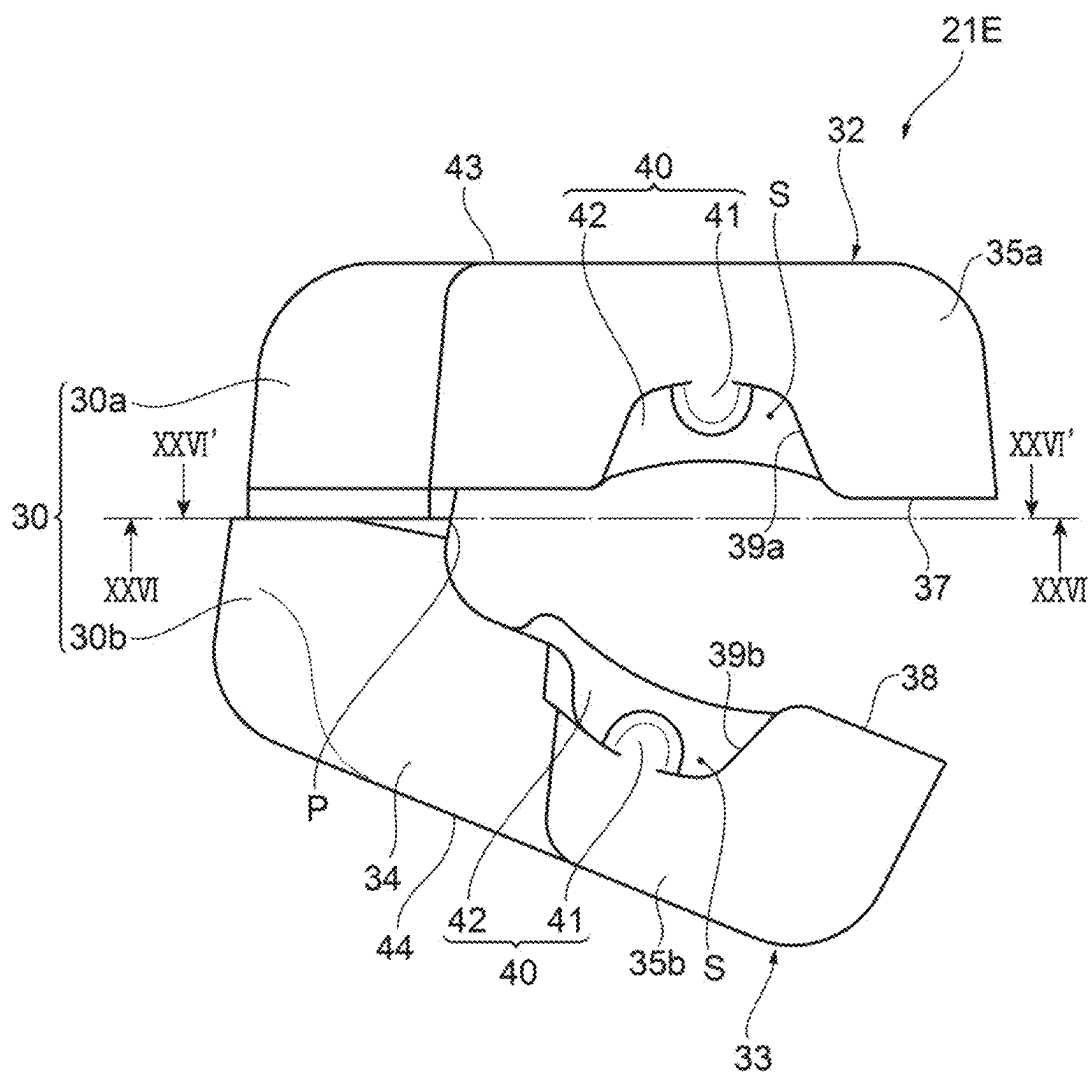


FIG. 26A

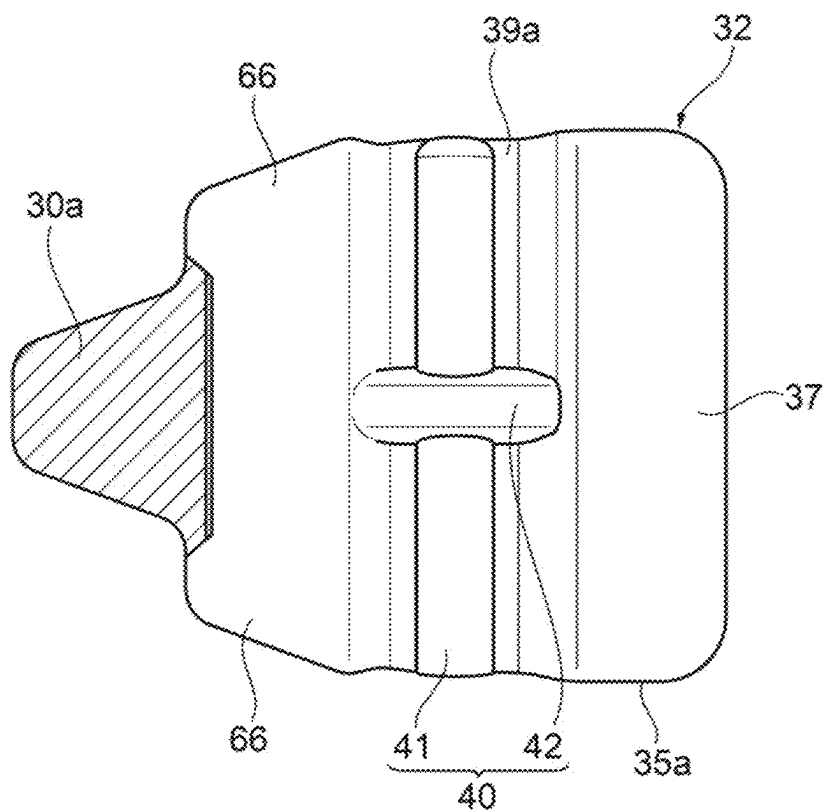


FIG. 26B

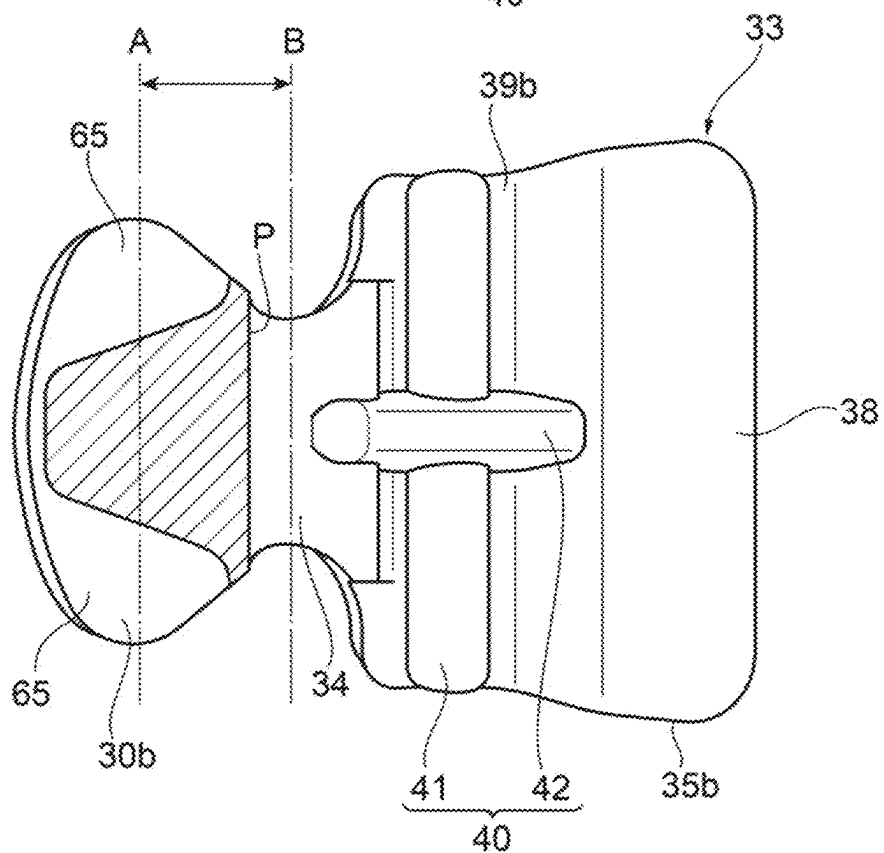


FIG. 27

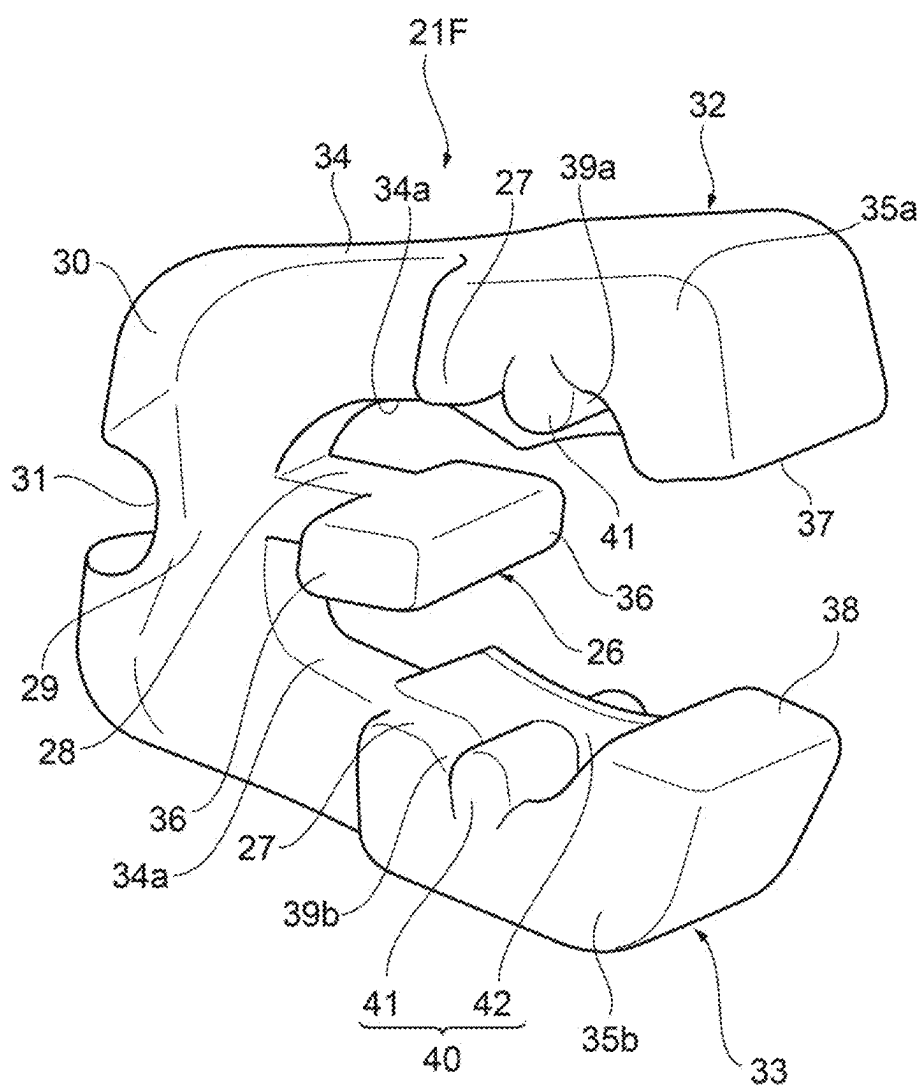


FIG. 28

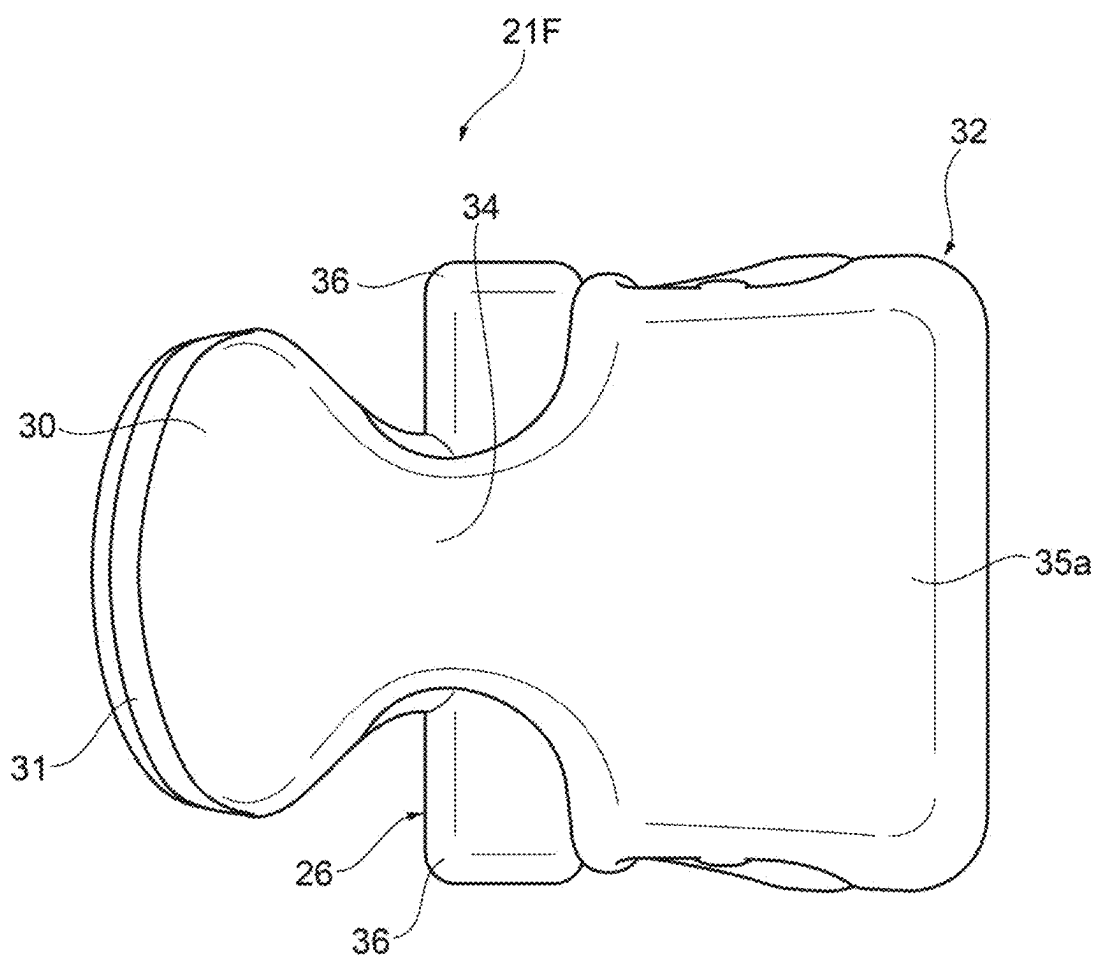


FIG. 29

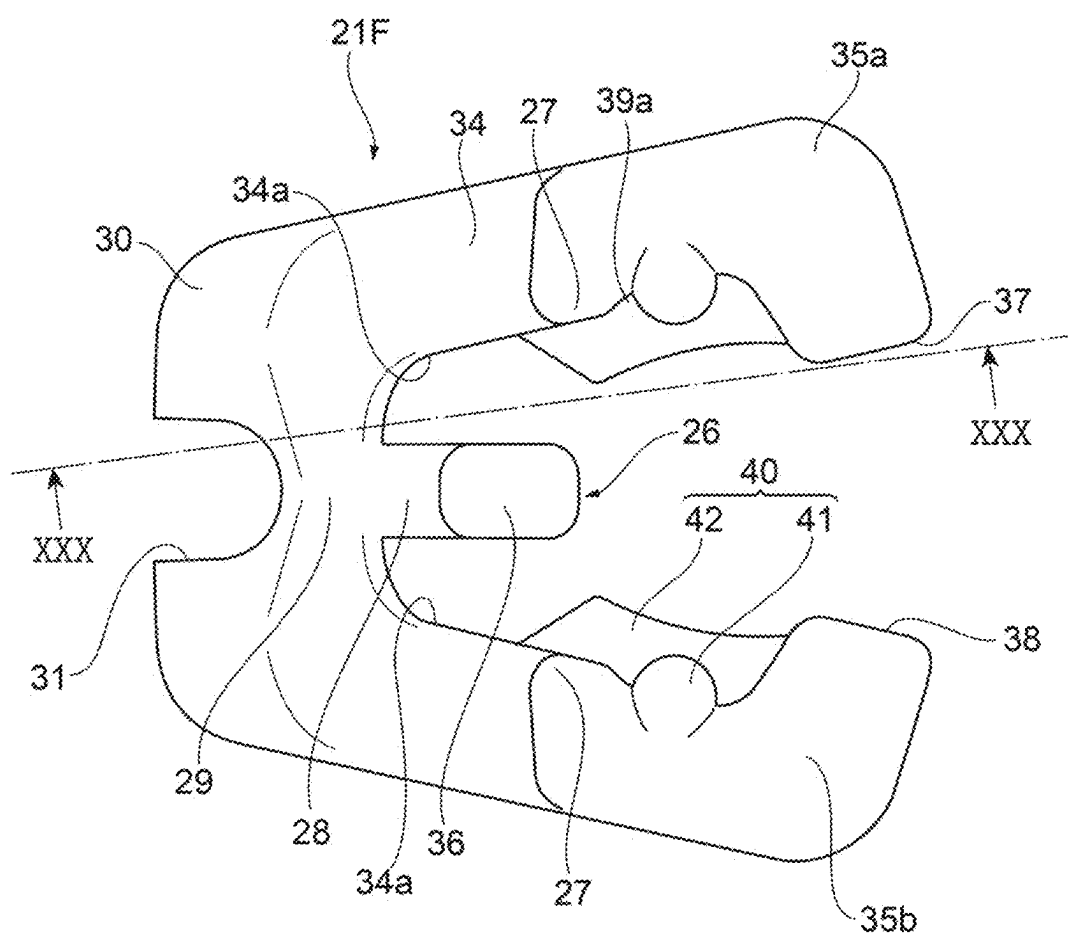


FIG. 30

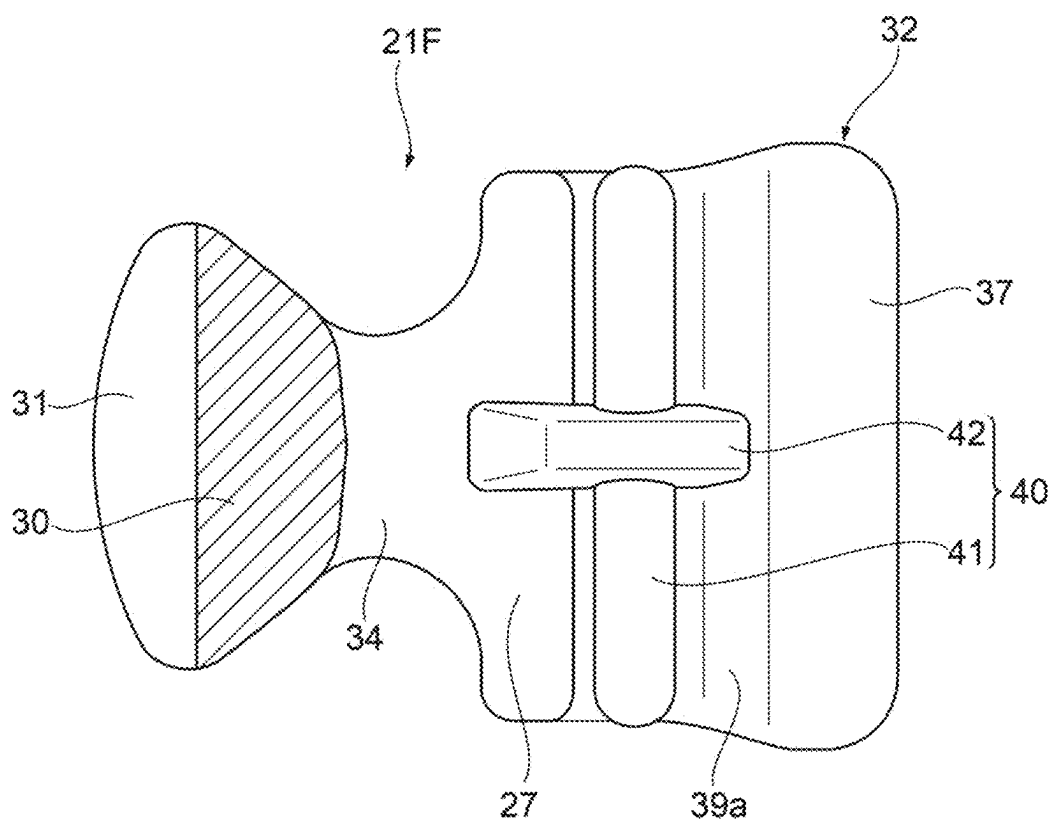
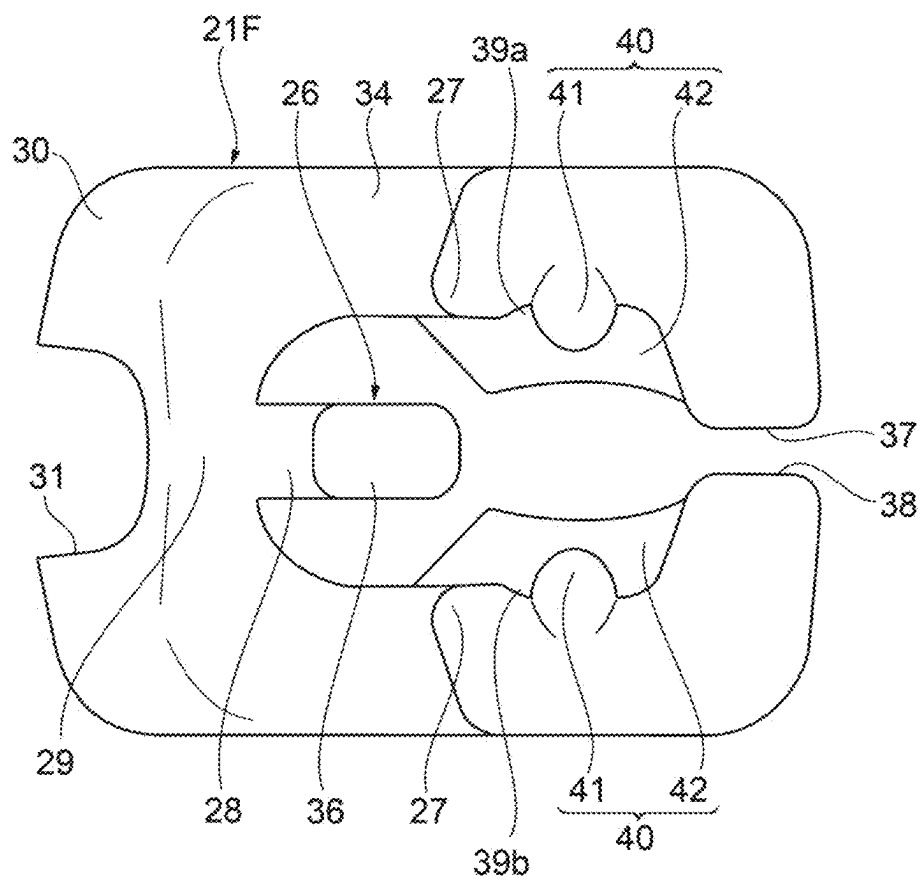


FIG. 31



FASTENER ELEMENT FOR SLIDE FASTENER, AND SLIDE FASTENER

TECHNICAL FIELD

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

BACKGROUND ART

[0002] In the related art, in a state where left and right element rows mesh with each other and a slide fastener is closed, when an excessive lateral pulling force acts on left and right fastener stringers, a fastener element may be detached from a fastener tape or may be damaged. Therefore, a new fastener element is attached to repair a portion where the fastener element is missing due to the detachment or damage.

[0003] For example, Patent Literature 1 describes a manual injection molding machine capable of injection-molding a new fastener element to a portion where a fastener element is missing. Further, in a fastener element described in Patent Literature 2, a fastener tape is clamped by a pair of element half portions separated on a tape front surface side and a tape back surface side in a portion where the fastener element is damaged and missing, and a fastener element for repair is attached by performing fastening using mechanical fastening means such as a bolt member and a nut member.

[0004] Further, in the related art, there is also known a slide fastener in which a metal fastener element is molded by die casting by setting a mold on a fastener tape and making a molten metal flow into the mold (for example, see Patent Literature 3).

CITATION LIST

Patent Literature

- [0005] Patent Literature 1: JPS53-71661U
- [0006] Patent Literature 2: JP5430674B
- [0007] Patent Literature 3: JPH05-123209A

SUMMARY OF INVENTION

Technical Problem

[0008] However, in a method of manufacturing a metal element or a resin element by die casting or injection molding, a dedicated molding machine is required, and clothes and the like requiring repair are required to be sent to a repair shop, and thus there is a problem in that a time and cost for repairing are increased.

[0009] Further, for the fastener element for repair disclosed in Patent Literature 2, a method for a large slide fastener whose aesthetic is not a concern such as those used for fishing nets is used, but is not preferred for applications where the aesthetic is required such as apparel, and improvement is desired.

[0010] The present invention has been made in view of the above-described circumstances, and an object of the present invention is to provide a fastener element for slide fastener which can be attached to a portion of a missing fastener element in a short time and at a low cost without being sent to a repair shop, and can have a good appearance, and a slide fastener.

Solution to Problem

[0011] The object of the present invention is achieved by the following configurations.

[0012] (1) A metal fastener element for a slide fastener including:

[0013] a meshing head portion; and

[0014] a first half portion and a second half portion which extend in a branched manner, in which

[0015] each of the first half portion and the second half portion includes, in a surface thereof facing each other, a clamping groove extending along a width direction of the fastener element, and

[0016] the first half portion and the second half portion are branched on a side of the meshing head portion with respect to the clamping grooves.

[0017] (2) The fastener element according to (1), in which an inner convex portion protruding into a space formed by the clamping grooves is provided in each of the clamping grooves.

[0018] (3) The fastener element according to (1) or (2), further including a neck portion which is continuous from the meshing head portion and which is narrower than the meshing head portion, in which

[0019] at least one of the first half portion and the second half portion is branched from a portion between a portion of the meshing head portion which is widest in the width direction of the fastener element and a portion of the neck portion which is narrowest in the width direction of the fastener element.

[0020] (4) The fastener element according to (3), further including a protrusion portion which protrudes from the meshing head portion and which is provided between the first half portion and the second half portion.

[0021] (5) The fastener element according to any one of (1) to (3), in which

[0022] the first half portion includes a neck portion and a first leg portion which extends from the neck portion thereof to a side opposite to the meshing head portion and which is wider than the neck portion thereof, and/or the second half portion includes a neck portion and a second leg portion which extends from the neck portion thereof to the side opposite to the meshing head portion and which is wider than the neck portion thereof,

[0023] a groove portion which extends along the width direction is formed in a front surface of the meshing head portion, and

[0024] at least one of the first half portion and the second half portion includes a pair of shoulder portions extending in the width direction between the neck portion thereof and the first leg portion or the second leg portion and configured to be engaged with the groove portion.

[0025] (6) The fastener element according to (5), in which the shoulder portions are provided on any one of the first half portion and the second half portion.

[0026] (7) The fastener element according to any one of (2) to (6), in which the inner convex portion has a cross shape including a first inner convex portion which extends along the width direction and a second inner convex portion which intersects the first inner convex portion and which extends along a longitudinal direction.

[0027] (8) The fastener element according to (7), in which the second inner convex portion of the first half portion and

the second inner convex portion of the second half portion are offset from each other in the width direction of the fastener element.

[0028] (9) The fastener element according to any one of (2) to (6), in which the inner convex portion includes at least three claw portions which are respectively provided at an intermediate portion in the width direction and both end portions in the width direction, and positions of the at least three claw portions in a length direction are different.

[0029] (10) The fastener element according to any one of (1) to (9), in which each of facing surfaces of the first half portion and the second half portion is provided with an outer convex portion on a side of the clamping grooves opposite to the meshing head portion.

[0030] (11) The fastener element according to any one of (1) to (10), in which a maximum opening distance between the first half portion and the second half portion is 85% to 90% of a diameter of a core string of the fastener tape.

[0031] (12) The fastener element according to any one of (1), (2), and (7) to (11), in which

[0032] the meshing head portion includes a first head portion which is provided on a side of the first half portion in a front-back direction and which is tapered toward a front surface thereof, and a second head portion which is provided on a side of the second half portion in the front-back direction and which is wider than the first head portion,

[0033] the first half portion includes a first leg portion which is formed continuously from the first head portion, and

[0034] the second half portion includes a neck portion which is narrower than the second head portion, and a second leg portion which extends from the neck portion to a side opposite to the second head portion and which is wider than the neck portion.

[0035] (13) A slide fastener including:

[0036] a pair of fastener stringers each formed by injection-molding a plurality of resin fastener elements on the fastener tape; and

[0037] a slider configured to open and close the pair of fastener stringers, in which

[0038] in at least one of the pair of fastener stringers, the fastener element according to any one of (1) to (12) is crimped and attached to a tape side edge portion of the fastener tape between the resin fastener elements.

Advantageous Effects of Invention

[0039] According to the fastener element for slide fastener and the slide fastener of the present invention, the fastener element can be attached to a portion of a missing fastener element in a short time and at a low cost without being sent to a repair shop, and can have a good appearance.

BRIEF DESCRIPTION OF DRAWINGS

[0040] FIG. 1 is a plan view of a slide fastener according to the present invention.

[0041] FIG. 2 is a perspective view of a fastener element according to a first embodiment of the present invention.

[0042] FIG. 3 is a plan view of the fastener element shown in FIG. 2.

[0043] FIG. 4 is a front view of the fastener element shown in FIG. 2 and a fastener tape.

[0044] FIG. 5 is a cross-sectional view taken along a line V-V in FIG. 4.

[0045] FIG. 6 is a cross-sectional view taken along a line VI-VI of FIG. 3.

[0046] FIG. 7 is a cross-sectional view showing a state where the fastener element is crimped to the fastener tape at a position along the line VI-VI in FIG. 3.

[0047] FIG. 8 is a front view of the fastener element after being crimped, excluding the fastener tape from FIG. 7.

[0048] FIG. 9 is a perspective view of a fastener element according to a second embodiment of the present invention.

[0049] FIG. 10 is a front view of the fastener element shown in FIG. 9.

[0050] FIG. 11 is a side view of the fastener element shown in FIG. 9.

[0051] FIG. 12 is a cross-sectional view taken along a line XII-XII in FIG. 10.

[0052] FIG. 13 is a cross-sectional view taken along a line XIII-XIII in FIG. 10.

[0053] FIG. 14 is a cross-sectional view showing a state where the fastener element is crimped to a fastener tape along the line XIII-XIII in FIG. 10.

[0054] FIG. 15 is a perspective view of a fastener element according to a third embodiment of the present invention.

[0055] FIG. 16 is a front view of the fastener element shown in FIG. 15.

[0056] FIG. 17 is a side view of the fastener element shown in FIG. 15.

[0057] FIG. 18 is a perspective view of a fastener element according to a fourth embodiment of the present invention.

[0058] FIG. 19 is a front view of the fastener element shown in FIG. 18.

[0059] FIG. 20 is a side view of the fastener element shown in FIG. 18.

[0060] FIG. 21 is a perspective view of a fastener element according to a fifth embodiment of the present invention.

[0061] FIG. 22 is a front view of the fastener element shown in FIG. 21.

[0062] FIG. 23 is a cross-sectional view taken along a line XXIII-XXIII in FIG. 22.

[0063] FIG. 24 is a perspective view of a fastener element according to a sixth embodiment of the present invention.

[0064] FIG. 25 is a front view of the fastener element shown in FIG. 24.

[0065] FIG. 26 (a) of FIG. 26 is a cross-sectional view taken along a line XXVI-XXVI of FIG. 25, and (b) of FIG. 26 is a cross-sectional view taken along a line XXVI'-XXVI' of FIG. 25.

[0066] FIG. 27 is a perspective view of a fastener element according to a seventh embodiment of the present invention.

[0067] FIG. 28 is a plan view of the fastener element shown in FIG. 27.

[0068] FIG. 29 is a front view of the fastener element shown in FIG. 27.

[0069] FIG. 30 (a) of FIG. 30 is a cross-sectional view taken along a line XXX-XXX in FIG. 29.

[0070] FIG. 31 is a front view of the fastener element after being crimped, excluding a fastener tape from FIG. 27.

DESCRIPTION OF EMBODIMENTS

[0071] A fastener element for slide fastener and a slide fastener according to embodiments of the present invention will be described below.

[0072] In the following description, regarding the slide fastener, a direction in which a slider is slid to close left and right fastener stringers is referred to as an upper direction, and a direction in which the slider is slid to open the left and right fastener stringers is referred to as a lower direction. Further, a direction perpendicular to the upper-lower direction and parallel to a fastener tape is referred to as a left-right direction, a right side in FIG. 1 is referred to as a right direction, a left side is referred to as a left direction, and in FIG. 1, a front side of the paper is referred to as a front direction, and a back side of the paper is referred to as a back direction.

[0073] Further, regarding the fastener element, the left-right direction of the slide fastener is referred to as a longitudinal direction, and the upper-lower direction is referred to as a width direction. Further, regarding the longitudinal direction of the fastener element, a direction toward the facing fastener element is referred to as a front side, and a direction away from the facing fastener element is referred to as a rear side.

First Embodiment

[0074] As shown in FIG. 1, a slide fastener 10 includes a pair of left and right fastener stringers 11, 12 and a slider 13 capable of opening and closing the fastener stringers 11, 12.

[0075] The left and right fastener stringers 11, 12 include a pair of left and right fastener tapes 14, element rows 15 provided on facing tape side edge portions 14c of the pair of fastener tapes 14, top stops 16 fixed to the tape side edge portions 14c at upper ends of the element rows 15, and a bottom stop 17 fixed to the tape side edge portions 14c at lower ends of the element rows 15. The top stop 16 and the bottom stop 17 prevent the slider 13 from falling off from the element rows 15. The bottom stop 17 may be a separable end stop including a separable pin and a box body. In addition, the above-described configuration is an example, and the top stop 16 or the bottom stop 17 may not necessarily be provided.

[0076] Each of the fastener tapes 14 includes a tape portion 14a and a core string 14b provided on one side edge of the tape portion 14a, and the core string 14b and a part of the tape portion 14a on a core string 14b side serve as the tape side edge portion 14c.

[0077] Each of the left and right element rows 15 is formed by a plurality of resin fastener elements 20 that are injection-molded on the tape side edge portion 14c of the fastener tape 14. For the resin fastener element 20, a synthetic resin material such as polyacetal, polyethylene terephthalate, or nylon can be used.

[0078] In such a slide fastener 10, in a state where the left and right element rows 15 are meshed with each other, when an excessive force is applied in a direction (left-right direction) to separate the left and right fastener stringers 11, 12 from each other, the fastener elements 20 may be damaged, and a portion in which the fastener elements 20 are detached from the fastener tape 14 and are missing may be generated.

[0079] Therefore, as shown by shaded lines in FIG. 1, a metal fastener element 21 of the present embodiment is attached by being crimped to a portion of the fastener tape 14 where the resin fastener element 20 is missing, and is used to repair the fastener stringers 11, 12.

[0080] As shown in FIGS. 2 to 6, the fastener element 21 attached to the missing portion is made of a metal such as a copper alloy or a zinc alloy. The fastener element 21

includes a meshing head portion 30 which has a substantially elliptical shape in a planar view and in a front surface of which a groove portion 31 having a substantially U-shaped cross section extending along the width direction is formed; and a first half portion 32 and a second half portion 33 that extend from a substantially center of the fastener element 21 in a front-back direction and branches into a substantially V shape.

[0081] The fastener element 21 further includes a neck portion 34 which is continuous from the meshing head portion 30 and is narrower than the meshing head portion 30. As shown in FIG. 5, the neck portion 34 includes a portion B that has a narrowest width WS and that is narrowest in the width direction of the fastener element 21. Meanwhile, the meshing head portion 30 includes, in front of the neck portion 34, a portion A which is widest in the width direction of the fastener element 21, which refers to at least a part forward than the portion A.

[0082] In the present embodiment, the first half portion 32 and the second half portion 33 are branched from between the portion A of the meshing head portion 30 shown in FIG. 5 which is widest in the width direction of the fastener element 21 and the portion B of the neck portion 34 which is narrowest in the width direction of the fastener element 21. Specifically, a branch portion P where the first half portion 32 and the second half portion 33 branch is provided along the width direction of the fastener element 21 between the portion A and the portion B in the longitudinal direction of the fastener element 21. The branch portion P where the first and second half portions 32, 33 branch is located closer to a meshing head portion side than later-described clamping grooves 39a, 39b (see FIG. 4).

[0083] On the first half portion 32, the neck portion 34, and a first leg portion 35a that extends from the neck portion 34 to a side opposite to the meshing head portion 30, that is wider than the neck portion 34, and that is substantially rectangular in a planar view, are formed. On the second half portion 33, the neck portion 34, and a second leg portion 35b that extends from the neck portion 34 to the side opposite to the meshing head portion 30, that is wider than the neck portion 34, and that is substantially rectangular in a planar view, are formed.

[0084] Further, the first half portion 32 is provided with a pair of wing-shaped shoulder portions 36, 36 extending in the width direction between the neck portion 34 and the first leg portion 35a. Each of the pair of shoulder portions 36, 36 is formed to straddle a center line C of the front-back direction (thickness) when the fastener element 21 is crimped and fixed to the fastener tape 14 as to be described later (see FIG. 8). Therefore, a thickness W1 of the neck portion 34 of the first half portion 32 having the pair of shoulder portions 36, 36 is formed to be thicker than a thickness W2 of the neck portion 34 of the second half portion 33 (see FIG. 4).

[0085] In this case, the branch portion P where the first and second half portions 32, 33 branch is located closer to the meshing head portion side than the pair of shoulder portions 36.

[0086] The pair of shoulder portions 36, 36 are engaged with the groove portions of the mating fastener elements 20 or 21 to be meshed, so as to prevent a positional displacement in the front-back direction. The pair of shoulder portions 36, 36 can be formed on both the first half portion 32 and the second half portion 33 symmetrically in the

front-back direction (see a fifth embodiment), but by forming the shoulder portions only on the first half portion 32 as described above, the thickness of the shoulder portion 36 is increased, making it easier to mold the fastener element 21.

[0087] In the present embodiment, it is desired that a front-back direction center portion 29 of the meshing head portion 30 is mainly plastically deformed by crimping, which will be described later, and a flat appearance of a front surface 43 and a back surface 44 can be maintained even after crimping. Therefore, as in the present embodiment, the branch portion P is preferably located between the portion A of the meshing head portion 30 which is widest in the width direction of the fastener element 21 and the portion B of the neck portion 34 which is narrowest in the width direction of the fastener element 21, and more preferably located forward than the pair of shoulder portions 36 in the longitudinal direction.

[0088] In facing surfaces of the leg portions 35a, 35b of the first and second half portions 32, 33, substantially U-shaped clamping grooves 39a, 39b each recessed in the front-back direction are provided along the width direction. The clamping grooves 39a, 39b of the first and second half portions 32, 33 cooperate with each other to accommodate the core string 14b of the fastener tape 14. Further, flat portions 37, 38 are formed on the facing surfaces of the leg portions 35a, 35b at rear end portions (opening end portions) of the clamping grooves 39a, 39b, respectively, and the flat portions 37, 38 clamp the tape portion 14a when the fastener element 21 is crimped.

[0089] A maximum opening distance L between the pair of leg portions 35a, 35b opened in a substantially V shape is set to 85% to 90% of a diameter d of the core string 14b of the fastener tape 14. For example, when the diameter d of the core string 14b is 1.30 mm to 1.40 mm, the maximum opening distance L is set to 1.2 mm, for example.

[0090] In each of the clamping grooves 39a, 39b of the first half portion 32 and the second half portion 33, an inner convex portion 40 protruding into a space S formed by the clamping grooves 39a, 39b and capable of biting into the core string 14b of the fastener tape 14 is provided. Specifically, the inner convex portion 40 includes a substantially columnar first inner convex portion 41 protruding in the front-back direction from a bottom surface of each of the clamping grooves 39a, 39b and extending along the width direction across both side surfaces of each of the leg portions 35a, 35b in the width direction; and a rib-shaped second inner convex portion 42 perpendicularly intersecting the first inner convex portion 41 at a substantially center of the first inner convex portion 41 in a length direction thereof (width direction) and extending along the longitudinal direction across both wall surfaces of each of the clamping grooves 39a, 39b in the longitudinal direction. The first inner convex portion 41 and the second inner convex portion 42 intersect each other in a substantially cross shape at a substantially center of each of the clamping grooves 39a, 39b.

[0091] The metal fastener element 21 of the present embodiment is attached to a portion, where the resin fastener element 20 is missing from the fastener stringers 11, 12, using a crimping tool (not shown).

[0092] In this case, first, the tape side edge portion 14c of the fastener tape 14 is inserted between the flat surfaces 37, 38 of the pair of leg portions 35a, 35b opened in a V shape, and the core string 14b is located between the pair of clamping grooves 39a, 39b. At this time, since the maximum

opening distance L between the pair of leg portions 35a, 35b is set to 85% to 90% of the diameter d of the core string 14b of the fastener tape 14, the core string 14b is inserted into the clamping groove 39a, 39b while being slightly compressed, and after the core string 14b is temporarily fixed in the clamping grooves 39a, 39b before crimping, the fastener tape 14 can be prevented from falling off from between the pair of leg portions 35a, 35b.

[0093] Next, the metal fastener element 21 is positioned at a predetermined position in the width direction (upper-lower direction) such that the fastener elements 20, 21, and 20 have the same pitch between a pair of resin fastener elements 20 adjacent to the portion where the fastener element 20 is missing.

[0094] Then, by pressing the leg portions 35a, 35b of the first half portion 32 and the second half portion 33 from the front-back direction by the crimping tool, the front-back direction center portion 29 of the meshing head portion 30 is plastically deformed. Accordingly, as shown in FIG. 7, the tape portion 14a is clamped by the flat portions 37, 38 of the first half portion 32 and the second half portion 33, and at the same time, the pair of inner convex portions 40 in the clamping grooves 39a, 39b are bitten into the core string 14b of the fastener tape 14, and the fastener element 21 is crimped and fixed to the fastener tape 14. A center portion of the fastener tape 14 is pressed and deformed by the pair of inner convex portions 40. In a state where the crimping is performed on the fastener tape 14, a gap S1 is provided between a portion on a meshing head portion 30 side of the clamping grooves 39a, 39b and the branch portion P in the first half portion 32 and the second half portion 33 of the fastener element 21. The core string 14b is not provided in the gap S1. By providing the gap S1, damage or unintended deformation due to a force applied to the portion on the meshing head portion 30 side of the clamping grooves 39a, 39b in the crimping step can be prevented. This is also advantageous when the fastener element 21 is released from a mold.

[0095] Since the fastener tape 14 is clamped by plastically deforming the front-back direction center portion 29 of the meshing head portion 30, as compared with a case where the first half portion 32 and the second half portion 33 are plastically deformed, the first half portion 32 and the second half portion 33 are deformed in a natural manner and maintain good appearance. That is, the front surface 43 from the meshing head portion 30 to the first half portion 32 and the back surface 44 from the meshing head portion 30 to the second half portion 33 after the crimping are flat and parallel to each other.

[0096] Since the first inner convex portion 41 of the inner convex portion 40 extends in the width direction in each of the clamping grooves 39a, 39b and clamps the core string 14b in a length direction thereof, mainly, wobbling of the fastener element 21 due to a force in the left-right direction acting on the fastener element 21 can be prevented to improve stability, and further, the fastener element 21 is prevented from falling off from the fastener tape 14. Further, since the rib-shaped second inner convex portion 42 clamps the core string 14b from a direction intersecting the length direction, the fastener element 21 is mainly prevented from being displaced in the width direction (upper-lower direction) with respect to the fastener tape 14. That is, the fastener element 21 is firmly fixed to the fastener tape 14 by an anchor effect of pressing and deforming the core string 14b

by the first inner convex portion 41 and the second inner convex portion 42 that have a cross shape.

[0097] As described above, according to the fastener element 21 of the present embodiment, the slide fastener 10 can be easily repaired by crimping and attaching the new metal fastener element 21 to the portion where the resin fastener element 20 is missing from the fastener tape 14. Further, it is not necessary to send clothes or the like requiring repair to a factory, and the time and costs for repairing the damaged fastener element can be significantly reduced, and the repair can be easily performed in the field.

[0098] Further, since the metal fastener element 21 has substantially the same appearance as the resin fastener element 20, an overall appearance of the slide fastener 10 including the metal fastener element 21 and the resin fastener element 20 can be maintained.

Second Embodiment

[0099] Next, a fastener element according to a second embodiment of the present invention will be described in detail with reference to FIGS. 9 to 14.

[0100] In a fastener element 21A according to the present embodiment, the second inner convex portion 42 of the first half portion 32 is formed to be offset from a width-direction center WC of the fastener element 21A (see FIGS. 12 and 13) to one side in the width direction. Meanwhile, the second inner convex portion 42 of the second half portion 33 is formed to be offset from the width-direction center WC of the fastener element 21A toward another side in the width direction. That is, the second inner convex portion 42 of the first half portion 32 and the second inner convex portion 42 of the second half portion 33 are offset from each other in the width direction of the fastener element 21A.

[0101] Accordingly, when the fastener element 21A is crimped to the fastener tape 14, as shown in FIG. 14, the second inner convex portions 42 of the first half portion 32 and the second half portion 33 press the core string 14b of the fastener tape 14 to deform the core string 14b in a shearing direction. As a result, the fastener element 21A can improve an effect of preventing a displacement of the fastener element 21A in the width direction with respect to the fastener tape 14.

[0102] Other configurations and effects are the same as those of the fastener element 21 according to the first embodiment.

Third Embodiment

[0103] Next, a fastener element according to a third embodiment of the present invention will be described in detail with reference to FIGS. 15 to 17.

[0104] In addition to the configuration of the fastener element 21 according to the first embodiment, a fastener element 21B according to the present embodiment further includes an outer convex portion 50. The outer convex portion 50 includes a first outer convex portion 51 extending in the width direction on the flat portion 37 of the first half portion 32 along an end portion on a meshing head portion 30 side (front side); and a second outer convex portion 52 extending in the width direction on the flat portion 38 of the second half portion 33 along an end portion on a side (rear side) opposite to the meshing head portion 30. The first outer convex portion 51 and the second outer convex portion 52

are formed at positions apart from each other in the longitudinal direction when viewed from the front-back direction.

[0105] When the fastener element 21B is crimped and fixed to the fastener tape 14, in addition to a fixing force from the inner convex portions 40, 40 in the clamping grooves 39a, 39b, the tape portion 14a is deformed in a substantially crank shape in the left-right direction and clamped by the first outer convex portion 51 and the second outer convex portion 52, so that the fixing force is further strengthened and it is difficult for the fastener element 21B to come off from the fastener tape 14. Further, since the tape portion 14a is clamped by the first outer convex portion 51 and the second outer convex portion 52 over an entire length of each of the leg portions 35a, 35b in the width direction, in addition to the effects of the fastener element 21 of the first embodiment, the wobbling of the fastener element 21B with respect to the fastener tape 14 (rotation in a plane of the fastener tape 14) can be further prevented.

Fourth Embodiment

[0106] Next, a fastener element according to a fourth embodiment of the present invention will be described in detail with reference to FIGS. 18 to 20.

[0107] A fastener element 21C according to the present embodiment includes an outer convex portion 55 having a shape different from that of the outer convex portion 50 of the fastener element 21B of the third embodiment.

[0108] The outer convex portion 55 includes a first outer convex portion 56 provided on the flat portion 37 of the first half portion 32 and a second outer convex portion 57 provided on the flat portion 38 of the second half portion 33. In the first outer convex portion 56, a part of the flat portion 37 of the first half portion 32 on one side in the width direction is provided to protrude toward the flat portion 38, and in the second outer convex portion 57, a part of the flat portion 38 of the second half portion 33 on another side in the width direction is provided to protrude toward the flat portion 37. The first outer convex portion 56 and the second outer convex portion 57 are formed at positions apart from each other in the width direction when viewed from the front-back direction.

[0109] When the fastener element 21C is crimped and fixed to the fastener tape 14, the tape portion 14a is deformed in a substantially crank shape in the upper-lower direction and firmly clamped by the first outer convex portion 56 and the second outer convex portion 57. Further, since the tape portion 14a is clamped over an entire length of each of the leg portions 35a, 35b in the width direction, similar to the fastener element 21B of the third embodiment, the wobbling of the fastener element 21C with respect to the fastener tape 14 can be prevented.

Fifth Embodiment

[0110] Next, a fastener element according to a fifth embodiment of the present invention will be described in detail with reference to FIGS. 21 to 23.

[0111] A fastener element 21D of the present embodiment includes an inner convex portion 60 including three claw portions 61a, 62a, 63a and an inner convex portion 60 including three claw portions 61b, 62b, 63b which form a pair, instead of the pair of inner convex portions 40 in the fastener element 21 according to the first embodiment.

[0112] The inner convex portion 60 of the first half portion 32 includes a first claw portion 61a, a second claw portion 62a, and a third claw portion 63a which are provided in the clamping groove 39a, and the inner convex portion 60 of the second half portion 33 includes a first claw portion 61b, a second claw portion 62b, and a third claw portion 63b which are provided in the clamping groove 39b.

[0113] The first claw portion 61a and the first claw portion 61b are provided apart from each other in the longitudinal direction respectively at one end portions of the clamping grooves 39a, 39b in the width direction (a front side of the paper in FIG. 22), the first claw portion 61a is formed in the clamping groove 39a closer to the meshing head portion 30, and the first claw portion 61b is formed in the clamping groove 39b closer to an opening-side end portion. The second claw portion 62a and the second claw portion 62b are provided to face each other in the front-back direction at intermediate portions of the clamping grooves 39a, 39b in the width direction and in the longitudinal direction. Further, the third claw portion 63a and the third claw portion 63b are provided apart from each other in the longitudinal direction at the other end portions of the clamping grooves 39a, 39b in the width direction (a deep side of the paper in FIG. 22), the third claw portion 63a is formed in the clamping groove 39a closer to an opening end portion, and the third claw portion 63b is formed in the clamping groove 39b closer to the meshing head portion 30. The first claw portions 61a, 61b and the third claw portions 63a, 63b are integrally formed from bottom surfaces of the clamping grooves 39a, 39b to side surfaces in the longitudinal direction.

[0114] Accordingly, when the fastener element 21D of the present embodiment is crimped and fixed to the fastener tape 14, the core string 14b is clamped between the first claw portions 61a, 61b, between the second claw portions 62a, 62b, and between the third claw portions 63a, 63b at different positions in the width direction and in a balanced manner at three portions different in clamping direction, and the fastener tape 14 is firmly held.

[0115] In the fastener element 21D of the present embodiment, the shoulder portion 36 described in the first embodiment (see FIG. 3) is divided into two parts including a first shoulder portion 36a and a second shoulder portion 36b. Specifically, a pair of the first shoulder portions 36a extends in the width direction in a wing shape between the neck portion 34 and the first leg portion 35a of the first half portion 32, and a pair of the second shoulder portions 36b extends in the width direction in a wing shape between the neck portion 34 and the second leg portion 35b of the second half portion 33.

[0116] Then, when the fastener element 21D is crimped and fixed to the fastener tape 14, the shoulder portion 36 is formed in which the first shoulder portion 36a and the second shoulder portion 36b are overlapped and fitted in the groove portion 31.

[0117] Other configurations and effects are the same as those of the fastener element 21 of the first embodiment.

Sixth Embodiment

[0118] Next, a fastener element according to a sixth embodiment of the present invention will be described in detail with reference to FIGS. 24 to 26.

[0119] A fastener element 21E of the present embodiment includes the meshing head portion 30, and the first half portion 32 and the second half portion 33 branching from a

substantially center of the meshing head portion 30 in the front-back direction into a substantially V-shape. The meshing head portion 30 includes a first head portion 30a formed on a first half portion 32 side and a second head portion 30b formed on a second half portion 33 side. The first head portion 30a is formed in a substantially triangular shape that is tapered toward a front surface thereof, and the second head portion 30b is wider than the first head portion 30a and has a substantially elliptical shape in a planar view.

[0120] Further, in the first half portion 32, the first leg portion 35a having a substantially rectangular shape in a planar view is formed continuously from the first head portion 30a. In the second half portion 33, the neck portion 34 continuous from the second head portion 30b and narrower than the second head portion 30b is continuously formed by hanging from the second head portion 30b. Further, the second leg portion 35b that extends from the neck portion 34 to a side opposite to the second head portion 30b, that is wider than the neck portion 34, and that has a substantially rectangular shape in a planar view, is formed. That is, the second head portion 30b and the second half portion 33 (the neck portion 34 and the second leg portion 35b) have shapes similar to those of a half portion of the meshing head portion 30, the neck portion 34, and the second leg portion 35b of the first embodiment. The first leg portion 35a of the first half portion 32 faces the neck portion 34 and the second leg portion 35b of the second half portion 33.

[0121] Further, the fastener element 21E of the present embodiment does not include the groove portion 31 and the shoulder portion 36 described in the first embodiment, and when the left and right element rows 15 mesh with each other, a front surface 65 of the second head portion 30b of the fastener element 21E and a back surface 66 of the first leg portion 35a of the first head portion 30a are respectively abutted against a back surface of the leg portion of the first head portion of another fastener element 20 and a front surface of the second head portion, thereby preventing a positional displacement in the front-back direction.

[0122] Similar to the first embodiment, the substantially U-shaped clamping grooves 39a, 39b are provided to extend in the width direction respectively in facing surfaces of the leg portions 35a, 35b of the first half portion 32 and the second half portion 33. The flat portions 37, 38 are respectively formed on the facing surfaces of the leg portions 35a, 35b at rear end portions (opening end portions) of the clamping grooves 39a, 39b. In each of the clamping grooves 39a, 39b of the first half portion 32 and the second half portion 33, the inner convex portion 40 including the first inner convex portion 41 and the second inner convex portion 42 that can bite into the core string 14b of the fastener tape 14, is provided.

[0123] In such a fastener element 21E in which the meshing head portion 30 has different shapes in the front-back direction, since the first half portion 32 and the second half portion 33 respectively include the clamping grooves 39a, 39b each having the inner convex portion 40 on the surfaces 37, 38 facing each other, the inner convex portions 40 also press and deform the core string 14b when the crimping is performed, and the fastener element 21 is also firmly fixed to the fastener tape 14.

[0124] Other configurations and effects are the same as those of the fastener element 21 of the first embodiment.

[0125] For example, the above description is made in which in the clamping grooves 39a, 39b, the inner convex portion 40 (the first inner convex portion 41 and the second inner convex portion 42) is provided, but the convex portion in the clamping grooves 39a, 39b is not limited to the inner convex portion 40, may be the outer convex portions 50, 55 and the inner convex portion 60 described in the second embodiment to fifth embodiment, or may be a combination of the convex portions.

Seventh Embodiment

[0126] Next, a fastener element according to a seventh embodiment of the present invention will be described in detail with reference to FIGS. 27 to 31.

[0127] In a fastener element 21F of the present embodiment, a wing-shaped protrusion portion 26 is provided to protrude from the meshing head portion 30 between the first half portion 32 and the second half portion 33, separately from the first half portion 32 and the second half portion 33.

[0128] That is, the protrusion portion 26 includes a base portion 28 that extends rearward from a rear surface of the front-back direction center portion 29 of the meshing head portion 30, and a pair of shoulder portions 36 that extend from a tip end portion of the base portion 28 to both sides in the width direction of the slide fastener, and is formed in a substantially T-shape by the base portion 28 and the pair of shoulder portions 36.

[0129] In the fastener element 21F having such a protrusion portion 26, since a stress generated when the fastener element 21F is crimped as shown in FIG. 31 is dispersed at three portions including the groove portion 31 of the meshing head portion 30, and the neck portions 34 of the first half portion 32 and the second half portion 33, occurrence of crimping cracks can be prevented.

[0130] As shown in FIG. 29, hollowed-out portions 34a whose inner surfaces facing each other are hollowed out are respectively formed in the neck portions 34 of the first half portion 32 and the second half portion 33, and a thickness of each of the neck portions 34 is reduced.

[0131] Accordingly, at the neck portions 34 of the first half portion 32 and the second half portion 33, a stress generated when the fastener element 21F is crimped is increased due to the hollowed-out portions 34a, so that stress concentration in the groove portion 31 of the meshing head portion 30 can be dispersed more reliably.

[0132] Further, in the present embodiment, a step portion 27 forming a front surface of each of the clamping grooves 39a, 39b is formed at substantially the same height as the hollowed-out portion 34a, but the present invention is not limited thereto, and for example, the step portion 27 may protrude inward than the hollowed-out portion 34a at substantially the same height as the second inner convex portion 42.

[0133] Regardless of the height to which the step portion 27 is formed, there is no substantial effect on a functional aspect in fixing the fastener element 21F to the fastener tape 14 (see FIG. 7) by crimping. However, during manufacturing of the fastener element 21F such as a surface treatment step, it is preferable that the height of the step portion 27 is formed to be substantially the same as a height of the hollowed-out portion 34a in order to prevent two fastener elements 21F before being crimped from being engaged with each other naturally and becoming difficult to separate.

[0134] Other configurations and effects are the same as those of the fastener element 21 of the first embodiment.

[0135] The present invention is not limited to each of the embodiments described above, and can be appropriately changed without departing from the gist of the present invention.

[0136] For example, in the above embodiments, a description is made in which one of the metal fastener elements 21 to 21E is attached to repair the portion which the resin fastener element 20 is missing. However, the present invention is not limited thereto, and for example, a slide fastener considering design properties may be configured in which the resin fastener element 20 and one of the metal fastener elements 21 to 21E are mixed by manufacturing the resin fastener stringers 11, 12 in a state where the resin fastener element 20 is missing in advance, and attaching one of the metal fastener elements 21 to 21E to the missing portion.

[0137] Further, the fastener elements 21 to 21E may be kept in a metal color of the material, and may also be changed to another color by being subjected to a surface treatment such as plating.

[0138] Further, in the embodiments described above, a description is made in which the inner convex portion 40 or 60 in each of the clamping grooves 39a, 39b has the first inner convex portion 41 and the second inner convex portion 42 having a cross shape, or the claw portions 61a, 61b, 62a, 62b, 63a, 63b. However, the inner convex portion of the present invention is not limited thereto, and may have another shape as long as the inner convex portion protrudes into the space S formed by the clamping grooves 39a, 39b and can bite into the core string 14b of the fastener tape 14.

[0139] As described above, the following matters are disclosed in this specification.

[0140] (1) A metal fastener element for a slide fastener including:

[0141] a meshing head portion; and

[0142] a first half portion and a second half portion which extend in a branched manner, in which

[0143] each of the first half portion and the second half portion includes, in a surface thereof facing each other, a clamping groove extending along a width direction and configured to accommodate a core string of the fastener tape, and

[0144] the first half portion and the second half portion are branched on a side of the meshing head portion with respect to the clamping grooves.

[0145] According to the configuration, the fastener element can be attached to a portion of a missing fastener element in a short time and at a low cost without being sent to a repair shop, and since the first half portion and the second half portion are branched on the meshing head portion side of the clamping grooves, the fastener element can have a good appearance even when crimped.

[0146] (2) The fastener element according to (1), in which an inner convex portion protruding into a space formed by the clamping grooves is provided in each of the clamping grooves.

[0147] According to the configuration, the fastener element can be firmly fixed to the fastener tape.

[0148] (3) The fastener element according to (1) or (2), further including a neck portion which is continuous from the meshing head portion and which is narrower than the meshing head portion, in which

[0149] at least one of the first half portion and the second half portion is branched from a portion between a portion of the meshing head portion which is widest in the width direction of the fastener element and a portion of the neck portion which is narrowest in the width direction of the fastener element.

[0150] According to the configuration, since the first half portion and the second half portion are branched between the widest portion of the meshing head portion and the narrowest portion of the neck portion, the fastener element can be easily deformed in a natural manner when crimped, and has a good appearance.

[0151] (4) The fastener element according to (3), further including a protrusion portion which protrudes from the meshing head portion and which is provided between the first half portion and the second half portion.

[0152] According to the configuration, since the protrusion portion is divided from the first half portion and the second half portion, stress during crimping is dispersed to the meshing head portion and the neck portions of the first half portion and second half portion, thereby preventing crimping cracks.

[0153] (5) The fastener element according to any one of (1) to (3), in which

[0154] the first half portion includes a neck portion and a first leg portion which extends from the neck portion thereof to a side opposite to the meshing head portion and which is wider than the neck portion thereof, and/or the second half portion includes a neck portion and a second leg portion which extends from the neck portion thereof to the side opposite to the meshing head portion and which is wider than the neck portion thereof,

[0155] a groove portion which extends along the width direction is formed in a front surface of the meshing head portion, and

[0156] at least one of the first half portion and the second half portion includes a pair of shoulder portions extending in the width direction between the neck portion thereof and the first leg portion or the second leg portion and configured to be engaged with the groove portion.

[0157] According to the configuration, the metal fastener element including the meshing head portion, the neck portion, and the leg portion on both sides in the front-back direction can be applied to a slide fastener including a resin fastener element having the same shape.

[0158] (6) The fastener element according to (5), in which the shoulder portions are provided on any one of the first half portion and the second half portion.

[0159] According to the configuration, a thickness of each of the shoulder portions can be increased, and the fastener element can be easily molded.

[0160] (7) The fastener element according to any one of (2) to (6), in which the inner convex portion has a cross shape including a first inner convex portion which extends along the width direction and a second inner convex portion which intersects the first inner convex portion and which extends along a longitudinal direction.

[0161] According to the configuration, the fastener element can be firmly fixed to the fastener tape, and a displacement of the fastener element in at least the width direction can be prevented.

[0162] (8) The fastener element according to (7), in which the second inner convex portion of the first half portion and

the second inner convex portion of the second half portion are offset from each other in the width direction of the fastener element.

[0163] According to the configuration, an effect of preventing a displacement of the fastener element in the width direction with respect to the fastener tape can be improved.

[0164] (9) The fastener element according to any one of (2) to (6), in which the inner convex portion includes at least three claw portions which are respectively provided at an intermediate portion in the width direction and both end portions in the width direction, and positions of the at least three claw portions in a length direction are different.

[0165] According to the configuration, the fastener element can be firmly fixed to the fastener tape, and displacements of the fastener element in the longitudinal direction and the width direction can be prevented.

[0166] (10) The fastener element according to any one of (1) to (9), in which each of facing surfaces of the first half portion and the second half portion is provided with an outer convex portion on a side of the clamping grooves opposite to the meshing head portion.

[0167] According to the configuration, the fastener element can be more firmly fixed to the fastener tape, and wobbling of the fastener element can be prevented.

[0168] (11) The fastener element according to any one of (1) to (10), in which a maximum opening distance between the first half portion and the second half portion is 85% to 90% of a diameter of a core string of the fastener tape.

[0169] According to the configuration, after the core string is temporarily fixed in the clamping grooves before crimping, the fastener tape can be prevented from falling off from a portion between the pair of leg portions.

[0170] (12) The fastener element according to any one of (1), (2), and (7) to (11), in which

[0171] the meshing head portion includes a first head portion which is provided on a side of the first half portion in a front-back direction and which is tapered toward a front surface thereof, and a second head portion which is provided on a side of the second half portion in the front-back direction and which is wider than the first head portion,

[0172] the first half portion includes a first leg portion which is formed continuously from the first head portion, and

[0173] the second half portion includes a neck portion which is narrower than the second head portion, and a second leg portion which extends from the neck portion to a side opposite to the second head portion and which is wider than the neck portion.

[0174] According to the configuration, the metal fastener element including the meshing head portion and the leg portion on one side in the front-back direction and including the meshing head portion, the neck portion, and the leg portion on another side in the front-back direction can be applied to a slide fastener including a resin fastener element having the same shape.

[0175] (13) A slide fastener including:

[0176] a pair of fastener stringers each formed by injection-molding a plurality of resin fastener elements on the fastener tape; and

[0177] a slider configured to open and close the pair of fastener stringers, in which

[0178] in at least one of the pair of fastener stringers, the fastener element according to any one of (1) to (12) is

crimped and attached to a tape side edge portion of the fastener tape between the resin fastener elements.

[0179] According to the configuration, it is possible to obtain a slide fastener including a fastener element which can be attached to a portion of a missing fastener element in a short time and at a low cost without being sent to a repair shop, and which has a good appearance even when crimped.

[0180] The present application is based on an international patent application (PCT/JP2022/012478) filed on Mar. 17, 2022, the contents of which are incorporated by reference into this application.

REFERENCE SIGNS LIST

- [0181] 10: slide fastener
 - [0182] 11, 12: fastener stringer
 - [0183] 13: slider
 - [0184] 14: fastener tape
 - [0185] 14a: tape portion
 - [0186] 14b: core string
 - [0187] 14c: tape side edge portion
 - [0188] 20 resin fastener element
 - [0189] 21, 21A, 21B, 21C, 21E: metal fastener element
 - [0190] 30: meshing head portion
 - [0191] 30a: first head portion
 - [0192] 30b: second head portion
 - [0193] 31: groove portion
 - [0194] 32: first half portion
 - [0195] 33: second half portion
 - [0196] 34: neck portion
 - [0197] 35a: first leg portion
 - [0198] 35b: second leg portion
 - [0199] 36, 36a: shoulder portion
 - [0200] 37, 38: flat portion
 - [0201] 39a, 39b: clamping groove
 - [0202] 40, 60: inner convex portion
 - [0203] 41: first inner convex portion
 - [0204] 42: second inner convex portion
 - [0205] 50, 55: outer convex portion
 - [0206] 61a, 62a, 63a, 61b, 62b, 63b: claw portion
 - [0207] d: diameter of core string
 - [0208] L: maximum opening distance between first half portion and second half portion
 - [0209] S: space
1. A metal fastener element (21, 21A, 21B, 21C, 21D, 21E, 21F) for a slide fastener comprising:
- a meshing head portion (30); and
 - a first half portion (32) and a second half portion (33) which extend in a branched manner, wherein each of the first half portion and the second half portion includes, in a surface thereof facing each other, a clamping groove (39a, 39b) extending along a width direction of the fastener element, and the first half portion and the second half portion are branched on a side of the meshing head portion (30) with respect to the clamping grooves (39a, 39b).
2. The fastener element (21, 21A, 21B, 21C, 21D, 21E, 21F) according to claim 1, wherein
- an inner convex portion (40, 60) protruding into a space (S) formed by the clamping grooves is provided in each of the clamping grooves (39a, 39b).
3. The fastener element (21, 21A, 21B, 21C, 21D, 21E, 21F) according to claim 1 or 2, further comprising

a neck portion (34) which is continuous from the meshing head portion (30) and which is narrower than the meshing head portion (30), wherein

at least one of the first half portion (32) and the second half portion (33) is branched from a portion between a portion of the meshing head portion (30) which is widest in the width direction of the fastener element and a portion of the neck portion (34) which is narrowest in the width direction of the fastener element.

4. The fastener element (21F) according to claim 3, further comprising

a protrusion portion (26) which protrudes from the meshing head portion (30) and which is provided between the first half portion (32) and the second half portion (33).

5. The fastener element (21, 21A, 21B, 21C, 21D) according to any one of claims 1 to 3, wherein

the first half portion includes a neck portion (34) and a first leg portion (35a) which extends from the neck portion thereof to a side opposite to the meshing head portion thereof, and/or the second half portion includes a neck portion (34) and a second leg portion (35b) which extends from the neck portion thereof to the side opposite to the meshing head portion and which is wider than the neck portion thereof,

a groove portion (31) which extends along the width direction is formed in a front surface of the meshing head portion, and

at least one of the first half portion and the second half portion includes a pair of shoulder portions (36) extending in the width direction between the neck portion thereof and the first leg portion or the second leg portion and configured to be engaged with the groove portion.

6. The fastener element (21, 21A, 21B, 21C, 21D) according to claim 5, wherein

the shoulder portions are provided on any one of the first half portion and the second half portion.

7. The fastener element (21, 21A, 21B, 21C, 21E, 21F) according to any one of claims 2 to 6, wherein

the inner convex portion (40) has a cross shape including a first inner convex portion (41) which extends along the width direction and a second inner convex portion (42) which intersects the first inner convex portion and which extends along a longitudinal direction.

8. The fastener element (21A) according to claim 7, wherein

the second inner convex portion (42) of the first half portion and the second inner convex portion (42) of the second half portion are offset from each other in the width direction of the fastener element.

9. The fastener element (21D) according to any one of claims 2 to 6, wherein

the inner convex portion (60) includes at least three claw portions (61a, 62a, 63a, 61b, 62b, 63b) which are respectively provided at an intermediate portion in the width direction and both end portions in the width direction, and positions of the at least three claw portions in a length direction are different.

10. The fastener element (21B, 21C) according to any one of claims 1 to 9, wherein

each of facing surfaces of the first half portion and the second half portion is provided with an outer convex

portion (50, 55) on a side of the clamping grooves opposite to the meshing head portion.

11. The fastener element (21, 21A, 21B, 21C, 21D, 21E, 21F) according to any one of claims 1 to 10, wherein a maximum opening distance (L) between the first half portion and the second half portion is 85% to 90% of a diameter (d) of a core string of the fastener tape.

12. The fastener element (21E) according to any one of claims 1, 2, and 7 to 11, wherein

the meshing head portion includes a first head portion (30a) which is provided on a side of the first half portion in a front-back direction and which is tapered toward a front surface thereof, and a second head portion (30b) which is provided on a side of the second half portion in the front-back direction and which is wider than the first head portion,

the first half portion includes a first leg portion (35a) which is formed continuously from the first head portion, and

the second half portion includes a neck portion (34) which is narrower than the second head portion, and a second leg portion (35b) which extends from the neck portion to a side opposite to the second head portion and which is wider than the neck portion.

13. A slide fastener (10) comprising:

a pair of fastener stringers (11, 12) each formed by injection-molding a plurality of resin fastener elements (20) on the fastener tape; and

a slider (13) configured to open and close the pair of fastener stringers, wherein

in at least one of the pair of fastener stringers, the fastener element (21, 21A, 21B, 21C, 21D, 21E, 21F) according to any one of claims 1 to 12 is crimped and attached to a tape side edge portion of the fastener tape between the resin fastener elements.

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