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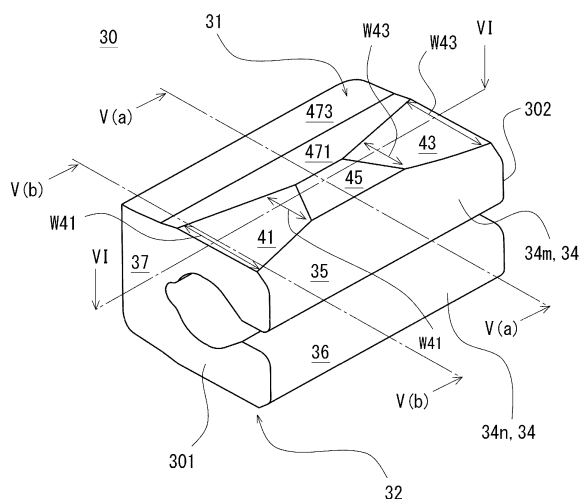
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(54) **FASTENER STRINGER, SLIDE FASTENER, AND STAKING MACHINE**

(57) A fastener stringer (50) includes a fastener tape (10) in which a tape side-edge portion (15) is provided with a core thread (16); a fastener element (20) secured to the tape side-edge portion (15); and a metal stop (30, 30s) secured to the core thread (16) of the tape side-edge portion (15) at an adjacent position to the fastener element (20). The stop (30, 30s) may be provided with a first outer surface (31) and a second outer surface (32) facing in opposite directions and sandwiching the core thread (16) of the tape side-edge portion (15). A first end portion (38e) of the stop (30, 30s) in a direction along the

core thread (16) may be provided with a first slant surface (41) extending along the core thread (16) to reach to a rim of the first outer surface (31) while being gradually closer to the core thread (16) and a second slant surface (42) extending along the core thread (16) to reach to a rim of the second outer surface (32) while being gradually closer to the core thread (16). A thickness (TH38) of the first end portion (38e) of the stop (30, 30s) being provided with the first slant surface (41) and the second slant surface (42) is less than a thickness (TH39) of a portion of the stop (30, 30s) other than said first end portion (38e).

[Fig. 4]



Description

[Technical Field]

[0001] The present disclosure is directed to a fastener stringer, a slide fastener, and a swaging apparatus. In particular, the present disclosure is directed to a fastener stringer provided with a stop or a slide fastener including that fastener stringer.

[Background Art]

[0002] Patent Literature 1 discloses a stop that is attached to a bulged tape edge of a slide fastener through a swaging process. A groove 5 extending in the length direction of the stop is provided at the connecting portion 4 between the top and bottom legs 2, 2 of the stop, and the transverse sectional shape of the groove 5 is V-shape as particularly illustrated in Figs. 2 and 3 of the same literature.

[0003] Patent Literature 2 discloses that a bulged portion 15 is provided at the top stop 10 for preventing a slider from being disengaged from a fastener stringer.

[Citation List]

[Patent Literature]

[0004]

[PTL 1] Japanese Utility Model Examined Application Laid-open No. 63-1855

[PTL 2] Japanese Patent Application Laid-open No. 2002-253307

[Summary of Invention]

[Technical Problem]

[0005] Attachment strength of the stop to the core thread of the tape side-edge portion of the fastener tape may be greater as deformation applied to the stop increases. However, in some cases, such increased deformation of the stops may not be acceptable or may not be desired.

[Solution to Problem]

[0006] A fastener stringer (50) according to one aspect of the present invention may include: a fastener tape (10) in which a tape side-edge portion (15) is provided with a core thread (16); a fastener element (20) secured to the tape side-edge portion (15) of the fastener tape (10); and a metal stop (30, 30s) secured to the core thread (16) of the tape side-edge portion (15) of the fastener tape (10) at an adjacent position to the fastener element (20), wherein the stop (30, 30s) is provided with a first outer surface (31) and a second outer surface (32) facing in

opposite directions and sandwiching the core thread (16) of the tape side-edge portion (15), a first end portion (38e) of the stop (30, 30s) in a direction along the core thread (16) is provided with a first slant surface (41) extending along the core thread (16) to reach to a rim of the first outer surface (31) while being gradually closer to the core thread (16) and a second slant surface (42) extending along the core thread (16) to reach to a rim of the second outer surface (32) while being gradually closer to the core thread (16), and a thickness (TH38) of the first end portion (38e) of the stop (30, 30s) being provided with the first slant surface (41) and the second slant surface (42) is less than a thickness (TH39) of a portion of the stop (30, 30s) other than said first end portion (38e).

[0007] In some embodiments, the first end portion (38e) of the stop (30, 30s) being provided with the first slant surface (41) and the second slant surface (42) is an end portion of the stop (30, 30s) being positioned farther away from the fastener element (20) along the core thread (16).

[0008] In some embodiments, the first end portion (38e) is provided with a first slant inner surface (41k) that slants corresponding to the first slant surface (41) and a second slant inner surface (42k) that slants corresponding to the second slant surface (42), and wherein the first end portion (38e) includes an edge portion (35m, 35n) that bites into the core thread (16).

[0009] In some embodiments, a second end portion (38g) of the stop (30, 30s) along the core thread (16) is provided with a third slant surface (43) extending along the core thread (16) to reach to a rim of the first outer surface (31) while being gradually closer to the core thread (16) and a fourth slant surface (44) extending along the core thread (16) to reach to a rim of the second outer surface (32) while being gradually closer to the core thread (16), and a thickness (TH38) of the second end portion (38g) of the stop (30, 30s) being provided with the third slant surface (43) and the fourth slant surface (44) is less than a thickness (TH39) of an intermediate portion (39) of the stop (30, 30s) between the first end portion (38e) and the second end portion (38g) of the stop (30, 30s).

[0010] In some embodiments, the second end portion (38g) is provided with a third slant inner surface (43k) that slants corresponding to the third slant surface (43) and a fourth slant inner surface (44k) that slants corresponding to the fourth slant surface (44), and wherein the second end portion (38g) includes an edge portion (35p, 35q) that bites into the core thread (16).

[0011] In some embodiments, a flat surface (45) is provided between the first slant surface (41) and the third slant surface (43), and a flat surface (46) is provided between the second slant surface (42) and the fourth slant surface (44).

[0012] A slide fastener according to further aspect of the present invention may include a pair of fastener stringers (50) each being equivalent of the fastener stringer (50) as stated above; and a fastener slider (60)

for opening and closing the pair of fastener stringers (50).

[0013] In some embodiments, the pair of fastener stringers (50) is closed by the frontward movement of the slider, and the stop (30, 30s) is provided at a frontward adjacent position relative to the fastener element (20).

[0014] A swaging apparatus according to another aspect of the present invention may be a swaging apparatus for producing the fastener stringer (50) as stated above, the swaging apparatus including: a first press part (81) and a second press part (82) for swaging the stop (30, 30s) to be attached to the core thread (16), wherein the first press part (81) is provided with a sloped surface for forming the first slant surface (41) of the stop (30, 30s), and the second press part (82) is provided with a sloped surface for forming the second slant surface (42) of the stop (30, 30s).

[Advantageous Effects of Invention]

[0015] According to one aspect of the present invention, it may be possible to avoid or suppress the relatively increased deformation of the stop required to ensure the sufficient attachment strength of the stop to the core thread of the tape side-edge portion.

[Brief Description of Drawings]

[0016]

[Fig. 1] Fig. 1 is a schematic partial elevational view of a slide fastener according to a first embodiment of the present invention.

[Fig. 2] Fig. 2 is a schematic partial elevational view of a slide fastener according to a first embodiment of the present invention, illustrating a state that elements have been arranged inside of the slider.

[Fig. 3] Fig. 3 is a schematic partial elevational view of a slide fastener according to a first embodiment of the present invention, illustrating a state that stops have been arranged inside of the slider.

[Fig. 4] Fig. 4 is a schematic perspective view of a stop included in a fastener stringer according to a first embodiment of the present invention in which illustration of a core thread of the tape side-edge portion of the fastener tape is omitted for the convenience of illustration.

[Fig. 5] Fig. 5 is a schematic sectional view of a stop included in a fastener stringer according to a first embodiment of the present invention. Fig. 5(a) schematically illustrates a sectional configuration along V(a)-V(a) in Fig. 4. Fig. 5(b) schematically illustrates a sectional configuration along V(b)-V(b) in Fig. 4.

[Fig. 6] Fig. 6 is a schematic sectional view of a stop included in a fastener stringer according to a first embodiment of the present invention, schematically illustrating a sectional configuration along VI-VI in Fig. 4. Fig. 6 additionally illustrates a sectional configuration of a fastener element adjacent to the stop.

[Fig. 7] Fig. 7 is a schematic perspective view of a configuration of a stop before being swaged which will be included in a fastener stringer according to a first embodiment of the present invention.

[Fig. 8] Fig. 8 is a view of a swaging apparatus used for producing a fastener stringer according to a first embodiment of the present invention, illustrating that a stop is held by and between a first press part and a second press part.

[Fig. 9] Fig. 9 is a sectional view of a swaging apparatus used for producing a fastener stringer according to a first embodiment of the present invention, schematically illustrating a sectional configuration along IX-IX in Fig. 8. Comparison between Fig. 9(a) and Fig. 9(b) would set forth proper alignment of a stop may be achieved in the swaging apparatus.

[Fig. 10] Fig. 10 is a schematic perspective view of a stop according to a comparative example of the present invention.

[Fig. 11] Fig. 11 is a sectional view of a swaging apparatus used for producing a fastener stringer according to a comparative example of the present invention. Fig. 11 is a sectional view corresponding to Fig. 9.

[Fig. 12] Fig. 12 is a schematic sectional view of a stop included in a fastener stringer according to a second embodiment of the present invention, additionally illustrating a sectional configuration of a fastener element adjacent to the stop.

[Fig. 13] Fig. 13 is a schematic perspective view of a stop according to a further comparative example of the present invention.

[Fig. 14] Fig. 14 is a schematic partial perspective view of a rear stop in Fig. 1.

[Description of Embodiments]

[0017] Hereinafter, non-limiting exemplary embodiments of the present invention will be described with reference to Figures. One or more embodiments and respective features included in the embodiment are not mutually exclusive. A skilled person would properly combine the respective embodiments and/or respective features without requiring excess descriptions, and would understand the synergic effects by such combinations. Overlapping descriptions among embodiments will be basically omitted. Referenced drawings are mainly for the purpose of illustrating the invention and may possibly be simplified for the sake of convenience of illustration.

[0018] In the following descriptions, a front-rear direction may be a direction of a movement of a slider for a slide fastener. Frontward movement of a slider may close a left-right pair of fastener stringers and, in turn, a left-right pair of fastener elements will be engaged one another. Rearward movement of the slider may open the left-right pair of fastener stringers and, in turn, the left-right pair of fastener elements will be disengaged one another. An up-down direction may be a direction normal

to the front-rear direction. The up-down direction may be equal to a direction normal to an upper wing or a lower wing of a slider, or an extending direction of a coupling pillar of a slider, or a direction normal to a main surface of a fastener tape. A left-right direction may be a direction normal to both of the front-rear direction and the up-down direction.

<The first embodiment>

[0019] The first embodiment will be described with references to Figs. 1 to 11 as an exemplary embodiment of several exemplary embodiments of the present invention. Fig. 1 is a schematic partial elevational view of a slide fastener. Fig. 2 is a schematic partial elevational view of a slide fastener, illustrating a state that elements have been arranged inside of the slider. Fig. 3 is a schematic partial elevational view of a slide fastener, illustrating a state that stops have been arranged inside of the slider. Fig. 4 is a schematic perspective view of a stop included in a fastener stringer in which illustration of a core thread of the tape side-edge portion of the fastener tape is omitted for the convenience of illustration. Fig. 5 is a schematic sectional view of a stop included in a fastener stringer. Fig. 5(a) schematically illustrates a sectional configuration along V(a)-V(a) in Fig. 4. Fig. 5(b) schematically illustrates a sectional configuration along V(b)-V(b) in Fig. 4. Fig. 6 is a schematic sectional view of a stop included in a fastener stringer, schematically illustrating a sectional configuration along VI-VI in Fig. 4. Fig. 6 additionally illustrates a sectional configuration of a fastener element adjacent to the stop. Fig. 7 is a schematic perspective view of a configuration of a stop before being swaged which will be included in a fastener stringer. Fig. 8 is a view of a swaging apparatus used for producing a fastener stringer, illustrating that a stop is held by and between a first press part and a second press part. Fig. 9 is a sectional view of a swaging apparatus used for producing a fastener stringer, schematically illustrating a sectional configuration along IX-IX in Fig. 8. Comparison between Fig. 9(a) and Fig. 9(b) would set forth proper alignment of a stop may be achieved in the swaging apparatus. Fig. 10 is a schematic perspective view of a stop according to a comparative example. Fig. 11 is a sectional view of a swaging apparatus used for producing a fastener stringer according to a comparative example. Fig. 11 is a sectional view corresponding to Fig. 9.

[0020] As illustrated in Figs. 1 to 3, a slide fastener 70 has a left-right pair of fastener stringers 50, and one fastener slider 60 for opening and closing the left-right pair of fastener stringers 50. Each fastener stringer 50 has a fastener tape 10 elongated in the front-rear direction, a fastener elements 20 aligned in the front-rear direction, and stops 30, 30s positioned adjacent to the fastener element 20. The left-right fastener elements 20 will be engaged one another as the fastener slider 60 moves forward, and the left-right fastener elements 20 will be

disengaged as the fastener slider 60 moves rearward. As shown in Fig. 3, the stops 30 have been housed in the fastener slider 60, and thus the forward movement of the fastener slider 60 is hindered. The stop 30 is a front stop, and the stop 30s is a rear stop.

[0021] The fastener slider 60 may have an upper wing 61, a lower wing 62, and a coupling pillar 63. The upper wing 61 and the lower wing 62 are arranged to be opposed with a constant interspace. The front end portion of the upper wing 61 and the front end portion of the lower wing 62 are coupled by the coupling pillar 63. Left-right pair of front mouths are arranged at the left and right positions of the coupling pillar 63 through which the fastener element 20 moves into the fastener slider 60 and through which the fastener element 20 moves out of the fastener slider 60 from the inside thereof. At least one of the upper wing 61 and the lower wing 62 may be provided with left-right pair of flanges 64. An element passage may be defined between the left or right flange 64 and the coupling pillar 63. Y-shaped element passage may be defined inside of the fastener slider 60. The fastener slider 60 may be made of a metal or a resin. The upper wing 61 of the fastener slider 60 may be provided with a pull tab attachment pillar 65, and a pull tab 66 may be attached to the pull tab attachment pillar 65.

[0022] Each one of the left-right paired fastener tapes 10 has a tape side-edge portion 15 being opposed to the other one of the fastener tapes 10, and the tape side-edge portion 15 extends along the elongated direction of the fastener tape 10, i.e. along the front-rear direction. The tape side-edge portion 15 is provided with a core thread 16. Likewise of the tape side-edge portion 15, the core thread 16 extends in the elongated direction of the fastener tape 10, i.e. front-rear direction. In the illustrated exemplary embodiment, the core thread 16 is provided across the tape side-edge portion 15 in the front-rear direction. In other embodiments, the core thread 16 may be provided in a part of the tape side-edge portion 15 in the front-rear direction, i.e. not provided across the whole region thereof.

[0023] In some embodiments, the fastener tape 10 may be a flexible cloth in which longitudinal warps and a lateral warp are woven, and may have an upper surface and a lower surface defining its thickness. The fastener tape 10 may have a tape main portion 14 and a tape side-edge portion 15, and the tape side-edge portion 15 is provided with the core thread 16. The core thread 16 may include one or more or two or more yarns extending in the front-rear direction, and may be secured to the tape side-edge portion 15 by being woven thereto. The core thread 16 may include a core thread top 16m projecting upward from the upper surface of the fastener tape 10 and a core thread bottom 16n projecting downward from the lower surface of the fastener tape 10.

[0024] In the illustrated exemplary embodiment, the fastener elements 20 are metal elements. The fastener elements 20 may be arranged at constant intervals in the front-rear direction along the tape side-edge portion 15

of the fastener tape 10, i.e. along the core thread 16 in particular. In other embodiment, the fastener element 20 may be a coil element in which a monofilament is wound helically, and may be sewn to the tape side-edge portion 15 of the fastener tape 10. In some embodiments, the core thread 16 may be provided inside of the coil element, and in other embodiments, the core thread 16 is not provided in the coil element. In yet other embodiments, the fastener elements 20 may be resin elements.

[0025] The stop 30 may be a metal stop and may be secured to the core thread 16 of the tape side-edge portion 15 of the fastener tape 10 through a swaging process. As shown in Figs. 4 to 6, the stop 30 may be configured to sandwich the core thread 16 of the tape side-edge portion 15 of the fastener tape 10, i.e. may have a first leg 35 at the upper surface side of the fastener tape 10, a second leg 36 at the lower surface side of the fastener tape 10, and a coupling portion 37 that couples the first leg 35 and the second leg 36. The first leg 35 may touch the core thread top 16m at the tape side-edge portion 15 and the second leg 36 may touch the core thread bottom 16n at the tape side-edge portion 15.

[0026] The core thread 16 of the tape side-edge portion 15 of the fastener tape 10 is held by and between the first leg 35 and the second leg 36, ensuring that the stop 30 is secured to the core thread 16 of the tape side-edge portion 15 of the fastener tape 10. The first leg 35 of the stop 30 may be referred to as an upper leg and the second leg 36 of the stop 30 may be referred to as a lower leg.

[0027] The coupling portion 37 may be provided outwardly of fastener tape relative to the first leg 35 and the second leg 36. The direction of outwardly of fastener tape may be a direction directed from a position on the surface of the fastener tape to a position outside of the fastener tape and, for example, may be a direction crossing the core thread from a position on the surface of the fastener tape to a position outside of the fastener tape. The first leg 35 and the second leg 36 are provided inwardly of fastener tape relative to the coupling portion 37. The direction of inwardly of fastener tape may be a direction directed from a position outside of the fastener tape to a position on the surface of the fastener tape and, for example, may be a direction crossing the core thread from a position outside of the fastener tape to a position on the surface of the fastener tape.

[0028] The coupling portion 37 may be positioned inwardly in the left-right direction relative to the first leg 35 and the second leg 36. Inwardly and outwardly in the left-right direction may be a direction recognized on the basis of the left-right pair of fastener stringers 50. For the closed left-right fastener stringers 50, the directions of inwardly and outwardly in the left-right direction can be described as follows. The inwardly in the left-right direction may be a direction directed to the engaged left-right fastener element lines in the left-right direction. The outwardly in the left-right direction may be a direction directed away from the engaged left-right fastener element lines.

[0029] As schematically shown in Fig. 7, sufficient

spacing is provided between the first leg 35 and the second leg 36 of the stop 30 before being swaged and deformed so that the core thread 16 of the tape side-edge portion 15 can be easily inserted into the space between the first leg 35 and the second leg 36. After the core thread 16 has been provided in the space between the first leg 35 and the second leg 36, the stop 30 may be plastically deformed so that the distance between the first leg 35 and the second leg 36 will be reduced.

[0030] The stop 30 may have a first outer surface 31 and second outer surface 32 that crosses the up-down direction. The first outer surface 31 is positioned at the same side as the upper surface of the fastener tape 10 in the up-down direction, and the second outer surface 32 is positioned at the same side as the lower surface of the fastener tape 10 in the up-down direction. The first outer surface 31 and the second outer surface 32 may sandwich the tape side-edge portion 15 and the core thread 16 and may face in opposite directions in the up-down direction. The first outer surface 31 and the second outer surface 32 have a width in the left-right direction, and a length in the front-rear direction. Each of the first outer surface 31 and the second outer surface 32 extends in the front-rear direction while having a substantially constant width.

[0031] The core thread 16 of the tape side-edge portion 15 may be provided between the first outer surface 31 and the second outer surface 32. The thickness TH30 of the stop 30 may be defined by the first outer surface 31 and the second outer surface 32. Each of the first outer surface 31 and the second outer surface 32 may occupy a rectangular region when viewed in elevation as illustrated in Figs. 1 to 3. In other words, each rim of the first outer surface 31 and the second outer surface 32 extends to draw a rectangular. In other embodiments, the first outer surface 31 and the second outer surface 32 each may have a shape viewed in elevation different from the illustrated one. Note that the first outer surface 31 may be referred to as an upper surface, and the second outer surface 32 may be referred to as a lower surface.

[0032] The stop 30 may have a connection surface 33 that extends in the up-down direction and interconnects the first outer surface 31 and the second outer surface 32. The connection surface 33 may be provided outwardly of fastener tape relative to the core thread 16 of the fastener tape 10. The connection surface 33 may connect the respective rims of the first outer surface 31 and the second outer surface 32 which are positioned inwardly in the left-right direction. The connection surface 33 may have a width in the up-down direction and may have a length in the front-rear direction. The connection surface 33 may extend in the front-rear direction while having a constant width in the up-down direction. The connection surface 33 may be oriented to be crossing or normal to the left-right direction. The connection surface 33 may be a surface that can touch the coupling pillar 63 of the fastener slider 60.

[0033] The stop 30 may have an opposite surface 34

positioned at the opposite side of the connection surface 33 in the left-right direction. The opposite surface 34 is provided inwardly of fastener tape relative to the core thread 16 of the fastener tape 10. The opposite surface 34 is divided by the fastener tape 10. The opposite surface 34 may be oriented to be crossing or normal to the left-right direction. Unlike the connection surface 33, the opposite surface 34 is provided over the fastener tape 10.

[0034] Specifically, the opposite surface 34 of the stop 30 may include a terminal surface 34m of the first leg 35 extending inwardly of fastener tape from the coupling portion 37 and a terminal surface 34n of the second leg 36 extending inwardly of fastener tape from the coupling portion 37. The terminal surface 34m of the first leg 35 may be oriented substantially normal to the upper surface of the fastener tape, and the terminal surface 34n of the second leg 36 may be oriented substantially normal to the lower surface of the fastener tape.

[0035] The stop 30 may include a first end surface 301 and a second end surface 302 which extend in the up-down direction to couple the first outer surface 31 and the second outer surface 32, and the first end surface 301 and a second end surface 302 are oriented to face in opposite directions one another in the front-rear direction. The first end surface 301 and the second end surface 302 are provided to cross the core thread 16 of the fastener tape 10. The first end surface 301 may be referred to as a front end surface, and the second end surface 302 may be referred to as a rear end surface. The first end surface 301 couples the front-side of the rim of the first outer surface 31 and the front-side of the rim of the second outer surface 32. The second end surface 302 couples the rear-side of the rim of the first outer surface 31 and the rear-side of the rim of the second outer surface 32.

[0036] It should be noted that the first outer surface 31 may be a surface across the first leg 35 and the coupling portion 37. Likewise, the second outer surface 32 may be a surface across the second leg 36 and the coupling portion 37. The connection surface 33 may be one side surface of the coupling portion 37. The connection surface 33 of the stop 30 may be a surface to be opposed to the other one of paired stops 30, and thus it could be referred to as an opposed surface.

[0037] The stop 30 may include two ends 48 of the first end portion 38e and the second end portion 38g in a direction along the core thread 16, i.e. the front-rear direction, and an intermediate portion 39 between the two ends 38. The first end portion 38e may be referred to as a front end portion, and the second end portion 38g may be referred to as a rear end portion. The first end portion 38e of the stop 30 may be positioned farther away from the fastener element 20 than the second end portion 38g. The second end portion 38g of the stop 30 may be positioned closer to the fastener element 20 than the first end portion 38e and may be positioned adjacent to the fastener element 20.

[0038] In a non-limiting example, the length L38e of

the first end portion 38e along the core thread 16, the length L38g of the second end portion 38g along the core thread 16, the length L39 of the intermediate portion 39 along the core thread 16 may be as follows. L38e=1.43mm, L38g=1.43mm, L39=0.94mm. In this case, the length L30 of the stop 30 along the core thread 16 is 3.8mm. In some embodiments, L38e>L39 is satisfied and L38g>L39 is satisfied, thereby suitably realizing the balancing between appearance of the stop 30 and the attachment strength. In some embodiments, the length L39 of the intermediate portion 39 included in the length L30 of the above-described stop 30 is about 25% to 40%. In other words, $(L39/L30) \times 100 = 25$ to 40 may be satisfied in some embodiments, thereby suitably realizing the balancing between appearance of the stop 30 and the attachment strength.

[0039] In the present embodiment, the first end portion 38e of the stop 30 may be provided with a first slant surface 41 extending along the core thread 16 to reach the front side of the rim of the first outer surface 31 while being gradually closer to the core thread 16 and a second slant surface 42 extending along the core thread 16 to reach to the front side of the rim of the second outer surface 32 while being gradually closer to the core thread 16. In the illustrated example, the respective slant degrees of the first slant surface 41 and the second slant surface 42 are equal one another. In the stop 30 provided with the first slant surface 41 and the second slant surface 42, the thickness TH38 of the first end portion 38e at the front extremity is less than the thickness TH39 of a portion of the stop 30 other than the first end portion 38e, i.e. the thickness TH39 of the intermediate portion 39 in the illustrated example. Accordingly, sufficient attachment strength of the stop 30 to the core thread 16 may be achieved without greatly deforming the stop 30 plastically.

[0040] Note that the tape side-edge portion 15 and the core thread 16 are provided between the first slant surface 41 and the second slant surface 42. Furthermore, the up-down distance between the first slant surface 41 and the second slant surface 42 may be gradually reduced as the first slant surface 41 extends toward the rim of the first outer surface 31 and the second slant surface 42 extends toward the rim of the second outer surface 32. The first slant surface 41 in the first outer surface 31 extends towards a side away from the fastener element 20 in the front-rear direction to reach the rim of the first outer surface 31. Also, the second slant surface 42 in the second outer surface 32 extends towards a side away from the fastener element 20 in the front-rear direction to reach the rim of the second outer surface 32. The thickness TH30 of the stop 30 may be reduced gradually from the intermediate portion 39 towards the front extremity of the first end portion 38e, thus deterioration of the appearance is thus prevented.

[0041] The first end portion 38e of the stop 30 provided with the first slant surface 41 and the second slant surface 42 may be an end portion of the stop 30 being positioned

farther away from the fastener element 20 along the core thread 16. Therefore, when forward movement of the fastener slider 60 is prevented, the stop 30 may be able to sufficiently withstand a force applied from the fastener slider 60.

[0042] As shown in Fig. 6, the first end portion 38e may have a first slant inner surface 41k that slants corresponding to the first slant surface 41 and a second slant inner surface 42k that slants corresponding to the second slant surface 42. Thus, the first end portion 38e may have first and second edge portions 35m, 35n that bite into the core thread 16. The first leg 35 has a first edge portion 35m that bites into the core thread top 16m in accordance with the first slant surface 41 and the first slant inner surface 41k. Likewise, the second leg 36 has a second edge portion 35n that bites into the core thread bottom 16n in accordance with the second slant surface 42 and the second slant inner surface 42k. Due to the first edge portion 35m and the second edge portion 35n, the distance between the front end portion 35e of the first leg 35 and the front end portion 36e of the second leg 36 is reduced. The first slant inner surface 41k of the front end portion 35e of the first leg 35 is a contact surface that touches the core thread 16. The second slant inner surface 42k of the front end portion 36e of the second leg 36 is a contact surface that touches the core thread 16.

[0043] Still further, in the present embodiment, a second end portion 38g of the stop 30 is provided with a third slant surface 43 extending along the core thread 16 to reach the rear side of the rim of the first outer surface 31 while being gradually closer to the core thread 16 and a fourth slant surface 44 extending along the core thread 16 to reach to the rear side of the rim of the second outer surface 32 while being gradually closer to the core thread 16. In the illustrated example, the respective slant degrees of the third slant surface 43 and the fourth slant surface 44 are equal one another. In the stop 30 being provided with the third slant surface 43 and the fourth slant surface 44, the thickness TH38 of the second end portion 38g at the rear extremity is less than the thickness TH39 of an intermediate portion 39 between the first end portion 38e and the second end portion 38g. Accordingly, the stop 30 may be more sufficiently secured to the core thread 16, and symmetry appearance of the stop 30 in the left-right direction may be further ensured.

[0044] Note that the tape side-edge portion 15 and the core thread 16 are provided between the third slant surface 43 and the fourth slant surface 44. The up-down distance between the third slant surface 43 and the fourth slant surface 44 may be gradually reduced as the third slant surface 43 extends toward the rim of the first outer surface 31 and the fourth slant surface 42 extends toward the rim of the second outer surface 32. The third slant surface 43 extends towards a side closer to the fastener element 20 and reaches the rim of the first outer surface 31. The fourth slant surface 44 extends towards a side closer to the fastener element 20 and reaches the rim of the second outer surface 32. The thickness TH30 of the

stop 30 may be reduced gradually from the intermediate portion 39 towards the rear extremity of the second end portion 38g, thus deterioration of the appearance is thus prevented.

[0045] In a case where the third slant surface 43 and the fourth slant surface 44 are provided at the stop 30 additionally to the first slant surface 41 and the second slant surface 42, the respective thicknesses TH38 at the both ends 38 of the stop 30 along the core thread 16 in the front-rear direction are less than the thickness TH39 of the intermediate portion 39 between the both ends 38. Accordingly, sufficient attachment strength of the stop 30 to the core thread 16 may be achieved without greatly deforming the stop 30 plastically.

[0046] As shown in Fig. 6, the second end portion 38g is provided with a third slant inner surface 43k that slants corresponding to the third slant surface 43 and a fourth slant inner surface 44k that slants corresponding to the fourth slant surface 44. Thus, the second end portion 38g may have third and fourth edge portions 35p, 35q that bite into the core thread 16. The first leg 35 has the third edge portion 35p that bites into the core thread top 16m in accordance with the third slant surface 43 and the third slant inner surface 43k. Likewise, the second leg 36 has a fourth edge portion 35q that bites into the core thread bottom 16n in accordance with the fourth slant surface 44 and the fourth slant inner surface 44k. Due to the third edge portion 35p and the fourth edge portion 35q, the distance between the rear end portion 35g of the first leg 35 and the rear end portion 36g of the second leg 36 is reduced. The third slant inner surface 43k of the rear end portion 35g of the first leg 35 is a contact surface that touches the core thread 16. The fourth slant inner surface 44k of the rear end portion 36g of the second leg 36 is a contact surface that touches the core thread 16.

[0047] The first leg 35 may have an intermediate inner surface 45k between the above-described first and third slant inner surfaces 41k, 43k which are respectively provided at the front end portion 35e and the rear end portion 35g of the first leg 35. The intermediate inner surface 45k also touches the core thread top 16m. The second leg 36 may have an intermediate inner surface 46k between the above-described second and fourth slant inner surfaces 42k, 44k which are respectively provided at the front end portion 36e and the rear end portion 36g of the second leg. The intermediate inner surface 46k also touches the core thread bottom 16n. Note that the inner surface of the first leg 35 and the inner surface of the second leg 36 are surfaces being opposed and sandwiching the core thread 16. The inner surface of the first leg 35 may be referred to as a first inner surface, and the inner surface of the second leg 36 may be referred to as a second inner surface.

[0048] In the illustrated exemplary embodiment, the stop 30 is provided with all of the first slant surface 41, the second slant surface 42, the third slant surface 43, and the fourth slant surface 44. However, it is envisaged that only one of the first pair of the first slant surface 41

and the second slant surface 42 and the second pair of the third slant surface 43 and the fourth slant surface 44 is employed in other embodiments. That is, there is no requirement to employ both of that pairs. In other embodiments, the first slant surface 41 and the second slant surface 42 can be omitted, and the third slant surface 43 and the fourth slant surface 44 may be employed. In this case, only two slant surfaces of the third slant surface 43 and the fourth slant surface 44 in total are provided at the stop 30, and thus the "third" slant surface will be named as a "first" slant surface, and the "fourth" slant surface will be named as a "second" slant surface.

[0049] As understood from the schematic view of Fig. 6, the first slant surface 41 is provided in the first outer surface 31 of the stop 30, and accordingly the front end portion 35e of the first leg 35 slants forward downward. The second slant surface 42 is provided in the second outer surface 32 of the stop 30, and accordingly the front end portion 36e of the second leg 36 slants forward upward. The distance between the front end portion 35e of the first leg 35 and the front end portion 36e of the second leg 36 may be sufficiently reduced so that the core thread 16 may be firmly held by and between the two.

[0050] As understood from the schematic view of Fig. 6, the third slant surface 43 is provided in the first outer surface 31 of the stop 30, and accordingly the rear end portion 35g of the first leg 35 slants rearward downward. The fourth slant surface 44 is provided in the second outer surface 32 of the stop 30, and accordingly the rear end portion 36g of the second leg 36 slants rearward upward. The distance between the rear end portion 35g of the first leg 35 and the rear end portion 36g of the second leg 36 may be sufficiently reduced so that the core thread 16 may be firmly held by and between the two.

[0051] An intermediate portion 35f is provided between the front end portion 35e and the rear end portion 35g of the first leg 35, and an intermediate portion 36f is provided between the front end portion 36e and the rear end portion 36g of the second leg 36. The distance between the intermediate portion 35f of the first leg 35 and the intermediate portion 36f of the second leg 36 may be set sufficiently large.

[0052] The stop 30 may have the minimum thickness TH30min at the first end portion 38e and the second end portion 38g. The stop 30 may have the maximum thickness TH30max at the intermediate portion 39 between the first end portion 38e and the second end portion 38g.

[0053] As illustrated in Fig. 6, the stop 30 may be positioned adjacent to the fastener element 20. In the illustrated exemplary embodiment, the stop 30 is positioned next to the front end of the fastener element line. It is envisaged that the stop 30 is positioned next to the rear end of the fastener element line in other embodiments. As discussed above, the fastener elements 20 may be metal elements. A skilled person would appreciate that the fastener element 20 may have a first leg 21, second leg 22, and a coupling portion coupling the first leg 21 and the second leg 22, likewise of the stop 30. The core

thread 16 is positioned between the first outer surface 21m of the first leg 21 and the second outer surface 22m of the second leg 22. The thickness TH20 of the fastener element 20 may be defined by the first outer surface 21m of the first leg 21 and the second outer surface 22m of the second leg 22.

[0054] In some embodiments, the minimum thickness TH30min of the first end portion 38e and the second end portion 38g of the above-described stop 30 may be less than the thickness TH20 of the fastener element 20. In some embodiments, the minimum thickness TH30min of the first end portion 38e and the second end portion 38g of the above-described stop 30 may be equal to the thickness TH20 of the fastener element 20.

[0055] Note that the fastener element 20 have a base provided inwardly of fastener tape, and an engagement head provided outwardly of fastener tape. Fig. 6 illustrates a sectional configuration of the base of the fastener element 20.

[0056] As would be appreciated with reference to Fig. 4, relatively large projection and/or recess is not formed in the first outer surface 31 of the stop 30, and the first outer surface 31 is configured mainly from the slant surfaces and the flat surface. The above-described first slant surface 41 and the third slant surface 43 are provided in the first outer surface 31 and a flat surface 45 is provided between them. A slant surface 471 and a slant surface 473 are provided outwardly of fastener tape relative to the first slant surface 41, the flat surface 45, and third slant surface 43. The slant surface 471 may be steeper than the slant surface 473. The slant surface 473 slants moderately and may be substantially flat in some embodiments. In some embodiments, the boarder between the slant surface 471 and the slant surface 473 is not clearly visible. Note that the second outer surface 32 may be provided with the above-described second slant surface 42 and the fourth slant surface 44, and the flat surface 46 is provided between them. A slant surface 472 and a slant surface 474 are provided outwardly of fastener tape relative to the second slant surface 42, the flat surface 46, and the fourth slant surface 44. The slant surface 472 may be steeper than the slant surface 474. The slant surface 474 slants moderately and may be substantially flat in some embodiments. In the illustrated example, the flat surfaces 45, 46 are surfaces in parallel to the fastener tape 10.

[0057] In the present embodiment, the attachment strength of the stop 30 to the core thread 16 is secured without relying on the projection or recess provided on the stop 30. In the present embodiment, the attachment strength of the stop 30 to the core thread 16 is secured by the core thread 16 being sandwiched by the first leg 35 and the second leg 36 at the first end portion 38e of the stop 30 based on the formation of the above-described first slant surface 41 and the second slant surface 42 and/or by the core thread 16 being sandwiched by the first leg 35 and the second leg 36 at the second end portion 38g of the stop 30 based on the formation of the

above-described third slant surface 43 and the fourth slant surface 44. No relatively large projection or recess is formed at the stop 30, thus the appearance of the stop 30 is secured. By providing the pair of the first slant surface 41 and the second slant surface 42 or the pair of the third slant surface 43 and the fourth slant surface 44, self-alignment of the stop 30 may be facilitated before being swaged in a swaging apparatus when the stop 30 is attached to the core thread 16 by swaging as described below.

[0058] As shown in Fig. 4, the left-right width of the first slant surface 41 may increase as being away from the flat surface 45. The left-right width of the third slant surface 43 may increase as being away from the flat surface 45. Similarly, the left-right width of the second slant surface 42 may increase as being away from the flat surface 46. The left-right width of the fourth slant surface 44 may increase as being away from the flat surface 46. In some embodiments, the left-right width of the first slant surface 41 may increase to be equal to or greater than 1/2 (one half) of the left-right width of the core thread 16. The same applies to the third slant surface. The left-right width of the second slant surface 42 may also increase to be equal to or greater than 1/2 (one half) of the left-right width of the core thread 16. The same applies to the fourth slant surface 44. In such embodiments, attachment strength of the stop 30 to the core thread 16 may be improved.

[0059] In some embodiments, the first slant surface 41 may be arranged above a portion R16 of the core thread 16 which has the maximum thickness. The same applies to the third slant surface. The first slant surface 42 may be arranged above a portion R16 of the core thread 16 which has the maximum thickness. The same applies to the fourth slant surface. In such arrangements, attachment strength of the stop 30 to the core thread 16 may be improved.

[0060] In some embodiments, the first slant inner surface 41k touches a portion of the core thread 16 which has the maximum thickness. The same applies to the third slant inner surface. The second slant inner surface 42k touches a portion of the core thread 16 which has the maximum thickness. The same applies to the fourth slant inner surface 44k. In such arrangements, attachment strength of the stop 30 to the core thread 16 may be improved.

[0061] The stop 30 before being swaged may be attached to the core thread 16 of the tape side-edge portion 15 of the fastener tape 10 through swaging using a swaging apparatus 80 shown in Fig. 8. The swaging apparatus 80 may have a first arm 83 in which a first press part 81 for pressing the first leg 35 of the stop 30 is provided at the terminal, and a second arm 84 in which a second press part 82 for pressing the second leg 36 of the stop 30 is provided at the terminal. The first arm 83 and the second arm 84 are axially coupled via a coupling axis 85, and can pivot one another. Before being swaged, the stop 30 may be thrown in between the first press part 81 and the second press part 82 and may be held tempo-

rarily. During the process of swaging, the first arm 83 and the second arm 84 rotates in opposite directions so that the first press part 81 moves closer to the second press part 82, the second press part 82 moves closer to the first press part 81, resulting in that the distance between the first press part 81 and the second press part 82 is reduced and, in turn, the core thread 16 is held sufficiently between the first leg 35 and the second leg 36 of the stop 30.

[0062] The first press part 81 may have a pressing surface 81m for pressing the first leg 35 of the stop 30, and this pressing surface 81m may be provided with two sloped surfaces for forming the first slant surface 41 and the third slant surface 43. A flat surface may be provided between these two sloped surfaces for forming the flat surface 45. The pressing surface 81m may be configured to form the above-described slant surface 471 and the slant surface 473 in the first outer surface 31.

[0063] The second press part 82 may have a pressing surface 82m for pressing the second leg 36 of the stop 30, and this pressing surface 82m may be provided with two sloped surfaces for forming the second slant surface 42 and the fourth slant surface 44. A flat surface may be provided between these two sloped surfaces for forming the flat surface 46. The pressing surface 82m may be configured to form the above-described slant surface 472 and the slant surface 474 in the second outer surface 32.

[0064] While the stop 30 is held temporarily between the first press part 81 and the second press part 82 as illustrated in Fig. 9(a), the stop 30 may possibly be not oriented as intended between the two. In the present embodiment, the pressing surface 81m of the first press part 81 is provided with the sloped surface, and the pressing surface 82m of the second press part 82 is provided with the sloped surface so that correct orientation of the stop 30 while being swaged may possibly be facilitated as shown in Fig. 9(b). This may ensure the self-alignment of the stop 30. Note that there is no need to provide two sloped surfaces in the pressing surface 81m, 82m. In some embodiments, only the sloped surface for forming the first slant surface 41 is provided at the first press part 81, and only the sloped surface for forming the second slant surface 42 is provided at the second press part 82. Even in this case, the self-alignment of stops may be achieved.

[0065] In the stop 30z according to a comparative example shown in Fig. 10, any one of the first to fourth slant surfaces is not formed in the first outer surface 31 and the second outer surface 32. A swaging apparatus 80z shown in Fig. 11 is one for producing the stop 30z shown in Fig. 10. Sloped surfaces for forming the first slant surface 41 and the third slant surface 43 are not provided in the first press part 81 of the swaging apparatus 80z shown in Fig. 11. Similarly, sloped surfaces for forming the second slant surface 42 and the fourth slant surface 44 are not provided in the second press part 82. Thus, the self-alignment of stops 30 as described with reference to Fig. 9 may not be promoted, possibly inviting the

lowered attachment strength of the stop 30 to the core thread 16.

<Second Embodiment>

[0066] A second embodiment will be discussed with reference to Fig. 12. Fig. 12 is a schematic sectional view of a stop included in a fastener stringer, additionally illustrating a sectional configuration of a fastener element adjacent to the stop.

[0067] In the present embodiment, the first slant surface 41 is provided across the entire length of the stop 30 in the front-rear direction, and the second slant surface 42 is provided across the entire length of the stop 30 in the front-rear direction. Even in this case, the same effects will be obtained with the first embodiment. The stop 30 has the minimum thickness at the first end portion 38e and the maximum thickness at the second end portion 38g.

<Further comparative example>

[0068] In the stop 30zz according to a comparative example shown in Fig. 13, two recesses 305 are formed in the first outer surface 31, and two recesses 305 are similarly formed in the second outer surface 32. In this case, it is required to give relatively larger deformation to the stop 30. Such a large deformation is not always acceptable. The self-alignment of stops 30 at the swaging apparatus 80 may not be possible either.

<Further embodiment>

[0069] Fig. 14 is a schematic partial perspective view of a rear stop 30s in Fig. 1. The rear stop 30s has the identical configuration with the front stop 30 of Fig. 1. In particular, this rear stop 30s is provided with a first outer surface and a second outer surface facing in opposite directions and sandwiching the core thread of the tape side-edge portion. A first end of the stop in a direction along the core thread is provided with a first slant surface extending along the core thread to reach to a rim of the first outer surface while being gradually closer to the core thread and a second slant surface extending along the core thread to reach to a rim of the second outer surface while being gradually closer to the core thread. The thickness of the first end of the stop being provided with the first slant surface and the second slant surface is less than a thickness of a portion of the stop other than said first end. The above-described other features of the front stop 30 may be similarly applicable to the rear stop 30s illustrated in Fig. 1 and 14. That is, the stops of the present disclosure should not be limited to the front stop and would be usable for the rear stop.

[0070] Given the above teachings, a skilled person in the art would be able to add various modifications to the respective embodiments. Reference codes included in claims are just for reference and should not be referenced

for purposes of narrowly construing the scope of claims.

[Reference Signs List]

5	[0071]
10	Fastener tape
15	Tape side-edge portion
16	Core thread
10 20	Fastener element
30	Stop
31	First outer surface
32	Second outer surface
38e	First end portion
15 38g	Second end portion
39	Intermediate portion
41	First slant surface
42	Second slant surface
50	Fastener stringer
20 60	Fastener slider
70	Slide fastener

Claims

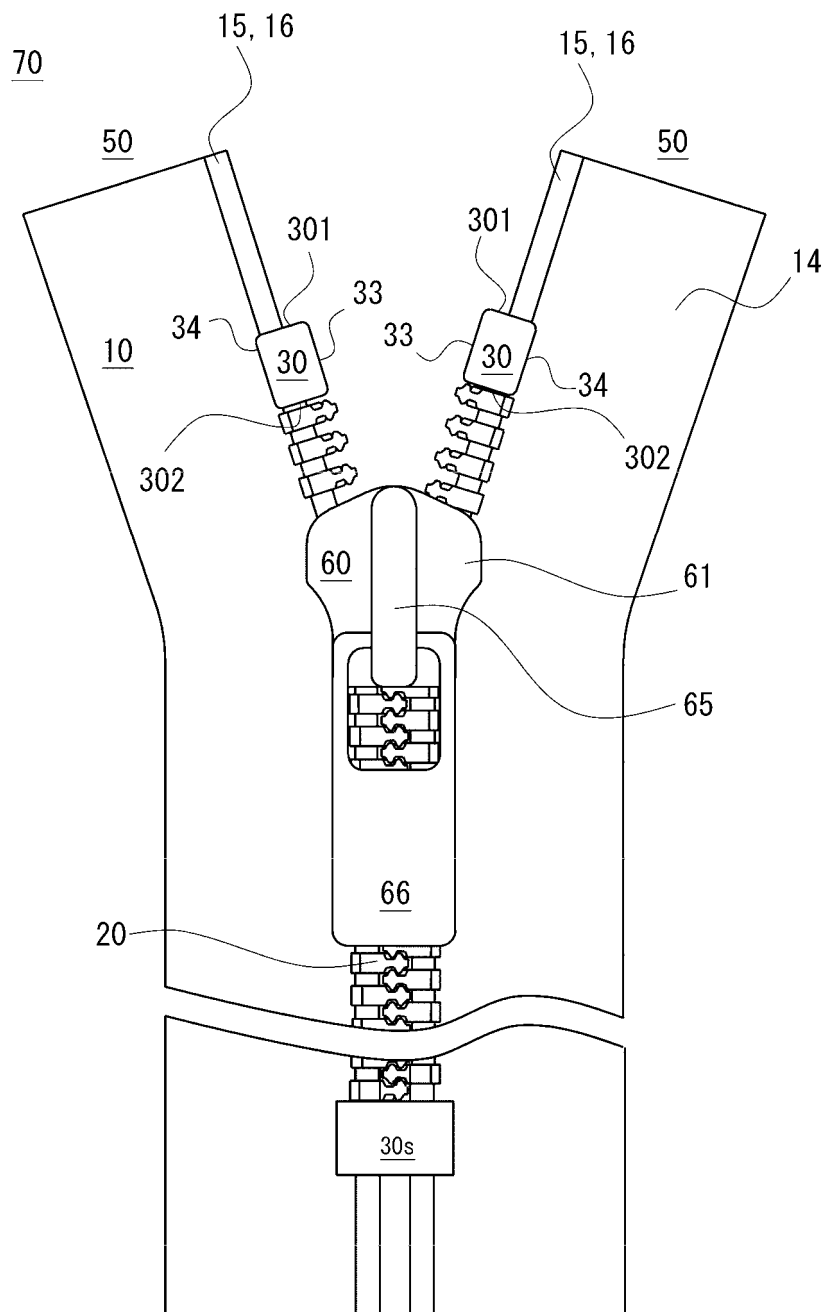
1. A fastener stringer (50) comprising:

a fastener tape (10) in which a tape side-edge portion (15) is provided with a core thread (16); a fastener element (20) secured to the tape side-edge portion (15) of the fastener tape (10); and a metal stop (30, 30s) secured to the core thread (16) of the tape side-edge portion (15) of the fastener tape (10) at an adjacent position to the fastener element (20), wherein the stop (30, 30s) is provided with a first outer surface (31) and a second outer surface (32) facing in opposite directions and sandwiching the core thread (16) of the tape side-edge portion (15), a first end portion (38e) of the stop (30, 30s) in a direction along the core thread (16) is provided with a first slant surface (41) extending along the core thread (16) to reach to a rim of the first outer surface (31) while being gradually closer to the core thread (16) and a second slant surface (42) extending along the core thread (16) to reach to a rim of the second outer surface (32) while being gradually closer to the core thread (16), and a thickness (TH38) of the first end portion (38e) of the stop (30, 30s) being provided with the first slant surface (41) and the second slant surface (42) is less than a thickness (TH39) of a portion of the stop (30, 30s) other than said first end portion (38e).

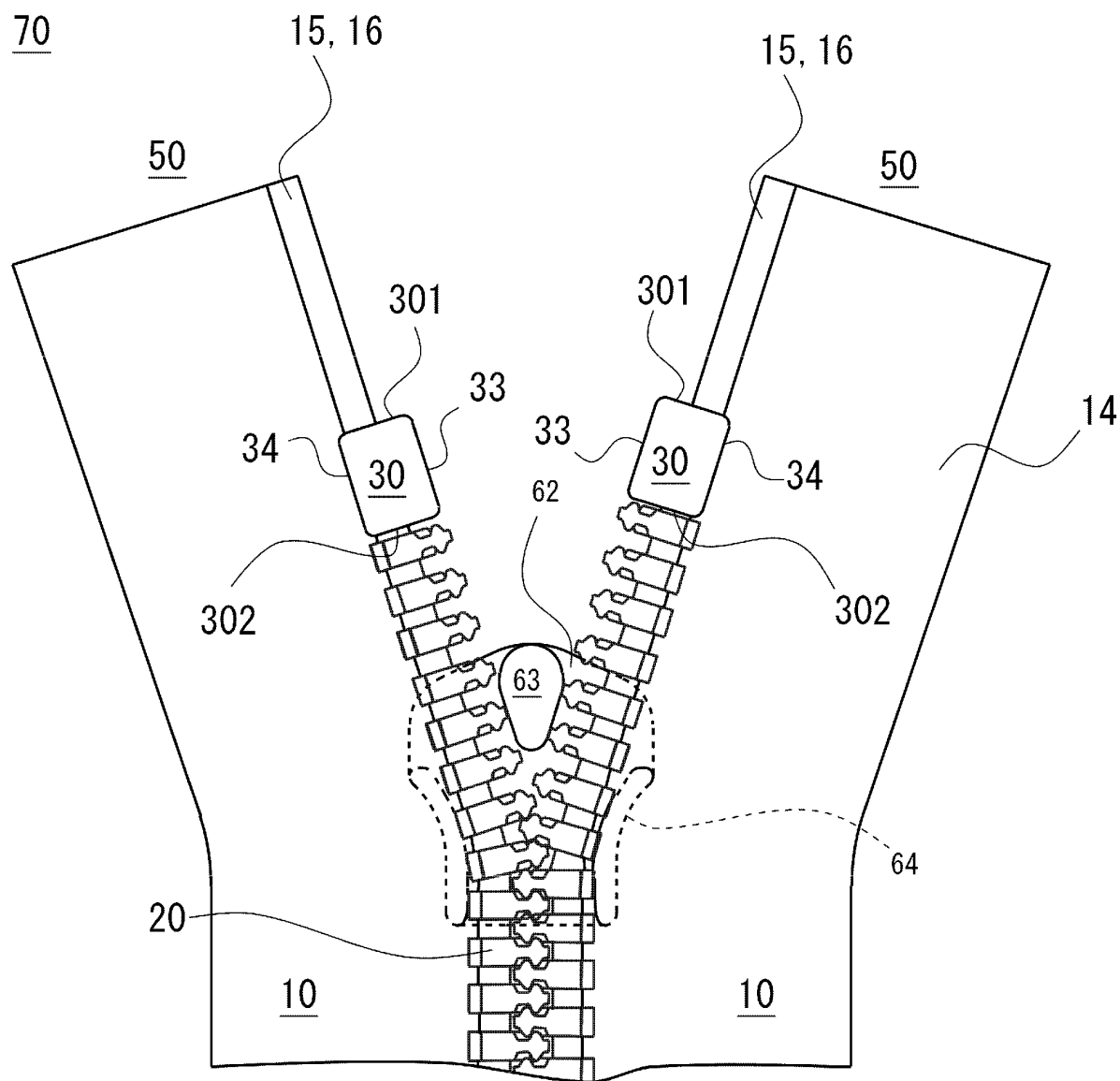
2. The fastener stringer (50) according to Claim 1,

- wherein the first end portion (38e) of the stop (30, 30s) being provided with the first slant surface (41) and the second slant surface (42) is an end portion of the stop (30, 30s) being positioned farther away from the fastener element (20) along the core thread (16).
3. The fastener stringer (50) according to Claim 1 or 2, wherein the first end portion (38e) is provided with a first slant inner surface (41k) that slants corresponding to the first slant surface (41) and a second slant inner surface (42k) that slants corresponding to the second slant surface (42), and wherein the first end portion (38e) comprises an edge portion (35m, 35n) that bites into the core thread (16).
 4. The fastener stringer (50) according to any one of Claims 1 to 3, wherein a second end portion (38g) of the stop (30, 30s) along the core thread (16) is provided with a third slant surface (43) extending along the core thread (16) to reach to a rim of the first outer surface (31) while being gradually closer to the core thread (16) and a fourth slant surface (44) extending along the core thread (16) to reach to a rim of the second outer surface (32) while being gradually closer to the core thread (16), and a thickness (TH38) of the second end portion (38g) of the stop (30, 30s) being provided with the third slant surface (43) and the fourth slant surface (44) is less than a thickness (TH39) of an intermediate portion (39) of the stop (30, 30s) between the first end portion (38e) and the second end portion (38g) of the stop (30, 30s).
 5. The fastener stringer (50) according to Claim 4, wherein the second end portion (38g) is provided with a third slant inner surface (43k) that slants corresponding to the third slant surface (43) and a fourth slant inner surface (44k) that slants corresponding to the fourth slant surface (44), and wherein the second end portion (38g) comprises an edge portion (35p, 35q) that bites into the core thread (16).
 6. The fastener stringer (50) according to Claim 4 or 5, wherein a flat surface (45) is provided between the first slant surface (41) and the third slant surface (43), and a flat surface (46) is provided between the second slant surface (42) and the fourth slant surface (44).
 7. A slide fastener comprising:
 - a pair of fastener stringers (50) each being equivalent of the fastener stringer (50) according to any one of Claims 1 to 6; and
 - a fastener slider (60) for opening and closing the pair of fastener stringers (50).
 8. The slide fastener according to Claim 7, wherein the pair of fastener stringers (50) is closed by the forward movement of the slider, and the stop (30, 30s) is provided at a frontward adjacent position relative to the fastener element (20).
 9. A swaging apparatus for producing the fastener stringer (50) of Claim 1, the swaging apparatus comprising:
 - a first press part (81) and a second press part (82) for swaging the stop (30, 30s) to be attached to the core thread (16), wherein
 - the first press part (81) is provided with a sloped surface for forming the first slant surface (41) of the stop (30, 30s), and
 - the second press part (82) is provided with a sloped surface for forming the second slant surface (42) of the stop (30, 30s).

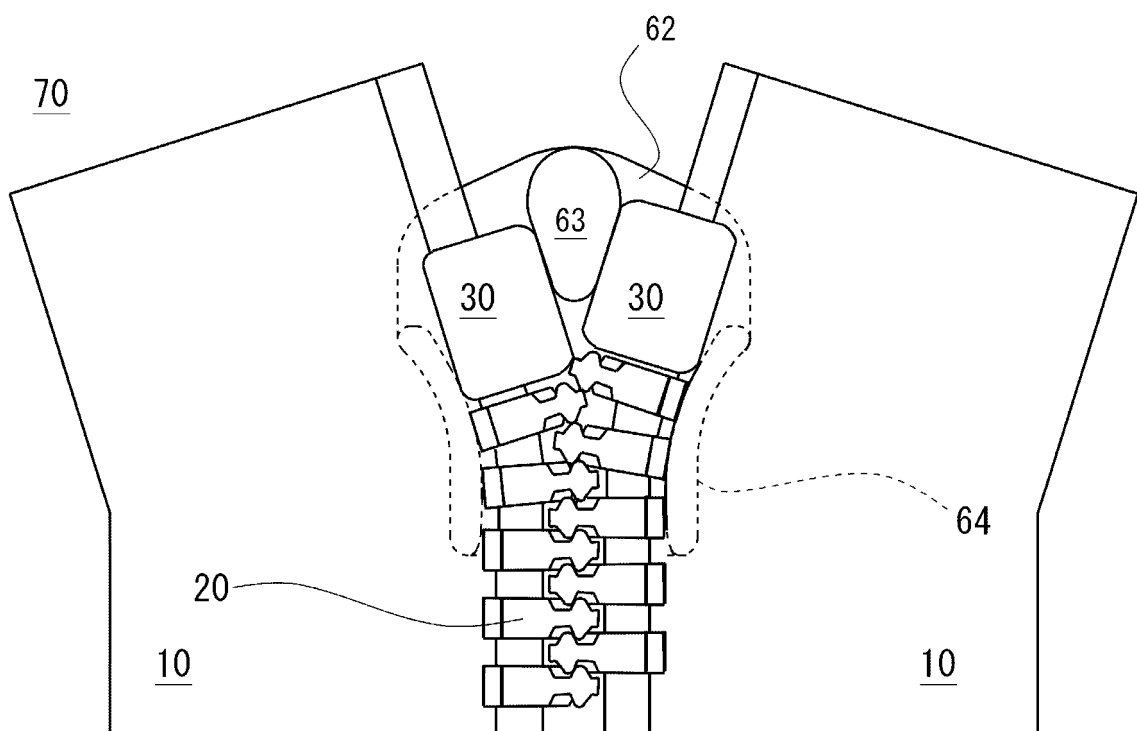
[Fig. 1]



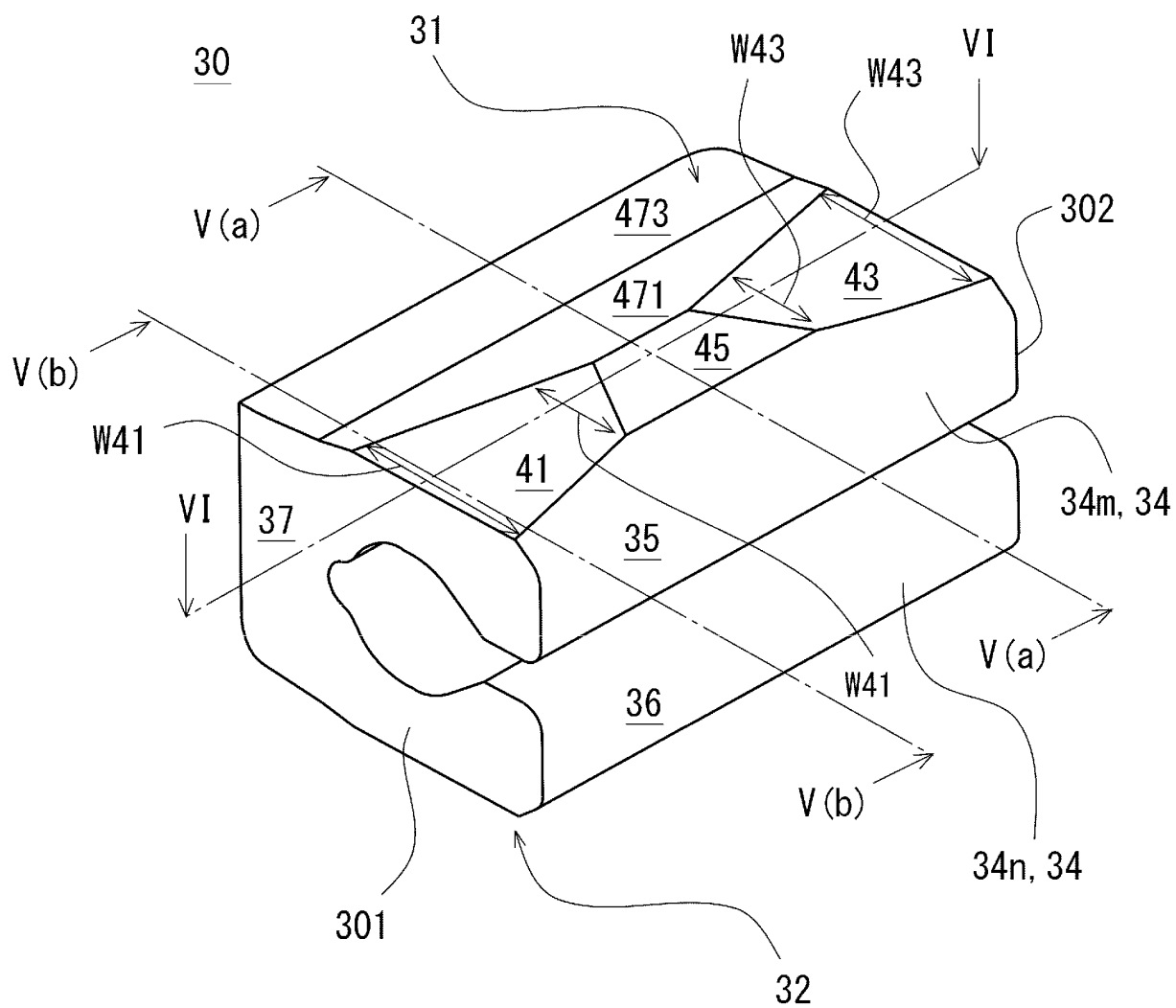
[Fig. 2]



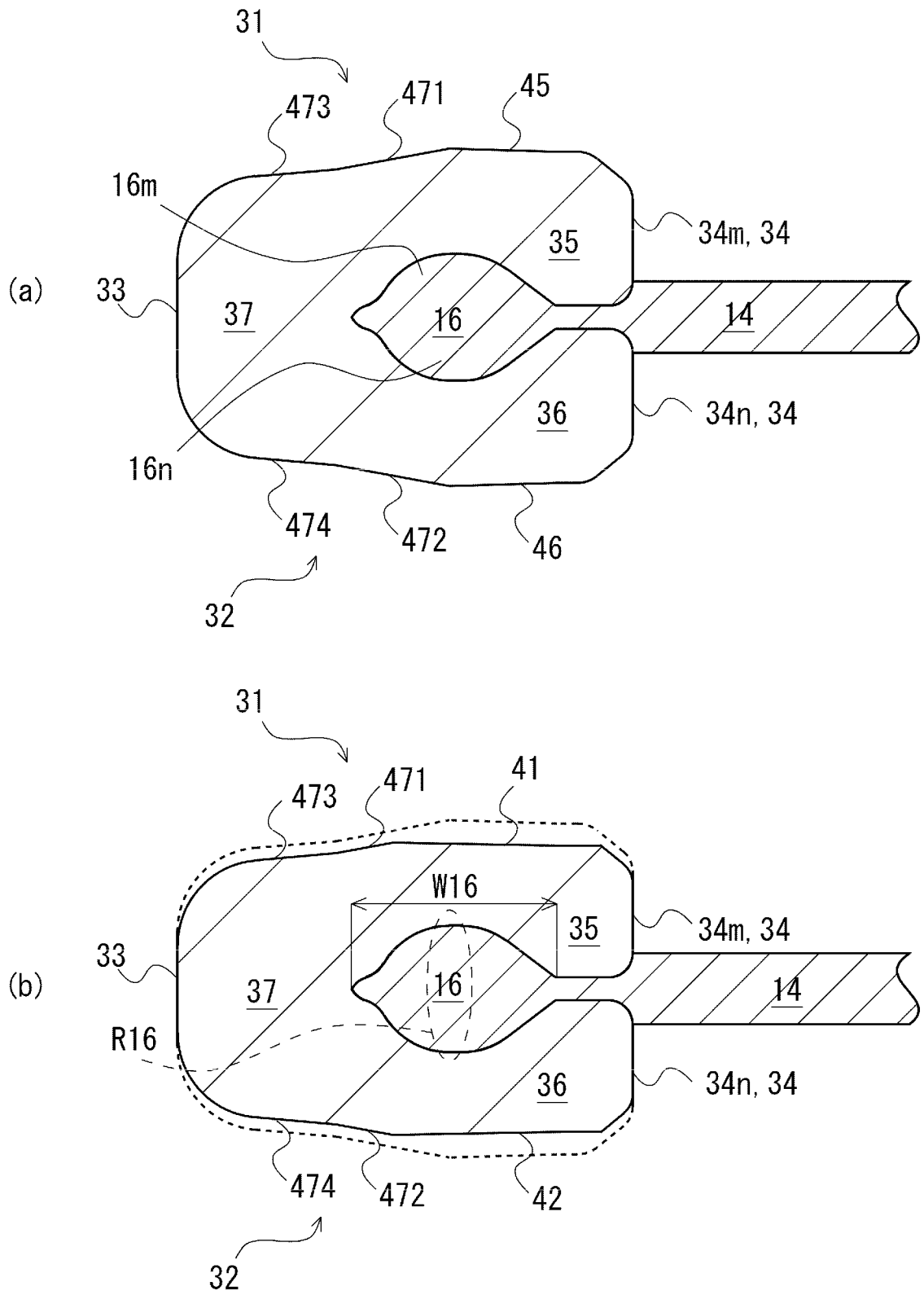
[Fig. 3]



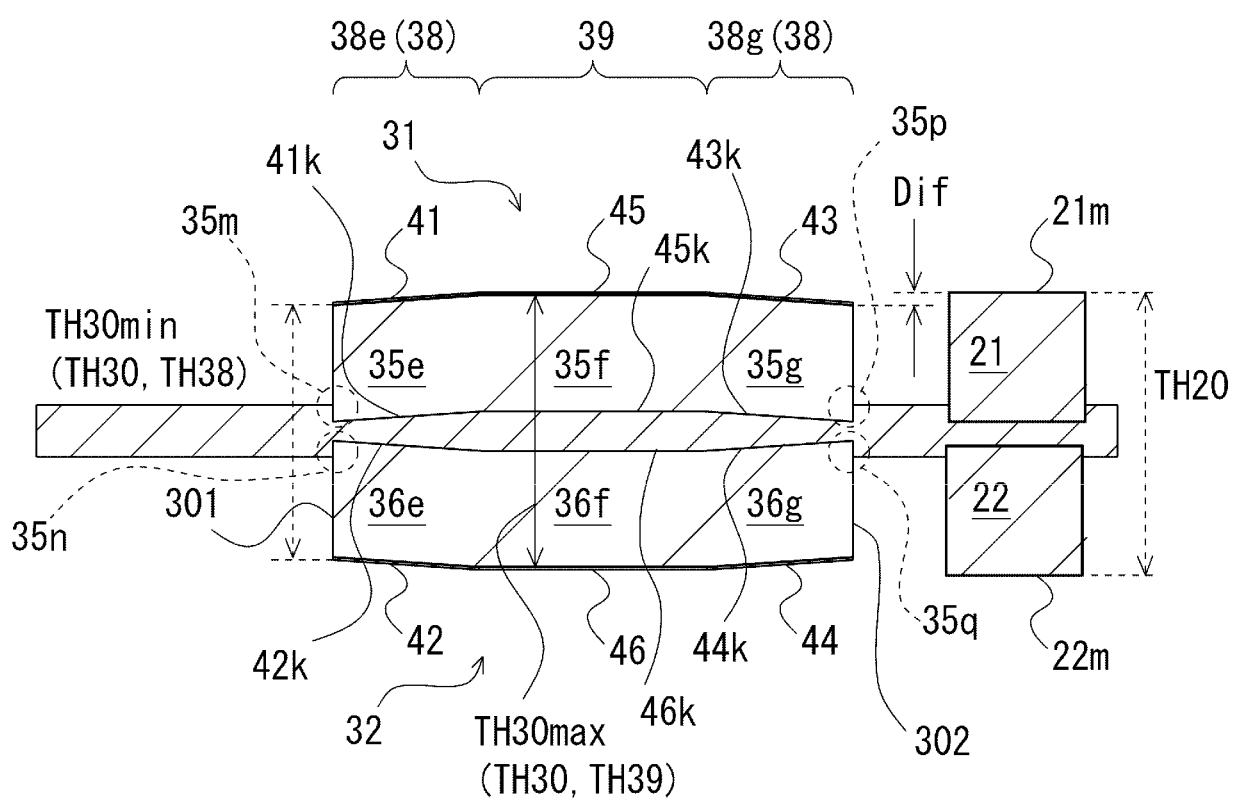
[Fig. 4]



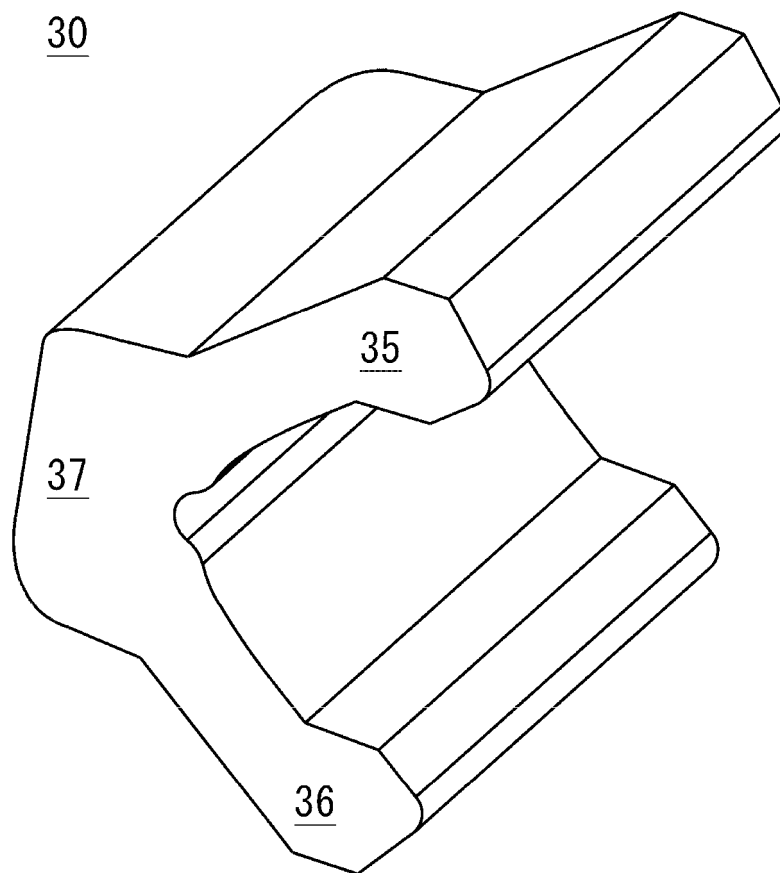
[Fig. 5]



[Fig. 6]

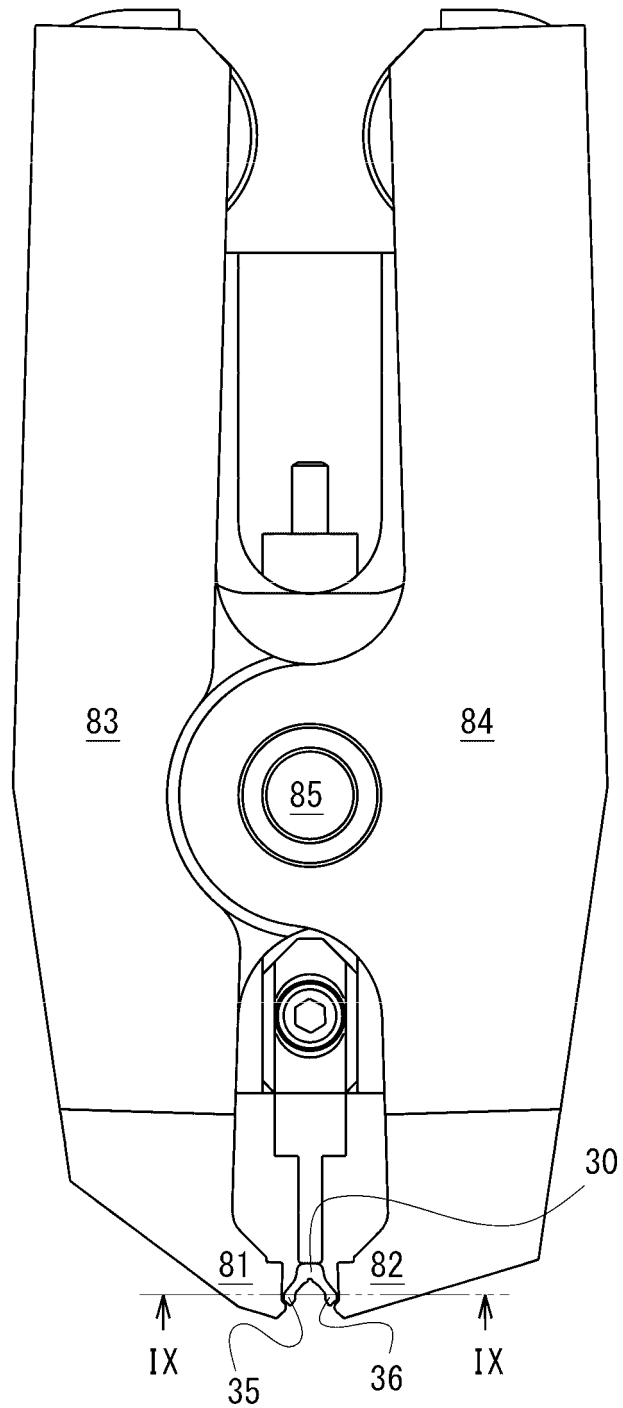


[Fig. 7]

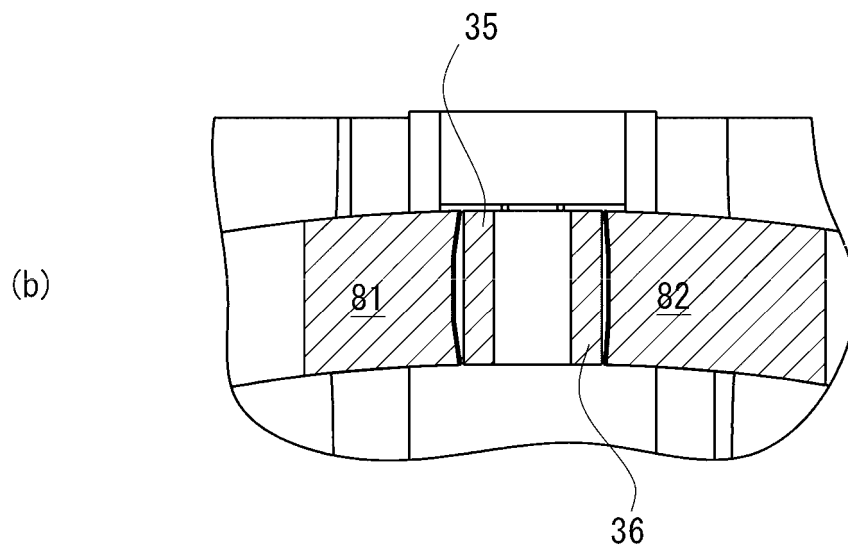
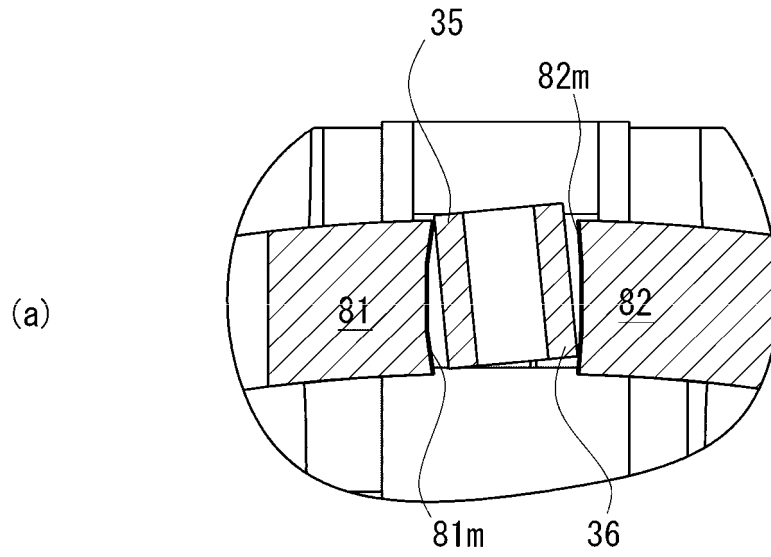


[Fig. 8]

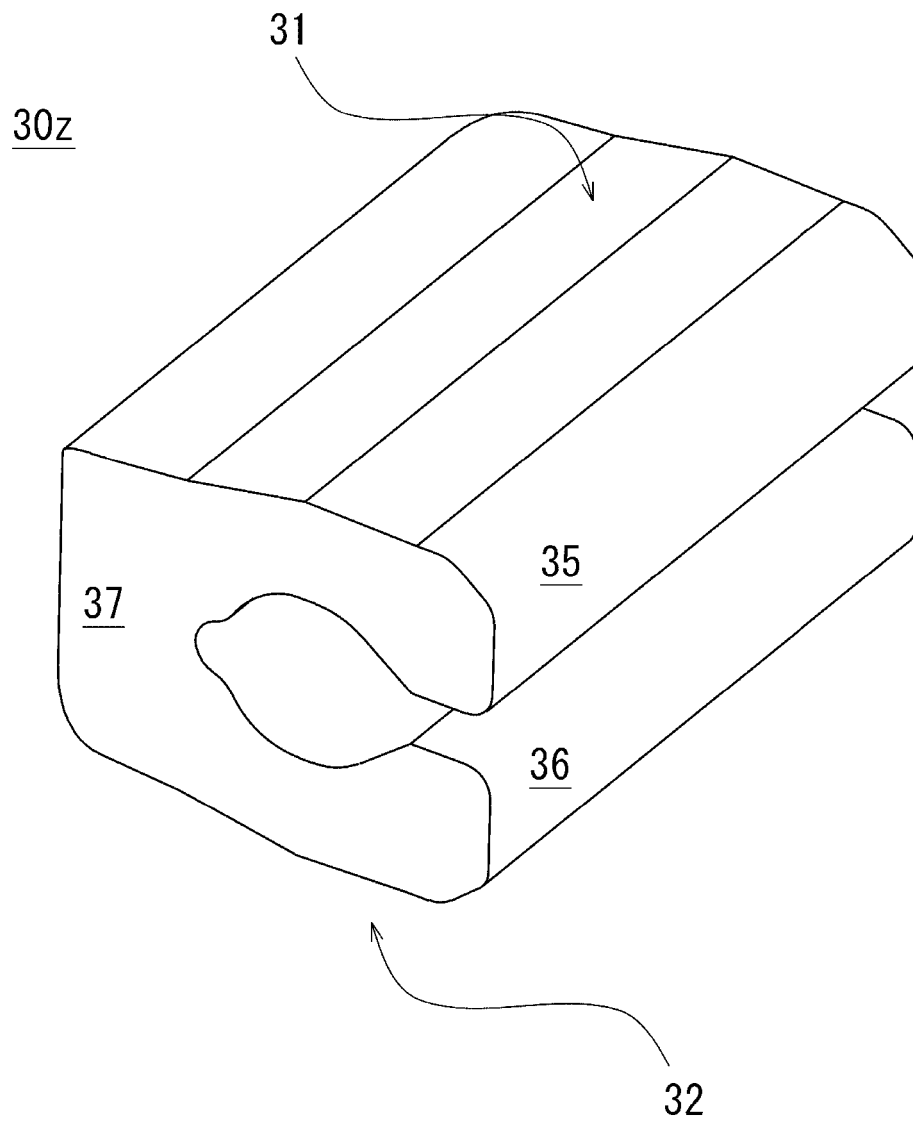
80



[Fig. 9]

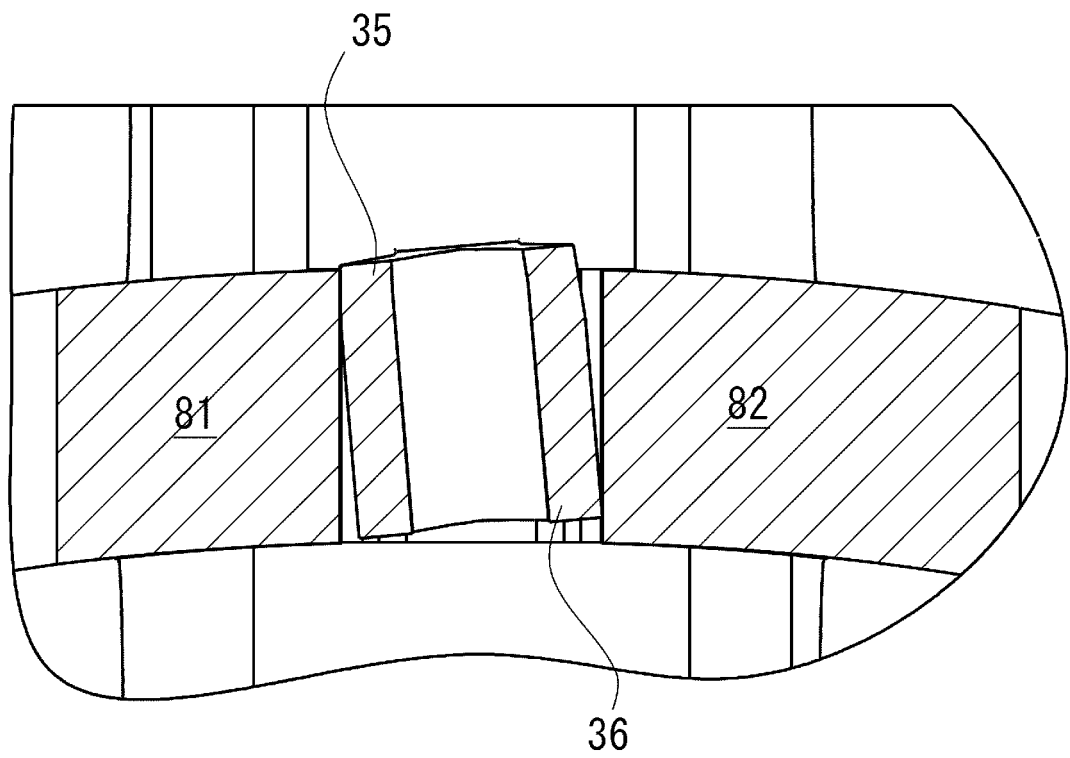


[Fig. 10]

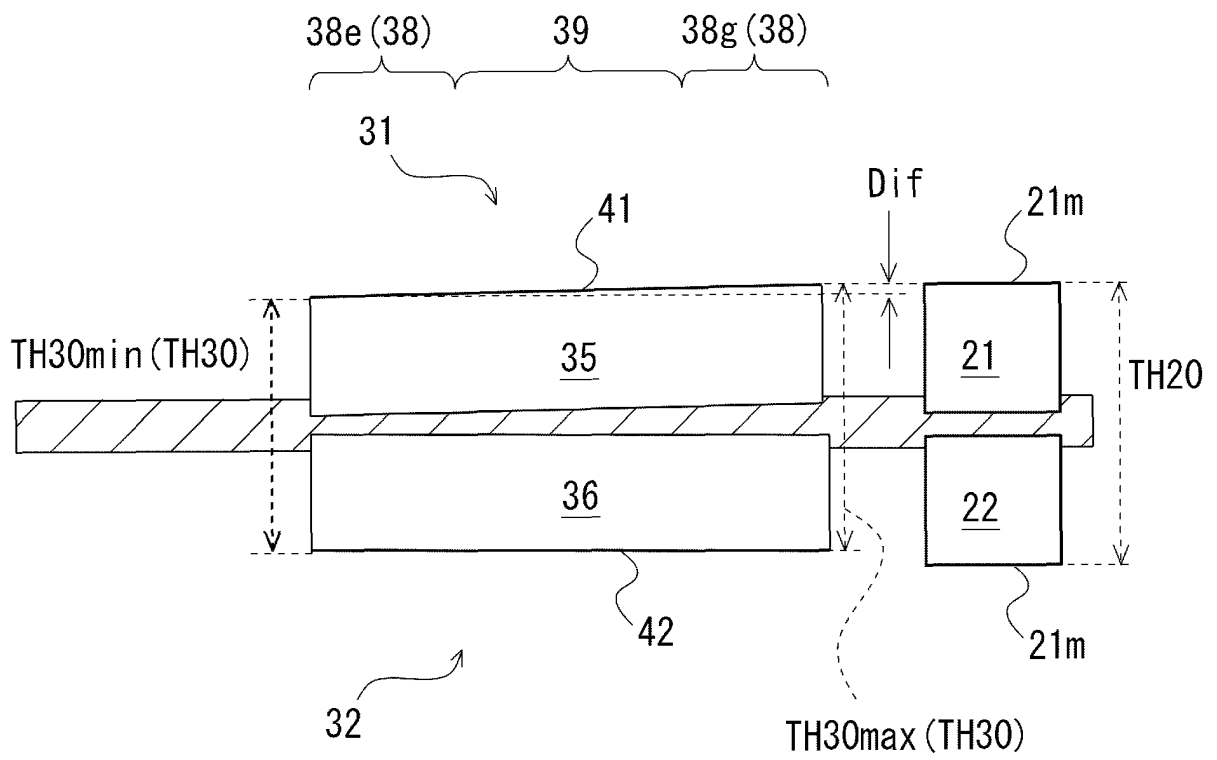


[Fig. 11]

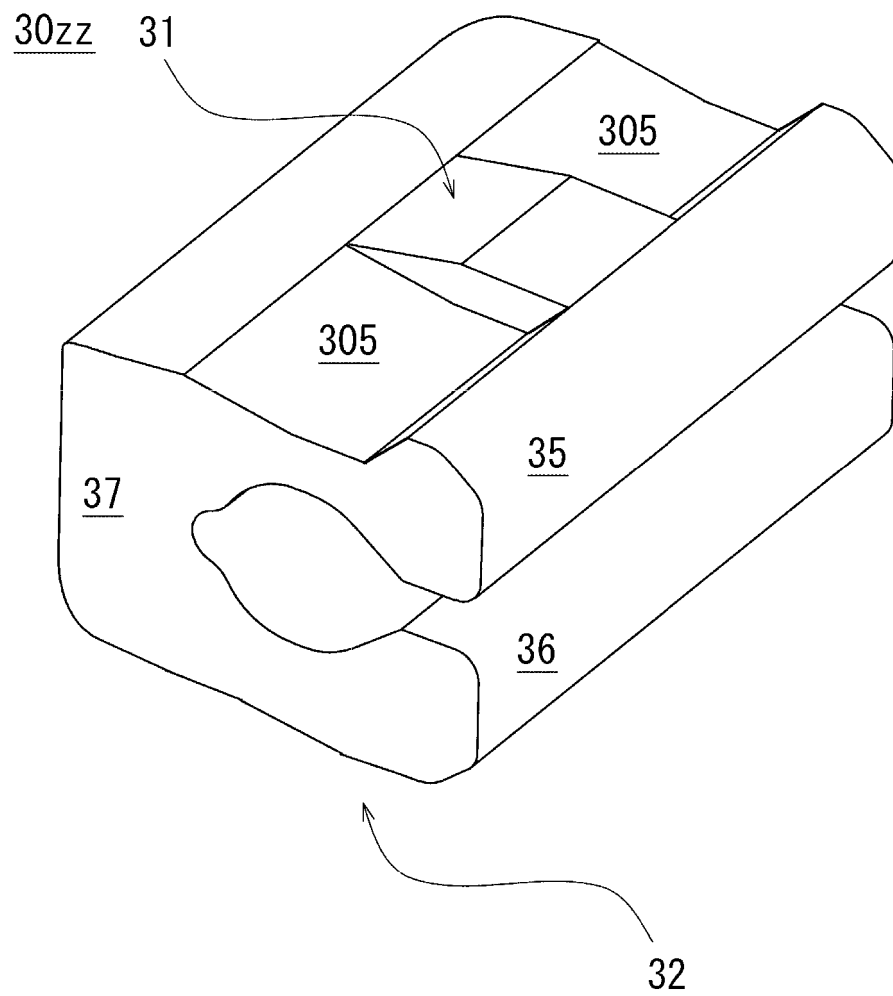
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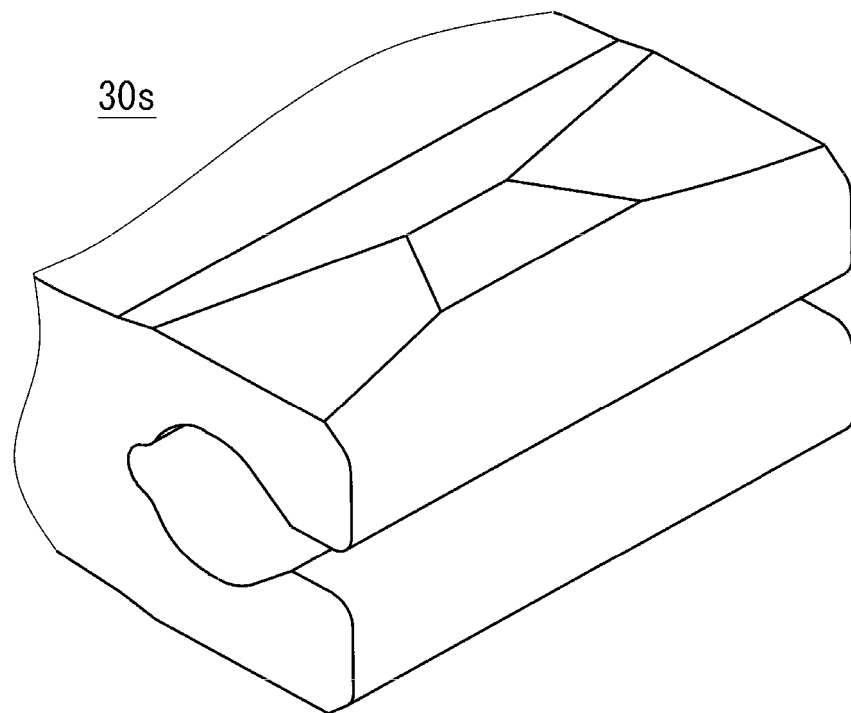
[Fig. 12]



[Fig. 13]



[Fig. 14]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/072264

A. CLASSIFICATION OF SUBJECT MATTER

A44B19/36(2006.01) i, A44B19/60(2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A44B19/36, A44B19/60

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

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

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2988796 A (CONMAR PRODUCTS CORP.), 20 June 1961 (20.06.1961), column 1, line 38 to column 3, line 9; fig. 1 to 7 (Family: none)	1-8
Y	JP 03-136603 A (Yoshida Kogyo Co., Ltd.), 11 June 1991 (11.06.1991), page 2, lower right column, line 8 to page 4; fig. 1 to 6 (Family: none)	1-8
Y	US 2900694 A (TALON INC.), 25 August 1959 (25.08.1959), column 1, line 62 to column 3, line 5; fig. 1 to 3 (Family: none)	1-9

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

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search
19 October 2015 (19.10.15)Date of mailing of the international search report
27 October 2015 (27.10.15)Name and mailing address of the ISA/
Japan Patent Office
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Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/072264

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 41-006038 Y1 (Yoshida Kogyo Co., Ltd.), 29 March 1966 (29.03.1966), page 1, left column, line 26 to right column, line 23; fig. 1 to 3 (Family: none)	1-9
A	JP 35-009476 B1 (Tadao YOSHIDA), 19 July 1960 (19.07.1960), (Family: none)	1-9
A	JP 50-060356 A (Carbide Form Grinding Inc.), 24 May 1975 (24.05.1975), & US 3863321 A	1-9

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REFERENCES CITED IN THE DESCRIPTION

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