

(43) International Publication Date
24 December 2014 (24.12.2014)(51) International Patent Classification:
A44B 18/00 (2006.01)(21) International Application Number:
PCT/US2014/042873(22) International Filing Date:
18 June 2014 (18.06.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2013-128657 19 June 2013 (19.06.2013) JP

(71) Applicant: 3M INNOVATIVE PROPERTIES COMPANY [US/US]; 3M Center, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

(72) Inventor: NISOGL, Shuhei; 6-7-29, Kitashinagawa, Shinagawa-ku, Tokyo 141-8684 (JP).

(74) Agents: KNECHT, Harold C., III et al.; 3M Center, Office of Intellectual Property Counsel, Post Office Box 33427, Saint Paul, Minnesota 55133-3427 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: FASTENER MEMBER

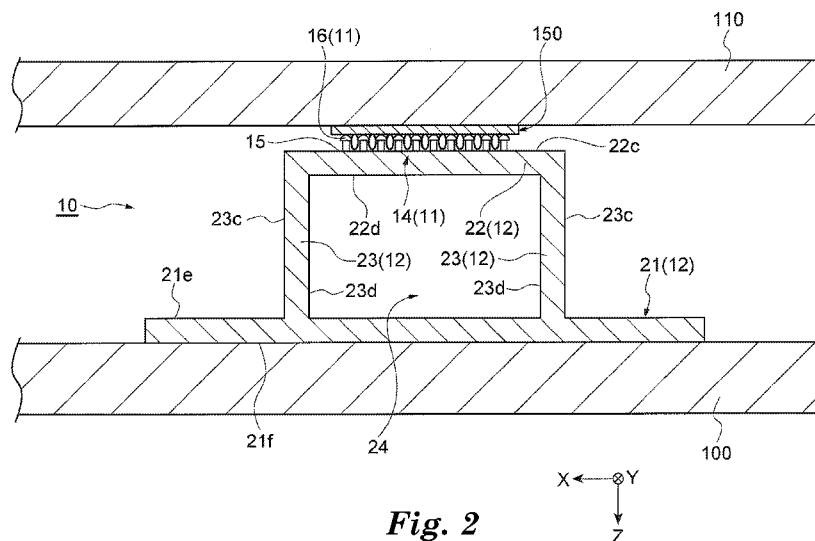


Fig. 2

(57) Abstract: A fastener portion 11 includes a plurality of engaging members 16 standing on a surface 15 of a base portion 14, and engaging members 16 include shaft portions 18 projecting from the base portion 14, and arrowhead portions 19 formed on the tips of the shaft portions 18. The fastener portion 11 can be mechanically coupled to the member 110 by hooking the arrowhead portions 19 on a coupling target such as a loop member 150 provided on the member 110. The fastener member 10 can be provided with a height adjustment portion for adjusting the height of the fastener portion with respect to the member 100, allowing the size of the gap between the first member and the second member coupled to the fastener portion to be adjusted. The fastener portion 11 and the height adjustment portion 12 can be formed integrally.

FASTENER MEMBER

FIELD OF THE INVENTION

5 The present invention is related to fasteners, in particular to fastener members and more particularly to fastener members that allow the height between members to be adjusted.

BACKGROUND ART

10 A structure in which a fastener member capable of being coupled to a first member is attached to a separate bracket fixed to a second member is known in the art. Such a structure allows the height between members to be adjusted. For example, Japanese Unexamined Patent Application Publication No. 2010-144859 and Japanese Unexamined Patent Application Publication No. 2009-100871 disclose structures in which L-shaped claws for supporting a fastener are provided on a bracket attached and
15 fixed to a vehicle internal finishing material or a vehicle interior ceiling, and a fastener constituted by providing a plurality of engaging members on a plate is slid into and sandwiched by the claws.

SUMMARY OF THE INVENTION

20 In the prior art arrangement, the fastener member is supported by claws on a separate bracket. Accordingly, there is the problem that, if a gap is formed between the fastener member and the claws, a gap and/or movement (i.e., "play") may occur between the fastener member and the bracket. Also, as a result of this play, the problem can occur that noise and the like is produced by vibrations during use. As a result, there is a
25 demand for a fastener member that allows the height between members to be adjusted and play and noise to be suppressed

A fastener member according to one aspect of the present invention is a fastener member that is fixed to a first member and that mechanically couples the first member to a second member. The fastener member includes: a fastener portion that has a base
30 portion having a surface, and a plurality of engaging members standing on the surface, and that is mechanically coupled to the second member by engaging the engaging members to the second member; and a height adjustment portion for adjusting the height of the fastener portion with respect to the first member, the engaging members having shaft portions projecting from the base portion, and arrowhead portions formed at tips of
35 the shaft portions, and the fastener portion and the height adjustment portion being formed integrally.

In accordance with another aspect of the present invention, the fastener portion of the fastener member can include a plurality of engaging members standing on the

surface of the base portion, and the engaging members includes shaft portions projecting from the base portion and arrowhead portions formed on the tips of the shaft portions. Accordingly, the fastener portion can be mechanically coupled to the second member by hooking the arrowhead portions upon a coupling target such as a loop member provided upon the second member. In addition, the fastener member is provided with a height adjustment portion for adjusting the height of the fastener portion with respect to the first member, allowing the size of the gap between the first member and the second member coupled to the fastener portion to be adjusted. The fastener portion and the height adjustment portion can be formed integrally. Accordingly, there is no play between the fastener portion and the height adjustment portion, allowing the second member to be reliably fastened to the first member. The term “no play” refers to the members being sufficiently fastened together to perceptively eliminate, mostly suppress or at least noticeably suppress noise arising from vibration or the like during use. The height between the members can be adjusted to suppress play and thereby noise.

In the fastener member according to another aspect, the engaging member may be disposed in a lattice-like manner as viewed from the surface.

In a fastener member according to another aspect, the arrowhead portion may extend in at least two directions from the tip side of the shaft portion.

In a fastener member according to another aspect, the height adjustment portion may be provided with a base fixed to the first member, a top portion on which the fastener portion is provided, and at least a pair of facing side wall portions vertically extending from the base toward the top portion.

In a fastener member according to another aspect, the height adjustment portion may include a base fixed to the first member, and the base may be formed in a plate-like shape with no through-hole.

In a fastener member according to another aspect, the height adjustment portion may be provided with a base fixed to the first member, a top portion on which the fastener portion is provided, and at least a pair of intersecting rib portions vertically extending from the base toward the top portion.

In a fastener member according to another aspect, the height adjustment portion may be constituted by a structure corresponding to a vehicle interior ceiling, and the fastener portion and the structure may be formed integrally.

[Effect of the Invention]

In accordance with one aspect of the present invention, the height between members can be adjusted to suppress play and thereby noise.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a fastener member according to an embodiment.

5 FIG. 2 is a cross-sectional view illustrating the fastener member illustrated in FIG. 1 in a state of use.

FIGS. 3a and 3b are cross-sectional views for describing coupling using the fastener member illustrated in FIG. 1.

FIGS. 4a and 4b are perspective views illustrating a structure according to a comparative example.

10 FIG. 5 is a perspective view illustrating the fastener member according to a modified example.

FIG. 6a is a perspective view and FIG. 6b is a cross-sectional view illustrating a fastener member according to the modified example.

15 FIGS. 7a and 7b are perspective views illustrating the fastener member according to the modified example.

FIG. 8 is a perspective view illustrating the engaging members according to the modified example.

FIG. 9a is a plan view and FIG. 9b is a side view of the engaging members illustrated in FIG. 8.

20 FIGS. 10a and 10b are perspective views illustrating the fastener member according to the modified example.

DETAILED DESCRIPTION

25 Embodiments of the present invention will now be described in greater detail below with reference to the attached drawings. In the following description, the same or the equivalent elements are given the same reference number, and duplicate descriptions are omitted. Also, the terms "X-direction", "Y-direction", and "Z-direction" are for descriptive purposes and are based on directions shown in the drawings.

30 FIG. 1 is a perspective view illustrating a fastener member according to an embodiment, and FIG. 2 is a cross-sectional view illustrating the fastener member illustrated in FIG. 1 in a state of use. FIG. 3 is a cross-sectional view for describing coupling using the fastener member illustrated in FIG. 1. The fastener member illustrated in FIGS. 2 and 3 is a cross-section along line II-II in FIG. 1. As illustrated in
35 FIGS. 1 to 3, a fastener member 10 according to this embodiment is a face-to-face engaging surface fastener used, for example, for fixing vehicle internal finishing material or vehicle interior ceiling. The fastener member 10 is used as a hook member that is mechanically coupled to a loop member 150 which is the counter side of coupling. The

fastener member 10 is fixed to an internal panel side member (first member) 100, and the loop member 150 is fixed to a vehicle body side member (second member) 110. The loop member 150 may be also provided on the vehicle internal finishing material or vehicle interior ceiling, and the fastener member 10 may be provided on the vehicle body side.

The fastener member 10 corresponds to a male side of the surface fastener. The fastener member 10 is provided with a fastener portion 11 that is mechanically coupled to a loop member 150 of a member 110 on the counter side, and a height adjustment portion 12 for adjusting the height of the fastener portion 11 with respect to the member 100. The fastener portion 11 is provided with a base portion 14 and a plurality of engaging members 16 standing on the base portion 14. The height adjustment portion 12 is provided with a base 21 fixed to the member 100, a top portion 22 on which the fastener portion 11 is provided, and a pair of vertically extending side wall portions 23.

The base portion 14 presents a plate-like form and has a main surface (surface) 15 which is substantially flat. The base portion 14 is formed extending in a planar manner in the XY-direction. In FIG. 1, the area corresponding to the base portion 14 is indicated by the dotted-dashed line. The base portion 14 of the fastener portion 11 is integrally molded with the top portion 22 of the height adjustment portion 12. In FIG. 2, the base portion 14 of the fastener portion 11 and the top portion 22 of the height adjustment portion 12 are identically hatch-marked and illustrated as the same member. However, if the fastener portion 11 and the height adjustment portion 12 are molded in different colors, a fastener portion 11 and height adjustment portion 12 constituted by separate members are molded into an integrated whole.

The engaging members 16 are provided in an area in a central position on the main surface 15, and are arranged in rows at predetermined intervals in a grid pattern as viewed from the Z-direction (i.e., viewed from the surface). The engaging members 16 have rod-shaped shaft portions 18 that are upright having the Z-direction as an axial direction, and arrowhead portions 19 that act as a head provided to tips of the shaft portions 18 (see FIG. 3). There is no particular limitation on the shape of the shaft portion 18, but in this embodiment, it is formed with a circular pillar shape. The arrowhead portion 19 has a sharp conical exterior shape at the tip side, whereby a latching face 19a for hooking the loop member 150 is formed on the main surface 15 side of the arrowhead portion 19. In this embodiment, the arrowhead portions 19 extend around the whole periphery from the tip side of the shaft portions 18 (i.e., extend in all directions).

There is no particular limitation on the arrangement pattern of the lattice shape of the engaging member 16. For example, the engaging member 16 may be arranged in

a linear row at a constant pitch in the Y-direction, and a plurality of these rows can be arranged at a constant pitch in the X-direction. At this time, an engaging member 16 of one row may be arranged adjacent to an engaging member 16 in an adjacent row in the X-direction (or Y-direction). Alternatively, an engaging member 16 of one row and an engaging member 16 in an adjacent row may be arranged in positions that are shifted in the X-direction (or Y-direction) relative to each other. In other words, the engaging members 16 may be arranged in a staggered manner along the X-direction (or the Y-direction).

The configuration of the engaging members 16 is not limited to the shape described above; any shape capable of hooking the loop member 150 is acceptable. The arrowhead portions may extend in at least two directions from the tip side of the shaft portions. For example, as illustrated in FIGS. 8 and 9, engaging members 30 having arrowhead portions 32 projecting obliquely downward from side surfaces 31a of shaft portions 31 may be applied. The shaft portions 31 are shaped like square prisms, and include a pair of planar side surfaces 31a facing each other in the X-direction, and a pair of planar side surfaces 31b facing each other in the Y-direction. The arrowhead portions 32 include a plurality (in this embodiment, four) of projections 33 projecting from each of the side surfaces 31a of the shaft portions 31. As illustrated in FIG. 9A, each of the projections 33 projects outward from the shaft portions 31 in four diagonal directions as seen from the Z-direction, the directions in which each of the projections 33 protrudes including both an X-directional component and a Y-directional component. As a result, each of the projections not only extends outward from the side surfaces 31a corresponding to the X-direction, but also extends outward from the side surfaces 31b facing each other in the Y-direction. As illustrated in FIG. 9B, each of the projections 33 extends obliquely downward as viewed in the Y-direction. Recessions 34 for hooking the loop members are formed on the undersides of each of the projections 33. The engaging members 30 illustrated in FIGS. 8 and 9 can be formed by using a die corresponding to the shape illustrated in FIG. 9A and a sliding die corresponding to the shape of the spaces underneath the projections 33 as indicated by UE in FIG. 9B.

The loop member 150 corresponds to the female side of the face fastener and has a plurality of loop threads 151 that protrude from a surface 150a. When coupled, the loop yarns 151 are engaged with the engaging members 16, and are installed on the surface 150a so that they extend in a ring shape. These loop members 150 are fixed to the member 110 on the vehicle body side of the vehicle, for example, either directly or via a bracket or the like.

Next, the configuration of the height adjustment portion 12 will be described. The base 21 of the height adjustment portion 12 is formed as a rectangular plate extending in the XY direction. In this embodiment, the base 21 is formed in a plate

shape with no through-hole. There is no particular limitation upon shape of the base 21; in this embodiment, the base 21 is formed as an elongated rectangle extending in the X-direction. The side wall portions 23 and the top portion 22 are formed on an upper surface 21e side of the base 21. An undersurface 21f of the base 21 is fixed to the member 100.

The side wall portions 23 are provided extending substantially vertically in the Z-direction from the surface 21e of the base 21, and are formed as rectangular plates extending in the YZ direction. The pair of side wall portions 23 are separated from each other with respect to the X-direction and face each other in parallel. There is no particular limitation upon the shape of the side wall portions 23; in this embodiment, the side wall portions 23 are formed as elongated rectangles extending in the Y-direction. The height of the height adjustment portion 12 can be adjusted by altering the length of the side wall portions 23 in the Z-direction during molding. There is no particular limitation upon the positions of the side wall portions 23 on the base 21, but ends 23a of the side wall portions 23 in the positive Y-direction are disposed further to the interior of the base 21 than an end 21a of the base 21 in the positive Y-direction, and ends 23b of the side wall portions 23 in the negative Y-direction are disposed further to the interior of the base 21 than an end 21b of the base 21 in the negative Y-direction. The distance between the end 21a and the ends 23a in the Y-direction is identical to the distance between the end 21b and the ends 23b in the Y-direction. Outer surfaces 23 of the side wall portions 23 in the positive X-direction are disposed further to the interior of the base 21 than an end 21c of the base 21 in the positive X-direction, and outer surfaces 23c of the side wall portions 23 in the negative X-direction are disposed further to the interior of the base 21 than an end 21d of the base 21 in the negative X-direction. The distance between the end 21c and the outer surfaces 23c in the X-direction is equivalent to the distance between the end 21d and the outer surfaces 23c in the X-direction. Inner surfaces 23d of the side wall portions 23 are separated from each other.

The top portion 22 is provided on upper ends of each of the side wall portions 23, and is formed as a rectangular plate extending in the XY direction in parallel with the base 21. Both ends in the X direction of the top portion 22 are linked to the upper ends of the side wall portions 23. There is no particular limitation upon the shape of the top portion 22; in this embodiment, an end 22a of the top portion 22 in the positive Y-direction is aligned with the ends 23a of the side wall portions 23, and an end 22b of the top portion 22 in the negative Y-direction are aligned with the ends 23b of the side wall portions 23. The fastener portion 11 is formed on an upper surface 22c of the top portion 22. In this embodiment, the upper surface 22c of the top portion 22 and the surface 15 of the base portion 14 are the same surface. However, these surfaces need not be the same surface; for example, the surface 15 of the base portion 14 may be

positioned higher or lower than the upper surface 22c of the top portion 22. An undersurface 22d of the top portion 22 is separated from the upper surface 21e of the base 21.

Due to having the shape described above, the height adjustment portion 12 includes a through-hole 24. The through-hole 24 penetrates along the Y-direction, i.e., the direction in which the ends 21c, 21d constituting the short ends of the base 21 extend, and forms a rectangular as viewed from the Y-direction. The through-hole 24 is formed by the area surrounded by the upper surface 21e of the base 21, the inner surfaces 23d of each of the side wall portions 23, and the undersurface 22d of the top portion 22, opens at the ends 22a, 23a in the positive Y-direction, and opens at the ends 22b, 23b in the negative Y-direction. The "height adjustment" of this embodiment does not involve setting a desired height by altering the height of the fastener portion 11 after manufacturing. Rather, the height adjustment portion 12 is formed during manufacturing by adjusting the height of the fastener portion 11 so as to be a desired height, so that the fastener portion 11 has the desired height when being used. To alter the height (i.e., the size of the gap between the members 100 and 110), the fastener member 10 itself is altered.

In this embodiment, the fastener portion 11 and the height adjustment portion 12 are formed integrally. That is, the fastener portion 11 and the height adjustment portion 12 are constituted as a single molded part. Accordingly, a fixing structure such as a claw is not provided between the fastener portion 11 and the height adjustment portion 12, nor is an adhesive or the like applied. The fastener portion 11 and the height adjustment portion 12 are firmly fixed, with no gap or play therebetween.

Next, the action and effect of the fastener member 10 according to this embodiment will be described.

First, fastener members 40, 50 according to a comparative example will be described with reference to FIG. 4. The fastener members 40, 50 according to the comparative example are separate members from brackets 41, 51 for adjusting height, and are constituted by providing a plurality of engaging members on a plate-shaped member. In the structure illustrated in FIG. 4A, the bracket 41 has a pair of claws 42 on an upper surface of the top portion. The fastener member 40 slides into and is sandwiched by the claws 42. An end in the sliding direction of the fastener member 40 is supported by a stopper 44 on the upper surface of the bracket 41. In the structure illustrated in FIG. 4B, the fastener member 50 is fixed to an upper surface of the bracket 51 using an adhesive or hotmelt. An adhesive layer 52 is formed between the fastener member 50 and the bracket 51.

In the structure illustrated in FIG. 4A, the fastener member 40 is supported by claws 42 on a separate bracket 41. Accordingly, there is the problem that, if a gap is

formed between the fastener member 40 and the claws 42, play may occur between the fastener member 40 and the bracket 41. Also, as a result of this play, the problem occurs that noise and the like can be produced by vibrations during use. In addition, not only is the number of parts increased, but there is also the problem that a step of fixing the fastener member 40 to the bracket 41 is necessary. Moreover, if the bracket 41 is a molded part, a sliding die must be thrust upward from below in order to form the claws 42, forming through-holes 43 in the bottom surface of the bracket 41. Such through-holes 43 may affect the strength of the bracket 41.

In the structure illustrated in FIG. 4B, the fastener member 50 is fixed to a separate bracket 51 by an adhesive, hotmelt, double-sided tape, or the like. Accordingly, not only is the number of parts increased, but there is also the problem that a step of fixing the fastener member 50 to the bracket 51 is necessary. In addition, if such a fixing method is used, debonding of the fastener member 50 and the bracket 51 may occur. Moreover, a primer is generally applied if double-sided tape is used, potentially creating a need for ventilation equipment in order to provide ventilation during the step of using the primer or adhesive.

In the fastener member 10 according to this embodiment, the fastener portion 11 includes a plurality of engaging members 16 standing on the surface 15 of the base portion 14, and the engaging members 16 include shaft portions 18 projecting from the base portion 14, and arrowhead portions 19 formed on the tips of the shaft portions 18. Accordingly, the fastener portion 11 can be mechanically coupled to the member 110 by hooking the arrowhead portions 19 on a coupling target such as a loop member 150 provided on the member 110. In addition, the fastener member 10 is provided with the height adjustment portion 12 for adjusting the height of the fastener portion 11 with respect to the member 100, allowing the size of the gap between the member 110 and the member 100 coupled to the fastener portion to be adjusted. The fastener portion 11 and the height adjustment portion 12 are formed integrally. Accordingly, there is no play between the fastener portion 11 and the height adjustment portion 12, allowing the member 100 and the member 110 to be reliably attached. Because no play is present, noise arising from vibration or the like during use can be perceptively eliminated, mostly suppressed or at least noticeably suppressed. As a result, it is possible to adjust the height between the members 100 and 110, and to suppress play and thereby noise.

In addition, the fastener portion 11 and the height adjustment portion 12 are not separate parts, but are an integrated single part. It is thus possible to reduce the number of parts and eliminate the need for a step of attaching the fastener member and the bracket as in the prior art.

In addition, the engaging members 16 of the fastener member 10 according to this embodiment are disposed in a grid as viewed from the surface. By this, the

engaging members 16 can be disposed in high density on the surface 15 of the base portion 14, and the coupling force with the loop member 150 can be further improved.

In addition, the arrowhead portions 19, 32 of the fastener member 10 according to this embodiment extend in at least two directions from the tip side of the shaft portions 18, 31. For example, the arrowhead portions 19 illustrated in FIG. 1 extend in all directions, and the arrowhead portions 32 illustrated in FIG. 8 extend in four directions. This allows the range within which each of the arrowhead portions 19, 32 can be coupled to the loop member 150. By making it easier for each of the engaging members 16, 30 to engage with the loop member 150 in this way, it is possible to increase the number of engaging members of the fastener member 10 that engage with the loop member 150, and thus improve the coupling force formed by the fastener member as a whole.

In the fastener member 10 according to this embodiment, the height adjustment portion 12 is provided with a base 21 fixed to the member 110, a top portion 22 upon which the fastener portion 11 is provided, and a pair of facing side wall portions 23 vertically extending from the base 21 toward the top portion 22. This shape is formed by inserting a sliding die into the portion surrounded by each of the parts 21, 22, 23 (i.e., the through-hole 24) during molding. That is, the height of the fastener portion 11 can easily be altered by altering the size of the sliding die.

In addition, the height adjustment portion 12 of the fastener member 10 according to this embodiment includes a base 21 fixed to the member 100, the base 21 being formed in a plate-like shape with no through-hole. This allows strength reduction of the base 21 to be suppressed, ensuring the strength of the fastener member 10. Moreover, strong fixing is possible if the base 21 and the member 100 are fixed using an adhesive.

There is no particular limitation upon the method used to mold a fastener member 10 including an integral fastener portion 11 and height adjustment portion 12 and high-density engaging members 16 exhibiting high mating strength, as in the case of this embodiment; a method such as the follow may be used. For example, the fastener portion 11 and the height adjustment portion 12 may be integrally molded, insert-molded, or two-color molded via injection molding. If the fastener member 10 is formed via insert molding or two-color molding, it is acceptable simply to prepare a plurality of dies for forming a height adjustment portion 12 of the desired height.

In extrusion molding, which has conventionally been used to mold fastener members, the many roll-shaped objects being molded makes it difficult to integrally mold the height adjustment portion and the fastener portion. In addition, adopting a method in which arrowhead portions having a shape achieved by bending the tip side of upwardly extending shaft portions in one direction are molded followed by being forcefully removed from the mold as the method for molding the engaging members may

make it difficult to achieve high density for the following reasons. Specifically, because the arrowhead portions must be capable of elastically deforming when the die is pulled off during demolding in order for forceful removal to be possible, the arrowhead portions are set to a low level of rigidity. Accordingly, the arrowhead portions will readily exhibit elastic deformation when engaged with the loop member 150. This makes it impossible to obtain a high level of mating strength. On the other hand, if the strength of the arrowhead portions or the number of the arrowhead portions is increased in order to increase mating strength, there is greater resistance at demolding, potentially creating problems such as demolding failure or arrowhead portion breakage. In addition, there may also be difficulties in demolding if the arrowhead portion extends in multiple directions, rather than only one. There is also the limitation that a flexible material must be used. By contrast, because the fastener member 10 according to this embodiment is formed according to a molding method such as that described above, the fastener portion 11 and the height adjustment portion 12 are a single piece, disposition in a high-density grid is possible, and arrowhead portions extending in multiple directions can be formed, thereby yielding high mating strength.

The present invention is not limited to the embodiment as described above.

For example, a fastener member 60 such as that illustrated in FIG. 5 may be used. In the fastener member 50, as illustrated in FIG. 5, a through-hole 64 surrounded by a base 61, a top portion 67, and side wall portions 66 extends in the X-direction. Such a shape also allows the height of the fastener portion 11 to be altered by altering the size of the sliding die used to form the through-hole 64.

A fastener member 70 such as that illustrated in FIG. 6 may also be used. In the fastener member 70 illustrated in FIG. 6, side wall portions 76 are provided at four sides of a top portion 78. Such a configuration allows for molding using a stationary die and a moving die from the underside of a base portion 71. This forms a through-hole 74 surrounded by the side wall portions 76. Such a shape allows for support by the four side wall portions, increasing the support strength of the fastener portion 11.

A fastener member 80 having an overall truncated pyramid shape, such as that illustrated in FIG. 7A, may also be used. The fastener member 80 illustrated in FIG. 7A includes a base portion 82, inclined side wall portions 83, and a top portion 85 smaller than the base portion 82. A through-hole 84 is formed in the portion surrounded by the parts 82, 83, 85.

A fastener member 90 such as that illustrated in FIG. 7B may also be used. In the fastener member 90 illustrated in FIG. 7B, a height adjustment portion 91 is provided with a base 96, a top portion 92 upon which the fastener portion 11 is provided, and a pair of intersecting rib portions 93, 94 vertically extending from the base 96 toward the

top portion 92. The base 96 and the top portion 92 are formed as circular plates. The number of rib portions may be increased to more than just one pair.

Fastener members 200, 300 such as those illustrated in FIG. 10 may also be used. In the fastener members 200, 300, members corresponding to height adjustment portions are constituted by structures 201, 301 corresponding to a vehicle interior ceiling.

Fastener portions 11 and the structures 201, 301 are formed integrally. These structures 201, 301 may also be referred to as "reinforcements" or "stiffeners". However, these need not necessarily function as reinforcing members, and may be any sort of structure corresponding to a vehicle interior ceiling. The structure 201 of the fastener member 200 illustrated in FIG. 10A includes a curved plate-shaped base, and height-adjusting platform portions 202, 203 protruding from both ends of the base. The fastener portions 11 are formed integrally with top portions of the platform portions 202, 203.

The structure 301 of the fastener member 300 illustrated in FIG. 10B includes a straight plate-shaped base, and height-adjusting platform portions 302, 303 protruding from both ends of the base. The fastener portions 11 are formed integrally with top portions of the platform portions 302, 303. The shapes illustrated in FIGS. 5 to 7 may be used for the platform portions 202, 203, 302, 303. A structure such as that illustrated in FIG. 10 allows a fastener to be efficiently attached to an interior ceiling. In addition, the use of the fastener members 200, 300 allows for simultaneous reinforcement.

What is claimed is:

1. A fastener member fixed to a first member and that mechanically couples the first member to a second member, the fastener member comprising:
 - 5 a fastener portion that includes a base portion having a surface, and a plurality of engaging members standing on the surface, and that is mechanically coupled to the second member by engaging the engaging members to the second member; and
 - a height adjustment portion for adjusting the height of the fastener portion with respect to the first member, the engaging members including shaft portions projecting
 - 10 from the base portion, and arrowhead portions formed on tips of the shaft portions, and the fastener portion and the height adjustment portion being formed integrally.
2. The fastener member according to claim 1, wherein, the engaging members are disposed in a lattice-like manner as viewed from the surface.
- 15 3. The fastener member according to claim 2, wherein the arrowhead portion extends in at least two directions from the tip side of the shaft portion.
4. The fastener member according to any one of claims 1 to 3, wherein the height adjustment portion includes:
 - 20 a base that is fixed to the first member;
 - a top portion on which the fastener portion is provided; and
 - at least a pair of facing side wall portions vertically extending from the base toward the top portion.
- 25 5. The fastener member according to any one of claims 1 to 4, wherein the height adjustment portion includes the base that is fixed to the first member, and the base is formed in a plate shape with no through-hole.
- 30 6. The fastener member according to any one of claims 1 to 3, wherein the height adjustment portion includes:
 - a base that is fixed to the first member;
 - a top portion on which the fastener portion is provided; and
 - at least a pair of intersecting rib portions vertically extending from the base
 - 35 toward the top portion.

7. The fastener member according to any one of claims 1 to 6, wherein the height adjustment portion is constituted by a structure corresponding to a vehicle interior ceiling, and

the fastener portion and the structure are formed integrally.

5

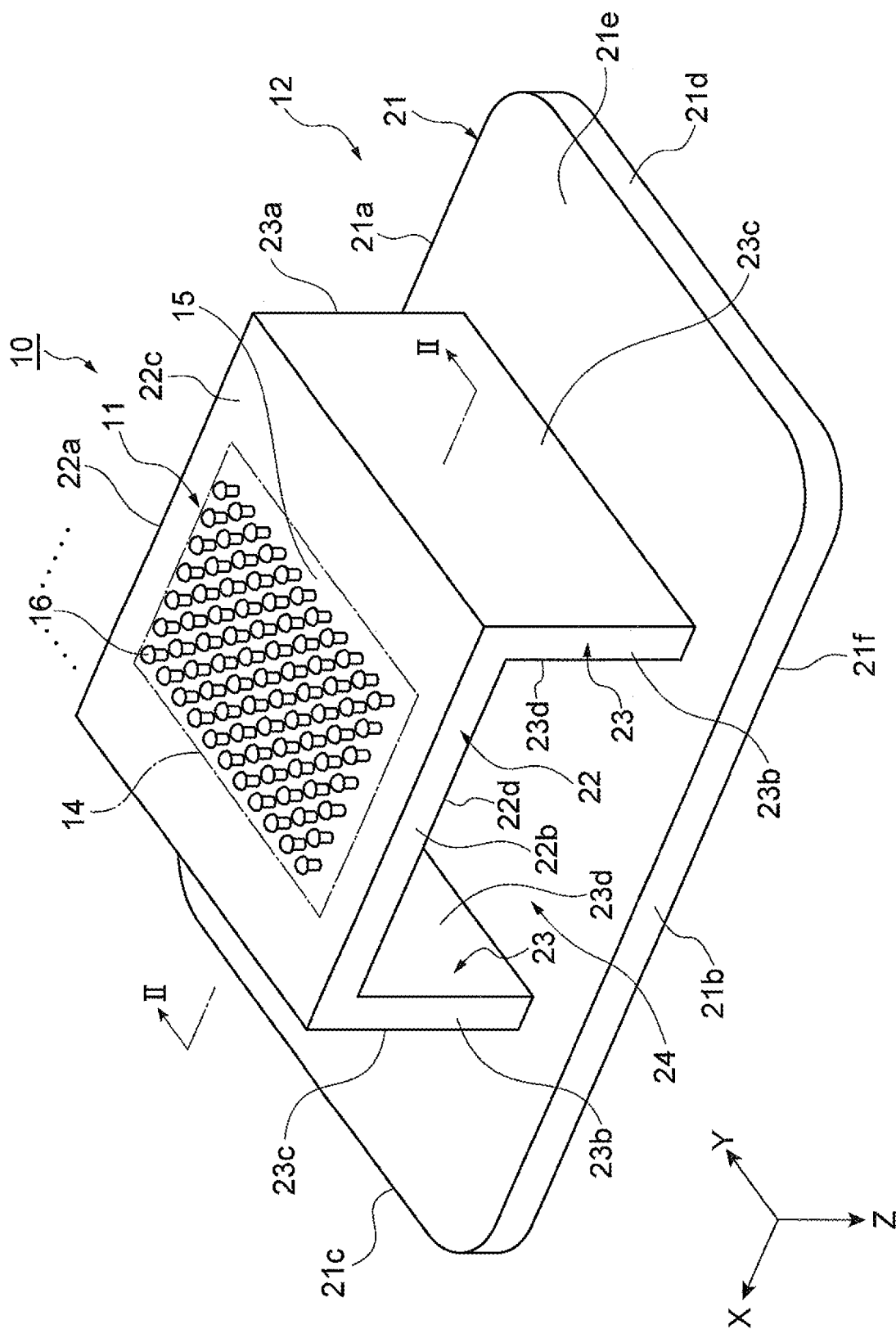


Fig. 1

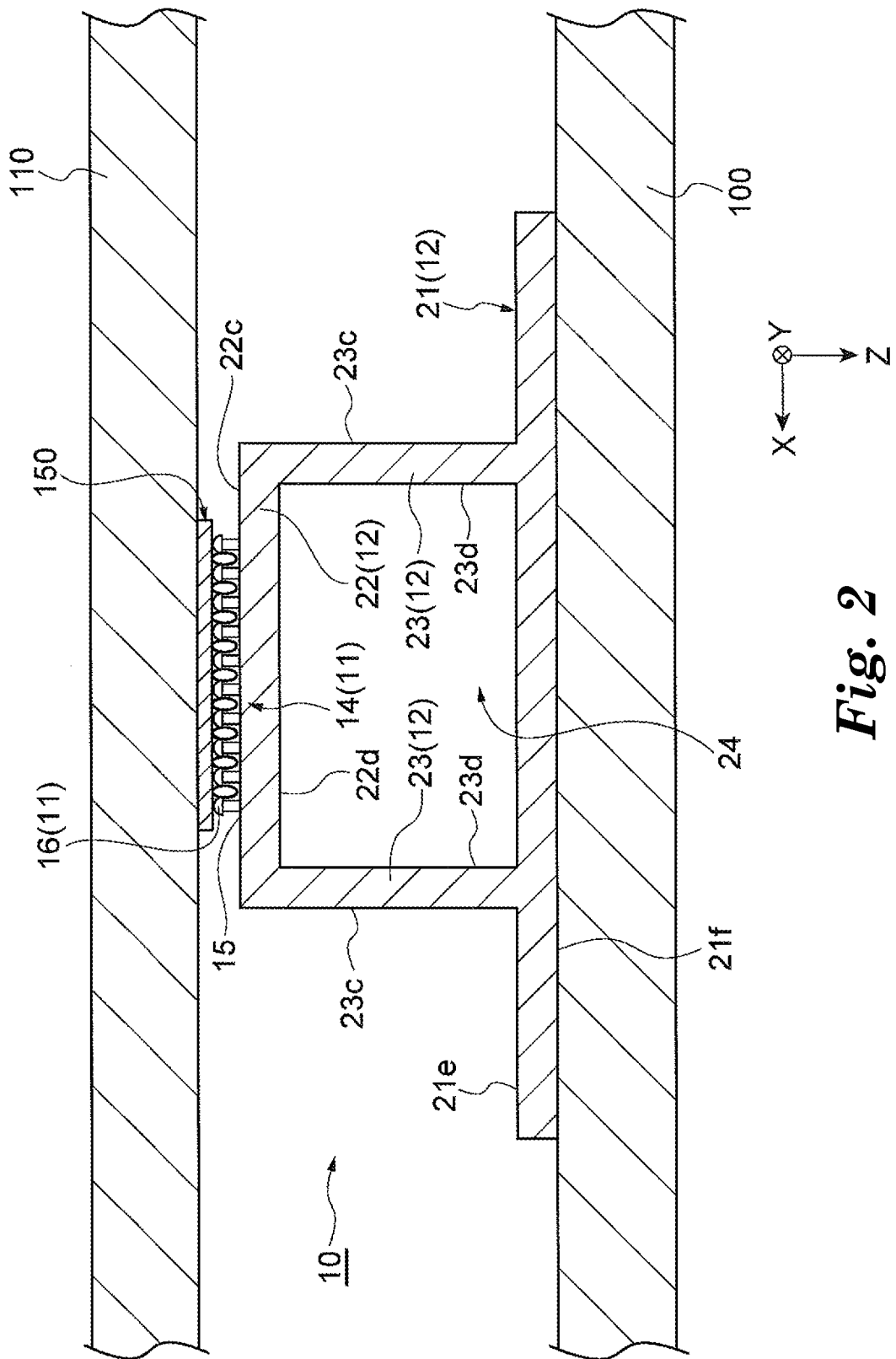


Fig. 2

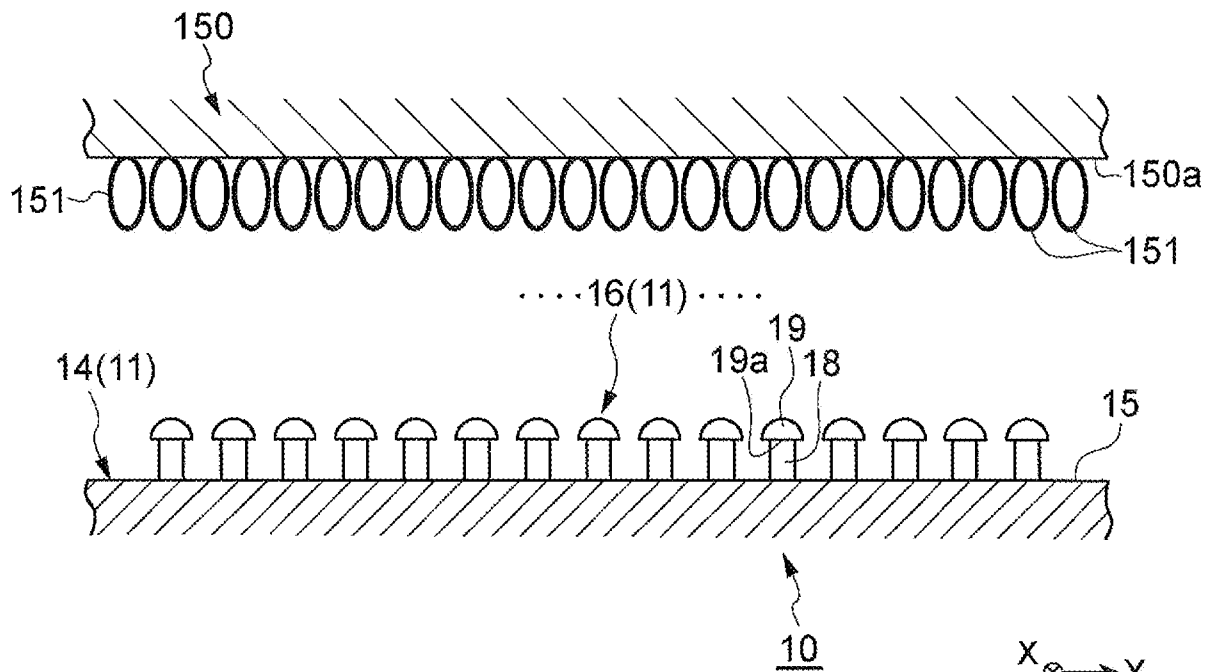


Fig. 3a

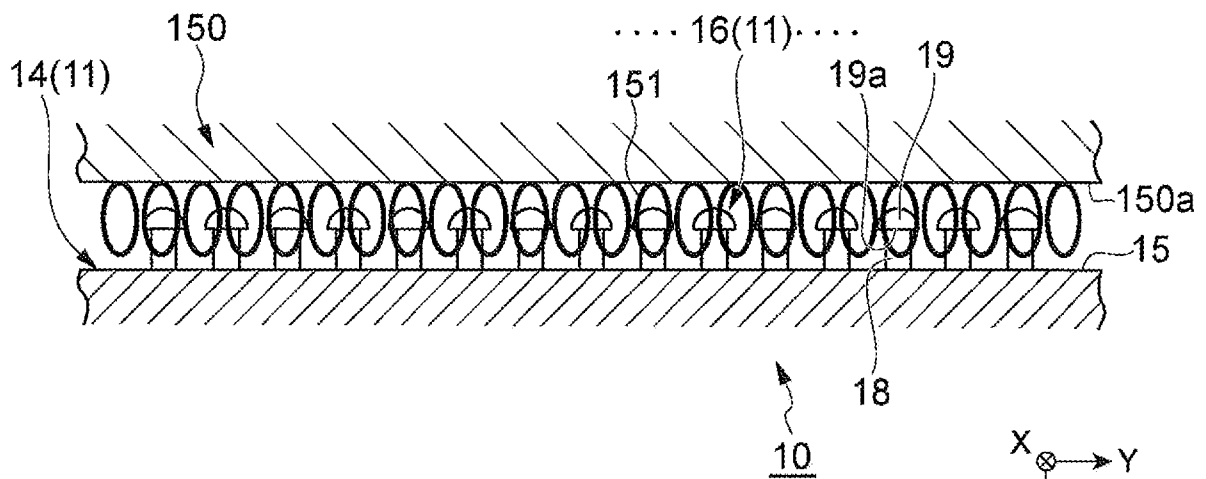
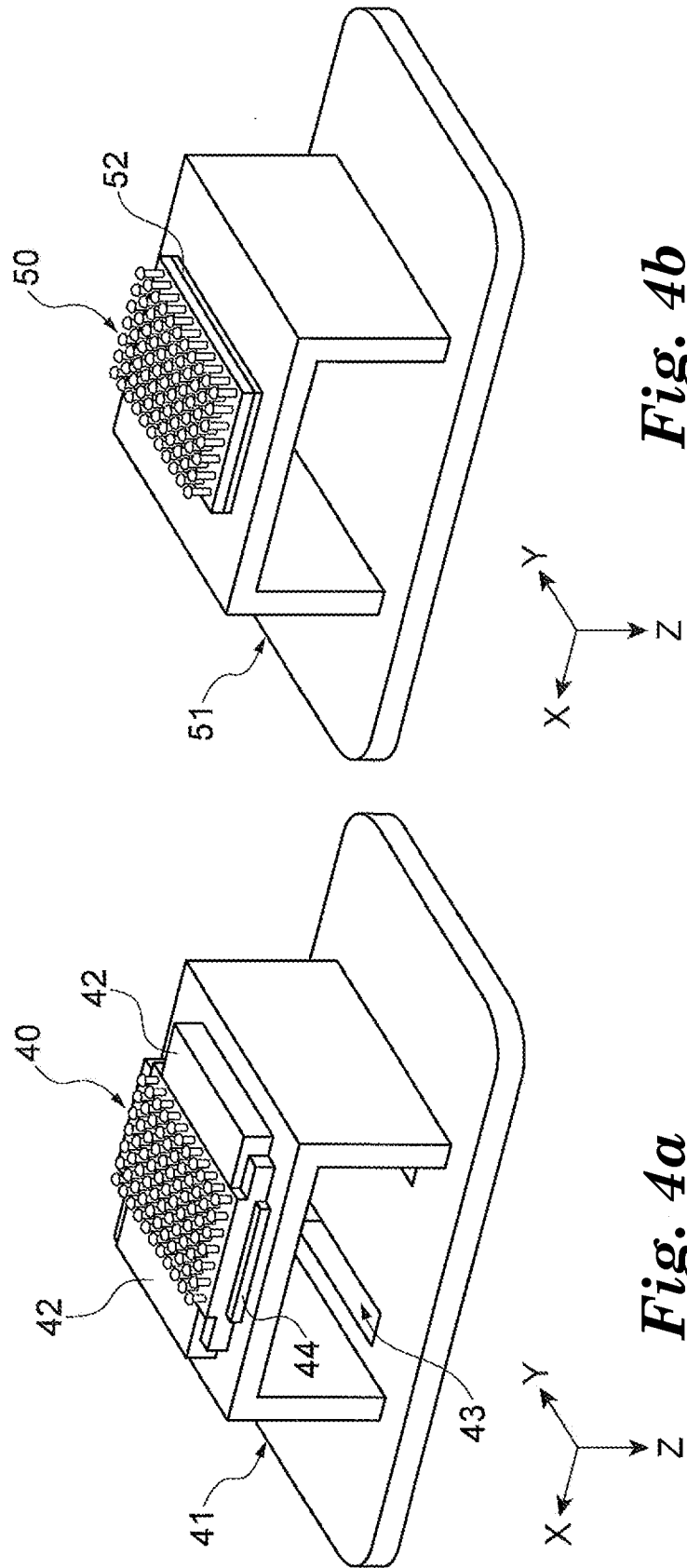


Fig. 3b



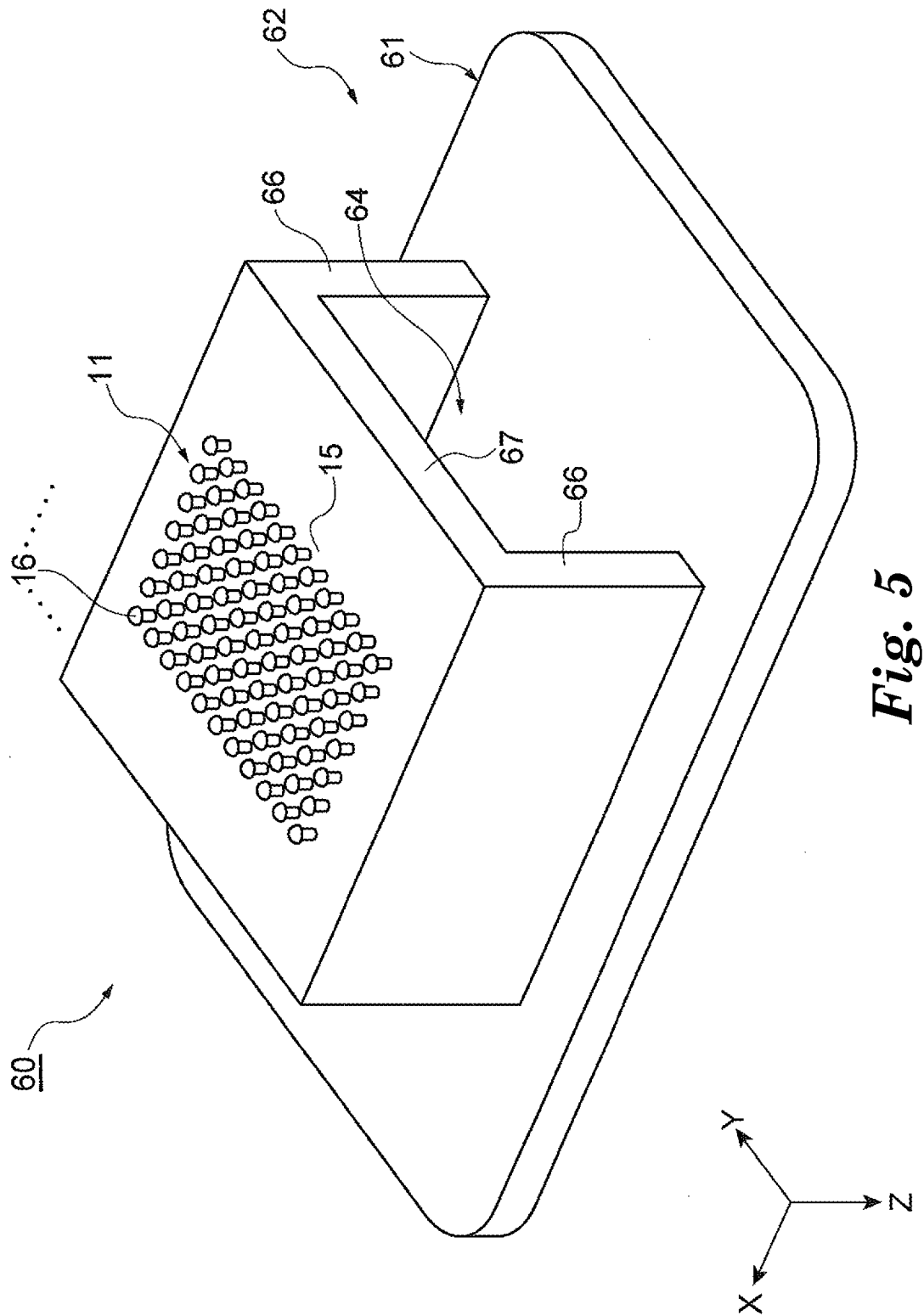


Fig. 5

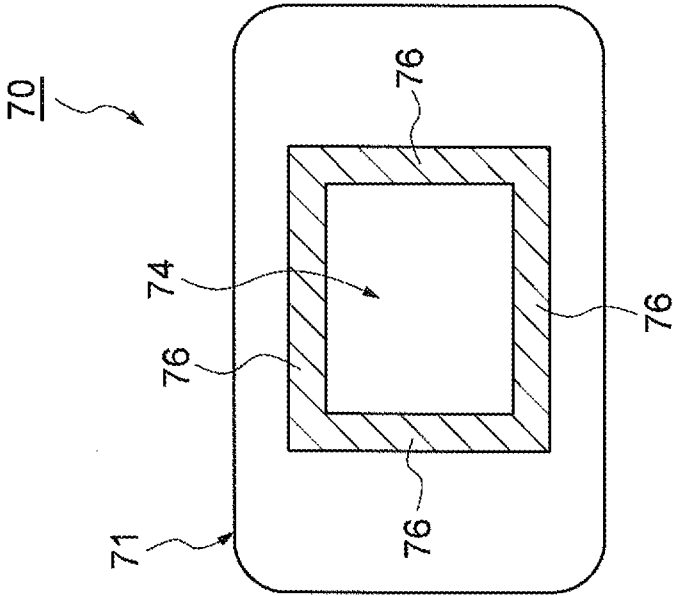


Fig. 6a

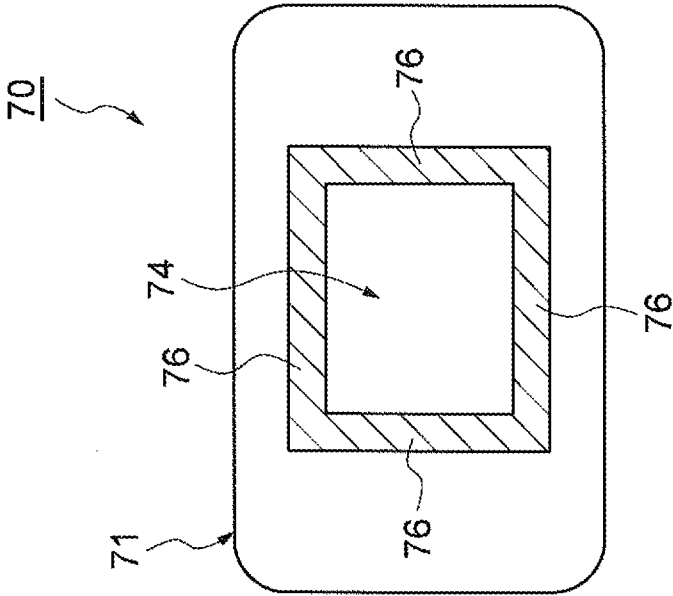


Fig. 6b

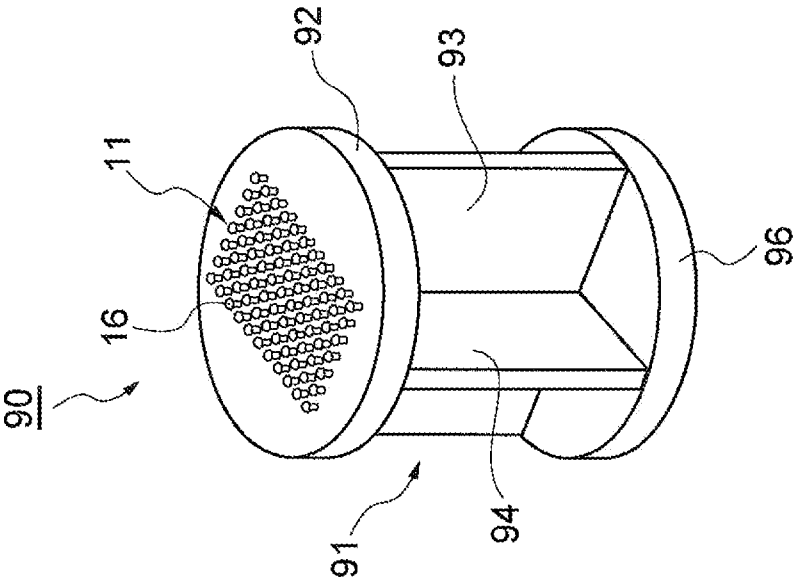


Fig. 7a

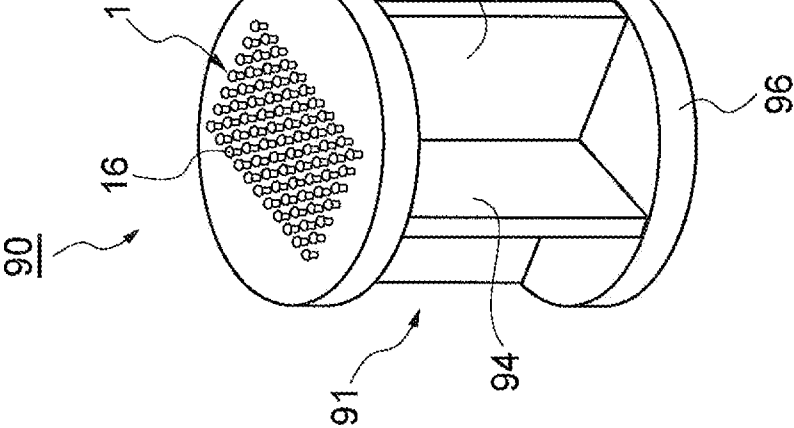


Fig. 7b

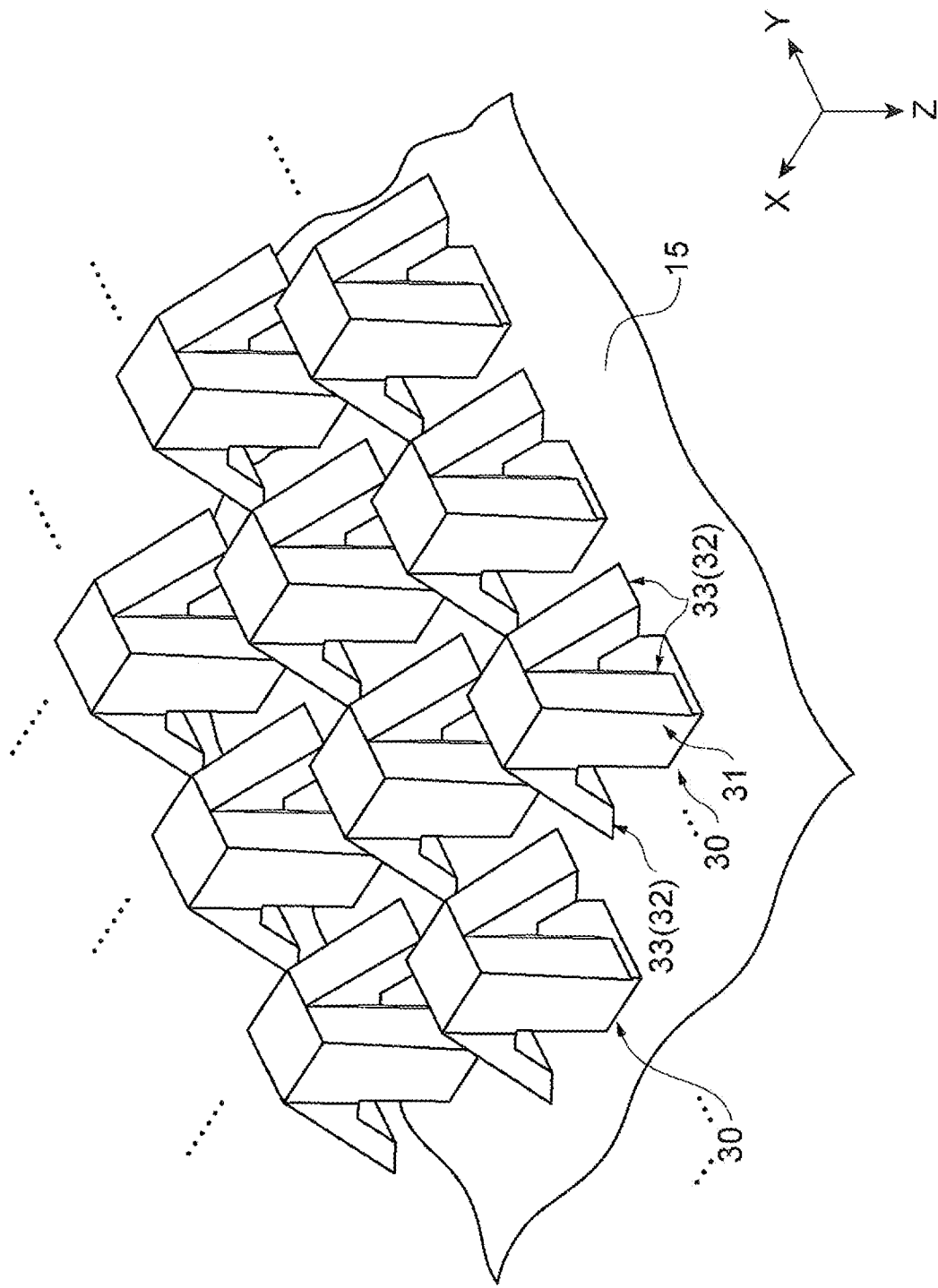


Fig. 8

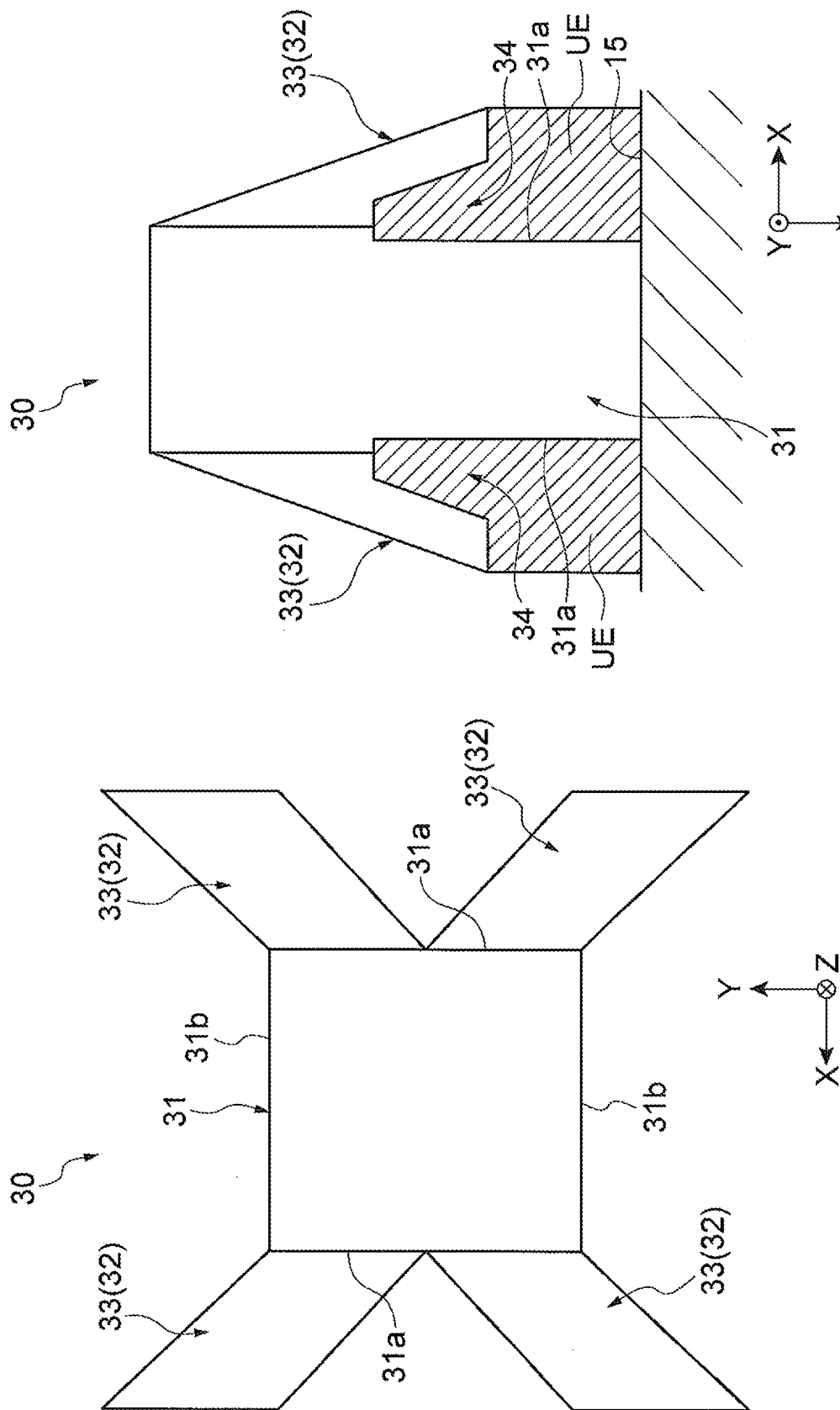
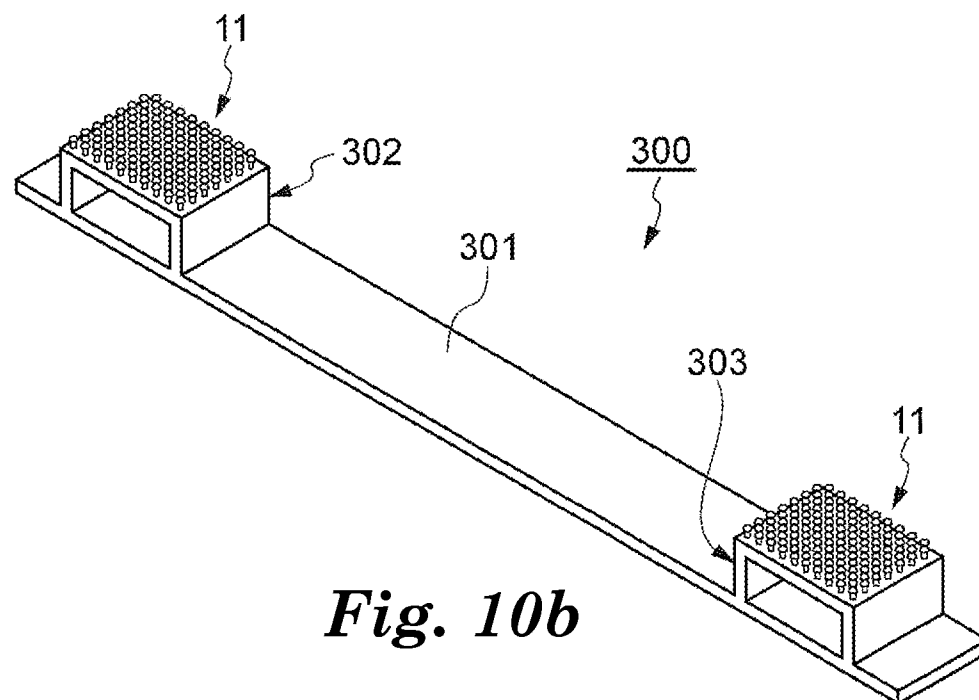
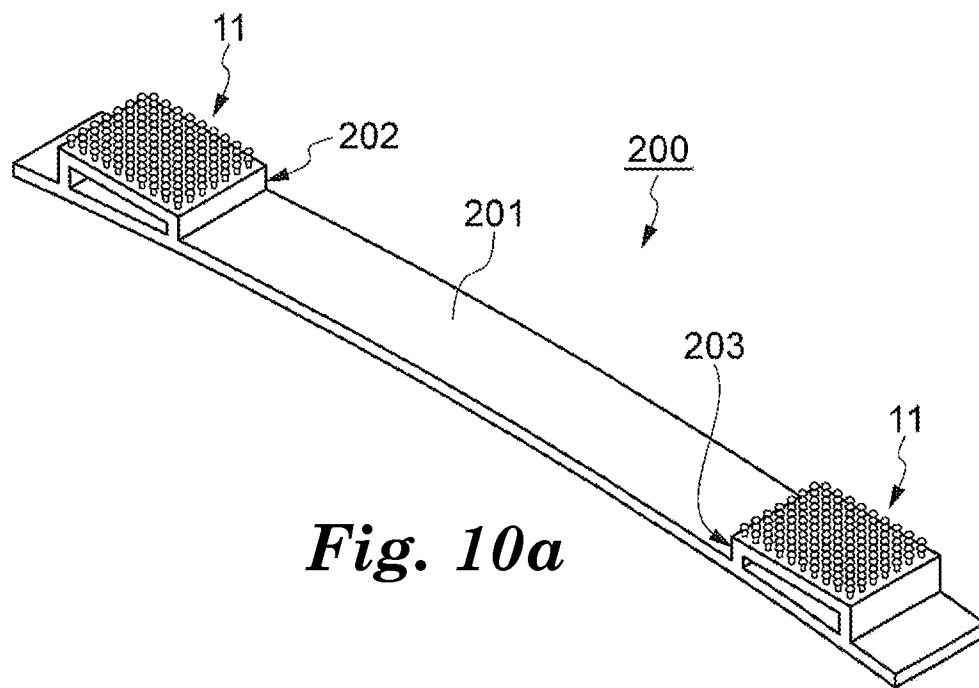


Fig. 9a

Fig. 9b

10/10



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/042873

A. CLASSIFICATION OF SUBJECT MATTER
INV. A44B18/00
ADD.

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)
A44B A47F B60R

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/098454 A1 (GALLANT CHRISTOPHER M [US] ET AL) 12 May 2005 (2005-05-12) abstract; figures 1-3 -----	1-7
X	JP 2005 231632 A (ACHILLES CORP) 2 September 2005 (2005-09-02) abstract; figure 3 -----	1-5,7
X	US 2005/003723 A1 (BROUARD MARCEL [CA] ET AL) 6 January 2005 (2005-01-06) abstract; figure 1 -----	1-5
X	US 2012/011685 A1 (ROCHA GERALD [US]) 19 January 2012 (2012-01-19) abstract; figures 7A,7B -----	1-5,7



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

22 September 2014

Date of mailing of the international search report

30/09/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

van Voorst, Frank

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/042873

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005098454	A1	12-05-2005	NONE
JP 2005231632	A	02-09-2005	NONE
US 2005003723	A1	06-01-2005	CA 2433557 A1 05-11-2003 US 2005003723 A1 06-01-2005
US 2012011685	A1	19-01-2012	AU 2011279007 A1 21-02-2013 CA 2805424 A1 19-01-2012 CN 103068270 A 24-04-2013 EP 2592960 A1 22-05-2013 JP 2013530796 A 01-08-2013 KR 20130041158 A 24-04-2013 TW 201208598 A 01-03-2012 US 2012011685 A1 19-01-2012 WO 2012009687 A1 19-01-2012