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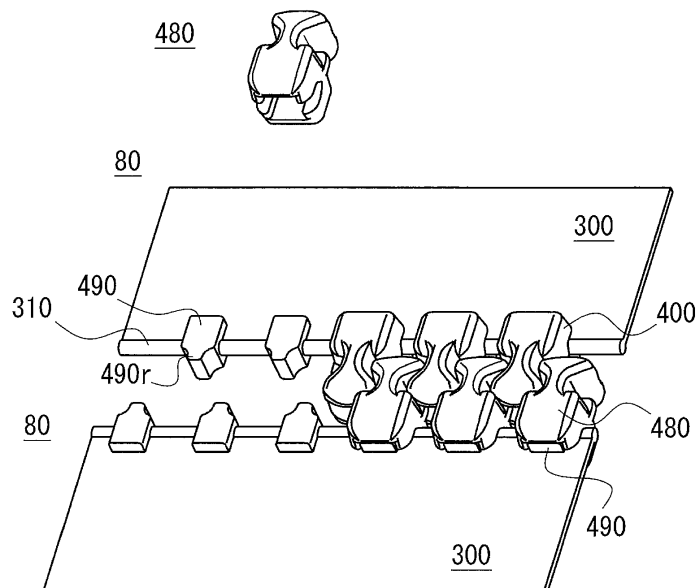
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(54) **CERAMIC COMPONENT, FASTENER STRINGER CONTAINING SAME, AND METHOD FOR PRODUCING FASTENER STRINGER**

(57) A ceramic part (480) is directly or indirectly attachable to a tape side-edge portion (310) of a fastener tape (300) of a slide fastener (90). The ceramic part (480) constitutes an entirety of a component part (400, 700) of

the slide fastener (90) that is to be secured to the tape side-edge portion (310) of the fastener tape (300), or a shell of the component part (400, 700), or a fragment of the component part (400, 700).

[Fig. 4]



Description

[Technical field]

[0001] The present disclosure is related to a ceramic part, a fastener stringer including the same, and a method of producing a fastener stringer.

[Background Art]

[0002] Patent literature 1 discloses in its paragraph 0043 that, for a fastener element molded from plastic material, ceramic material can be used in another working example.

[Citation List]

[Patent literature]

[0003] [PTL 1] Japanese Patent No. 5,207,142

[Summary]

[Technical Problem]

[0004] It is desired for component parts of a slide fastener secured to a fastener tape, e.g. fastener elements or stop members, to obtain a novel design while enhancing wear resistance, heat resistance, corrosion resistance, acid resistance, and/or alkali resistance.

[0005] It should be noted that Patent literature 1 does not disclose a ceramic part as would be described in the following paragraphs of the present specification which is a separated part from a fastener tape.

[Solution to Problem]

[0006] A ceramic part according to an aspect of the present disclosure may be a ceramic part (480) directly or indirectly attachable to a tape side-edge portion (310) of a fastener tape (300) of a slide fastener (90), wherein the ceramic part (480) constitutes an entirety of a component part (400, 700) of the slide fastener (90) that is to be secured to the tape side-edge portion (310) of the fastener tape

[0007] (300), or a shell of the component part (400, 700), or a fragment of the component part (400, 700).

[0008] The ceramic part may be prepared separately from the fastener tape. The ceramic part may constitute an entirety of, or a shell of, or a fragment of a component part, e.g. a fastener element or a stop member of the slide fastener. The ceramic part can be obtained at least via molding and firing of ceramic material. The composition or ingredients of the ceramic part would be properly determined, and it could present a desired design. The ceramic part may include an inorganic pigment in one case, and the ceramic part may not include an inorganic pigment in another case. The component part of the slide

fastener including this ceramic part may obtain a novel design while having enhanced wear resistance, heat resistance, corrosion resistance, acid resistance, and/or alkali resistance.

5 **[0009]** In some embodiments, a tape-insertion groove (486) is provided at least partially into which the tape side-edge portion (310) of the fastener tape (300) is to be inserted and/or a partial groove (486h) is provided that is a part of the tape-insertion groove (486).

10 **[0010]** Some embodiments may further include a receiving portion (485) that is capable of at least partially receiving an attachment portion (490) provided at a tape side-edge portion (310) of a fastener tape (300).

15 **[0011]** In some embodiments, a hole (488) may be provided that is spatially coupled to the tape-insertion groove (486).

[0012] Some embodiments may include at least one engaging structure (489) to be fitted with an attachment portion (490) provided at a tape side-edge portion (310) of a fastener tape (300) and/or to be fitted with other fragment of the component part (400, 700).

20 **[0013]** In some embodiments, the component part (400, 700) may be a fastener element (400) or a stop member (700).

25 **[0014]** In some embodiments, the component part (400, 700) may be a fastener element (400), and the ceramic part may include:

30 a head (483) that is an entirety of or a part of a head of the fastener element (400);
a base (481) that is an entirety of or a part of a base of the fastener element (400); and
a neck (482) that is an entirety of or a part of a neck of the fastener element (400).

35 **[0015]** In some embodiments, the component part (400, 700) may be a fastener element (400), and the ceramic part may include:

40 a head (483) that is a part of a head of the fastener element (400);
a base (481) that is a part of a base of the fastener element (400); and
45 a neck (482) that is a part of a neck of the fastener element (400).

[0016] In some embodiments, the base (481) may be provided with a groove (486) or a partial groove (486h) that may extend so as to penetrate the base (481).

50 **[0017]** In some embodiments, the base (481) may be provided with first plate (481a) and second plate (481b) which are separated by a groove (486) that extends so as to penetrate the base (481), and wherein the first plate (481a) and/or the second plate (481b) is provided with one or more holes (488m, 488n).

55 **[0018]** In some embodiments, the head (483) and/or the base (481) and/or the neck (482) may be provided with a faying surface (480i) that is shaped asymmetrically

relative to a given imaginary plane.

[0019] In some embodiments, the imaginary plane may be orthogonal to a direction extending along the tape side-edge portion (310) of the fastener tape (300).

[0020] A fastener stringer according to another aspect of the present disclosure may be a fastener stringer (250) including:

- a fastener tape (300);
- a plurality of fastener elements (400) fixed to a tape side-edge portion (310) of the fastener tape (300), wherein
- each fastener element (400) included in the plurality of fastener elements (400) may include a ceramic part (480) constituting an entirety of, or a shell of, or a fragment of the fastener element (400).

[0021] In some embodiments, the fastener element (400) may include an attachment portion (490) provided at the tape side-edge portion (310) of the fastener tape (300).

[0022] In some embodiments, the attachment portion (490) may include:

- a head (493) that is an entirety of or a part of a head of the fastener element (400);
- a base (491) that is an entirety of or a part of a base of the fastener element (400); and
- a neck (492) that is an entirety of or a part of a neck of the fastener element (400).

[0023] In some embodiments, the attachment portion (490) may be a resin portion fixed to the tape side-edge portion (310) of the fastener tape (300).

[0024] A method of producing a fastener stringer according to another aspect of the present disclosure may include:

- preparing a ceramic part (480) that constitutes an entirety of a component part (400, 700) of a slide fastener (90) that is to be secured to a tape side-edge portion (310) of a fastener tape (300), or a shell of the component part (400, 700), or a fragment of the component part (400, 700); and
- attaching the ceramic part (480) directly or indirectly to the fastener tape (300) of the slide fastener (90).

[0025] In some embodiments, said attaching the ceramic part (480) directly or indirectly to the fastener tape (300) may include inserting the tape side-edge portion (310) of the fastener tape (300) into a tape-insertion groove (486) of the ceramic part (480).

[0026] In some embodiments, said attaching the ceramic part (480) directly or indirectly to the fastener tape (300) may include coupling the ceramic part (480) to an attachment portion (490) provided at the tape side-edge portion (310) of the fastener tape (300).

[0027] In some embodiments, the ceramic part (480)

may constitute the fragment of the component part (400, 700), and said attaching the ceramic part (480) directly or indirectly to the fastener tape (300) may include sandwiching the tape side-edge portion (310) of the fastener tape (300) by a plurality of fragments of the component part (400, 700).

[0028] In some embodiments, said attaching the ceramic part (480) directly or indirectly to the fastener tape (300) may include sewing the ceramic part (480) to the fastener tape (300) with thread.

[Advantageous Effects of Invention]

[0029] According to an aspect of the present disclosure, for component parts of a slide fastener secured to a fastener tape, e.g. fastener elements or stop members, a novel design would be obtained while enhanced wear resistance, heat resistance, corrosion resistance, acid resistance, and/or alkali resistance is achieved.

[Brief Description of Drawings]

[0030]

[Fig. 1] Fig. 1 is a schematic elevational view of a slide fastener according to an aspect of the present disclosure.

[Fig. 2] Fig. 2 is a schematic flowchart of a method of producing a fastener stringer according to an aspect of the present disclosure.

[Fig. 3] Fig. 3 is a schematic flowchart of a method of producing a ceramic part according to an aspect of the present disclosure.

[Fig. 4] Fig. 4 is a schematic perspective view of a pair of half-finished fastener stringers according to an aspect of the present disclosure.

[Fig. 5] Fig. 5 is a schematic perspective view of a ceramic part that constitutes a shell of a fastener element included in a fastener stringer of Fig. 4.

[Fig. 6] Fig. 6 is a schematic top view of a ceramic part of Fig. 5.

[Fig. 7] Fig. 7 is a schematic cross-sectional view of a ceramic part taken along the line VII-VII in Fig. 6.

[Fig. 8] Fig. 8 is a schematic cross-sectional view of a ceramic part taken along the line VIII-VIII in Fig. 7.

[Fig. 9] Fig. 9 is a schematic cross-sectional view showing a coupled manner of a ceramic part and an attachment base.

[Fig. 10] Fig. 10 is a schematic perspective view of a ceramic part according to another embodiment of the present disclosure. This ceramic part constitutes an entirety of a fastener element. Hereinafter, in a case in which a ceramic part is identical to a fastener element, a fastener element may be simply referred to as a "ceramic element".

[Fig. 11] Fig. 11 is a schematic cross-sectional view of a ceramic part taken along the line XI-XI in Fig. 10.

[Fig. 12] Fig. 12 is a schematic cross-sectional view

of a ceramic part taken along the line XII-XII in Fig. 11.

[Fig. 13] Fig. 13 is a schematic elevational view of a fastener stringer, including fastener elements of Fig. 10, according to another embodiment of the present disclosure

[Fig. 14] Fig. 14 is a schematic cross-sectional view of a fastener stringer taken along the line XIV-XIV in Fig. 13.

[Fig. 15] Fig. 15 is a schematic perspective view of a half-finished fastener stringer according to another embodiment of the present disclosure, illustrating a state before ceramic elements fixed onto a web by adhesive are attached to a fastener tape by sewing.

[Fig. 16] Fig. 16 is a schematic elevational view of a fastener stringer, illustrating a state in which ceramic elements, fixed onto a web by adhesive, are attached to a fastener tape by sewing.

[Fig. 17] Fig. 17 is a schematic elevational view of a fastener stringer, illustrating the opposite side of Fig. 16.

[Fig. 18] Fig. 18 is a schematic cross-sectional view of a fastener stringer taken along the line XVIII-XVIII in Fig. 16.

[Fig. 19] Fig. 19 is a schematic perspective view of a half-finished fastener stringer according to another embodiment of the present disclosure.

[Fig. 20] Fig. 20 is schematic elevational and cross-sectional views of a ceramic part that configures one fragment of a fastener element included in a fastener stringer of Fig. 19. Fig. 20 (b) illustrates a schematic cross-sectional configuration taken along the line XXb-XXb in Fig. 20 (a).

[Fig. 21] Fig. 21 is schematic elevational and cross-sectional views of an attachment base that constitutes the other fragment of a fastener element included in a fastener stringer of Fig. 19. Fig. 21 (b) illustrates a schematic cross-sectional configuration taken along the line XXIb-XXIb in Fig. 21 (a).

[Fig. 22] Fig. 22 is a schematic cross-sectional view of a semi-ceramic element that is configured by a ceramic part being coupled to an attachment base which are shown in Figs. 20 and 21. It should be noted that the semi-ceramic element indicates a fastener element that consists of a ceramic part and non-ceramic part.

[Fig. 23] Fig. 23 is a schematic perspective view illustrating an attachment base of another example which constitutes a fragment.

[Fig. 24] Fig. 24 is a schematic perspective view illustrating a ceramic part of another example which constitutes a fragment.

[Fig. 25] Fig. 25 is a schematic perspective view of a half-finished fastener stringer according to another embodiment of the present disclosure.

[Fig. 26] Fig. 26 is a schematic perspective view of a ceramic part that constitutes a fragment of a fastener element included in a fastener stringer of Fig.

25.

[Fig. 27] Fig. 27 is a schematic process view of manufacturing of a fastener stringer of Fig. 25, illustrating how a fastener stringer and a ceramic element are assembled in a cross-section taken along a cross-sectional plane XXVII-XXVII in Fig. 25.

[Fig. 28] Fig. 28 is a schematic process view of manufacturing of a fastener stringer of Fig. 25, illustrating that a head of one fragment and a head of the other fragment are assembled so that a head of a ceramic element is configured.

[Fig. 29] Fig. 29 is a schematic cross-sectional view illustrating a state in which a ceramic element is secured to a fastener tape by a fixing member of a bolt and a nut.

[Fig. 30] Fig. 30 is a schematic perspective view illustrating a ceramic element of another example.

[Fig. 31] Fig. 31 is a schematic perspective view illustrating a ceramic stop member of another example.

[Fig. 32] Fig. 32 is a schematic elevational view illustrating a slide fastener of another example.

[Description of Embodiments]

[0031] Hereinafter, non-limiting exemplary embodiments of the present invention will be described with references to Figs. 1 to 32. One or more disclosed embodiments and respective features included in the embodiment are not mutually exclusive. A skilled person would properly combine the respective embodiments and/or respective features without requiring excess descriptions. A skilled person would also understand synergic effect by such combinations. Overlapping descriptions among embodiments will be basically omitted. Referenced drawings are mainly for the purpose of illustrating an invention and may possibly be simplified for the sake of convenience of illustration.

[0032] As shown in Fig. 1, a slide fastener 90 has a pair of left-right fastener stringers 80, and a slider 40 for opening and closing the paired left-right fastener stringers 80. Each fastener stringer 80 has a fastener tape 300, and fastener elements 400 and stop members 700 which are attached to a tape side-edge portion 310 of the fastener tape 300. The fastener tape 300 may be a woven or knitted fabric, but could take other forms. The fastener tape 300 has a tape top surface 301 and a tape bottom surface that is opposite to the tape top surface 301. The thickness of the fastener tape 300 is defined by the tape top surface 301 and the tape bottom surface. In some cases, the tape side-edge portion 310 is provided with a core. An embodiment is envisaged in which the tape side-edge portion 310 is not provided with a core.

[0033] The fastener element 400 has a base 410 fixed to the tape side-edge portion 310, a head 430 that is provided outwardly of fastener tape relative to the base 410, and a neck 420 of a narrowed width interposed between the base 410 and the head 430. The fastener el-

element 400 has a constricted shape at the neck 420 between the base 410 and the head 430. It should be noted that, "outwardly of fastener tape" is identical to a direction directed from a point or position over the tape top surface or the bottom surface of the fastener tape to a point or position external of the tape top surface or the bottom surface of the fastener tape. Typically, outwardly of fastener tape is indicated by an arrow AL9 in Fig. 1. The arrow AL9 is in parallel to the tape top surface or the bottom surface of the fastener tape 300, and extends so as to be orthogonal to the tape side-edge portion 310. Inwardly of fastener tape is a direction directed to the opposite side of said outwardly of fastener tape.

[0034] The slider 40 may be made of metal or resin or ceramic. Frontward movement of the slider 40 closes the left-right fastener stringers 80, and its rearward movement opens the left-right fastener stringers 80. For a slide fastener 90, front-rear direction would be understood in accordance with moving direction of a slider 40. For a slide fastener 90, left-right direction is a direction that is orthogonal to the front-rear direction and is in parallel to the tape top surface or the bottom surface of the fastener tape 300. For a slide fastener 90, up-down direction is a direction that is orthogonal to the front-rear direction and the left-right direction.

[0035] The slider 40 has a top wing, a bottom wing opposed to the top wing, and a coupling pillar that couples the top wing and the bottom wing. The top wing is provided with a pull tab attachment pillar, and a pull tab is attached thereto. The top wing of the slider 40 has a first opposing inner surface that faces the bottom wing. The bottom wing of the slider 40 has a second opposing inner surface that faces the top wing. When the slide fastener 90 is used, the fastener element 400 may touch or hit the first opposing inner surface of the top wing, the second opposing inner surface of the bottom wing, and/or the coupling pillar. Therefore, it is requested to secure sufficient attachment strength of the fastener elements 400 to the fastener tape 300. Also, the fastener elements 400 are requested to have sufficient durability to withstand a wear due to contact with the slider 40. Likewise, the stop member 700 would be required to have the sufficient attachment strength and the sufficient wear resistance.

[0036] In the slide fastener 90, the left-right fastener stringers 80 may possibly be pulled laterally in opposite directions in the left-right direction. The slide fastener 90 would be required to have sufficient durability to withstand this lateral pulling. Note that, when damage of a fastener tape or damage of a fastener element is caused in a test of pulling a slide fastener laterally, the slide fastener would be determined as defective.

[0037] The fastener element 400 and the stop member 700 are component parts of the slide fastener 90 that are secured to the fastener tape 300 of the slide fastener 90. In the present embodiment, the component part of this slide fastener 90 includes a ceramic part. The ceramic part constitutes an entirety of, or a shell of, or a fragment of the component part of the slide fastener 90. The ce-

ramic part mainly consists of ceramic material.

[0038] The component part of the slide fastener 90 may be assembled and configured from one or more parts, not necessarily limited to through. In some cases, the component part of the slide fastener 90 includes an attachment base and a shell. The attachment base may be a portion fixed to the tape side-edge portion 310. The shell may be a portion that covers the attachment base. The attachment base could possibly be understood as a core part.

[0039] In some cases, the component part of the slide fastener 90 is configured from one or more fragments. In some cases, the component part of the slide fastener 90 is configured from two fragments. In cases where the component part of the slide fastener 90 is divided into two halves, one fragment may be a ceramic part and the other fragment may be an attachment base that is fixed to the tape side-edge portion 310. In some cases where the component part of the slide fastener 90 is divided into two halves, both fragments may be ceramic parts.

[0040] In some cases, the ceramic part constitutes an entirety of, or a shell of, or a fragment of the fastener element 400. In some cases, the ceramic part constitutes an entirety of, or a shell of, or a fragment of the stop member 700. The stop member 700 may include both types of a stop member 710 that allows decoupling and coupling of the left-right fastener stringers 80 as illustrated in Fig. 1 and a stop member 720 that does not allow decoupling and coupling of the left-right fastener stringers 80. The stop member 720 may be referred to as a separable stop. The stop member 720 includes a box to which a box bar is coupled, and an insertion bar to be held by the box by being inserted into a hollow in the box so as to be adjacent to the box bar.

[0041] Ceramic material has been so far never considered as material of component parts of a slide fastener 90 that are secured to the fastener tape 300 of the slide fastener 90. This is because, in a fastening industry, it has been a common technical understanding that fastener elements 400 or stop members 700 are made of metal or resin. For example, a metal-made element can be produced by cutting a metal wire rod of a base member, and it can be attached to a side-edge portion of a fastener tape via a step of swaging. Regarding the resin-made element, molding thereof and fixing thereof to a fastener tape could be simultaneously performed by injection-molding in which a side-edge portion of a fastener tape is arranged in a mold. In contrast, it would be immediately recognized that the benefits of the easiness of deformation of metal-made element and the easiness of molding and fixing of resin-made element would be lost with respect to fastener elements made of ceramic.

[0042] The ceramic part may be produced via a step of molding a mixture of ceramic powder and binder etc., and a following step of firing. Ceramic molded articles produced by molding are generally mechanically fragile because a binder is contained. The step of firing at extremely high temperature higher than at least 1000°C

may possibly be necessary as the step of molding that should follow the step of molding. This temperature would be adequate for a general fastener tape to burn.

[0043] The present inventors have truly studied, contrary to the above-described common technical understanding, on the use of ceramic material as material of component parts of a slide fastener 90 that are secured to a fastener tape 300 of slide fastener 90. The present inventors have newly discovered the meaningfulness of preparing a ceramic part separately from a fastener tape, and directly or indirectly attaching this to a fastener tape. Accordingly, it would be possible to provide component parts of a slide fastener with new design and with enhanced wear resistance, heat resistance, corrosion resistance, acid resistance, and/or alkali resistance. The ceramic part constitutes an entirety of, or a shell of, or a fragment of a component part of the slide fastener 90, and thus a certain degree of attaching efficiency to a fastener tape would be secured.

[0044] Note that, as described above, the ceramic part may be produced via the step of molding of a mixture of ceramic powder, binder and etc., and the following step of firing. The ceramic part may mainly consist of ceramic material. The ceramic part can be referred to as a ceramic fired body.

[0045] There may be a case where compromises of reduced functionalities of wear resistance, heat resistance, corrosion resistance, acid resistance, or alkali resistance and the like are required to obtain new design of the above-described component part. As an outstanding point, the ceramic part included in the component part of the slide fastener provides its enhanced functionality rather than a drastic drop of its functionality when obtaining its new design.

[0046] A method of producing a ceramic part may be accompanied by the steps of molding and firing. In some cases, pellets made by drying and granulating a mixture of ceramic powder and binder (bonding agent) may be used when molding, not necessarily limited to through. In order to adjust the color of ceramic parts, inorganic pigment may possibly be mixed into the ceramic powder and binder. The binder may typically be an organic binder which can be removed by heating. The binder can include plural types of organic substances. For example, the binder can include polyvinyl alcohol, methyl cellulose, acrylic resin, and agar etc. Molding of ceramic powder can be done by using injection-molding, but of course other methods of molding can be used. Molding of ceramic powder would produce a ceramic molded article. Firing of the ceramic molded article would produce a ceramic fired article in which organic binder and other volatile components have been removed. Appropriately set condition of firing, e.g. temperature profile may ensure a desired transparency of a ceramic fired article. If the main purpose of firing is to remove the organic binder, then the firing could be referred to as degreasing.

[0047] Considerations will be made for cases where the ceramic part constitutes an entirety of the fastener

element 400 or the stop member 700. In this case, extremely high durability against contact or hit with the slider 40 would be obtained. The risk of partially damaging the fastener element 400 or the stop member 700 in the test of pulling laterally would be nearly zero. Also, more sufficient corrosion resistance, acid resistance or alkali resistance would be obtained than resin-made element or metal-made element. There are cases where the slide fastener 90 is incorporated into a wet suit or where it is used for coupling fishnets. It is also envisioned that the slide fastener 90 is used in much severe environments than the cases indicated herein such as in a space. Relatively enhanced corrosion resistance, acid resistance or alkali resistance of the fastener element 400 would provide ample benefits.

[0048] A case is considered where the ceramic part constitutes a shell of or a fragment of the fastener element 400 or the stop member 700. The shell and the fragment of the fastener element 400 or the stop member 700 may be portions exposed to the external environment. As the shell and the fragment are configured by the ceramic part, the same benefit as described above would be obtained. In some cases, the use of this ceramic part may contribute in reducing weight of a fastener element 400, depending on ingredients of ceramic part.

[0049] The composition or ingredients of ceramic part would be properly determined by a skilled person in the art. In some cases, the ceramic part includes at least zirconia. In some cases, the ceramic part mainly consists of zirconia. Zirconia may be referred to as zirconium dioxide (ZrO_2). Zirconia can include additive(s). Zirconia in which rare-earth oxide as an additive is solid-solved may be referred to as stabilized zirconia or partially stabilized zirconia. As the rare-earth oxide, calcium oxide, magnesium oxide, and yttrium oxide can be exemplified. Zirconia has a very high melting point, and can have a desired transparency if condition of firing is appropriately set. In a case where the fastener element 400 or the stop member 700 includes zirconia, an appearance that is different from a clear-coating can be given. Additionally to mechanical or chemical property such as the above-described wear resistance, heat resistance, corrosion resistance, acid resistance, or alkali resistance, the fastener element 400 or the stop member 700 can obtain an enhanced appearance. The ceramic part can include one or more types of inorganic pigments additionally to zirconia. The inorganic pigment is dispersed in the ceramic part so that a desired color is given to the ceramic part. For example, the ceramic part can exhibit red, yellow, blue, green, black or white color.

[0050] Note that transparency can be imparted to the fastener element 400 by forming a clear coating onto the resin-made element or the metal-made element. The same applies to the stop member 700. However, this clear coating requires a step of coating, and has a poor mechanical or chemical properties in general. This clear coating is not superior to a ceramic part having a transparency, from a standpoint of design.

[0051] In some embodiments, the ceramic part includes cubic zirconia. The existence of cubic zirconia can be proved through inspection using an energy dispersive X-ray analyzer (EDX). In some embodiments, the ceramic part includes alumina, silicon carbide, or aluminum nitride, in addition to zirconia or as an alternative to zirconia. Alumina, silicon carbide, or aluminum nitride may be preferable in a point that they are lighter than zirconia. In some cases, zirconia-containing alumina may be used.

[0052] A method of producing a fastener stringer 80 would be described with reference to Fig. 2. Firstly, a ceramic part is produced or prepared. Next, a ceramic part is directly or indirectly attached to the fastener tape. As would be understood from the above descriptions, the ceramic part constitutes an entirety of, or a shell of, or a fragment of a component part (e.g. fastener element 400 or stop member 700) of a slide fastener 90 secured to a fastener tape 300 of a slide fastener 90. More specific working examples in accordance with the flowchart shown in Fig. 2 would be understood from the following descriptions.

[0053] A method of producing a ceramic part will be described with reference to Fig. 3. Firstly, raw material including ceramic powder is produced. In some cases, this step can include a step of mixing and a step of granulating in this order. An organic binder, ceramic powder, and other necessary ingredients e.g. an inorganic pigment are mixed in the step of mixing. The mixture is then molded into pellets of injection-molded material in the step of granulating. In the step of granulating, a molding roll can be used which receives a mixture extruded from an extruding nozzle and molds the received mixture into pellets. The step of granulating can be accompanied by a step of drying. Next, these pellets are used for molding, e.g. injection-molding under a desired condition. Mold temperature, injecting pressure, and injecting time period would be determined as desired. In a case of injection-molding, more complicated shapes of molded articles would be easily obtained. Next, this ceramic molded article produced as such is fired. The step of firing would be performed under a condition in which organic binder in the ceramic molded article can be evaporated and the ceramic powder can be properly fired. Next, if necessary, the ceramic part obtained by the step of firing is polished. In some cases, a step of preheating is performed between the step of molding and the step of firing so that the organic binder in the molded article can be removed in advance of the full firing. In some cases, the step of preheating is not performed, and the organic binder can be removed during the firing.

[0054] Hereinafter, discussions will follow with reference to Figs. 4 to 31 on configurations of the ceramic part that is a part separated from a fastener tape, methods of direct or indirect attachment thereof to a fastener tape, and/or configurations of a fastener element or a stop member including a ceramic part.

[0055] The fastener stringer 80 illustrated in Fig. 4 is produced by attaching a ceramic part 480 indirectly to a

fastener tape 300. In particular, the ceramic part 480 is coupled to and installed to a resin-made or metal-made attachment portion 490 fixed to the tape side-edge portion 310. The ceramic part 480 is indirectly attached to the fastener tape 300, i.e. via the attachment portion 490. In some cases including the illustrated cases, the attachment portion 490 is a resin portion fixed to the tape side-edge portion 310 of the fastener tape 300.

[0056] The ceramic part 480 constitutes a shell of a fastener element 400. The fastener element 400 is comprised of the ceramic part 480 forming the shell thereof and the attachment portion 490 encapsulated by the shell. The fastener element 400 is a semi-ceramic element that is partially made of ceramic material. It should be noted that the shell should not be limited to one that is exposed in the entire external surface of the fastener element 400. In some cases, the shell occupies only a part of the external surface of the fastener element 400. As illustrated in Fig. 4, the attachment portion 490 also constitutes an exposed portion of the fastener element 400. It is not necessary that the ratio between ceramic material and resin material in the fastener element 400 is 50/50 in weight ratio. It is not necessary that the ratio between ceramic material and metal material in the fastener element 400 is 50/50 in weight ratio.

[0057] It is possible to produce the ceramic part 480 through molding and firing as described with reference to Fig. 3. The half-finished fastener stringer 80 excluding the ceramic parts 480 includes a fastener tape 300 and an attachment portion 490 fixed to the tape side-edge portion 310. In a case where the attachment portion 490 is made of resin, the half-finished fastener stringer 80 can be produced by performing an injection-molding while the tape side-edge portion 310 is arranged in a molding cavity of a mold. In a case where the attachment portion 490 is made of metal, the half-finished fastener stringer 80 can be produced by attaching the attachment portion 490 to the tape side-edge portion 310 through a step of swaging.

[0058] In the case of Fig. 4, the fastener stringer 80 can be easily produced by inserting and fitting the attachment portion 490, which has been already fixed to the tape side-edge portion 310, into and with the ceramic part 480 that constitutes the shell of the fastener element 400. It should be noted that any types of adhesives can be used, depending on a requirement. In some cases, all fastener elements 400 of the fastener stringer 80 are semi-ceramic elements. In other case, only a predetermined pieces of fastener elements 400 are semi-ceramic elements. In particular, an embodiment is envisioned where fastener elements which may likely receive an impact are selectively configured as semi-ceramic elements.

[0059] As illustrated in Fig. 5, the ceramic part 480 extends along the length direction DL8 while having a width that fluctuates in the width direction DL6. The width direction DL6 is the same as the front-rear direction described for the slide fastener 90. The length direction DL8

is the same as the left-right direction described in relation to the slide fastener 90. The maximum width of the ceramic part 480 along the width direction DL6 is less than the maximum length of the ceramic part 480 along the length direction DL8. The ceramic part 480 is a part that is slightly elongated.

[0060] Similar to the fastener element 400, the ceramic part 480 has a base 481, a neck 482, and a head 483 in this order along the length direction DL8. The ceramic part 480 has a constricted shape at the neck 482 between the base 481 and the head 483. As illustrated in Fig. 6, a relationship is satisfied where the maximum width W481 of the base 481 > the maximum width W483 of the head 483 > the minimum width W482 of the neck 482. As illustrated in Fig. 6, the width of the ceramic part 480 smoothly changes. A shoulder 484 extending toward the head 483 is provided between the base 481 and the head 483. The shoulder 484 will be housed by a terminal recess 483k provided at the head 483 of the other one of the engaging pair.

[0061] The base 481 has a receiving portion 485 opening on the opposite side of the head 483. The receiving portion 485 has a size that is suitable for receiving the above-described attachment portion 490. The receiving portion 485 of the illustrated example has a hollow that is defined by a top plate (first plate) 481a, a bottom plate (second plate) 481b, and side walls 481c, 481d of the base 481.

[0062] The receiving portion 485 has a bottom surface 485k at the opposite side of its opening, and the bottom surface 485k is provided with a recess 485r. The recess 485r extends in a height direction that is orthogonal to the width and length directions of the ceramic part 480. In another example, the recess 485r extends in another direction. It should be noted that the attachment portion 490 has a protrusion 490r that is fitted with the recess 485r of the ceramic part 480. Fitting of the protrusion and the recess would reinforce the coupling of the ceramic part 480 and the attachment portion 490.

[0063] The base 481 has an insertion mouth at the opposite side of the head 483, and has a tape-insertion groove (this may simply be referred to as a groove) 486 that penetrates the base 481 in the width direction. In the illustrated example, the receiving portion 485 opening on the opposite side of the head 483 is provided in the base 481, and thus the tape-insertion groove 486 is spatially coupled with the hollow of the receiving portion 485 and is divided into a first groove 486m and a second groove 486n by the hollow of the receiving portion 485. The side wall 481c of the base 481 is provided with the first groove 486m. The side wall 481d of the base 481 is provided with the second groove 486n. The first groove 486m and the second groove 486n extend linearly in substantially parallel to the length direction of the ceramic part 480. As would be understood from Fig. 7, in the illustrated example, the first groove 486m and the second groove 486n are provided in the middle position between the top plate 481a and the bottom plate 481b, and have a nar-

rowing terminal shape toward the head 483.

[0064] As illustrated in Fig. 9, when the attachment portion 490 is inserted into the receiving portion 485 of the ceramic part 480, the tape side-edge portion 310 (the core provided there in some cases) is inserted in to the tape-insertion groove 486 of the base 481 of the ceramic part 480. When the attachment portion 490 is further inserted in the receiving portion 485 of the ceramic part 480, the protrusion 490r of the attachment portion 490 is fitted with the recess 485r provided at the bottom surface 485k of the ceramic part 480.

[0065] In some cases, the attachment portion 490 is moved while the ceramic part 480 is stationary so that the attachment portion 490 is inserted into the receiving portion 485 of the ceramic part 480. In other case, the ceramic part 480 is moved while the attachment portion 490 is stationary so that the attachment portion 490 is inserted into the receiving portion 485 of the ceramic part 480. In a still further case, the attachment portion 490 and the ceramic part 480 are moved to be closer one another.

[0066] In some cases, the receiving portion 485 of the ceramic part 480 is filled with an ultraviolet curing adhesive (UV curing adhesive) in advance. After the receiving portion 485 and the attachment portion 490 are coupled, ultraviolet rays are irradiated, and the ceramic part 480 and the attachment portion 490 are coupled firmly. It would be possible to use an energy-ray, other than ultraviolet rays, curing resin.

[0067] In another case, the UV curing adhesive is not used. The attachment portion 490 is pressed into the receiving portion 485 so that firm coupling of the ceramic part 480 and the attachment portion 490 is secured.

[0068] In some cases, fitting between the recess 485r of the ceramic part 480 and the protrusion 490r of the attachment portion 490 would suppress rattling movement of the attachment portion 490 in the receiving portion 485.

[0069] In an illustrated embodiment of Figs. 10 to 18, a fastener stringer 80 is configured by directly attaching a ceramic part 480 to a fastener tape 300 by using a fixing member. The ceramic part 480 is directly attached to the fastener tape 300 by the fixing member, instead of being attached thereto via the above-described attachment portion 490. The ceramic part 480 configures an entirety of one fastener element 400. The fastener element 400 is a ceramic element that is made of ceramic material. Methods of securing the ceramic part 480 to the tape side-edge portion 310 would be sewing, for example. However, in another embodiment, adhesive is used or a combination of bolt and nut is used. Thread, adhesive, and bolt/nut are generally referred to as a fixing member.

[0070] Similar to the ceramic part 480 in Fig. 5, the ceramic part 480 illustrated in Fig. 10 has an insertion mouth at the opposite side of the head 483, and has a tape-insertion groove 486 that penetrates the base 410 in the width direction. The ceramic part 480 has a top plate 481a and a bottom plate 481b that is separated by

the tape-insertion groove 486. The base 481 of the ceramic part 480 is provided with a hole 488 as an alternative to (or in addition to, in some embodiments) the receiving portion 485 of the ceramic part 480 in Fig. 5. The hole 488 penetrates the top plate 481a and penetrates the bottom plate 481b. The hole 488 includes a top hole 488m in the top plate 481a and a bottom hole 488n in the bottom plate 481b.

[0071] The top plate 481a has an opposing inner surface that faces the bottom plate 481b, and a top surface that is opposite to the opposing inner surface. The bottom plate 481b has an opposing inner surface that faces the top plate 481a, and a bottom surface that is opposite to the opposing inner surface. The top surface of the top plate 481a is provided with a guide groove 481k that has a substantially semi-circular shape in a cross section and extends in the width direction of the ceramic part 480. The bottom surface of the bottom plate 481b is provided with a guide groove 481t that has a substantially semi-circular shape in a cross section and extends in the width direction of the ceramic part 480. The hole 488 is provided at the center of the guide groove 481k, 481t in the width direction, and the guide groove 481k, 481t is divided into first and second sections by the hole 488. In the illustrated example, the shape of the hole 488 in the elevational view is a circle. However, in another example, the shape of the hole 488 in elevational view could be triangle or rectangle or other polygons or star.

[0072] As illustrated in Fig. 13, the ceramic part 480 can be directly attached to the fastener tape 300 by the fixing member. The ceramic part 480 can be attached to the tape side-edge portion 310 by sewing using threads 510. Again, the thread 510 is an example of a fixing member.

[0073] Before a step of sewing using threads 510, a step is performed in which the tape side-edge portion 310 is inserted into the tape-insertion groove 486 of the ceramic part 480. It would be possible to move the fastener tape 300 while the ceramic part 480 is stationary so that the tape side-edge portion 310 is inserted into the tape-insertion groove 486 of the ceramic part 480. It would be possible to move the ceramic part 480 while the fastener tape 300 is stationary so that the tape side-edge portion 310 is inserted into the tape-insertion groove 486 of the ceramic part 480. Both of the fastener tape 300 and the ceramic part 480 can be moved so as to be closer one another.

[0074] It should be noted that various manner of sewing would be considered for sewing the ceramic part 480 to the tape side-edge portion 310 by threads 510, and should not be limited to illustrated examples.

[0075] In the illustrated example, as illustrated in Fig. 14, one top thread 511 and two bottom threads 512 are used to sew the ceramic part 480 to the tape side-edge portion 310. The top thread 511 extends so as to sew the top plate 481a of the ceramic part 480 onto the tape top surface 301 of the fastener tape 300. The bottom thread 512 extends so as to sew the bottom plate 481b

of the ceramic part 480 onto the tape bottom surface 302 of the fastener tape 300.

[0076] The top thread 511 extends on the top plate 481a of the ceramic part 480, in particular is arranged in the guide groove 481k and is positioned on the top plate 481a. The top thread 511 has portions, appearing at the side of the tape bottom surface 302 or extending on the tape bottom surface 302, in the hole 488 and at both neighboring positions of the ceramic part 480 in the width direction of the ceramic part 480. Accordingly, stable attachment of the ceramic part 480 to the fastener tape 300 would be facilitated.

[0077] Likewise, the bottom thread 512 extends on the bottom plate 481b of the ceramic part 480, in particular is arranged in the guide groove 481t and is positioned on the bottom plate 481b. The bottom thread 512 has portions, appearing at a side of the tape top surface 301 or extending on the tape top surface 301, in the hole 488 and at both neighboring positions in the width direction of the ceramic part 480. Accordingly, stable attachment of the ceramic part 480 to the fastener tape 300 would be facilitated.

[0078] In an illustrated case of Figs. 15-18, plural ceramic parts 480 are fixed to a web 520 by adhesive, and this is sewn to the tape side-edge portion 310. Spacing between the ceramic parts 480 in the web 520 is properly set so that unintentional displacement of ceramic part 480 during a step of sewing would be avoided or suppressed.

[0079] The web 520 is an elongated member that is elongated in the same direction as the fastener tape 300. The web 520 may be a flexible member, e.g. cloth, resin-made sheet, or rubber-made sheet, which has a carrier surface 521 on which the ceramic parts 480 are placed and an opposite surface 522 that is opposite to the carrier surface 521. In a specific example, the web 520 is an elastomer-made sheet. In some cases, the web 520 has a thermal conductivity that is less than that of the ceramic part 480. The web 520 contributes in suppressing a sense of cool that could be given to a human when the ceramic part 480 comes into a direct contact with a human skin.

[0080] The order of producing of a fastener stringer 80 would be as follows. Firstly, the plural ceramic parts 480 are fixed to the web 520 by adhesive and so on. Various types of adhesives can be used. An embodiment is envisioned where recesses for positioning the ceramic parts 480 are provided on the web 520. Next, the tape side-edge portion 310 is inserted into the tape-insertion groove 486 of the ceramic part 480. Accordingly, the bottom plate 481b of the base 481 of the ceramic part 480 is sandwiched between the tape side-edge portion 310 and the web 520. Next, the web 520, the ceramic part 480 and the fastener tape 300 are sewn together by the use of threads 510.

[0081] As illustrated in Figs. 16 to 18, one top thread 511 and one bottom thread 512 are used so that the ceramic part 480 is sewn to the tape side-edge portion 310. The top thread 511 extends straight in the guide

groove 481k of the top plate 481a of each ceramic part 480 and is engaged with the bottom thread 512 in the hole 488 of each ceramic part 480. The bottom thread 512 extends along the length direction of the web 520 in the opposite surface 522 of the web 520, and is engaged with the top thread 511 in the hole 488 of each ceramic part 480. In the illustrated example, as shown in Fig. 18, the top thread 511 forms a loop in the hole 488 of each ceramic part 480 and the bottom thread 512 passes through this loop of the top thread 511.

[0082] In an illustrated case of Figs. 19 to 29, the ceramic part 480 constitutes a fragment of a fastener element 400. In an illustrated case of Figs. 19 to 24, the ceramic part 480 is secured to a resin-made or metal-made attachment portion 490 that has been fixed to the tape side-edge portion 310 in advance. In an illustrated case of Figs. 25 to 29, a pair of ceramic parts 480 are secured while sandwiching the tape side-edge portion 310.

[0083] As shown in Figs. 19 to 22, the ceramic part 480 constitutes one (fragment) of halves of one fastener element 400. The attachment portion 490 fixed to the tape side-edge portion 310 constitutes the other one (fragment) of the halves. In the illustrated example, the fastener element is divided into two halves by a plane being parallel to the tape top surface 301 of the fastener tape 300 and being positioned slightly above the tape top surface 301.

[0084] As shown in Figs. 20 and 21, the ceramic part 480 has a faying surface 480i that is in accordance with the above-described division of one fastener element 400 into two halves. The faying surface 480i that exists in the head 483 of the ceramic part 480 is provided with one mating protrusion 489. The attachment portion 490 has a faying surface 490i that may come into surface-contact with the faying surface 480i of the ceramic part 480. The faying surface 490i that exists in the head 493 of the attachment portion 490 is provided with one mating recess 499. It should be noted that the attachment portion 490 has a base 491, a neck 492, and a head 493 in this order, similar to the fastener element 400 and the ceramic part 480. The base 491 of the attachment portion 490 is a part of the base of the fastener element 400. The neck 492 of the attachment portion 490 is a part of the neck of the fastener element 400. The head 493 of the attachment portion 490 is a part of the head of the fastener element 400. As illustrated in Fig. 22, the mating protrusion 489 of the ceramic part 480 is fitted with the mating recess 499 of the attachment portion 490 so that coupling of the ceramic part 480 and the attachment portion 490 is achieved. An embodiment is envisioned where the ceramic part 480 is provided with the mating recess 499, and the attachment portion 490 is provided with the mating protrusion 489. The mating protrusion and the mating recess may be generally referred to as an engaging structure. In some embodiments, press-fit, adhesion, or combination thereof is performed, and thus firm coupling of the ceramic part 480 and the attachment portion 490

would be secured.

[0085] In an illustrated embodiment of Fig. 23, the rim of the faying surface 490i of the attachment portion 490 is provided with a peripheral wall 470 so that a reservoir for adhesive is formed on the faying surface 490i of the attachment portion 490. Alternatively or additionally to this, as shown in Fig. 24, a peripheral wall 470 is provided on the faying surface 480i of the ceramic part 480 so that a reservoir for adhesive is formed on the faying surface 480i of the ceramic part 480. Use of adhesive would ensure more secure bonding between the fragments, not necessarily limited to through.

[0086] In an illustrated case of Figs. 25 to 29, a pair of ceramic parts 480 are secured while sandwiching the tape side-edge portion 310. Referring to Fig. 25, the ceramic part 480 placed onto the tape top surface 301 of the fastener tape 300 would be referred to as a top ceramic part 480M, and the ceramic part 480 placed onto the tape bottom surface 302 would be referred to as a bottom ceramic part 480N. The top ceramic part 480M and the bottom ceramic part 480N are ceramic parts 480 that have the same configuration. In another embodiment, the top ceramic part 480M and the bottom ceramic part 480N have different configurations.

[0087] As shown in Fig. 26, the ceramic part 480 has a faying surface 480i that is in accordance with the above-described division of one fastener element 400 into two halves. The faying surface 480i is provided across the head 483, the neck 482, and a part of the base 481 of the ceramic part 480. The ceramic part 480, i.e. the illustrated head 483 has a faying surface 480i that is shaped asymmetry with respect to an imaginary plane being positioned at the center in the width direction DL6 of the ceramic part 480 and being orthogonal to the direction along the tape side-edge portion 310 of the fastener tape 300. The base 481 of the ceramic part 480 is provided with a half-groove 486h that constitutes a half of the tape-insertion groove 486. The half-groove 486h is a groove that is a part of the tape-insertion groove 486. The base 481 of the ceramic part 480 is provided with a flat surface 487 that touches the tape side-edge portion 310.

[0088] The faying surface 480i has a first surface 480A that is provided in the base 481, a second surface 480B that is provided across the head 483 and the neck 482 and closer to a terminal end than the first surface 480A, and third and fourth surfaces 480C, 480D that are provided to sandwich the second surface 480B. The first surface 480A and the second surface 480B of one ceramic part 480 touches the first surface 480A and the second surface 480B of the other ceramic part 480. The third surface 480C of one ceramic part 480 touches the fourth surface 480D of the other ceramic part 480. The fourth surface 480D of one ceramic part 480 touches the third surface 480C of the other ceramic part 480.

[0089] The faying surface 480i provided at the head 483 has the second surface 480B that is oriented at a given angle, i.e. obliquely relative to the flat surface 487 and the first surface 480A provided in the base 481. The

obliquely arranged second surface 480B would allow increased surface-contact area of the top ceramic part 480M and the bottom ceramic part 480N.

[0090] As shown in Figs. 27 and 28, the top ceramic part 480M and the bottom ceramic part 480N are arranged to sandwich the tape side-edge portion 310 and they are coupled together. As shown in Fig. 28, when the top ceramic part 480M and the bottom ceramic part 480N are coupled, movement of each ceramic part 480 as schematically illustrated by an arrow in Fig. 28 (b) is suppressed owing to the oblique second surface 480B. In some cases, the top and bottom ceramic parts 480M, 480N are firmly secured to the tape side-edge portion 310 and to the other ceramic part 480 of the pair by adhesive.

[0091] Additionally or alternatively to adhesion, as shown in Fig. 29, the top and bottom ceramic parts 480M, 480N can be coupled together, using a bolt 531 and a nut 532, while the tape side-edge portion 310 is sandwiched. A hole is provided at each ceramic part 480 to allow an axial portion of the bolt 531 to be inserted therein. Each ceramic part 480 may be provided with a step portion for housing a head of the bolt 531 or the nut.

[0092] An embodiment is envisioned where the fastener element 400 is divided into three fragments or more, unlike examples illustrated in Figs. 19 to 29. An embodiment is envisioned where the fastener element is divided into two halves or three fragments or more by a plane orthogonal to the tape top surface 301 of the fastener tape 300, unlike examples illustrated in Figs. 19 to 29. If required, the ceramic part 480 is provided with the tape-insertion groove 486. An embodiment is envisioned where the fragment is provided with a receiving portion 485 for receiving the attachment portion 490 (or a part of the receiving portion 485). An embodiment is envisioned where the fragment is provided with a hole through which a thread is passed.

[0093] In an illustrated case of Fig. 30, similar to the case of Fig. 10, the ceramic part 480 constitutes an entirety of one fastener element 400. The fastener element 400 is a ceramic element made of ceramic material. Adhesive would be an example as means for attaching the ceramic part 480 to the tape side-edge portion 310. However, in another embodiment, adhesive is utilized, and the ceramic part 480 is attached to the fastener tape 300.

[0094] In an illustrated case of Fig. 31, the ceramic part 480 constitutes an entirety of one stop member 700. The stop member 700 is a ceramic stop member made of ceramic material. The ceramic part 480 has a top leg 480E that is placed onto the tape top surface 301 of the fastener tape 300, a bottom leg 480F that is placed onto the tape bottom surface 302, and a coupling portion 480G that couples the top leg 480E and the bottom leg 480F. As illustrated in Fig. 31, the top leg 480E is provided with holes 488 through or into which a thread or an axial portion of a bolt is passed or inserted. Like the fastener element 400, embodiments would be appreciated where the ceramic part 480 constitutes an entirety of, a shell of,

or a fragment of the stop member 700.

[0095] Fig. 32 discloses a slide fastener 90 configured differently from Fig. 1. There is no reason that specific shape of the fastener element 400 or the stop member 700 is limited to that of Fig. 1. In some cases, the ceramic part 480 constitutes an entirety of, a shell of, or a fragment of the fastener element 400 or the stop member 700 disclosed in Fig. 32.

[0096] In cases where the ceramic part 480 constitutes an entirety of, a shell of, or a fragment of the fastener element 400 or the stop member 700, a method of attaching it to the fastener tape 300 would be a technical challenge. In every illustrated example discussed above, the ceramic part 480 alone includes the tape-insertion groove 486, or the ceramic part 480 includes a structure that configures the tape-insertion groove 486 together with the other ceramic part 480 being combined, i.e. the above-described half-groove 486h. Accordingly, it would be possible to attach the ceramic-made or semi-ceramic-made fastener element 400 or the stop member 700 to a commonly-used fastener tape that do not have high heat resistance.

[0097] Furthermore, as an outstanding aspect, in some cases, the ceramic part 480 includes zirconia. Fracture toughness of zirconia is greater than those of alumina or silicon oxide. Therefore, it would be possible to supply the fastener elements or stop members that are mechanically strong. Still further, zirconia has transparency and is used as a jewelry item. Use of zirconia would allow provision of new appearance of an extraordinary fastener stringer in wide applications including bags, clothes, and fishnets and, at the same time, there is no need to make sacrifices to the characteristics of the fastener element or the stop member.

[0098] Given the above teachings, a skilled person in the art would be able to add various modifications to the respective embodiments. Reference codes in Claims are just for reference and should not be referred for purposes of narrowly construing the scope of claims.

[Reference Signs List]

[0099]

90	Slide fastener
300	Fastener tape
400	Fastener element
480	Ceramic part
700	Stop member

Claims

1. A ceramic part (480) directly or indirectly attachable to a tape side-edge portion (310) of a fastener tape (300) of a slide fastener (90), wherein the ceramic part (480) constitutes an entirety of a component part (400, 700) of the slide fastener (90) that is to be se-

- cured to the tape side-edge portion (310) of the fastener tape (300), or a shell of the component part (400, 700), or a fragment of the component part (400, 700).
2. The ceramic part according to Claim 1, wherein a tape-insertion groove (486) is provided at least partially into which the tape side-edge portion (310) of the fastener tape (300) is to be inserted and/or a partial groove (486h) is provided that is a part of the tape-insertion groove (486).
 3. The ceramic part according to Claim 2, wherein a hole (488) is provided that is spatially coupled to the tape-insertion groove (486).
 4. The ceramic part according to any one of Claims 1-3, comprising a receiving portion (485) that is capable of at least partially receiving an attachment portion (490) provided at a tape side-edge portion (310) of a fastener tape (300).
 5. The ceramic part according to any one of Claims 1-4, comprising at least one engaging structure (489) to be fitted with an attachment portion (490) provided at a tape side-edge portion (310) of a fastener tape (300) and/or to be fitted with other fragment of the component part (400, 700).
 6. The ceramic part according to any one of Claims 1-5, wherein the component part (400, 700) is a fastener element (400) or a stop member (700).
 7. The ceramic part according to any one of Claims 1-6 wherein the component part (400, 700) is a fastener element (400), the ceramic part comprising:
 - a head (483) that is an entirety of or a part of a head of the fastener element (400);
 - a base (481) that is an entirety of or a part of a base of the fastener element (400); and
 - a neck (482) that is an entirety of or a part of a neck of the fastener element (400).
 8. The ceramic part according to any one of Claims 1-7 wherein the component part (400, 700) is a fastener element (400), the ceramic part comprising:
 - a head (483) that is a part of a head of the fastener element (400);
 - a base (481) that is a part of a base of the fastener element (400); and
 - a neck (482) that is a part of a neck of the fastener element (400).
 9. The ceramic part according to Claim 7 or 8, the base (481) is provided with a groove (486) or a partial groove (486h) that extends so as to penetrate the base (481).
 10. The ceramic part according to any one of Claims 7 to 9, wherein the base (481) is provided with first plate (481a) and second plate (481b) which are separated by a groove (486) that extends so as to penetrate the base (481), and wherein the first plate (481a) and/or the second plate (481b) is provided with one or more holes (488m, 488n).
 11. The ceramic part according to any one of Claims 7 to 10, wherein the head (483) and/or the base (481) and/or the neck (482) is or are provided with a faying surface (480i) that is shaped asymmetrically relative to a given imaginary plane.
 12. The ceramic part according to Claim 11, wherein the imaginary plane is orthogonal to a direction extending along the tape side-edge portion (310) of the fastener tape (300).
 13. A fastener stringer (250) comprising:
 - a fastener tape (300);
 - a plurality of fastener elements (400) fixed to a tape side-edge portion (310) of the fastener tape (300), wherein
 - each fastener element (400) included in the plurality of fastener elements (400) includes the ceramic part (480) according to any one of Claims 1 to 12.
 14. The fastener stringer according to Claim 13, wherein the fastener element (400) includes an attachment portion (490) provided at the tape side-edge portion (310) of the fastener tape (300).
 15. The fastener stringer according to Claim 14, wherein the attachment portion (490) comprises:
 - a head (493) that is an entirety of or a part of a head of the fastener element (400);
 - a base (491) that is an entirety of or a part of a base of the fastener element (400); and
 - a neck (492) that is an entirety of or a part of a neck of the fastener element (400).
 16. The fastener stringer according to Claim 14 or 15, wherein the attachment portion (490) is a resin portion fixed to the tape side-edge portion (310) of the fastener tape (300).
 17. A method of producing a fastener stringer, the method comprising:
 - preparing a ceramic part (480) that constitutes an entirety of a component part (400, 700) of a slide fastener (90) that is to be secured to a tape

side-edge portion (310) of a fastener tape (300),
 or a shell of the component part (400, 700), or
 a fragment of the component part (400, 700);
 and
 attaching the ceramic part (480) directly or indi- 5
 rectly to the fastener tape (300) of the slide fas-
 tener (90).

18. The method of producing a fastener stringer accord- 10
 ing to Claim 17, wherein said attaching the ceramic
 part (480) directly or indirectly to the fastener tape
 (300) comprises:

inserting the tape side-edge portion (310) of the 15
 fastener tape (300) into a tape-insertion groove
 (486) of the ceramic part (480); and/or
 coupling the ceramic part (480) to an attachment
 portion (490) provided at the tape side-edge por-
 tion (310) of the fastener tape (300); and/or 20
 sandwiching the tape side-edge portion (310) of
 the fastener tape (300) by a plurality of frag-
 ments of the component part (400, 700).

19. The method of producing a fastener stringer accord- 25
 ing to Claim 17 or 18, wherein said attaching the
 ceramic part (480) directly or indirectly to the fastener
 tape (300) comprises sewing the ceramic part (480)
 to the fastener tape (300) with thread.

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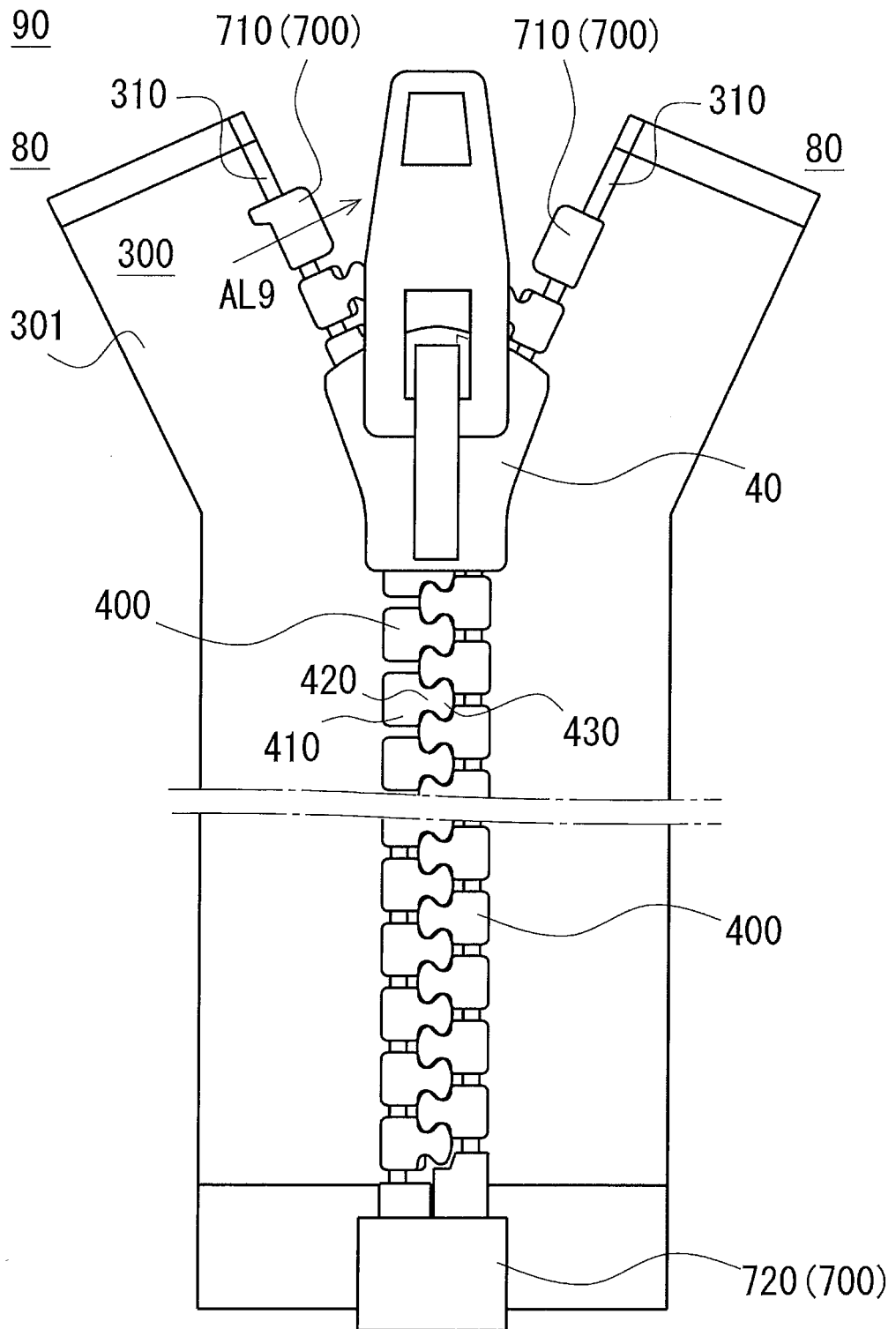
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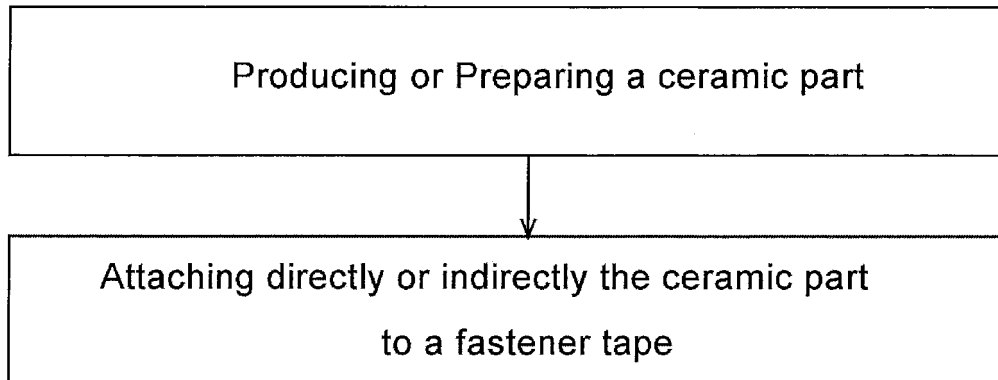
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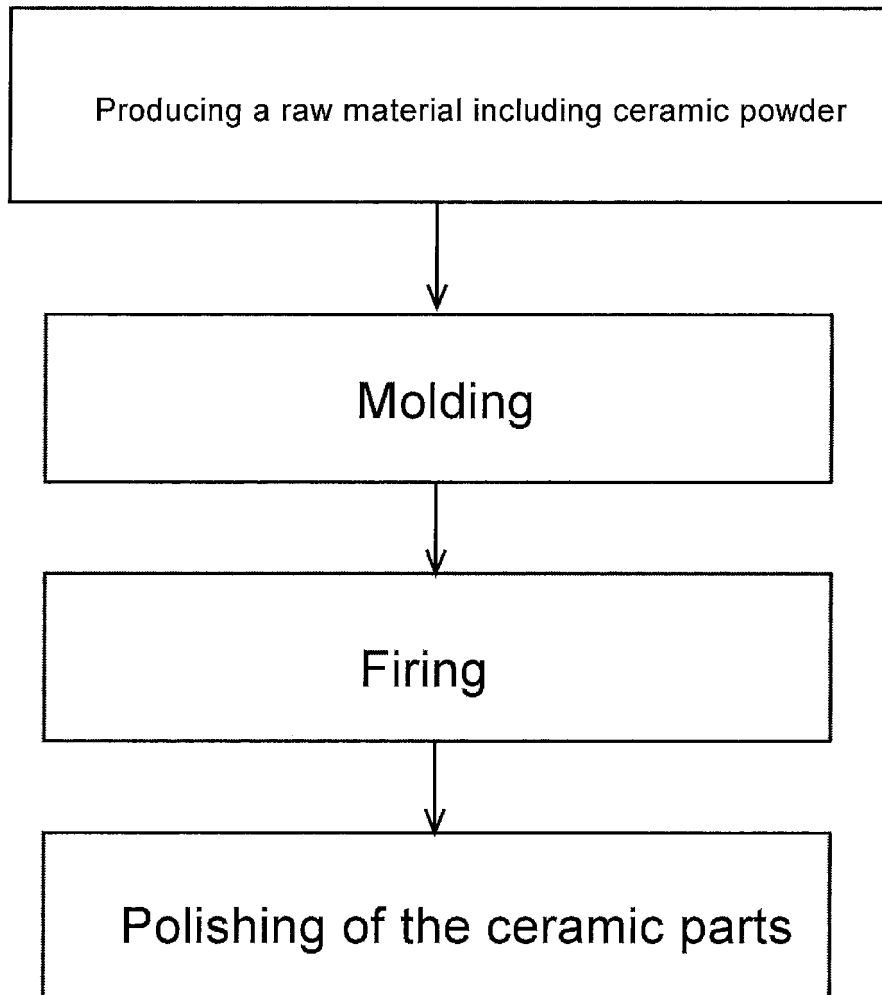
[Fig. 1]



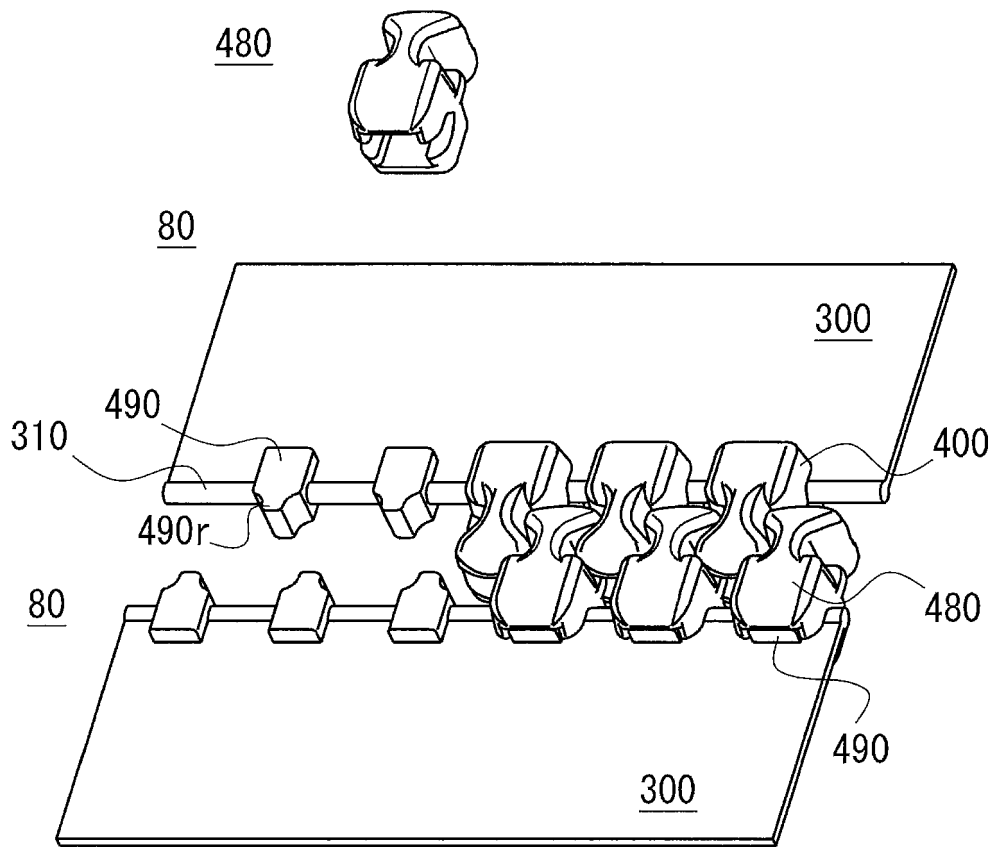
[Fig. 2]



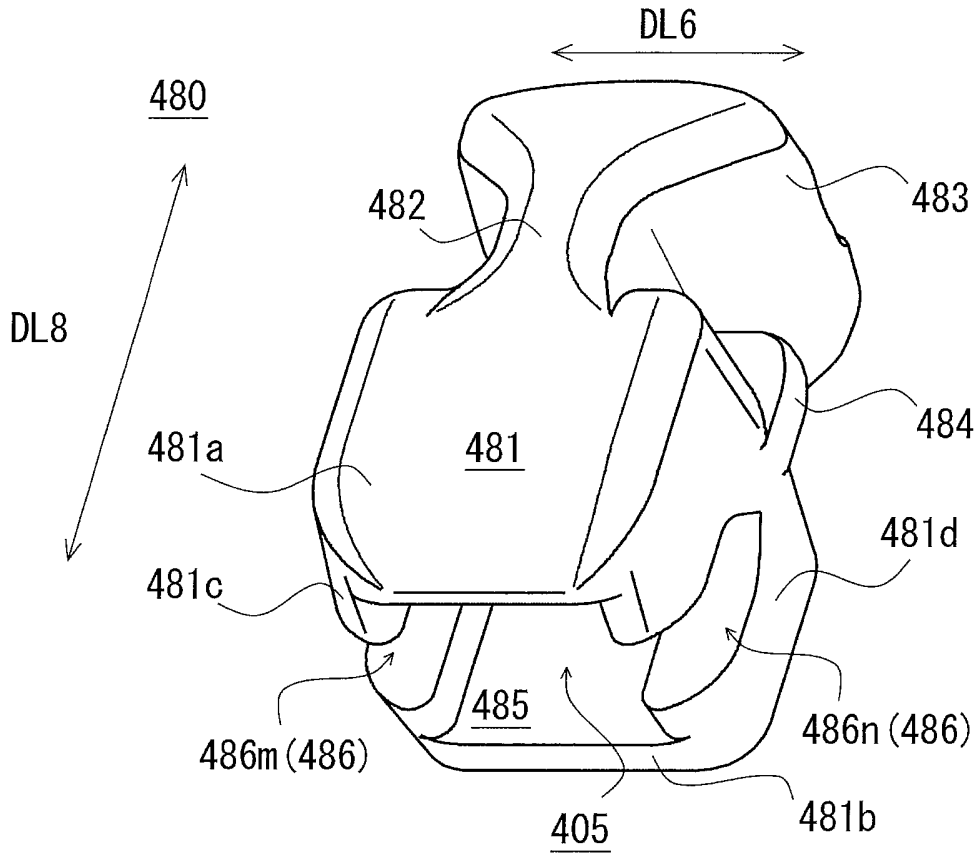
[Fig. 3]



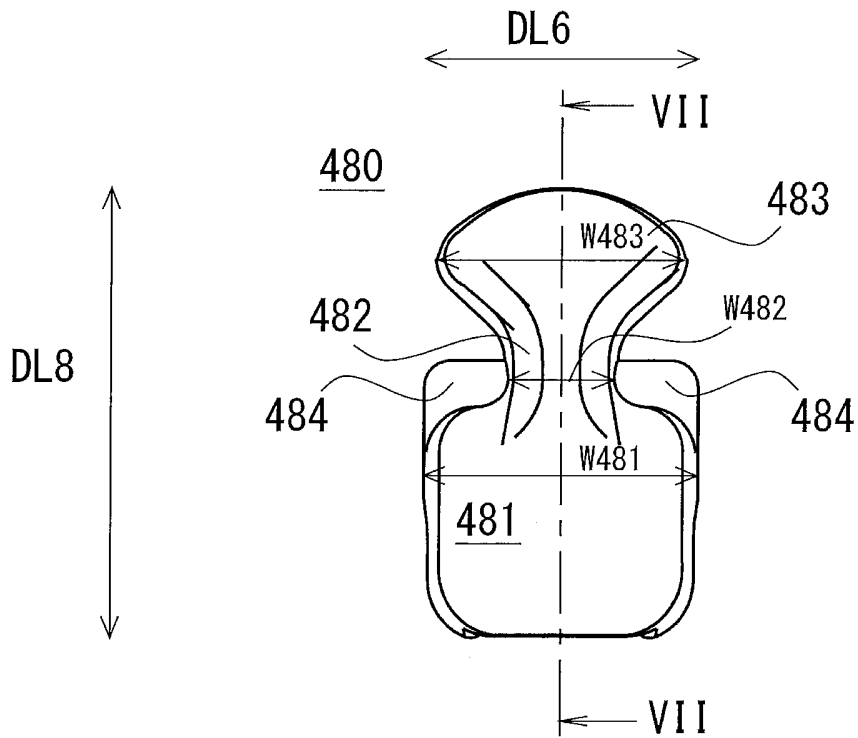
[Fig. 4]



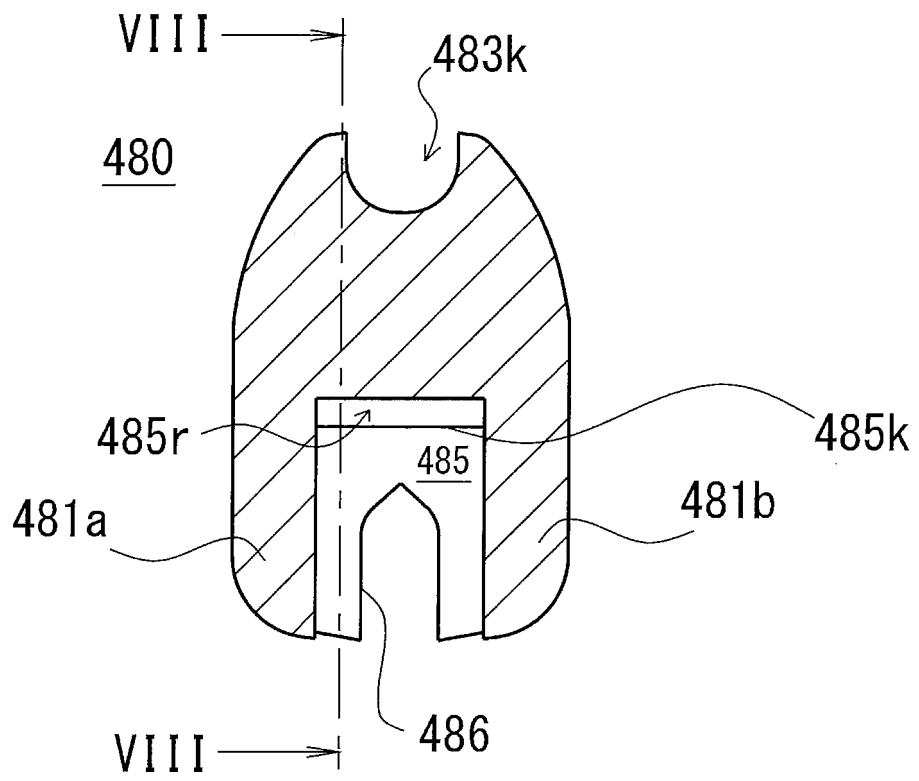
[Fig. 5]



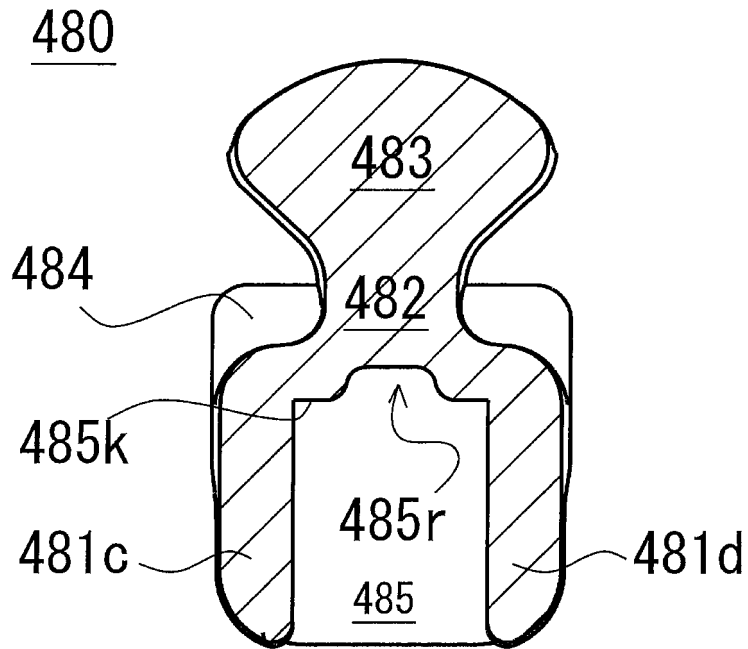
[Fig. 6]



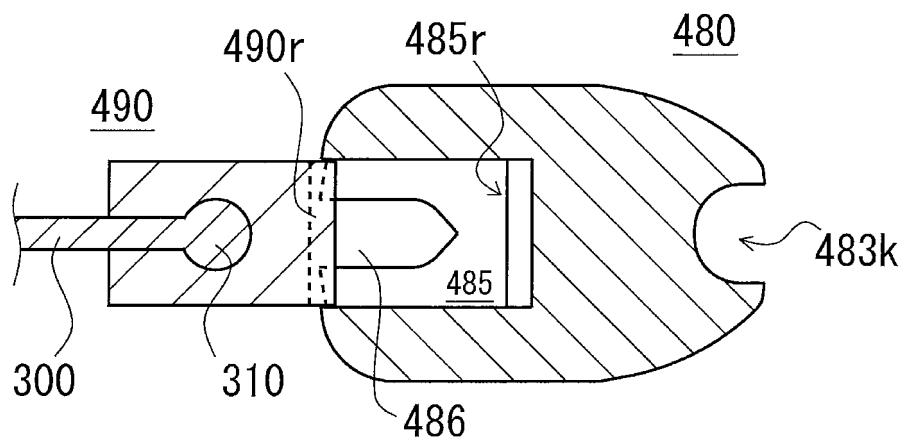
[Fig. 7]



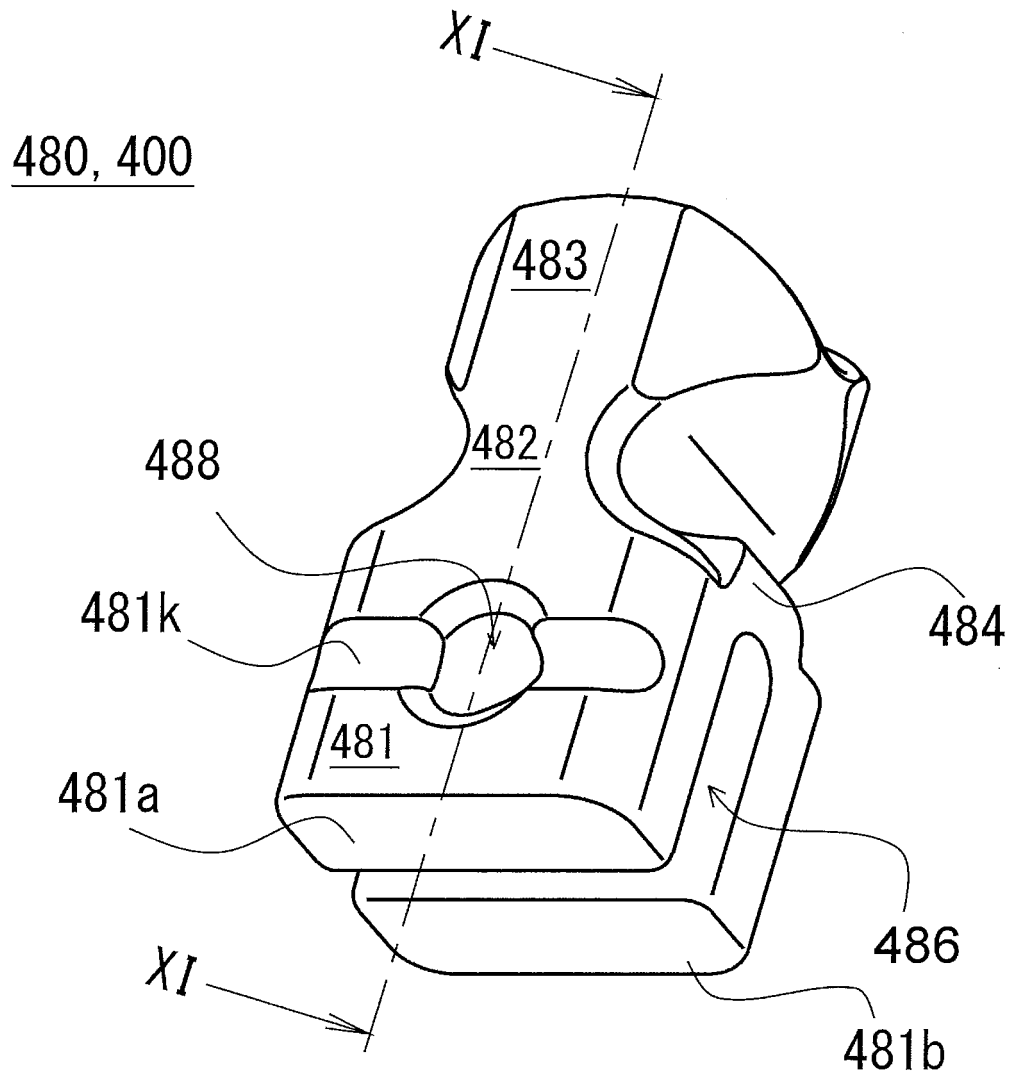
[Fig. 8]



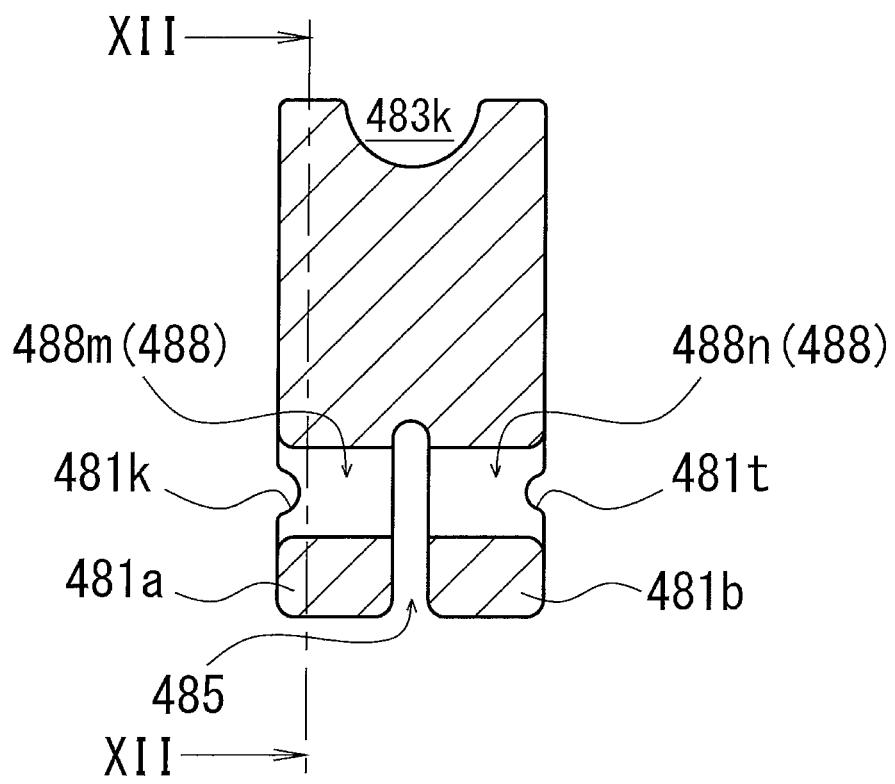
[Fig. 9]



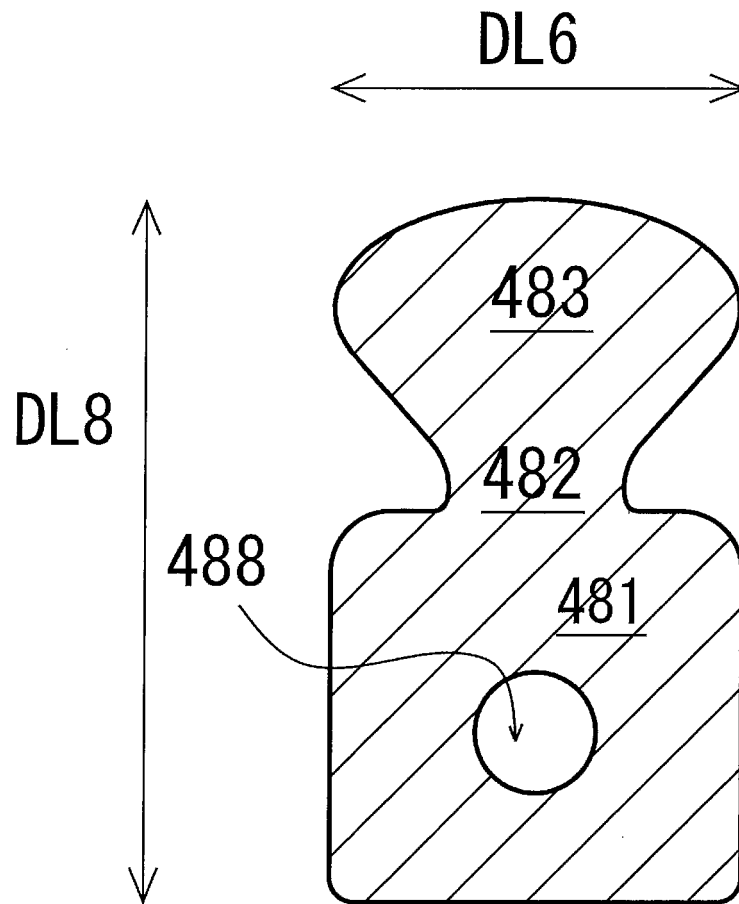
[Fig. 10]



[Fig. 11]

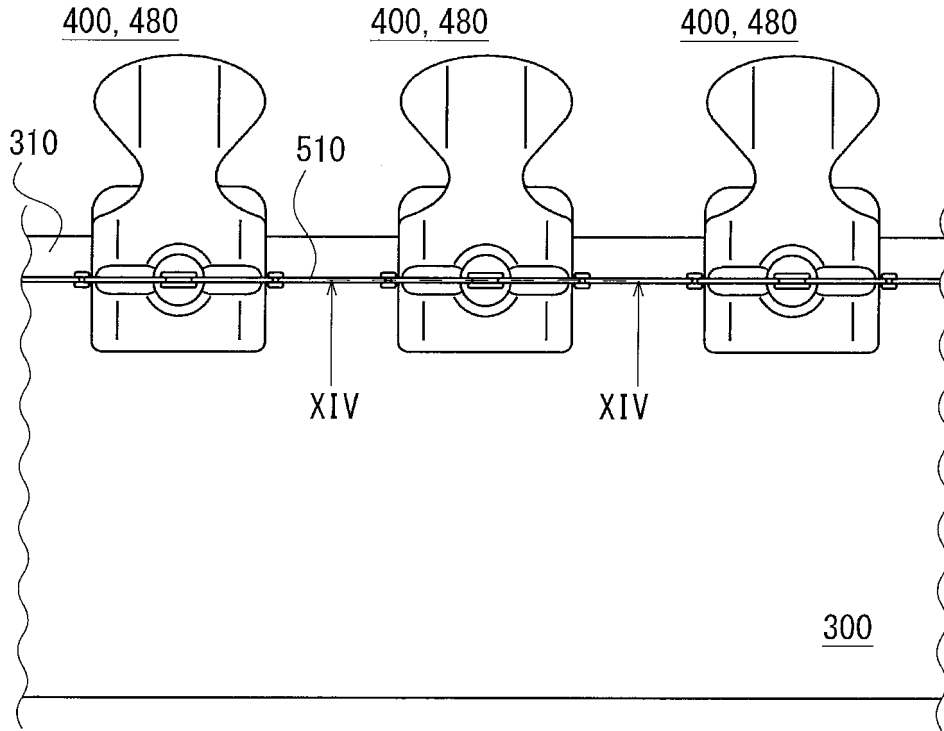


[Fig. 12]

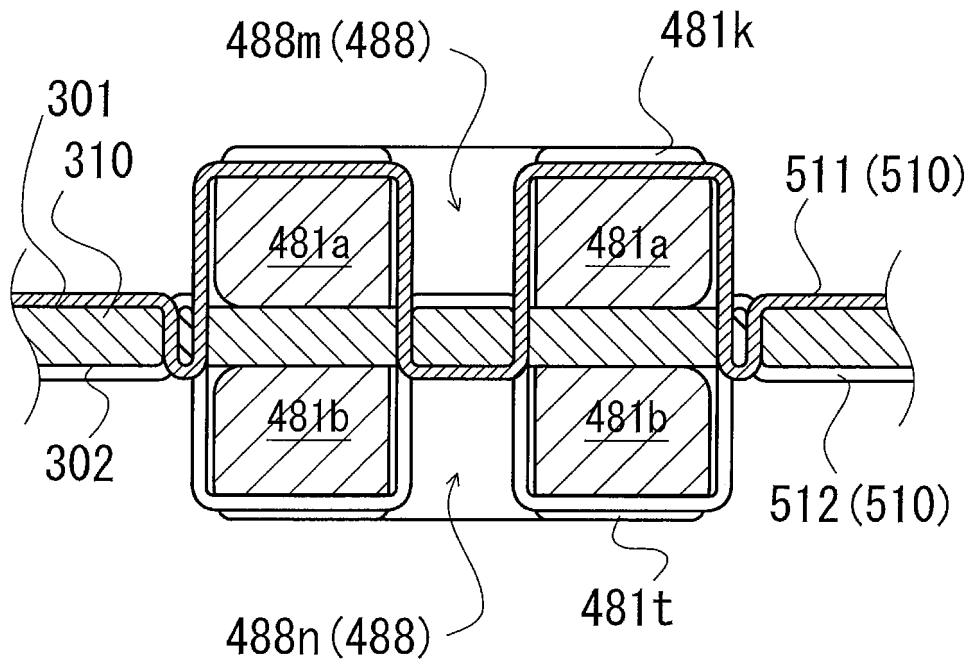


[Fig. 13]

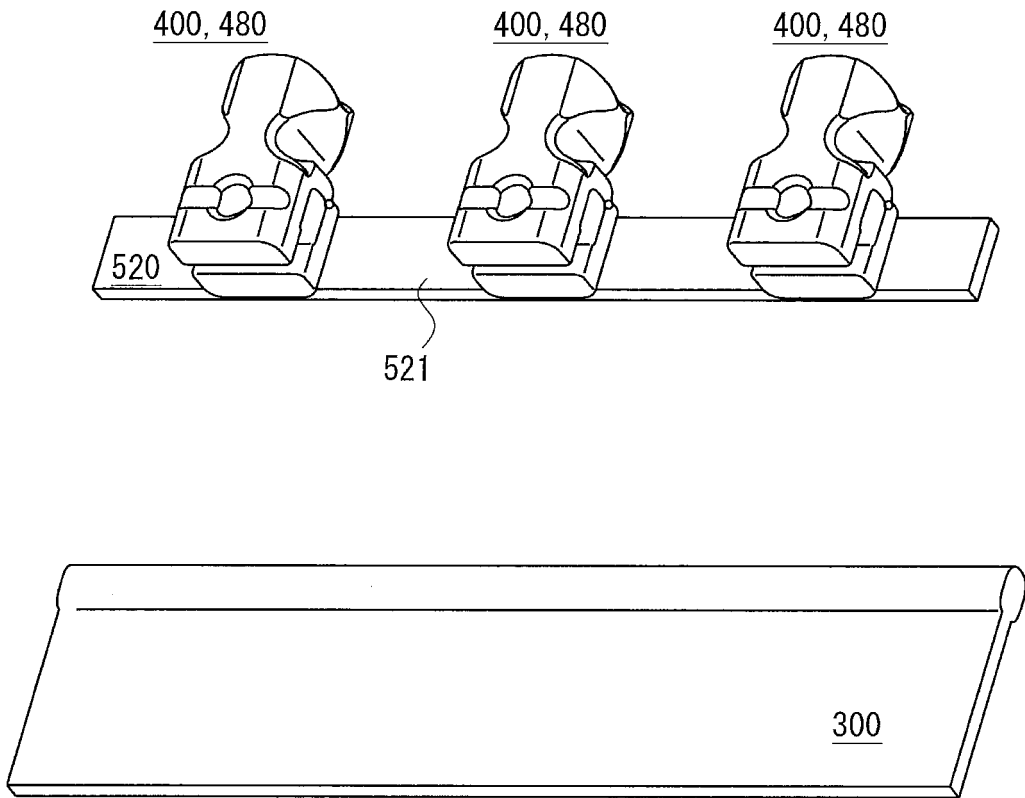
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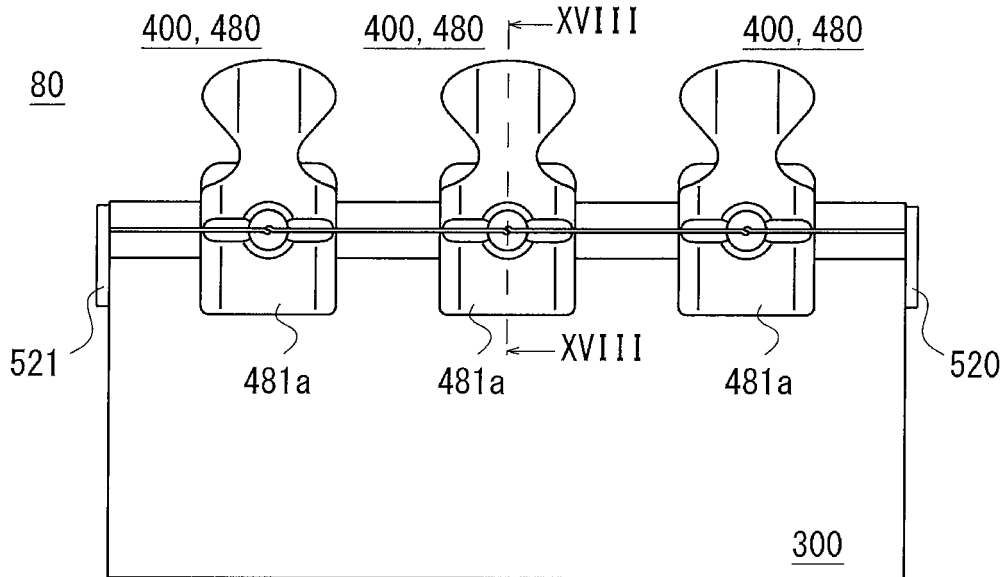
[Fig. 14]



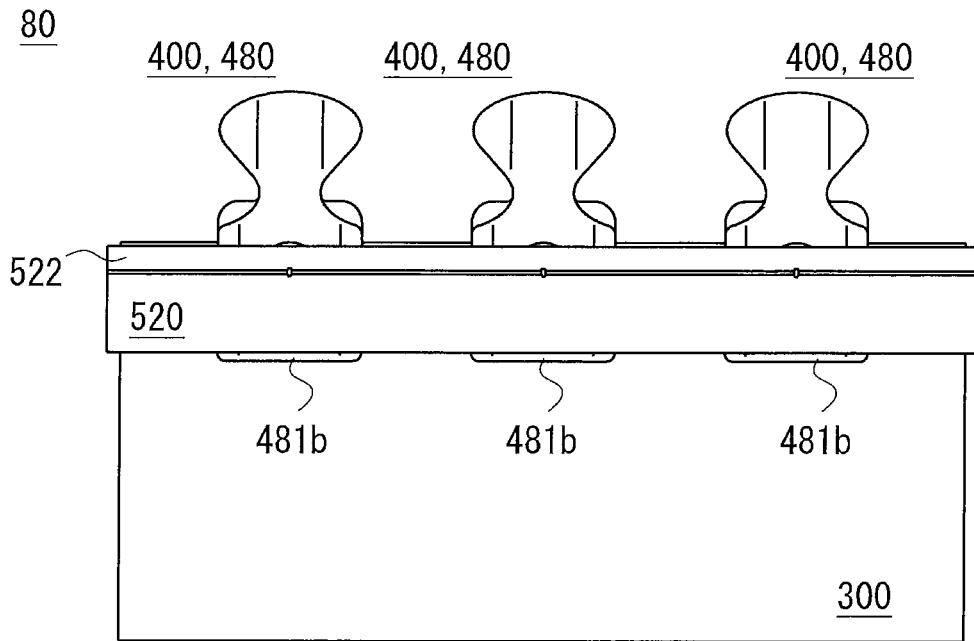
[Fig. 15]



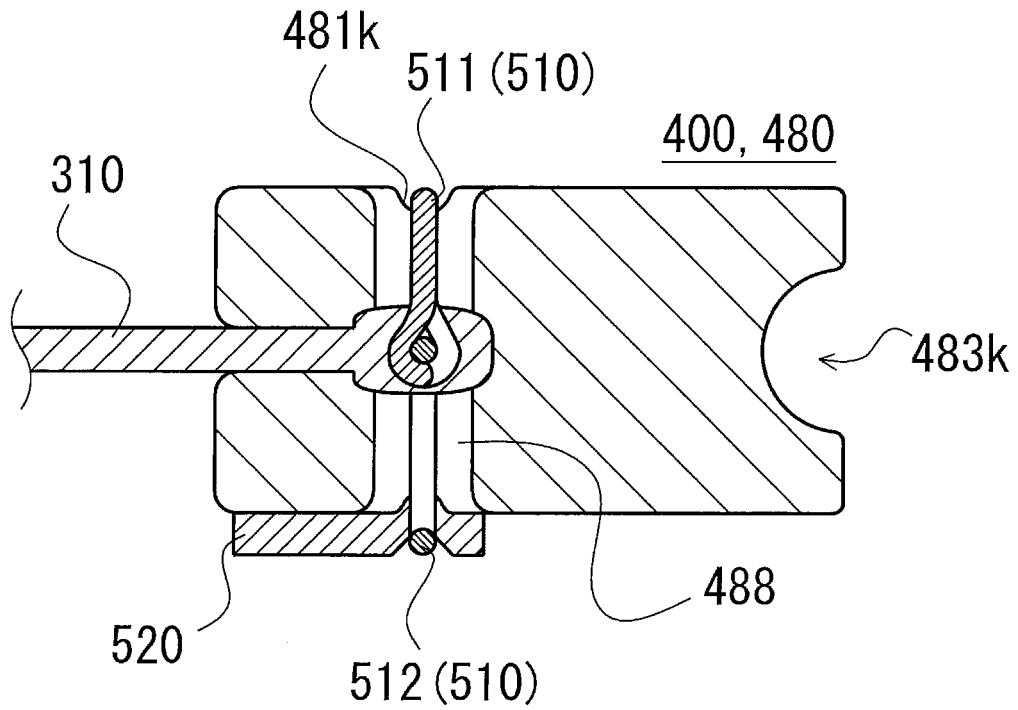
[Fig. 16]



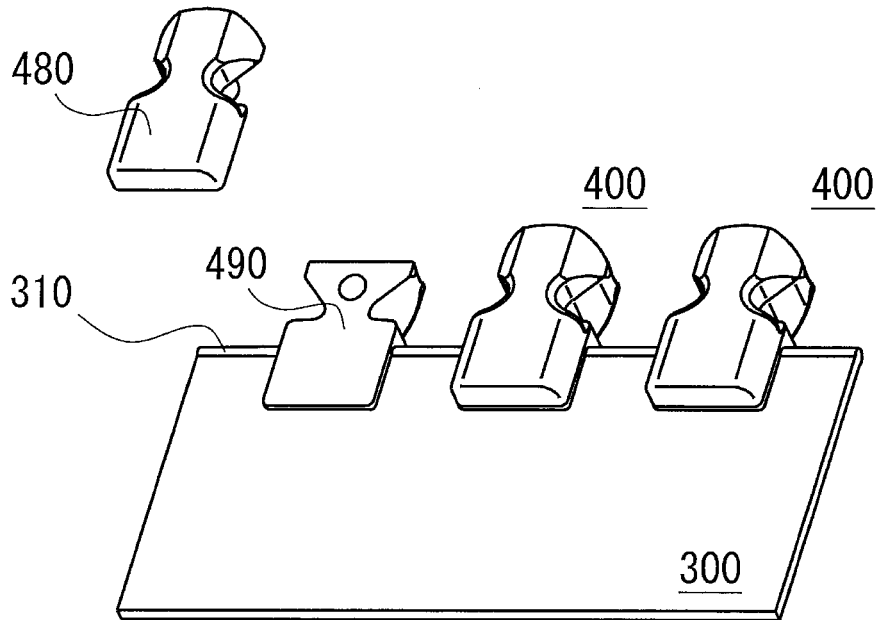
[Fig. 17]



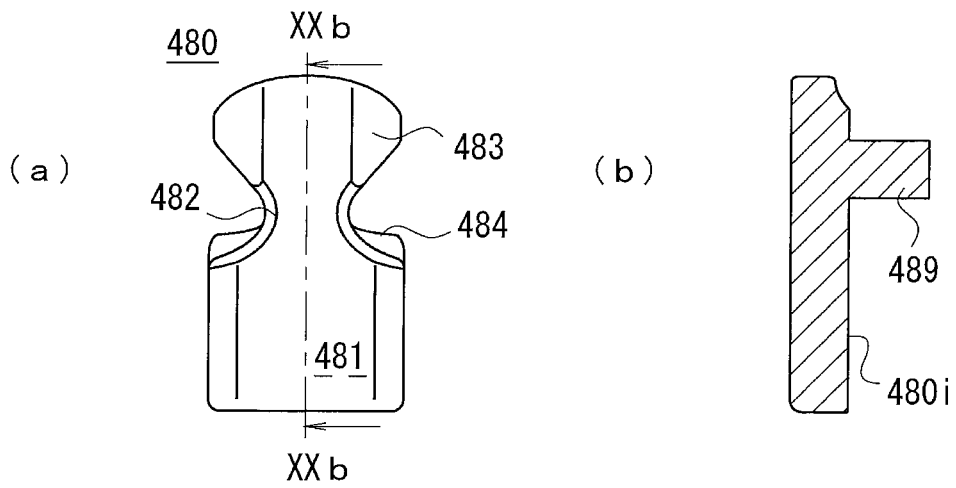
[Fig. 18]



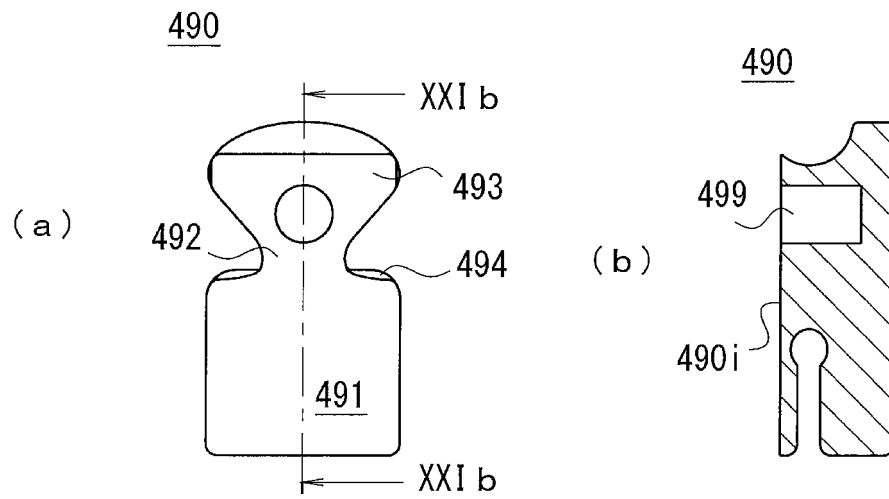
[Fig. 19]



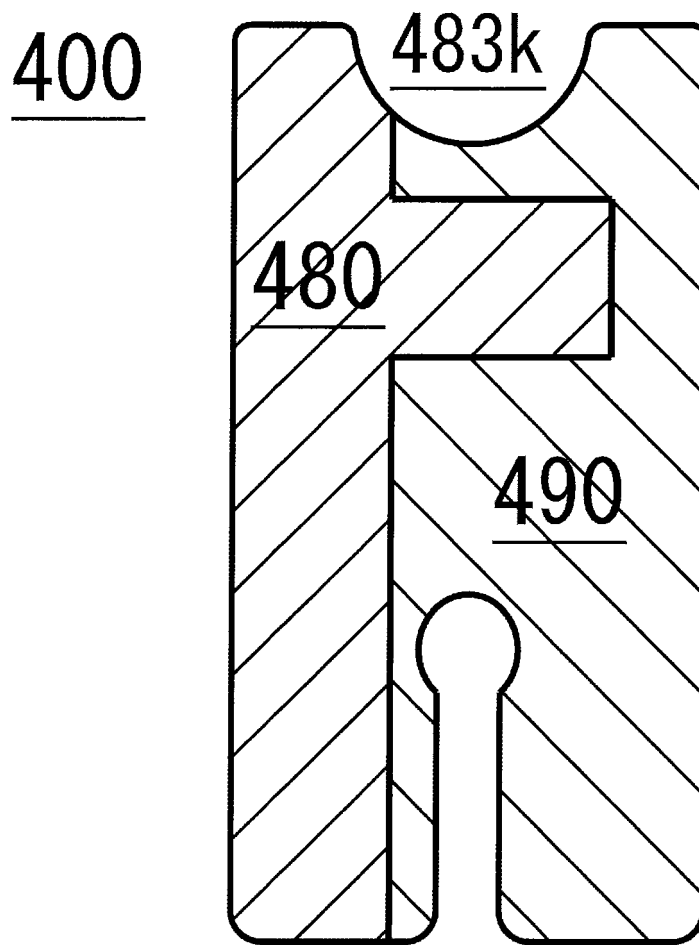
[Fig. 20]



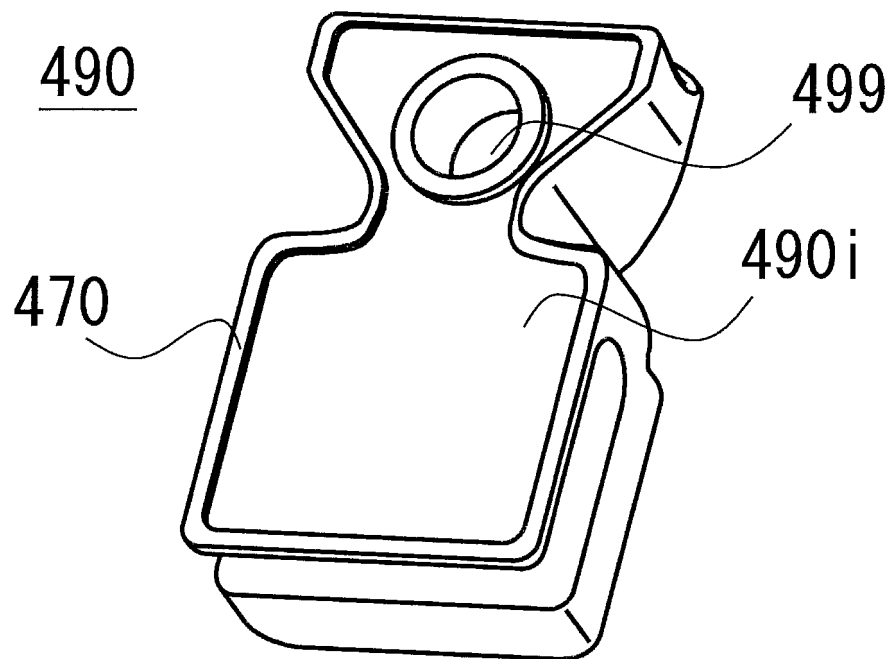
[Fig. 21]



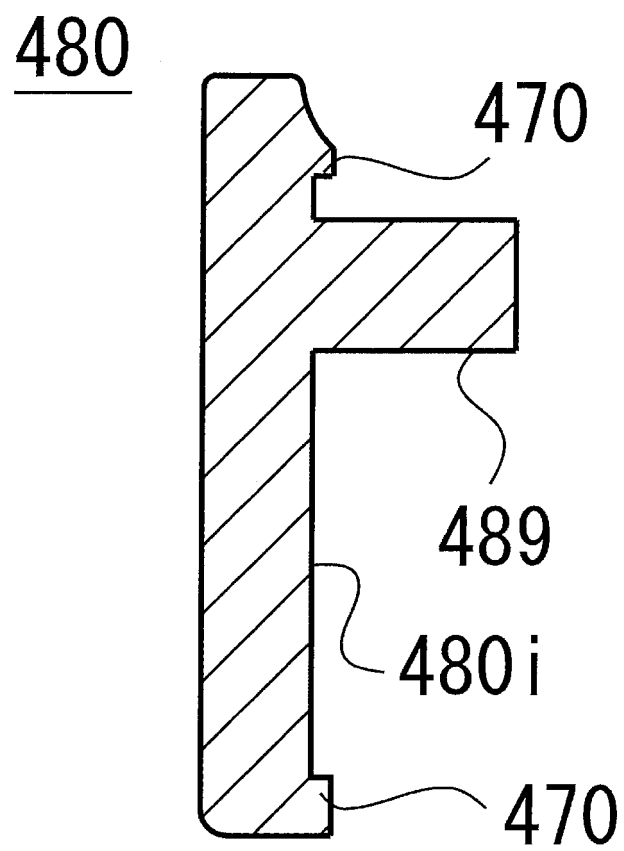
[Fig. 22]



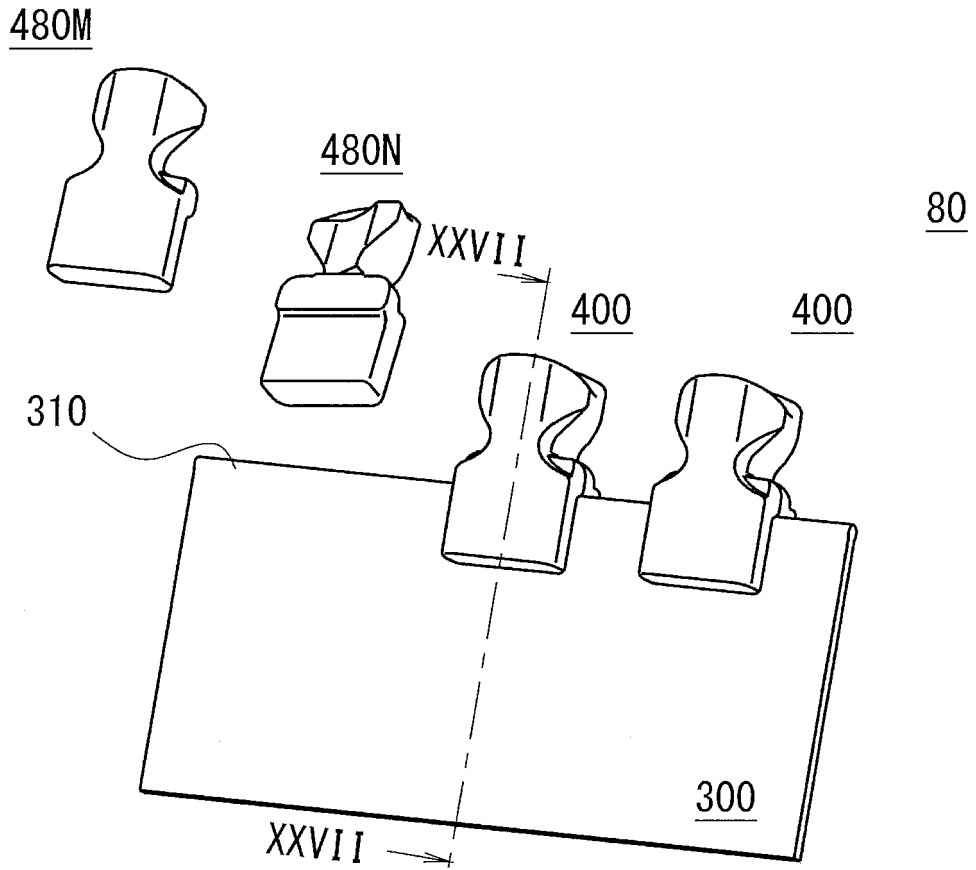
[Fig. 23]



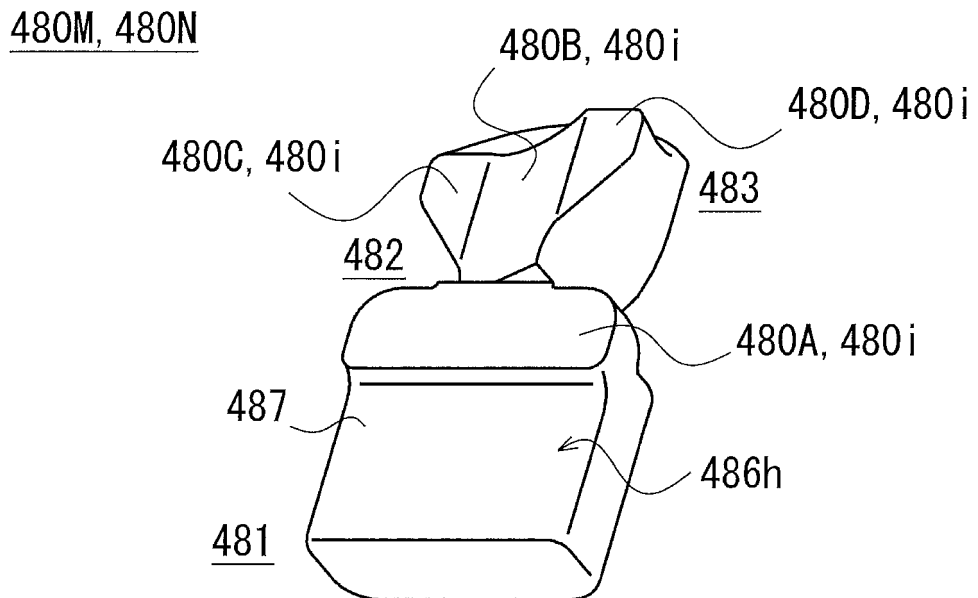
[Fig. 24]



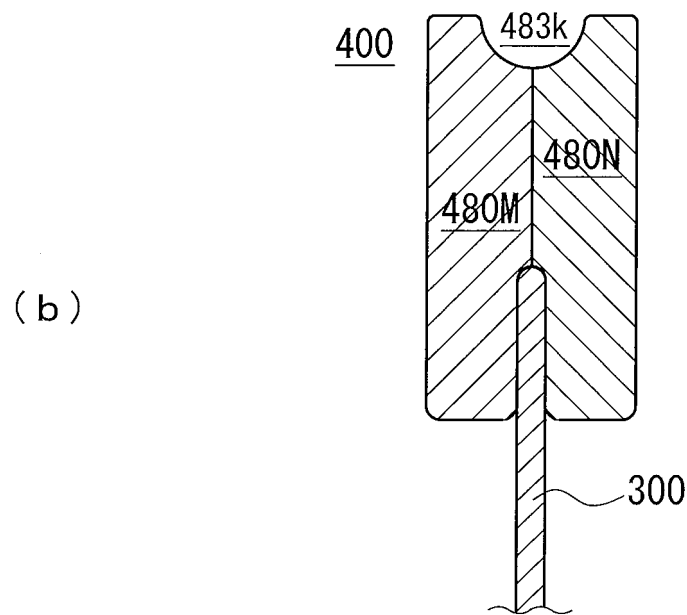
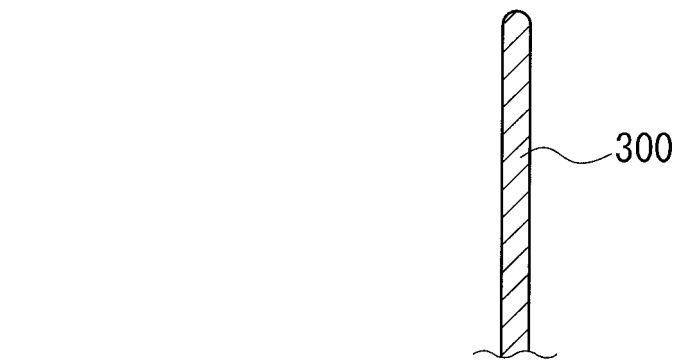
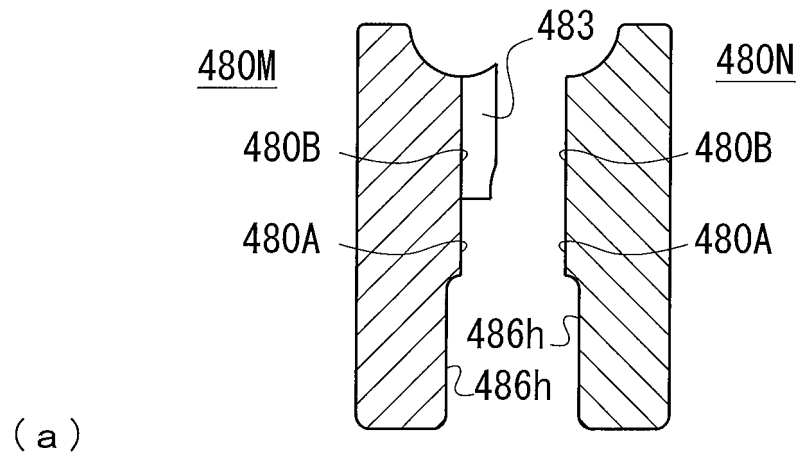
[Fig. 25]



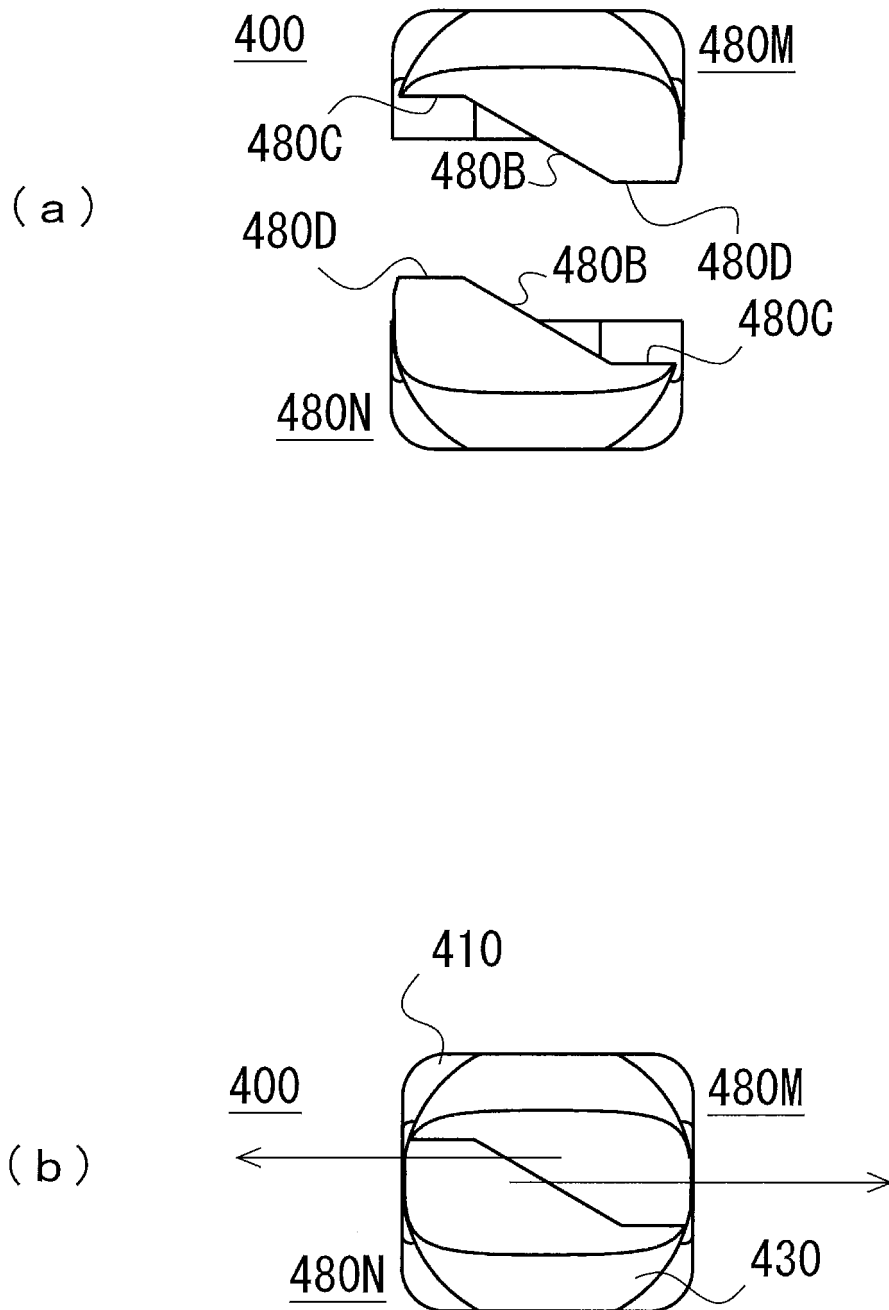
[Fig. 26]



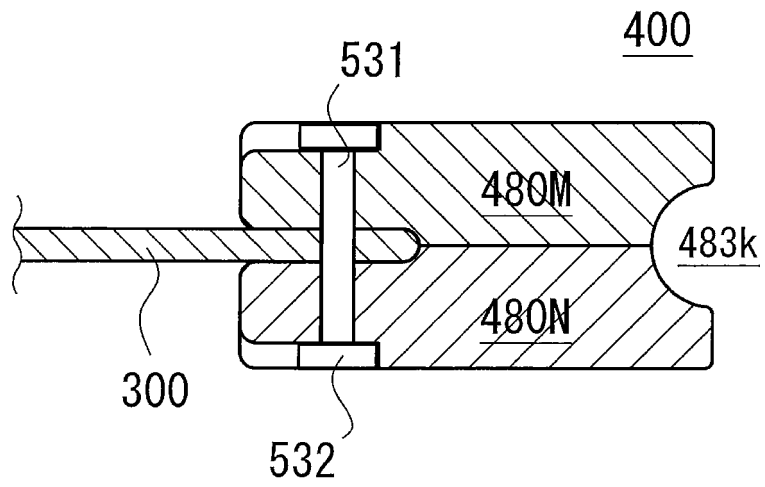
[Fig. 27]



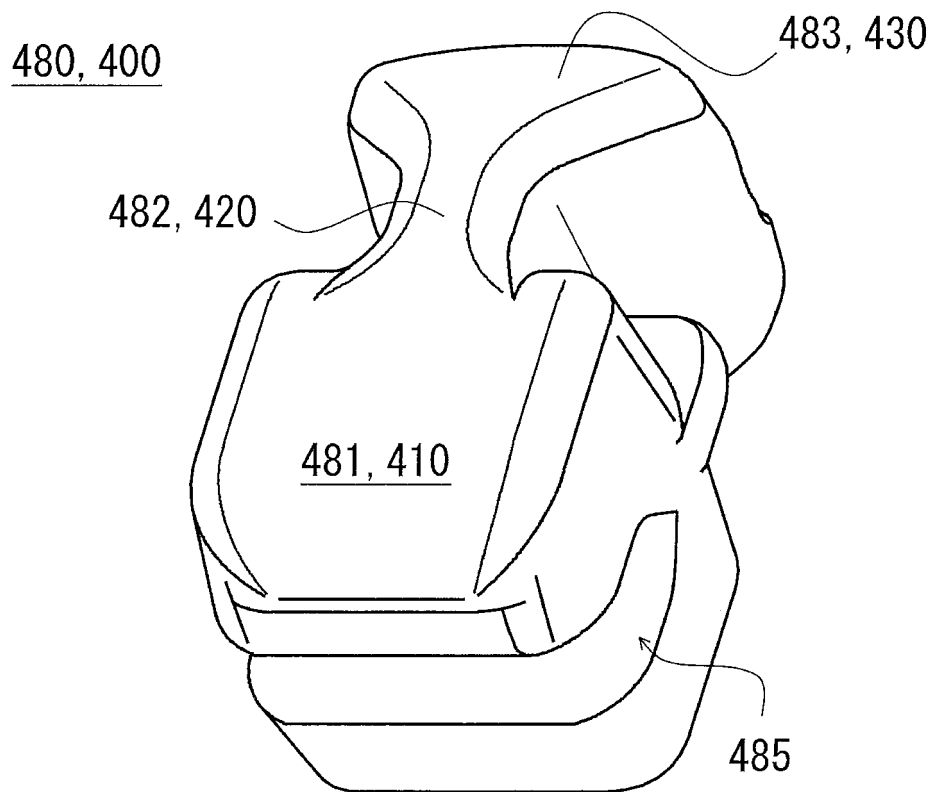
[Fig. 28]



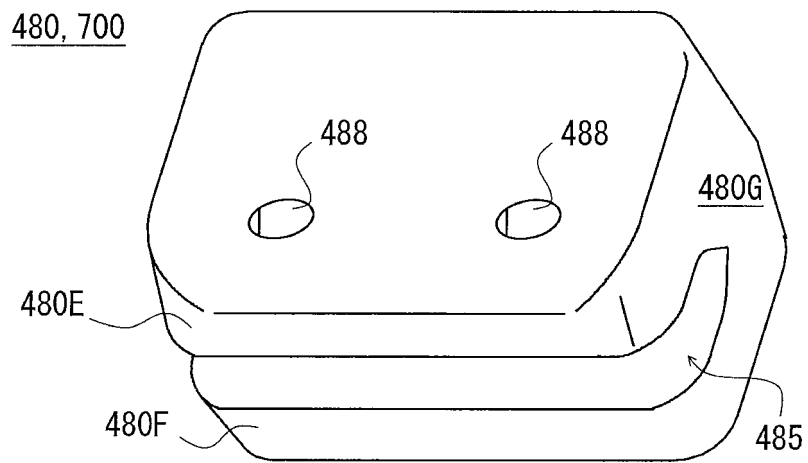
[Fig. 29]



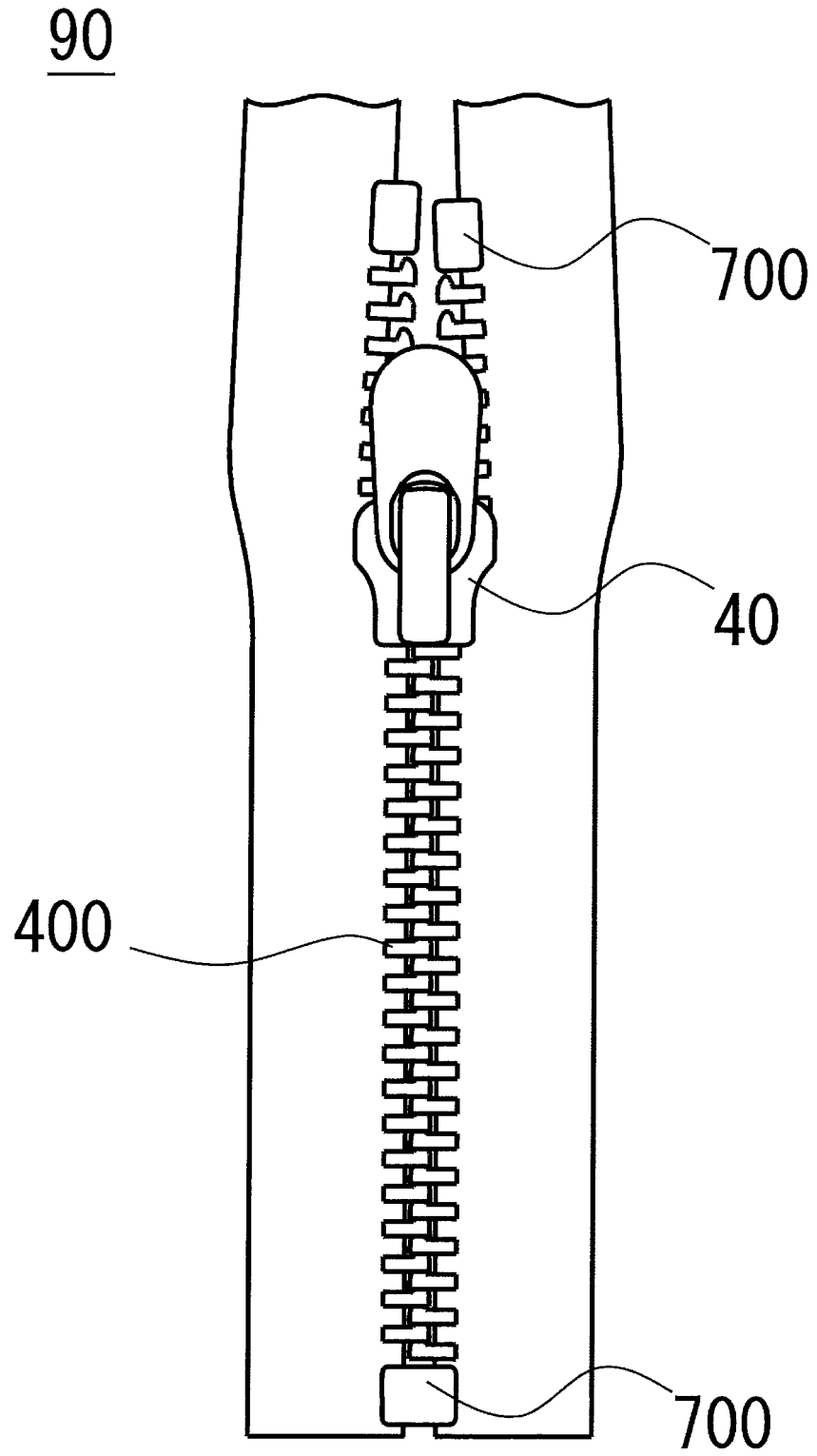
[Fig. 30]



[Fig. 31]



[Fig. 32]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/000881

A. CLASSIFICATION OF SUBJECT MATTER A44B19/02(2006.01)i, A44B19/44(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.
X	JP 5207142 B2 (YKK Corp.), 12 June 2013 (12.06.2013), paragraphs [0043] to [0044], [0050]; fig. 1 to 2	1-2, 6-9, 13, 17
Y	& US 2009/0320249 A1 paragraphs [0039] to [0040]; fig. 1 to 2	1-5, 10-12, 18
A	& EP 2140776 A1 paragraphs [0029] to [0030]; fig. 1 to 2 & CN 101617876 A & KR 10-2010-0003221 A	14-16, 19
X	WO 2014/016908 A1 (YKK Corp.), 30 January 2014 (30.01.2014), paragraphs [0027], [0035], [0065]; fig. 1 to 3	1, 6, 17, 19
A	& US 2015/0184277 A1 paragraphs [0040], [0049]; fig. 1 to 3 & CN 103564994 A	2-5, 7-16, 18
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Date of the actual completion of the international search 30 March 2017 (30.03.17)	Date of mailing of the international search report 11 April 2017 (11.04.17)	
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/000881

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
5 10	Y WO 2011/070678 A1 (YKK Corp.), 16 June 2011 (16.06.2011), paragraphs [0058], [0060], [0093]; fig. 6 to 8, 11 & CN 102665471 A	1-3, 5, 10-12
15	Y WO 2011/074055 A1 (YKK Corp.), 23 June 2011 (23.06.2011), paragraphs [0012] to [0014], [0040]; fig. 1 to 5 & CN 102665476 A	1, 4-5
20 25 30 35 40 45 50	Y JP 2006-247026 A (YKK Corp.), 21 September 2006 (21.09.2006), paragraph [0031]; fig. 1 to 2 & US 2006/0201217 A1 paragraph [0047]; fig. 1 to 2 & KR 10-2006-0097620 A & CN 1830349 A	18

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Patent documents cited in the description

- JP 5207142 B [0003]