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(54) **AN ADJUSTABLE STOPPER ASSEMBLY FOR A VEHICLE**

(57) An adjustable stopper assembly for a vehicle door or hood, comprises: a base part comprising a body and attachment means for securing in an aperture in the body of the vehicle; a pin part comprising a head portion and a shank extending from the head portion; and an intermediate part located between the base part and the head portion of the pin part and being releasably securable to the base part: wherein: the shank of the pin part comprises at least one first, resiliently deformable outwardly-extending projection at a first longitudinal position of the shank, at least one second, resiliently deformable outwardly-extending projection at a second longitudinal position of the shank spaced from the first projection in the longitudinal direction of the shank and a screw-threaded portion between the at least one first, resiliently deformable projection and the head portion of the pin; the intermediate part comprises a screw-threaded through aperture which is screw-threadedly engaged with the screw-thread portion of the pin shank; and the base part comprises a recess in which the at least one second, resiliently deformable projection of the shank is received, the recess having one or more inwardly-extended projections which are engageable with the at least one second resiliently deformable projection as the pin part is rotated.

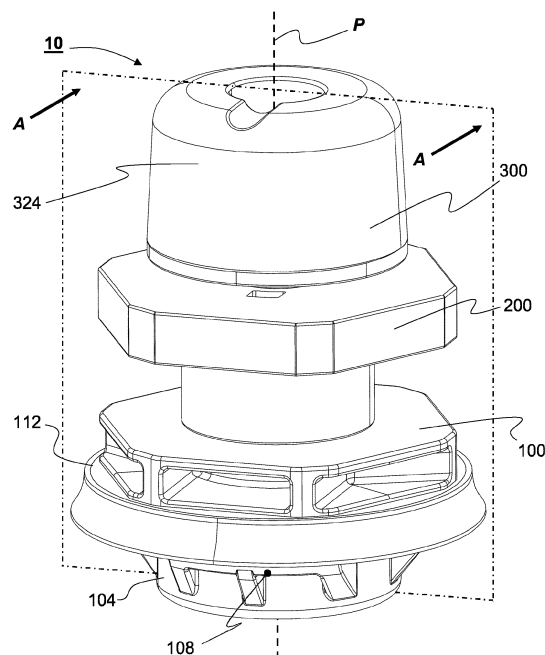


FIG. 1

Description**Technical Field of Invention**

5 **[0001]** The present invention relates to adjustable stopper assemblies for vehicles, for keeping two structural parts of a vehicle in a spaced relationship with each other and/or to prevent damage

Introduction

10 **[0002]** Stopper assemblies are commonly used in the automotive sector. In particular, adjustable stopper assemblies are used to withstand and reduce the vibrations of parts which may be opened, such as the hood of the engine compartment or the trunk door.

15 **[0003]** Stopper assemblies have the function of supporting a movable structural part (for example the hood or trunk door of a vehicle) in a position flush with a stationary structural part (for example the body of a vehicle). The relative distance between the two structural parts may vary, for example, owing to manufacturing and assembly tolerances. There is therefore a need to have an improved adjustable spacer devices which allow compensation of the manufacturing and assembly tolerances between the two structural parts. Furthermore, there is a need for an adjustable spacer assembly that can be adjusted more accurately by providing feedback to the user (e.g. haptic or audible).

20 **Summary of the Invention**

[0004] In accordance with the present invention, an adjustable stopper assembly for a vehicle door or hood comprises:

25 a base part comprising a body and attachment means for securing in an aperture in the body of the vehicle;
 a pin part comprising a head portion and a shank extending from the head portion; and
 an intermediate part located between the base part and the head portion of the pin part and being releasably securable to the base part, wherein:

30 the shank of the pin part comprises at least one first, resiliently deformable outwardly-extending projection at a first longitudinal position of the shank, and a screw-threaded portion between the at least one first, resiliently deformable projection and the head portion of the pin part;
 the intermediate part comprises a screw-threaded through aperture which is screw-threadedly engaged with the screw-thread portion of the pin shank; and
 the base part further comprises a recess in which the at least one first, resiliently deformable projection of the
 shank is received, the recess having one or more inwardly-extending projections which are engageable with
 the at least one first resiliently deformable projection as the pin part is rotated, during assembly.

35 **[0005]** In the above assembly, the at least one first, resiliently deformable outwardly-extending projection ensures that the pin part and the intermediate part do not become inadvertently disengaged from each other. In addition, the engagement of the at least one first, resiliently deformable outwardly-extending projection with the one or more inwardly-extending projections in the recess of the base part allows the pin part to be rotated stepwise through a predetermined stepping angle in order to adjust the longitudinal position of the pin part. Furthermore, the engagement between the at least one first resiliently deformable outwardly-extending projection and the one or more inwardly-extending projections provides for a tactile or haptic and/or audible feedback when rotating the pin part during use (i.e. adjustment) and assembly of
 the adjustable stopper. This allows for a more precise rotation through predetermined increments and improving accuracy of the adjustment as well as user experience.

[0006] Advantageously, the first longitudinal position is a distal end of said shank.

40 **[0007]** Alternatively, the adjustable stopper assembly may further comprise at least one second, resiliently deformable outwardly-extending projection at a second longitudinal position of said shank spaced from said first projection in a longitudinal direction of said shank. Preferably, the second longitudinal position is spaced in a longitudinal direction proximal to the first longitudinal position.

45 **[0008]** The at least one second resiliently deformable outwardly-extending projection ensures that the pin part and the intermediate part do not become inadvertently disengaged from each other, while the first resiliently deformable outwardly-extending projection is predominantly used to engage with the one or more inwardly-extending projections in the recess of the base part, allowing the pin part to be rotated stepwise through a predetermined stepping angle in order to adjust the longitudinal position of the pin part.

50 **[0009]** In one embodiment, the shank of the pin part comprises a first, generally cylindrical portion on which the screw-threaded portion is located.

[0010] The shank of the pin part may further comprise a resiliently deformable portion extending from the distal end of the generally cylindrical portion. The second, resiliently deformable portion of the pin part may be planar.

[0011] In one embodiment, the or each first, resiliently deformable outwardly-extending projection is planar.

[0012] In one embodiment, the or each second, resiliently deformable outwardly-extending projection is planar.

[0013] Preferably, the maximum extent to which the or each first, resiliently deformable outwardly-extending projection projects in the lateral direction is greater than the diameter of the screw-threaded through aperture of the intermediate part.

[0014] This ensures that any attempt to disengage the pin part from the intermediate part will be inhibited by the or each first, resiliently deformable outwardly-extending projection.

[0015] Preferably, in the alternative embodiment, the maximum extent to which the or each second, resiliently deformable outwardly-extending projection projects in the lateral direction is greater than the diameter of the screw-threaded through aperture of the intermediate part.

[0016] Preferably, the shank of the pin part comprises two first, resiliently deformable outwardly-extending projections at the first longitudinal position of the shank.

[0017] Preferably, in the alternative embodiment, the shank of the pin part comprises two second, resiliently deformable outwardly-extending projections at the second longitudinal position of the shank.

[0018] Having two diametrically opposite first and, alternatively, second resiliently deformable outwardly-extending projections allows for the pin part to be centred within the recess of the base part and balance the points of contact between the outwardly-extending projections and the one or more inwardly-extending projections in the recess of the base part during rotation.

[0019] The adjustable stopper assembly may further comprise a cap secured to the head portion of the pin. Preferably, the cap comprises a resiliently deformable material.

[0020] The head portion of the pin part preferably comprises engagement means for facilitating rotation of the pin part.

[0021] Conveniently, the head portion of the pin may comprise a recess for insertion of a tool. Additionally, the cap may comprise a recess for facilitating insertion and use of the tool.

[0022] The adjustable stopper assembly may further comprise one or more first projections on one of the intermediate part and the base part, each one receivable in a corresponding recess on the other of the intermediate part and the base part.

[0023] Advantageously, each one of the corresponding recess may comprise one or more second projections configured to operably engage with a respective one of the one or more first projections during assembly.

[0024] This provides the advantage of allowing a preassembly into a semi-mounted position between the intermediate part and the base part, e.g. for transport of the components before full assembly on the vehicle. Also, the engagement between the first and second projections during assembly (i.e. the first projections slide into the recess and over respective second projections) may provide a tactile and/or audible feedback to the user indicating the correct locking between the base part and the intermediate part.

Brief Description of the Drawings

[0025] By way of example only, a specific embodiment of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an embodiment of adjustable stopper assembly for a vehicle, in accordance with the present invention;

Figure 2 is a cross sectional view of the adjustable stopper assembly of Figure 1 along sectional plane A-A;

Figure 3 is an exploded perspective view of the adjustable stopper assembly of Figure 1;

Figures 4 is an illustration of the base part of the stopper assembly of Figure 1 in (a) a perspective top view, (b) a perspective bottom view, (c) a top view, (d) a bottom view (e) a side view and (f) a cross sectional view along B-B;

Figures 5 is an illustration of the intermediate part of the stopper assembly of Figure 1 in (a) a perspective top view, (b) a perspective bottom view, (c) a top view, (d) a bottom view, (e) a side view and (f) a cross sectional side view along C-C ;

Figure 6 is an illustration of the pin part (bumper) of the stopper assembly of Figure 1 in (a) a perspective top view, (b) a perspective side-bottom view, (c) a top view, (d) a bottom view, (e) a side view and (f) a cross-sectional side view along D-D;

Figure 7 is an exploded perspective view of an alternative embodiment of the adjustable stopper assembly, comprising a base part, an intermediate part and a pin part (having two spaced apart projections);

Figure 8 is a perspective side-bottom view of the alternative pin part of the adjustable stopper assembly shown in Figure 7, and

Figure 9 is a cross-sectional side view of the assembled alternative adjustable stopper assembly shown in Figure 7.

Description

[0026] The described example embodiment relates to an adjustable stopper assembly for use with vehicles, and particularly, an adjustable bump stop provided to a structure of the vehicle chassis. However, the invention is not limited to vehicle structures, but may also be used for any other structure requiring an adjustable bumpstop between contactingly engaging components.

[0027] Certain terminology is used in the following description for convenience only and is not limiting. The words 'right', 'left', 'lower', 'upper', 'front', 'rear', 'upward', 'down', 'downward', 'above' and 'below' designate directions in the drawings to which reference is made and are with respect to the described component when assembled and mounted (e.g. *in situ*). The words 'inner', 'inwardly' and 'outer', 'outwardly' refer to directions toward and away from, respectively, a designated centreline or a geometric centre of an element being described (e.g. central axis), the particular meaning being readily apparent from the context of the description.

[0028] Further, as used herein, the terms 'connected', 'attached', 'coupled', 'mounted' are intended to include direct connections between two members without any other members interposed therebetween, as well as, indirect connections between members in which one or more other members are interposed therebetween. The terminology includes the words specifically mentioned above, derivatives thereof, and words of similar import.

[0029] Further, unless otherwise specified, the use of ordinal adjectives, such as, 'first', 'second', 'third' etc. merely indicate that different instances of like objects are being referred to and are not intended to imply that the objects so described must be in a given sequence, either temporally, spatially, in ranking or in any other manner.

[0030] Through the description and claims of this specification, the terms 'comprise' and 'contain', and variations thereof, are interpreted to mean 'including but not limited to', and they are not intended to (and do not) exclude other moieties, additives, components, integers or steps. Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality, as well as, singularity, unless the context requires otherwise.

[0031] Features, integers, characteristics, compounds, chemical moieties or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive. The invention is not restricted to the details of any foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract or drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0032] In the present example embodiment, the adjustable stopper assembly 10 shown in the Figures is assembled from a base portion 100, an intermediate portion 200 and a pin portion 300, which are assembled around a common longitudinal axis P. As will be explained, in use, and as best seen in Figure 2 and 9, the base portion 100 is secured in a hole 402 formed in the body or structure 400 of a vehicle. The intermediate portion 200 and pin portion 300 are screw-threadedly connected together, whereby their relative longitudinal position can be adjusted, and the intermediate portion 200 is releasably attachable to the base portion 100.

[0033] Referring now to Figures 1 to 3, the base portion 100 is formed, for example, from a moulded polymer material (plastic) and has a generally cylindrical central body 102 coaxially aligned with the longitudinal axis P and a coaxial outer tubular wall 104 radially spaced apart from the central body 102 by means of four identical spacing webs 106. Three identical securing tabs 108 project outwardly from the outer tubular wall 104, equally angularly spaced around its periphery, and each having an inclined upper surface 110 configured to secure the base portion 100 within the hole 402 of the body or structure 400 of the vehicle, as will be explained. A circular flange portion 112 extends radially outwardly from the upper end of the tubular wall 104 and carries a resiliently deformable annular seal 114. The longitudinally uppermost end of the base portion 100 is formed into a hexagonal head 116 to facilitate rotation of the base portion 100 in order to secure it in position, as will be explained.

[0034] As best seen in Figures 3 and 4, a securing collar 118 is arranged coaxially with axis P and extends from the

upper face of the hexagonal head 116. The outer face of the collar 118 is provided with three identical L-shaped recesses 120, circumferentially equidistantly spaced around the periphery. Each recess 120 comprises a short vertically (i.e. parallel to the longitudinal axis **P**) extending portion 122 whose upper end is formed in a chamfered upper shoulder 124 of the collar 118 and whose lower end merges into a circumferentially extending portion 126. As will be explained, each recess 122, 126 is configured to receive a complementarily-shaped projection 212 extending from an inner surface of the intermediate portion 200 so as to form a bayonet-type connection during assembly.

[0035] Furthermore, and as shown in Figure 3 ad 4, the shorter, vertically extending portion 122 of each recess 120 is provided with a first internal projection 128 at approximately its midpoint (i.e. at the junction between the upper recess portion 122 and the circumferential lower recess portion 126), and the circumferentially extending lower recess portion 126 of each recess 120 is provided with an identical second internal projection 130 approximately at its midpoint. As will be explained in more detail, the first and second projections 128, 130 are configured to allow the intermediate part 200 to be retained in a semi-mounted position on the base part 100, with each complementarily-shaped projection or lug 212 retainingly located between the first and second internal projections 128, 130 of the respective L-shaped recess 120.

[0036] As best seen in Figures 2 and 4(f), the central body 102 comprises a coaxial cylindrical recess 132 formed from its upper end and extending longitudinally through the central body 102 of the base portion 100, but terminating at a bottom wall 134. The internal side wall 136 of the recess 132 is provided with three identical, inwardly-projecting elongate projections 138 extending parallel to the longitudinal axis **P** along the internal side wall 136 of the recess 132.

[0037] Referring to Figures 1, 2, 3 and 5, the intermediate portion or intermediate part 200 of this particular example embodiment is also formed from a moulded polymer material (e.g. plastic) and comprises a generally tubular body 202 and a hexagonal outwardly-extending flanged head portion 204 at its upper end (or proximal end). As best seen in the cross-sectional illustration of Figure 2, the passage 206 of the upper portion of the tubular body 202 has a significantly smaller interior diameter than the passage 208 of the lower portion and the interior wall of the upper passage 206 is formed into a screw thread 210.

[0038] Referring now in particular to Figure 5(b), the inner face of the lower passage 208 of the tubular body 202 is provided with three identical radially inwardly-projecting projections or lugs 212, circumferentially equidistantly spaced around the inner wall of the lower passage 208. Each one of the projections or lugs 212 is configured to be received in a respective one of the three L-shaped recesses 120 provided in collar 118 that is extending from the upper end of the base part 100, forming a bayonet-type connection. It is understood that number and the circumferential spacing of the L-shaped recesses 120 is matched to the number and circumferential spacing of the projections or lugs 212. Furthermore, the shape of each one of the projections 212 is adapted to operably slot / slide into the L-shaped recesses 120. For example, the projection may be shaped like a hemisphere or a cuboid with rounded corners so as to facilitate sliding entry into the L-shaped recesses 120 during assembly.

[0039] Referring now to Figures 6(a)-(f), the pin part or pin portion 300 is also primarily formed from a moulded polymer material (e.g. plastic) and has a circular disc-shaped head portion 302 with a radially outwardly extending peripheral flange 304 at its lower end and an elongate stem or shank portion 306 extending coaxially along the longitudinal axis **P** from the under-surface of the head portion 302 (i.e. the distal end). The stem or shank portion 306 has a cylindrical upper portion 308, adjacent to the head portion 302 which is provided with a screw thread 310 complementary to the screw-thread 210 of upper passage 206 of the intermediate part 200, and a resiliently deformable planar lower portion 312 coaxial with the upper portion 308 at its distal end.

[0040] A pair of identical elongate resiliently deformable planar projections 314 extend radially outwardly and towards the head portion 302 from opposite faces of the planar lower portion 312 of the stem or shank 306, forming the shape of an anchor. The resiliently deformable projections 314 extend from the distal end of the planar lower portion 312 and are inclined upwardly with respect to the plane of the planar lower portion 312 at a predetermined angle, for example, at an angle of approximately 30°.

[0041] As best seen in Figure 6, the disc-shaped head portion 302 and the cylindrical upper portion 308 of the stem or shank portion 306 are moulded so as to form a longitudinal cylindrical aperture 316 into upper portion 308 and a hexagonal aperture 318 into the head portion 302. The hexagonal aperture 318 may be shaped so as to receive a standard Allen key tool for adjusting the rotational position of the pin part or portion 300. Alternatively, as shown in Figure 9, the cylindrical upper portion 308 of the stem or shank portion 306 may be moulded around a metal bolt 320 coaxially aligned with longitudinal axis **P**. The metal bolt 320 is configured to receive a standard Allen key tool for adjusting the rotational position of the pin part or pin portion 300.

[0042] A resiliently deformable bump cap 324 of a polymer material (e.g. a polymer foam or other deformable plastic) is secured to the upper face of the disc-shaped head portion 302 and is provided with a through hole 326 coaxially aligned with axis **P** so as to allow access of an Allen key tool to the hexagonal aperture 318 or hexagonal bolt head 322. The bump cap 324 may be glued or otherwise attached to the upper surface of the head portion 302 of the pin part 300.

[0043] Referring now to Figures 7, 8 and 9, an alternative example embodiment of the adjustable stopper assembly 10' of the present invention has an equivalent base part 100', intermediate part 200' and pin part 300', with the base part 100' and the intermediate part 200' being substantially the same as the base part 100 and intermediate part 200 of

adjustable stopper assembly 10. However, the alternative pin part 300' comprises a first pair of resiliently deformable projections 314a' and a second pair of resiliently deformable projections 314b', longitudinally spaced apart from and proximal to the first pair of resiliently deformable projections 314a'. The pair of resiliently deformable projections 314a' and 314b' are identical elongate planar projections that extend outwardly from opposite faces of the planar lower portion 312' of the stem or shank 306'. The projections 314a', 314b' extend in a direction inclined upwardly with respect to the planar lower portion 312'.

[0044] In this particular example embodiment, the materials used for the pin part 300 are 2k components, i.e. a resilient foam polymer of the bump cap 324 combined with a resilient polymer or plastic of the head portion 302 and shank 306 (e.g. PA66-GF15% + TPV45 SHA). The intermediate part 200 is made from a 1k component (e.g. PP-GF30% or PA6-GF15%) and the base part 100 is made from a 2k component, i.e. a first polymer for the body (e.g. PP-GF30% or PA6-GF15%) and a second polymer for the seal (e.g. TPV 55 SHA). An example of the pressure force on each bump cap 324 may be 500N, with a pretension on the TPV material of ± 300 N. However, it is understood by the person skilled in the art that any other suitable material may be used for any one of the components of the stopper assembly adapted to perform within the scope of the present invention.

[0045] During assembly, the intermediate part 200 and the pin part 300 are assembled by pushing the stem or shank portion 306 of the pin part 300 through the threaded upper passage 206 of the intermediate part 200. The footprint of the elongate planar projections 314 is wider than the diameter of the threaded upper passage 206 (i.e. the maximum extent to which they project in the lateral direction is greater than the diameter of the threaded upper passage 206), but are resiliently deformable and thus deform sufficiently (i.e. fold inwards) to allow movement through the threaded upper passage 206. When the resiliently deformable projections 314 have passed through the upper passage 206, the then inwardly deformed projections 314 spring back outwardly into the original position consequently preventing the pin part 300 from being inadvertently withdrawn back through the upper passage 206 of the intermediate part 200. Further, once the projections 314 are pushed through the upper passage 206, the screw thread 210 on the upper portion and the screw thread 310 of the pin part 300 threadedly engage by rotating the pin part 300 with respect to the intermediate part 200. Any attempt to remove the pin part 300 from the intermediate part 200, e.g. by unscrewing it, will eventually be resisted by contact engagement of the resiliently deformable projections 314 with the upper surface of the cylindrical lower passage 208 (i.e. the shoulder portion formed between the upper passage 206 and the lower passage 208).

[0046] Typically, the adjustable stopper assembly 10 is delivered with the intermediate part 200 (and the pin part 300 which is attached to the intermediate part 200) retained on the base part 100 in a semi-mounted condition. This is achieved by pushing the projections or lugs 212 of the intermediate part 200 into respective L-shaped recesses 120 of the base part 100 and over respective first internal projections 128 of the upper recess portion 122, so as to be positioned between the first internal projection 128 and the second internal projection 130 of the L-shaped recess 120. In this semi-mounted arrangement, the intermediate part 200 is "loosely" coupled with the base part 100.

[0047] In use, and as best seen in Figure 2, 3 and 9, the base part 100 is separated from the semi-mounted intermediate part 200 (and the pin part 300 coupled to the intermediate part 200) by pulling the projections or lugs 212 of the intermediate part 200 over the first internal projections 128 and out of the L-shaped recesses 120. The lower portion of the base part 100 is then inserted into a hole or aperture 402 formed in the vehicle body 400. The base part 100 is then rotated, for example, by means of the hexagonal head 116, so as to contactingly engage the inclined upper surface 110 of each securing tab 108 with the under-surface of the vehicle body 402, wedgingly securing the base part 100 to the vehicle body 400 and pushing the resiliently deformable annular seal 114 into sealing engagement with the outer (upper) surface of the vehicle body 400.

[0048] The intermediate part 200 (to which the pin part 300 is connected) is then passed through an aperture 502 of an outer panel 500, and the projections or lugs 212 of the intermediate part 200 are each aligned with and moved into the upper end of respective L-shaped recesses 120 in the securing collar 118 of the base part 100.

[0049] When moving the projections or lugs 212 into the L-shaped recess 120, the projections 212 are pushed over the first internal projection 128 in the upper recess portion 122 and are subsequently rotated over the second internal projections 130 of the circumferential recess portion 126 into a locked position (e.g. clockwise when viewed from the top). The rotation of the intermediate part 200 may be actioned via the hexagonal flanged head 204 (e.g. using suitable tools). To remove the intermediate part 200 from the base part 100, the intermediate part 200 is simply rotated anti-clockwise (when viewed from the top) moving the projections or lugs 212 through the circumferential recess portion 126 and over the second internal projection 130 to then pull the projections or lugs 212 of the intermediate part 200 upwards through the upper recess portion 122 and over the first internal projection 128 and out of engagement with the base part 100.

[0050] It will also be observed that as the intermediate part 200 is fitted onto the base part 100, the planar lower portion 312 of the stem or shank 306 of the pin part 300 is received into the coaxial central body recess 132 of the central body 102 of the base part 100. As best seen in Figure 2, the dimensions of the pair of resiliently deformable elongate planar projections 314 allow the pin part 300 to be rotated within the central body recess 132. However, rotation of the pin part 300 is resisted by engagement of the projections 314 with the inwardly-projecting elongate projections 138, but application

of additional torque to the pin part 300 deforms the projections 314 so that they can pass over the elongate projections 138 and then spring back into the initial shape. The "snapping" movement of the rotating projections 314 over the internal elongate projections 138 of the central body recess 132 provides a tactile and audible feedback to the user indicating a predetermined rotation of the pin part 300 for each passing of an elongate projection 138.

[0051] Therefore, as the longitudinal position of the pin part 300 is rotated, which is achieved by use of an Allen key engaged with the hexagonal aperture 318 in the head portion 302 or the alternative metal bolt 320 moulded into the pin part 300, the screw-threaded engagement between the screw thread 310 and the complementarily screw-threaded upper passage 206 causes the longitudinal position of the pin part 300 relative to the intermediate part 200 to change, thus, the longitudinal position of the pin part 300 can therefore be adjusted so as to position the bump cap 324 at a desired height. The engagement of the resiliently deformable projections 314 with the elongate projections 138 provides a stepwise rotation (i.e. audible or tactile feedback for each step), thus, allowing a stepwise adjustment of the longitudinal position of the pin part 300. In the present example embodiment, there are six circumferentially equidistantly spaced elongate projections 138, so each step is a rotation of 60 degrees.

[0052] It will be appreciated by persons skilled in the art that the above embodiment(s) have been described by way of example only and not in any limitative sense, and that various alterations and modifications are possible without departing from the scope of the invention as defined by the appended claims. Various modifications to the detailed designs as described above are possible, for example, variations may exist in shape, size, arrangement (i.e. a single unitary components or two separate components), assembly or the like.

Reference List:

10	Stopper	306	Shank / Stem portion
100	Base part	308	Cylindrical upper portion
102	Central body	310	Screw thread
104	Tubular wall	312	Planar lower portion
106	Spacing webs	314	Resiliently deformable projections
108	Securing tabs	316	Longitudinal cylindrical aperture
110	Inclined upper surface	318	Hexagonal aperture
112	Flange portion	320	Metal bolt
114	Annular seal	322	bolt head
116	Hexagonal head	324	Bump cap
118	Securing collar	326	Bump cap through hole
120	L-shaped recess		
122	Upper recess portion	100'	Alternative base part
124	Upper shoulder	200'	Alternative intermediate part
126	Circumferential recess portion	300'	Alternative pin part
128	First internal projection	314a'	First pair resilient projections
130	Second internal projection	314b'	Second pair resilient projections
132	Central body recess		
134	Bottom wall	400	Vehicle body / structure
136	Side wall	402	Vehicle aperture / hole
138	elongate projection	500	Panel
200	Intermediate part	502	Panel aperture / hole
202	Tubular body		
204	Flanged head		
206	Upper passage		
208	Lower passage		
210	Screw thread		
212	Projection / lug		
300	Pin part		
302	Head portion		
304	Flange		

Claims

1. An adjustable stopper assembly (10) for a vehicle door or hood, comprising:

a base part (100) comprising a body (102) and attachment means (108) for securing in an aperture (402) in a body (400) of the vehicle;
a pin part (300) comprising a head portion (302) and a shank (306) extending from said head portion (302); and
an intermediate part (200) located between said base part and said head portion of said pin part and being releasably securable to said base part, wherein:

said shank of said pin part comprises at least one first, resiliently deformable outwardly-extending projection (314) at a first longitudinal position of said shank, and a screw-threaded portion (310) between said at least one first, resiliently deformable projection and said head portion of said pin part;
said intermediate part comprises a screw-threaded through aperture (206) which is screw-threadedly engaged with said screw-thread portion of said shank; and
said base part further comprises a recess (132) in which said at least one first, resiliently deformable projection of said shank is received, said recess having one or more inwardly-extending projections (138) which are engageable with said at least one first resiliently deformable projection as said pin part is rotated, during assembly.

2. An adjustable stopper assembly according to claim 1, wherein said first longitudinal position is a distal end of said shank.

3. An adjustable stopper assembly according to any one of the preceding claims, further comprising at least one second, resiliently deformable outwardly-extending projection (314b') at a second longitudinal position of said shank spaced from said first projection in a longitudinal direction of said shank, and wherein said second longitudinal position is spaced in a longitudinal direction proximal to said first longitudinal position.

4. An adjustable stopper assembly according to any one of the preceding claims, wherein said shank of said pin part comprises a first, generally cylindrical portion (308) on which said screw-threaded portion is located.

5. An adjustable stopper assembly according to claim 4, wherein said shank of said pin part further comprises a resiliently deformable portion (312) extending from a distal end of said generally cylindrical portion (308).

6. An adjustable stopper assembly according to claim 5, wherein said resiliently deformable portion of said pin part is planar.

7. An adjustable stopper assembly according to any one of the preceding claims, wherein said or each first, resiliently deformable outwardly-extending projection is planar.

8. An adjustable stopper assembly according to any one of claims 3 to 7, wherein said or each second, resiliently deformable outwardly-extending projection is planar.

9. An adjustable stopper assembly according to any one of the preceding claims, wherein the maximum extent to which said or each first, resiliently deformable outwardly-extending projection projects in a lateral direction is greater than the diameter of said screw-threaded through aperture of said intermediate part.

10. An adjustable stopper assembly according to any one of claims 3 to 9, wherein the maximum extent to which said or each second, resiliently deformable outwardly-extending projection projects in a lateral direction is greater than the diameter of said screw-threaded through aperture of said intermediate part.

11. An adjustable stopper assembly according to any one of the preceding claims, wherein said shank of said pin part comprises two first, resiliently deformable outwardly-extending projections (314) at said first longitudinal position of said shank.

12. An adjustable stopper assembly according to any one of claims 3 to 11, wherein said shank of said pin part comprises two second, resiliently deformable outwardly-extending projections (314b') at said second longitudinal position of said shank.

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13. An adjustable stopper assembly according to any one of the preceding claims, further comprising a cap (324) secured to said head portion of said pin part and wherein said cap comprises a resiliently deformable material.
- 5 14. An adjustable stopper assembly according to any one of the preceding claims, wherein said head portion of said pin part comprises engagement means (318) for facilitating rotation of said pin part.
- 10 15. An adjustable stopper assembly according to any one of the preceding claims, further comprising one or more projections (212) on one of said intermediate part and said base part, each one receivable in a corresponding recess (120) on the other of said intermediate part and said base part.

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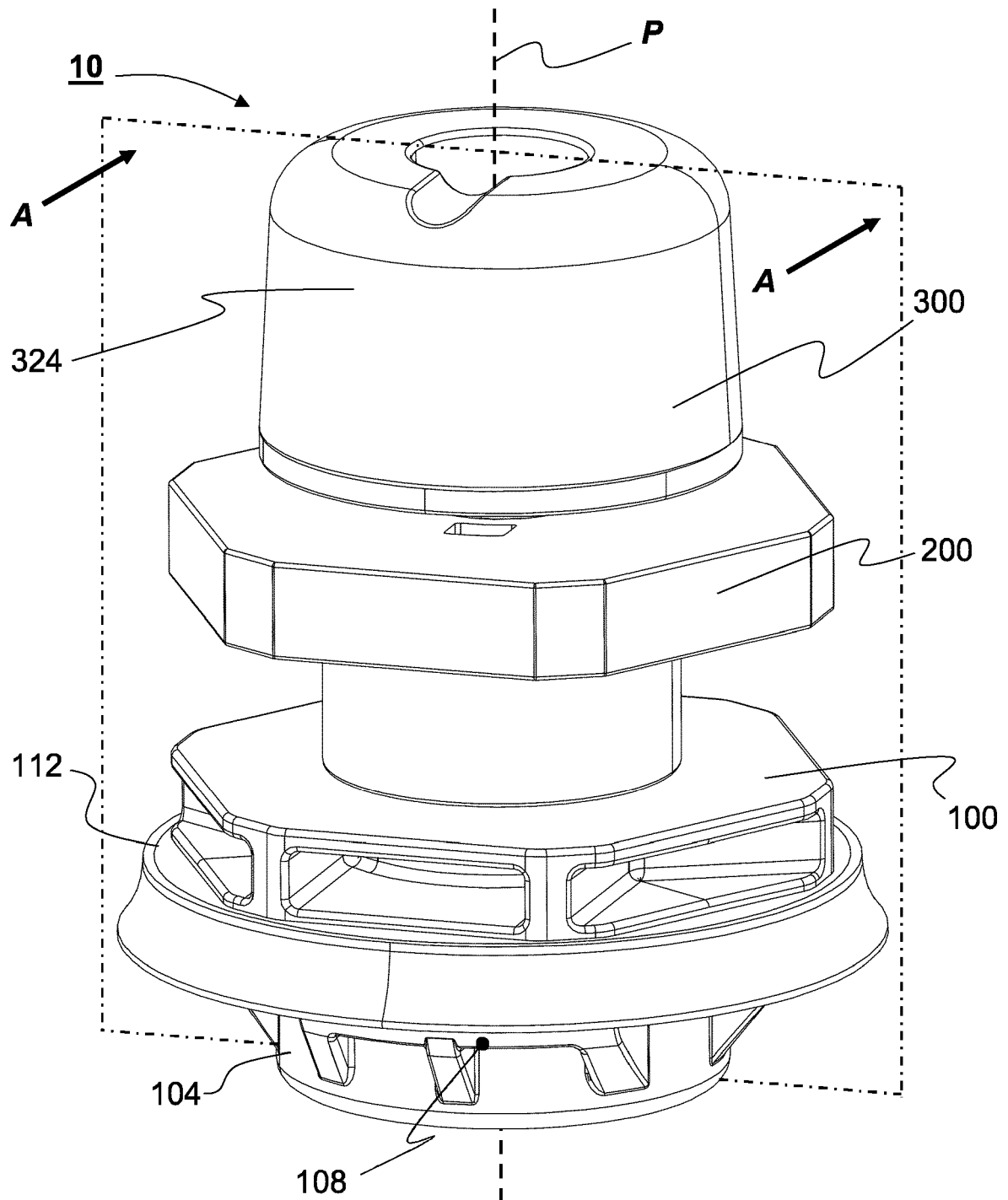


FIG. 1

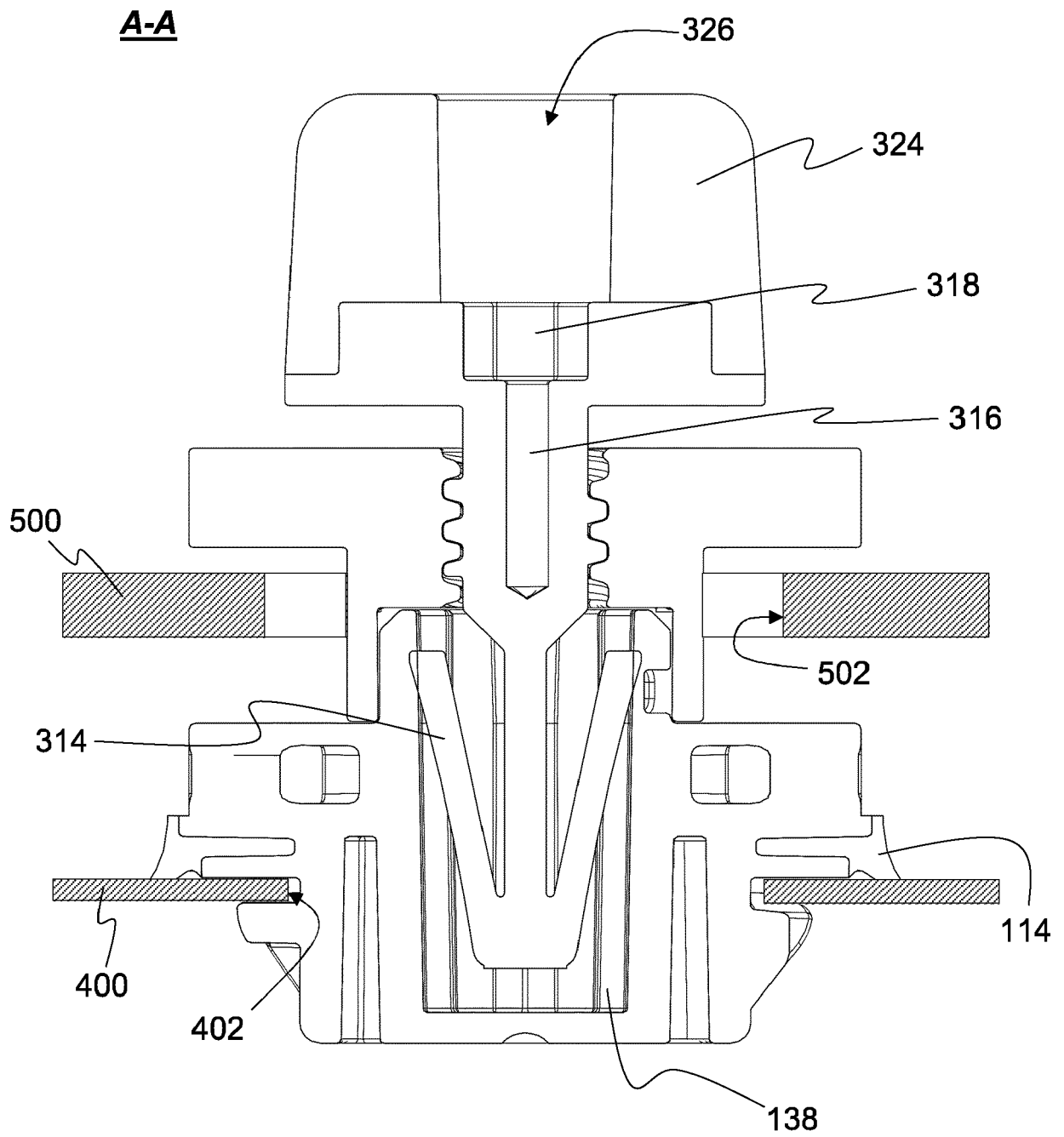


FIG. 2

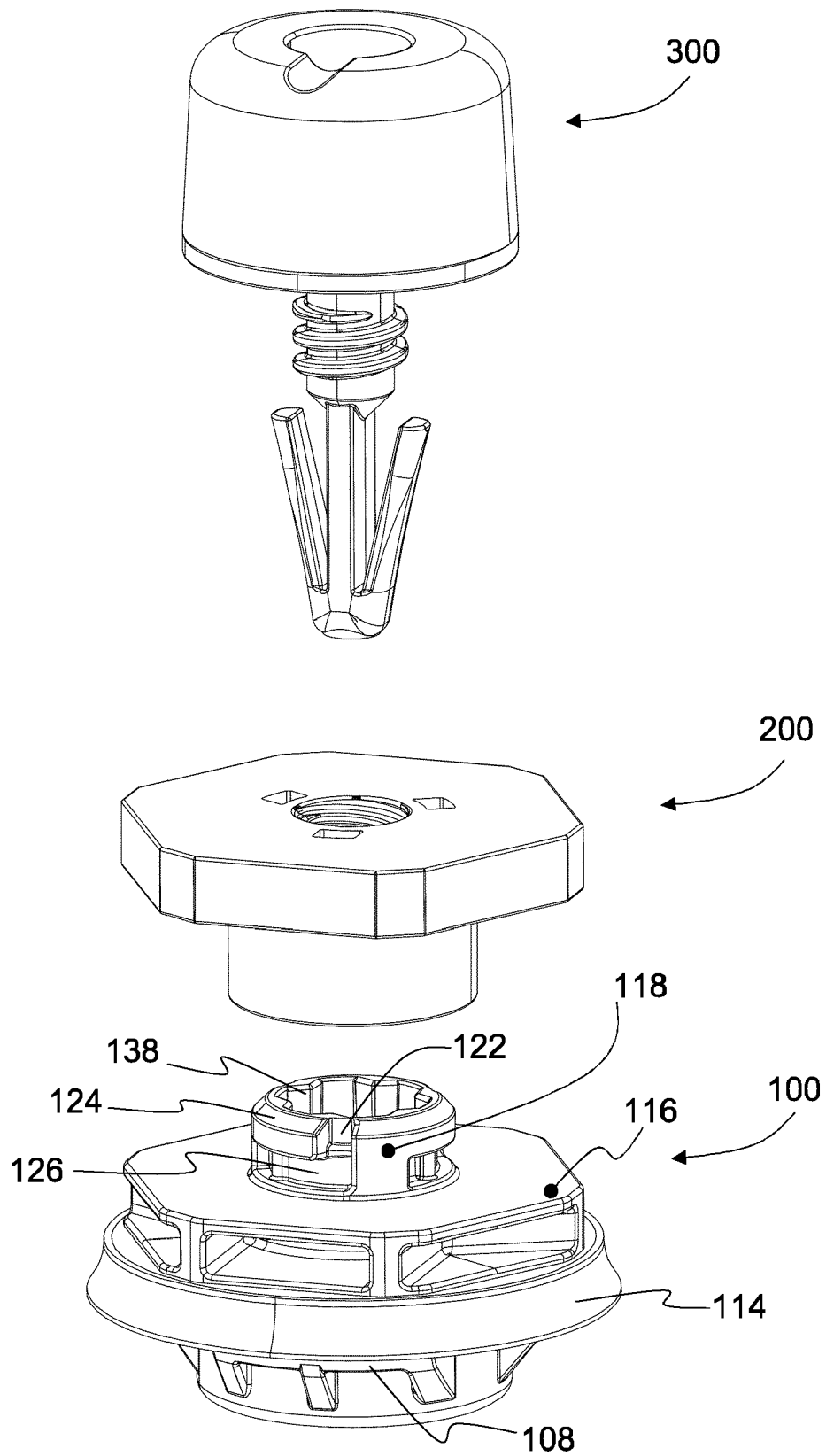


FIG. 3

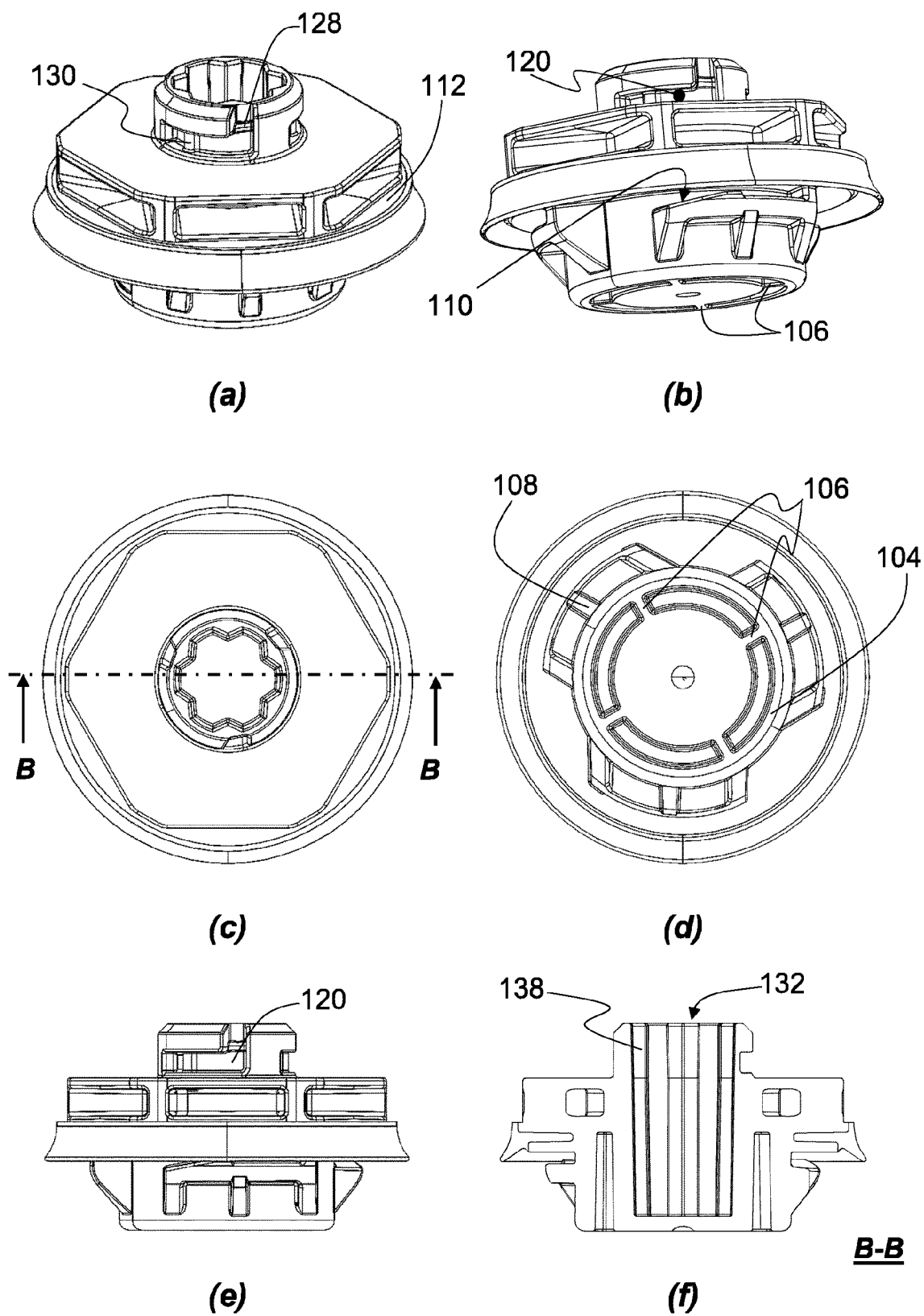


FIG. 4

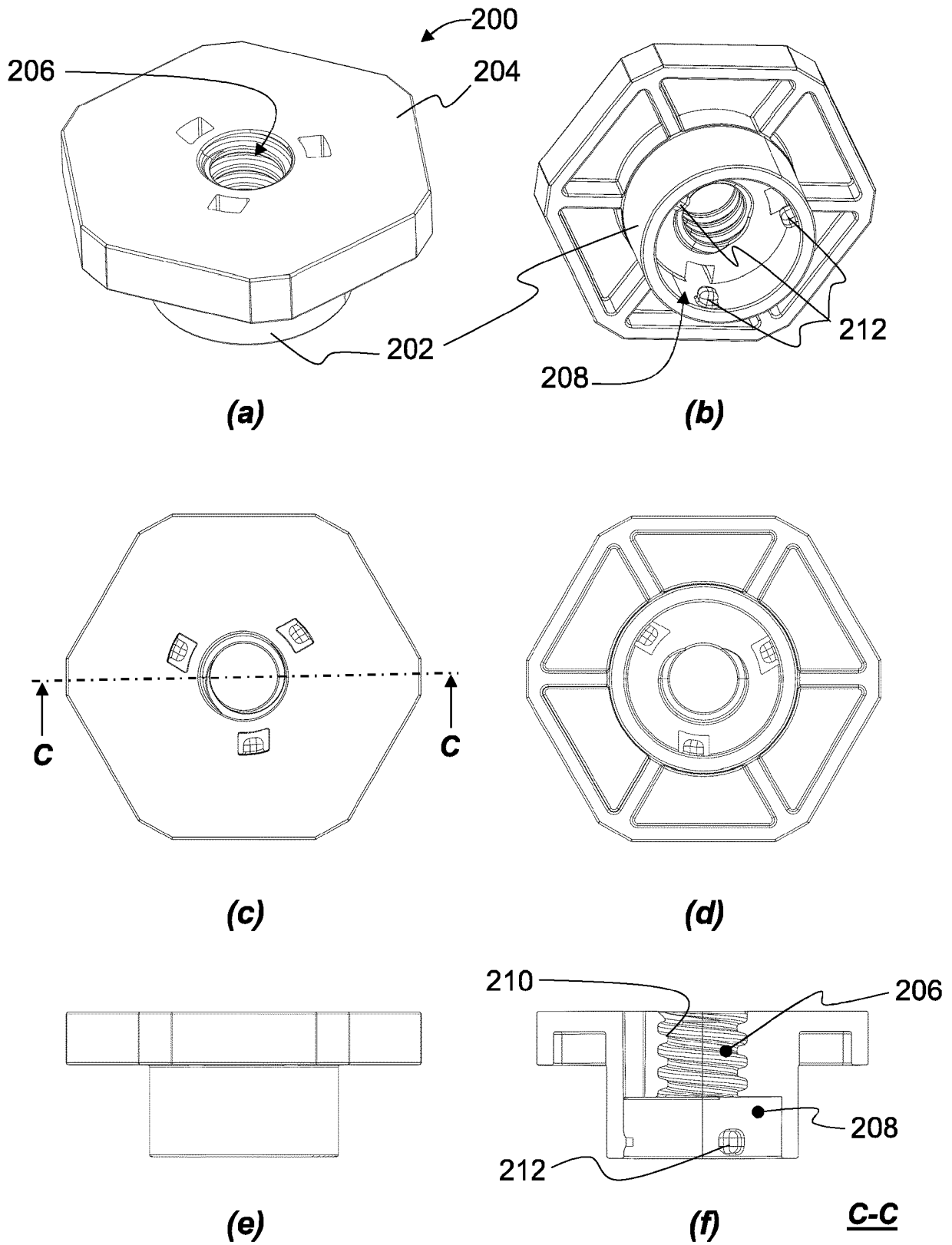


FIG. 5

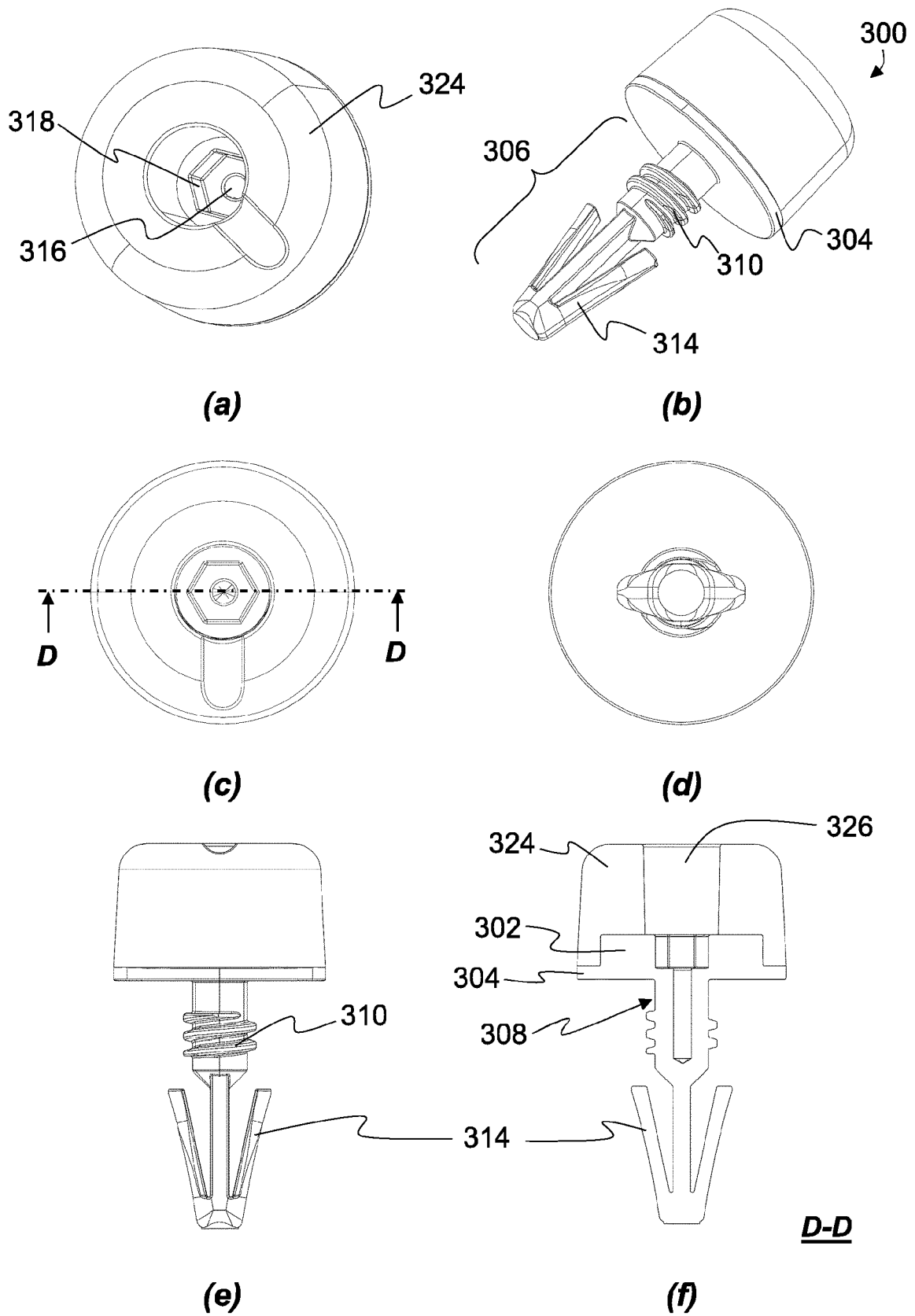


FIG. 6

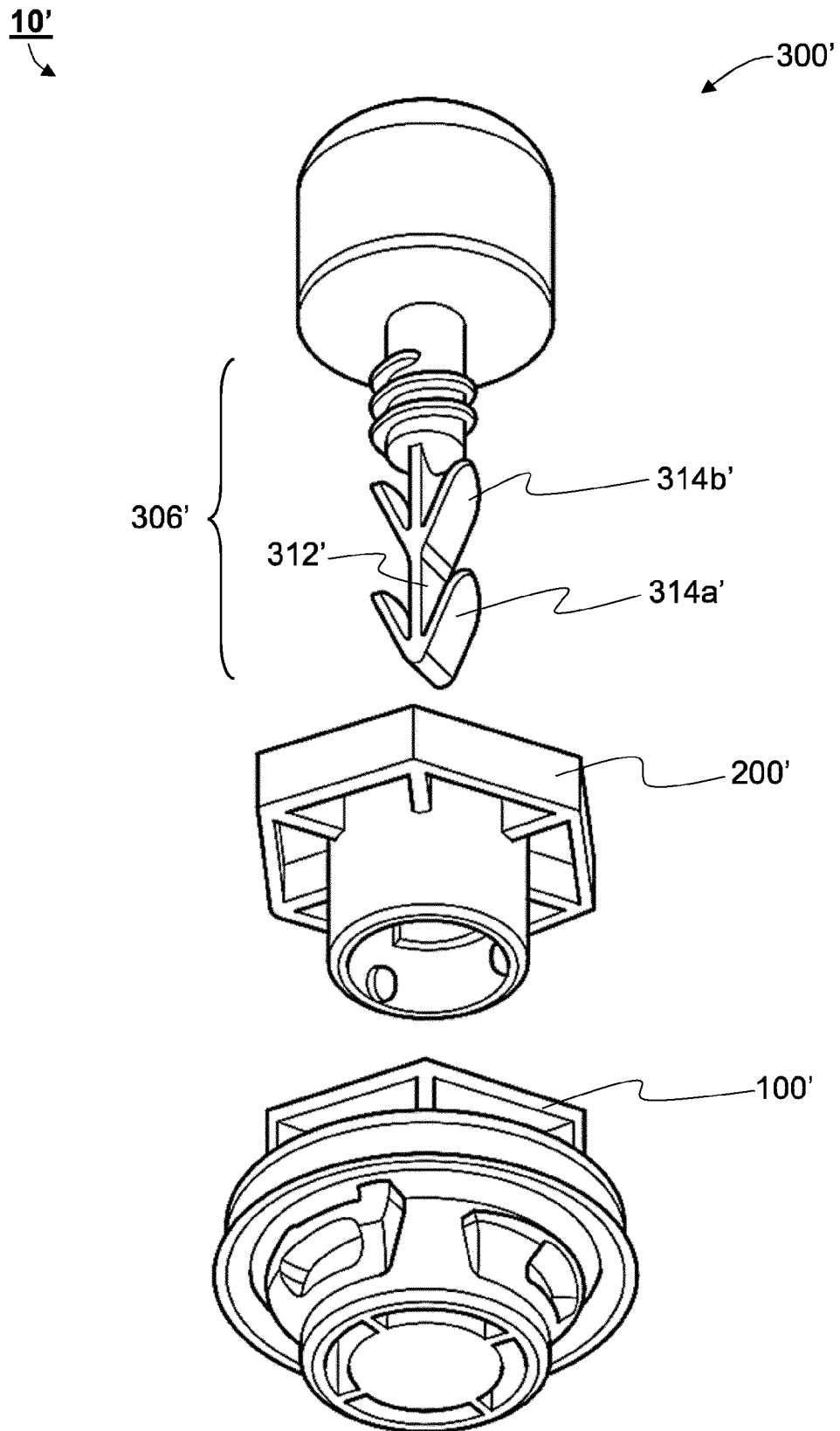


FIG. 7

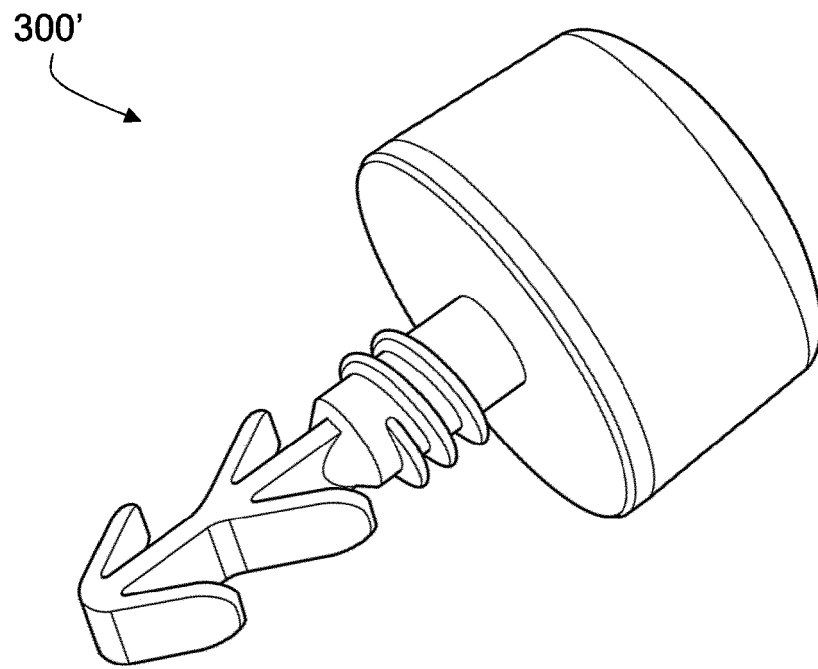


FIG. 8

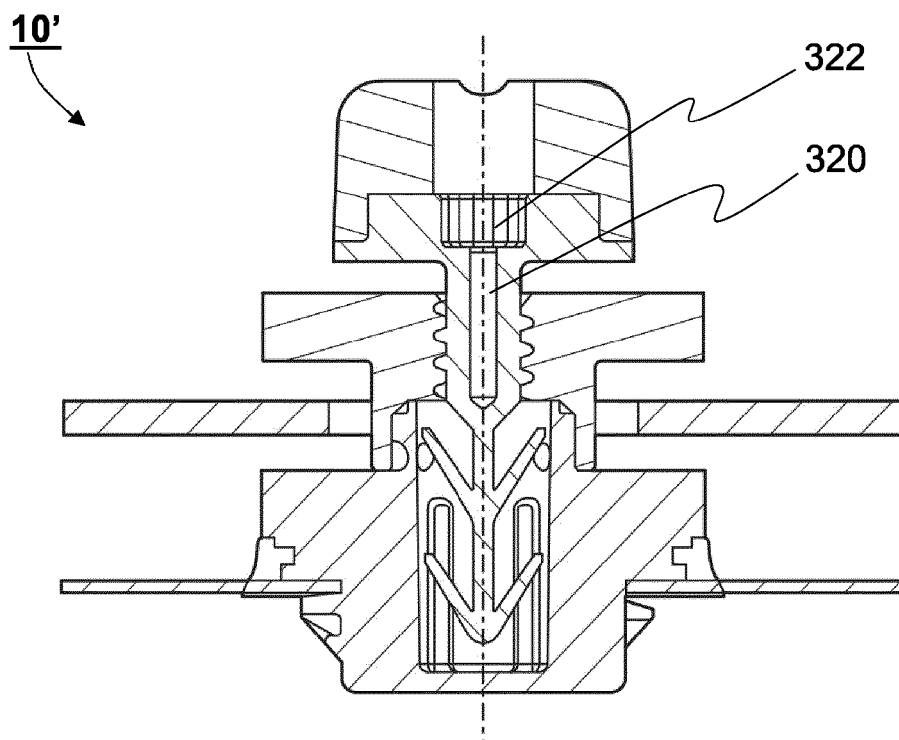


FIG. 9



EUROPEAN SEARCH REPORT

Application Number

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		1 August 2022	Klemke, Beate
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5

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