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(54) **DOOR HINGE AND A METHOD OF LOCATING A DOOR**

(57) A door hinge apparatus for supporting a door within a door frame, wherein said door frame includes a floor mounted part, comprising:
a door shoe (701) attachable to the bottom of a door, wherein said door shoe defines a cavity (702);
a spigot (101) having a threaded portion (102) and a spigot top (103), wherein said spigot top is receivable within said cavity; and
a lower threaded securing member (1102) for threaded engagement upon said threaded portion and an upper threaded retaining member (201), wherein a floor mounted part of a door frame is retainable between said lower threaded securing member and said upper threaded retaining member, characterized by:
a collar (601) locatable over said door shoe, wherein:
said collar includes inwardly inclined edges (604, 606) configured to restrain said spigot top within said cavity, thereby preventing the dislodging of said spigot top from said cavity.

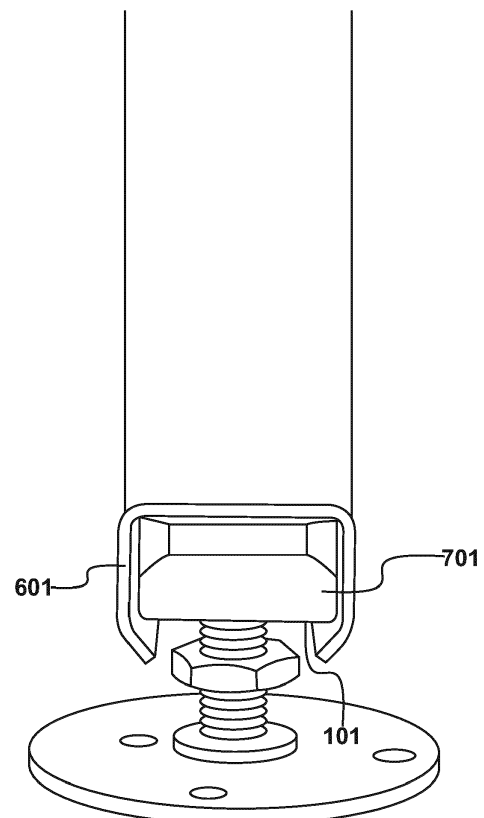


Fig. 16

Description

[0001] The present invention relates to an apparatus for preventing the dislodging of a door hinge, in which a door shoe defining a cavity is attached to the bottom of a door and a spigot engageable within said cavity extends from a floor.

[0002] In many environments, doors are required that are considered to be robust and securable, to a greater extent than conventional doors used in most domestic and commercial situations. To provide the level of required robustness, doors of this type tend to be heavy and as such require hinges that rest on a solid base, as distinct from being hinged in a conventional cantilever style.

[0003] Known systems provide a shoe that is attached to the bottom of the door. The shoe defines a cavity that is configured to engage with a vertically extending spigot. This arrangement supports the weight of the door and allows hinging to take place. However, a problem exists with systems of this type in that it is possible for the cavity to be displaced with respect to the spigot if a significant force is applied to the door, possibly in response to an attempt being made to achieve unauthorised opening.

[0004] According to a first aspect of the present invention, there is provided an apparatus for preventing the dislodging of a door hinge, in which a door shoe defining a cavity is attached to the bottom of a door and a spigot engageable within said cavity extends from a floor, comprising: a collar locatable over said door shoe, wherein said collar includes inwardly inclined edges configured to restrain said spigot within said cavity.

[0005] According to a second aspect of the invention, there is provided a method of locating a door within a door frame, comprising the steps of: locating a collar over a door shoe; attaching said door shoe to the bottom of a door; fastening a spigot to a bottom portion of a door-frame; and engaging said spigot within a cavity defined by said door shoe, wherein said collar includes inwardly inclined edges configured to restrain said spigot within said cavity.

[0006] Embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings. The detailed embodiments show the best mode known to the inventor and provide support for the invention as claimed. However, they are only exemplary and should not be used to interpret or limit the scope of the claims. Their purpose is to provide a teaching to those skilled in the art. Components and processes distinguished by ordinal phrases such as "first" and "second" do not necessarily define an order or ranking of any sort. In the drawings:

Figure 1 shows an example of a spigot for supporting a door;

Figure 2 shows the application of a retaining member upon the spigot identified in *Figure 1*;

Figure 3 shows the deployment of a washer;

Figure 4 shows the location of an attachment plate; *Figure 5* shows the location of an attaching element; *Figure 6* shows an apparatus for preventing the dislodging of a door hinge;

Figure 7 shows the application of the apparatus of *Figure 6* over a door shoe;

Figure 8 shows a combined sub-assembly of the apparatus of *Figure 7*;

Figure 9 shows the application of the sub-assembly of *Figure 8* to the bottom of a door;

Figure 10 illustrates the relocation of the door of *Figure 9*;

Figure 11 shows the application of a lower threaded securing member to a door frame;

Figure 12 shows the location of an attachment element to the securing member identified in *Figure 11*;

Figure 13 shows the location of a door frame base over the attachment element shown in *Figure 12*;

Figure 14 shows the location of the first assembly identified in *Figure 5*;

Figure 15 shows the attachment of the door with its second assembly upon the first assembly; and

Figure 16 shows an end view of the configuration identified in *Figure 15*.

Figure 1

[0007] In an embodiment, to construct a door hinge, a door shoe defining a cavity is attached to the bottom of a door and a spigot engageable within this cavity extends from a floor.

[0008] An example of a spigot **101** is shown in *Figure 1*. The spigot **101** includes a threaded portion **102** and a spigot top **103**. The spigot top **103** is receivable within the cavity of a door shoe to facilitate hinging. In the embodiment of *Figure 1*, the spigot top **103** is rotatable around the threaded portion **102** by the provision of a bearing race located within a race cavity **104**.

Figure 2

[0009] To assemble the door hinge, an upper threaded retaining member **201** as shown in *Figure 2*, is deployed upon the threaded portion **102** of the spigot **101**. This allows a floor mounted part of a door frame to be retained between the upper threaded retaining member **201** and a lower threaded securing member- described with reference to *Figure 13* and *Figure 14*.

Figure 3

[0010] A washer **301** is deployed, as shown in *Figure 3*, over the threaded portion **102**. The washer **301** is positioned to contact the upper threaded retaining member **201**.

Figure 4

[0011] After receiving the washer **301**, an attachment plate **401** as shown in *Figure 4*, is located over the threaded portion **201**. The attachment plate **401** includes a hole **402** for receiving an attachment element engageable within a solid base. In the embodiment, additional holes **403**, **404** and **405** are also provided for receiving additional attachment elements.

[0012] This combination is identified as a first sub-assembly.

Figure 5

[0013] The first sub-assembly of *Figure 4* is shown in an upright configuration in *Figure 5*. The spigot top **103** is presented at the top of the spigot for deployment within a door shoe. An example of an attaching element **501** is shown being located within the hole **402**.

Figure 6

[0014] An apparatus for preventing the dislodging of a door hinge is shown in *Figure 6*. A door shoe, described with reference to *Figure 7* and defining a cavity, is attached to the bottom of a door. The spigot **101** is engageable within this cavity and extends from a floor. To prevent the dislodging of the door hinge, the apparatus provides a collar **601** that is locatable over a door shoe. The collar includes inwardly inclined edges configured to restrain the spigot within the cavity.

[0015] The embodiment is provided with a base portion **602**, along with a first side wall **603** defining a first inwardly inclined edge **604**. In addition, the apparatus is provided with a second side wall **605** defining a second inwardly inclined edge **606**.

[0016] The base **602** includes holes for accommodating attachments that secure a shoe to a door. In this embodiment, a first hole **611** is provided, along with a second hole **612** and a third hole **613**.

Figure 7

[0017] An example of a door shoe **701** is shown in *Figure 7*. The door shoe **701** defines a cavity **702** for accommodating the spigot top **103**. The door shoe also includes a first hole **711**, a second hole **712** and a third hole **713** that align respectively with holes **611**, **612** and **613** within the base portion **602** of the collar **601**.

[0018] The collar **601** is locatable over the door shoe **701** by moving the collar in the direction of arrow **714**.

Figure 8

[0019] After movement of the collar **601** in the direction of arrow **714**, the collar **601** is located over the door shoe **701**, as shown in *Figure 8*. Respective holes, including first hole **611** and first hole **711**, have been aligned to

facilitate attachment of the assembly to the bottom of a door.

[0020] This combination is identified as a second sub-assembly **801**.

Figure 9

[0021] A door **901** is shown in *Figure 9*, having a door bottom **902**. The second sub-assembly **801**, described with reference to *Figure 8*, is located towards an end **903** of the door bottom **902**. The second sub-assembly **801** is then secured in place by means of securing devices **904** located through the aligned holes **611/711**, **612/712**, **613/713**.

Figure 10

[0022] After attachment of the assembly **801** onto the door bottom **902**, the door **901** may now be relocated for location within a door frame, whereupon the spigot **101** is engaged within the cavity **702**.

[0023] As shown in *Figure 10*, the upward orientation of the door is indicated by arrow **1001**.

Figure 11

[0024] A door frame foundation **1101** is shown in *Figure 11*. A lower threaded securing member **1102** is located upon the door frame foundation **1101**. The lower threaded securing member **1102** includes a tapped hole **1103** for receiving the lower end of the threaded portion **102**.

[0025] In addition, a second hole **1104** is provided for receiving an attachment element; thereby allowing the lower threaded securing member **1102** to be secured to the door frame foundation **1101**.

Figure 12

[0026] After arranging the lower threaded securing member **1102**, an attachment element **1201** is located through the second hole **1104** to achieve secure attachment, as shown in *Figure 12*.

Figure 13

[0027] To locate the door **901** within a door frame, as shown in *Figure 13*, a door frame base **1301** is located over the door frame foundation **1101**. Thus, in this way, the lower threaded securing member is sandwiched between the door frame foundation **1101** and the door frame base **1301**.

[0028] Full construction of the door frame is then achieved by the provision of a first vertical frame **1311**, along with a cooperating second vertical door frame and a door frame top.

Figure 14

[0029] To continue with the door locating procedure, the first assembly, described with reference to Figure 5, is located above the door frame base 1301. The threaded portion 102 of the spigot 101 is located within the hole present within the door frame base to allow threaded engagement within the tapped hole 1103 of the lower threaded securing member 1102.

[0030] In this embodiment, as shown in Figure 14, the spigot 101 is further secured by the provision of the attachment plate 401. Thus, the attachment plate 401 is brought into contact with the door frame base 1301 and secured in place by means of the upper threaded securing member 201. The upper threaded securing member may take the form of a tapped nut, as shown in this embodiment, onto which additional torque may be deployed by the application of an appropriate spanner.

[0031] After securing the attachment plate 401 in place, attaching elements, such as attaching element 501 described with reference to Figure 5, are deployed through respective holes, including hole 402.

Figure 15

[0032] After securing the first assembly, as described with reference to Figure 14, the door, with its attached second sub-assembly, is located within the doorframe, as shown in Figure 15. The spigot top 103 is engaged within the cavity 702 defined by the door shoe. As previously described, a collar has been located over the door shoe, wherein the collar includes inwardly inclined edges 604/606 configured to restrain the spigot top within the cavity.

Figure 16

[0033] An end view of the door hinge assembly is shown in Figure 16, with the first sub-assembly engaged with the second sub-assembly. The spigot 101 is attachable to a floor, with the door shoe 701 being attachable to the bottom of a door.

[0034] The apparatus for preventing the dislodging of the spigot from the door shoe comprises the collar 601 that includes inwardly inclined edges configured to restrain the spigot within the cavity. In this way, when deployed, it is possible for force to be applied against the door which may result, temporarily, in this cavity 702 being displaced away from the spigot top 103. However, when such a condition occurs, the spigot top 103 is restrained by the first inwardly inclined edge 604 or by the second inwardly inclined edge 606. Thus, when the applied force subsides, the spigot top 103 returns to its location within the cavity 702.

[0035] The embodiment does not require modification to existing elements but, by the provision of the attachment plate 401 and the collar 601, the amount of force required to dislodge the door has increased substantially

and experiments suggest that the integrity of other components will be undermined first if very high forces are deployed against the door.

Claims

1. A door hinge apparatus for supporting a door within a door frame, wherein said door frame includes a floor mounted part, comprising:

a door shoe (701) attachable to the bottom of a door, wherein said door shoe defines a cavity (702);

a spigot (101) having a threaded portion (102) and a spigot top (103), wherein said spigot top is receivable within said cavity; and

a lower threaded securing member (1102) for threaded engagement upon said threaded portion and an upper threaded retaining member (201), wherein a floor mounted part of a door frame is retainable between said lower threaded securing member and said upper threaded retaining member, **characterized by:**

a collar (601) locatable over said door shoe, wherein:

said collar includes inwardly inclined edges (604, 606) configured to restrain said spigot top within said cavity, thereby preventing the dislodging of said spigot top from said cavity.

2. The apparatus of claim 1, **characterized in that** said collar comprises:

a base portion (602);

a first side wall (603) defining a first of said inwardly inclined edges; and

a second side wall defining a second of said inwardly inclined edges.

3. The apparatus of claim 1, **characterized in that** said first side wall, said base and said second side wall have a length substantially similar to the length of said door shoe.

4. The apparatus of claim 2 or claim 3, **characterized in that** said base includes holes (402) for accommodating attachments that secure a shoe to a door.

5. The apparatus of claim 4, **characterized by** an attachment plate (401), wherein said attachment plate has a hole (402) for receiving an attaching element (501) engagable within a solid base below said floor mounted part.

6. The apparatus of claim 5, **characterized in that** said

attachment plate has one or more additional holes for receiving additional attachment elements engageable within said floor mounted part.

7. The door hinge of claim **6**, **characterized by** a washer (301) arranged between said attachment plate and said upper threaded retaining member. 5
8. The apparatus of any of claims **5 to 7**, **characterized in that** said spigot top is rotatable around said threaded portion. 10
9. A hinged door, **characterized by** including door hinge apparatus according to any of claims **1 to 8**. 15
10. A method of locating a door within a door frame, comprising the steps of:

attaching a door shoe (701) to the bottom of a door (902); 20
fastening a spigot (101) to a bottom portion of a door frame (1101); and
engaging said spigot within a cavity (702) defined by said door shoe, **characterized by** the step of: 25
locating a collar (601) over said door shoe prior to said attaching step, wherein said collar includes inwardly inclined edges (604) configured to restrain said spigot within said cavity. 30

11. The method of claim **10**, **characterized in that**:

said collar comprises a base portion (602), a first side wall (603) defining a first of said inwardly inclined edges (604); 35
a second side wall defining a second of said inwardly inclined edges.

12. The method of claim **11**, **characterized in that** said base portion includes holes (601), and further comprising the step of accommodating attachments through the holes in the base portion to secure the shoe to a door. 40
13. The method of claim **11** or claim **12**, wherein the spigot comprises a threaded portion, a lower threaded securing member and a securing plate; and 45

said securing plate includes a hole, wherein said fastening step further comprises the steps of: 50

securing a lower threaded securing member upon the threaded portion;
retaining a floor mounted part of a door frame between the lower threaded securing member and an upper threaded retaining member; and 55
receiving an attaching element within a hole

of an attachment plate; and

engaging the attaching element within a solid base below the floor mounted part.

14. The method of claim **13**, further comprising the step of further engaging additional attachment elements within the floor mounted part by receiving the additional attachment elements through additional holes in the attachment plate.
15. The method of claim **14**, further comprising the step of arranging a washer between the attachment plate and the upper threaded retaining member.

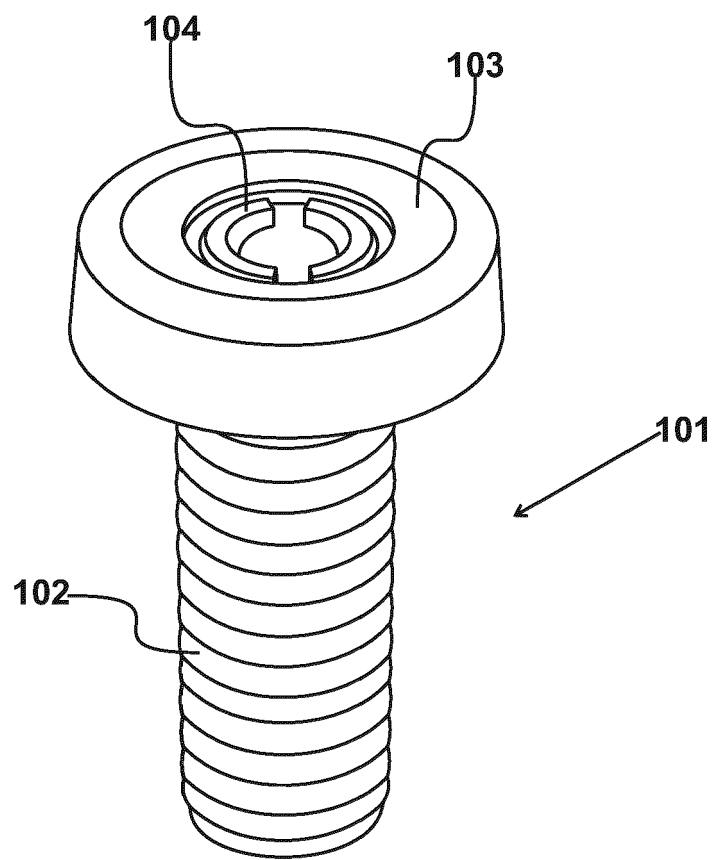


Fig. 1

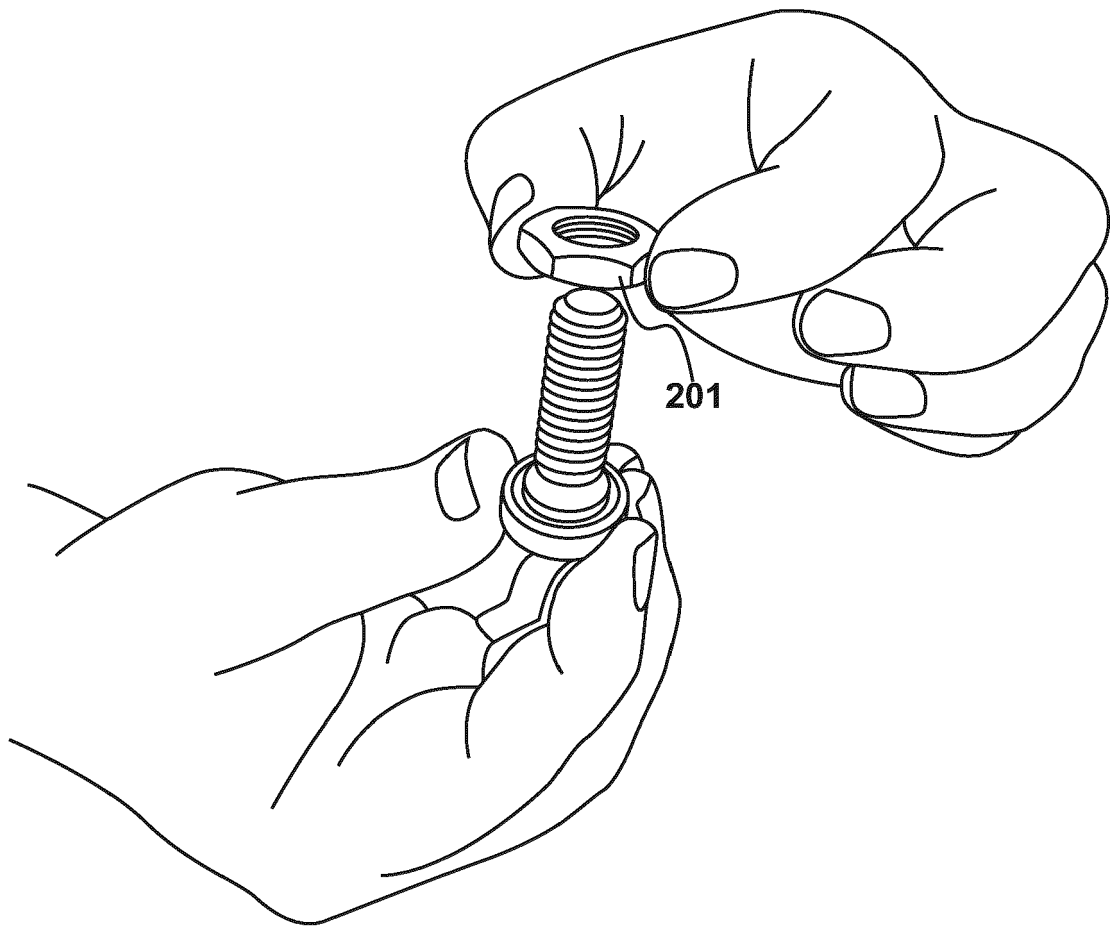


Fig. 2

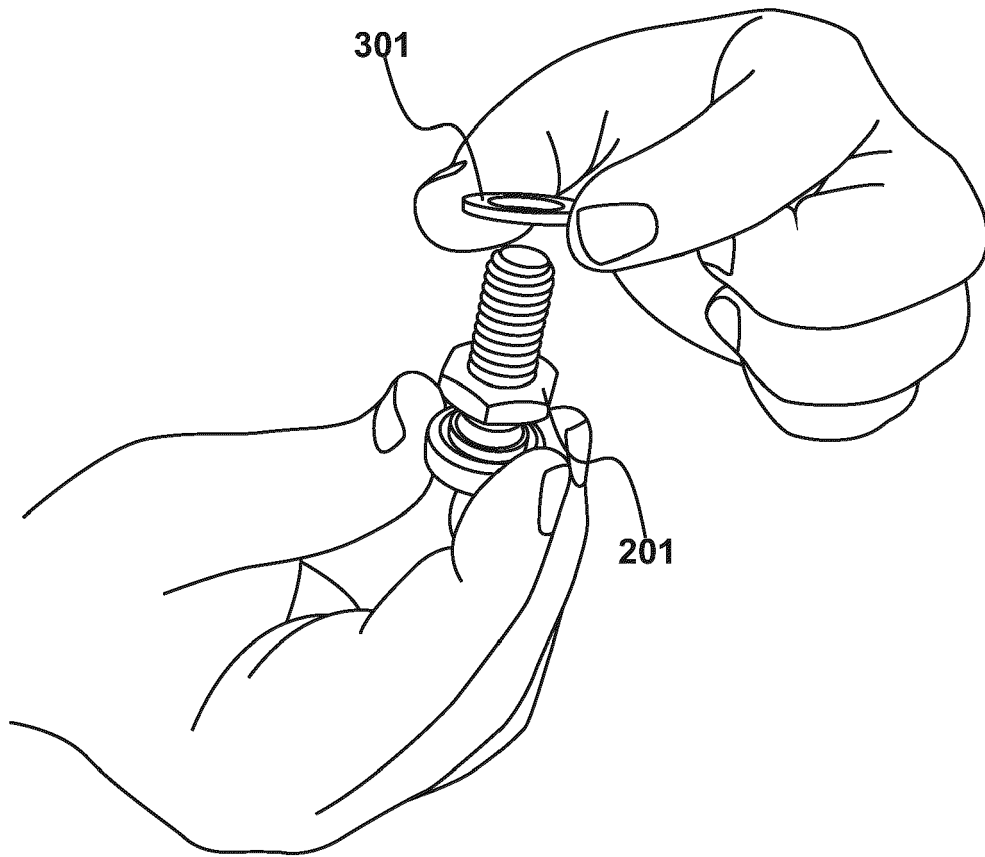


Fig. 3

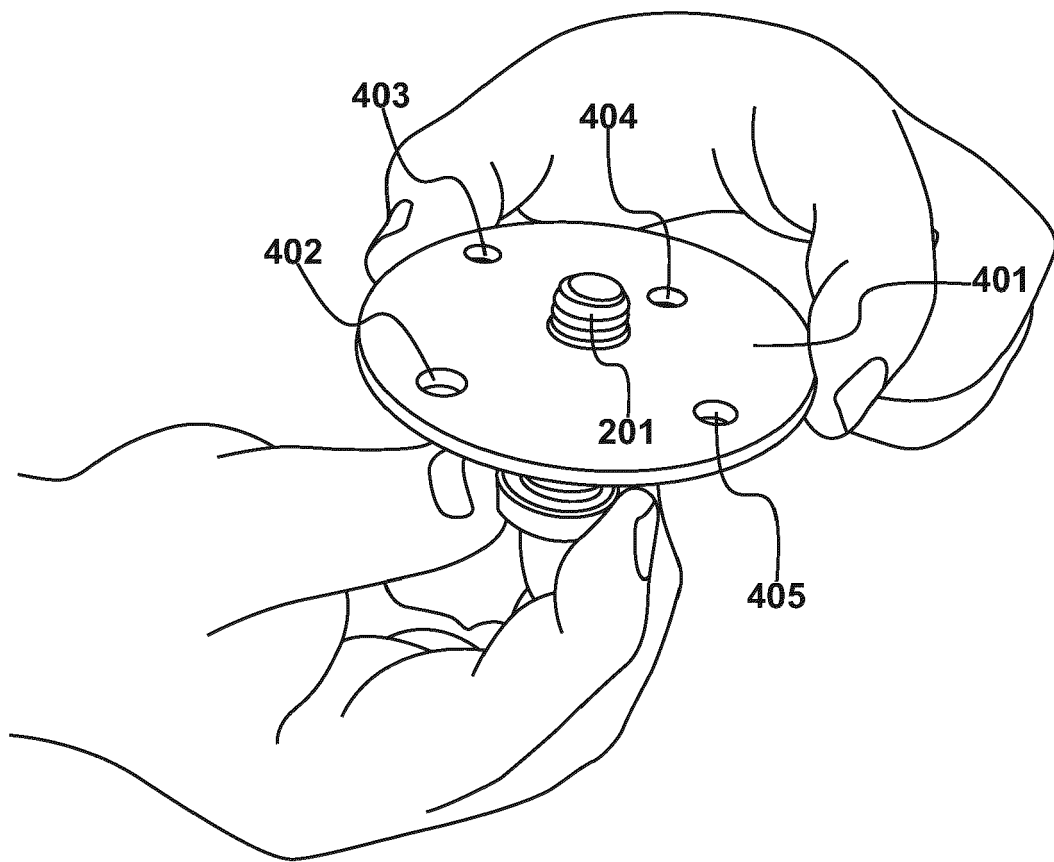


Fig. 4

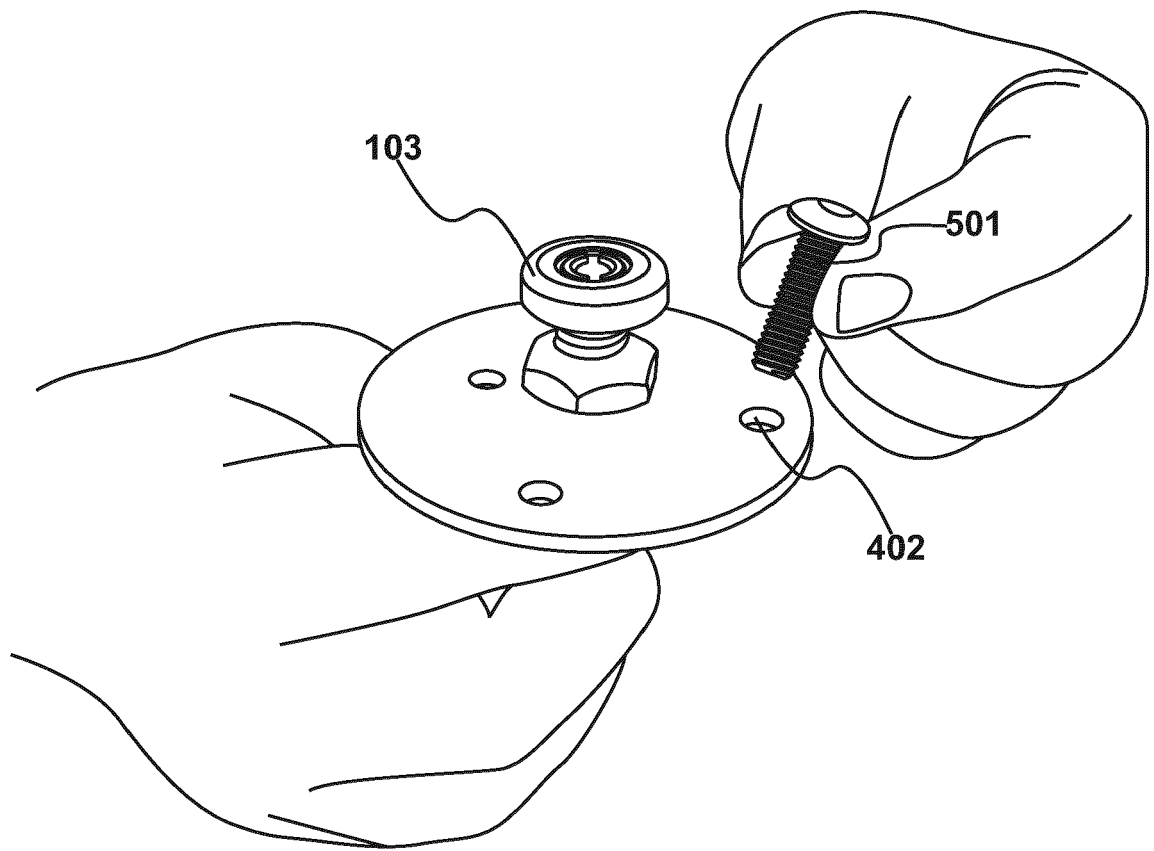


Fig. 5

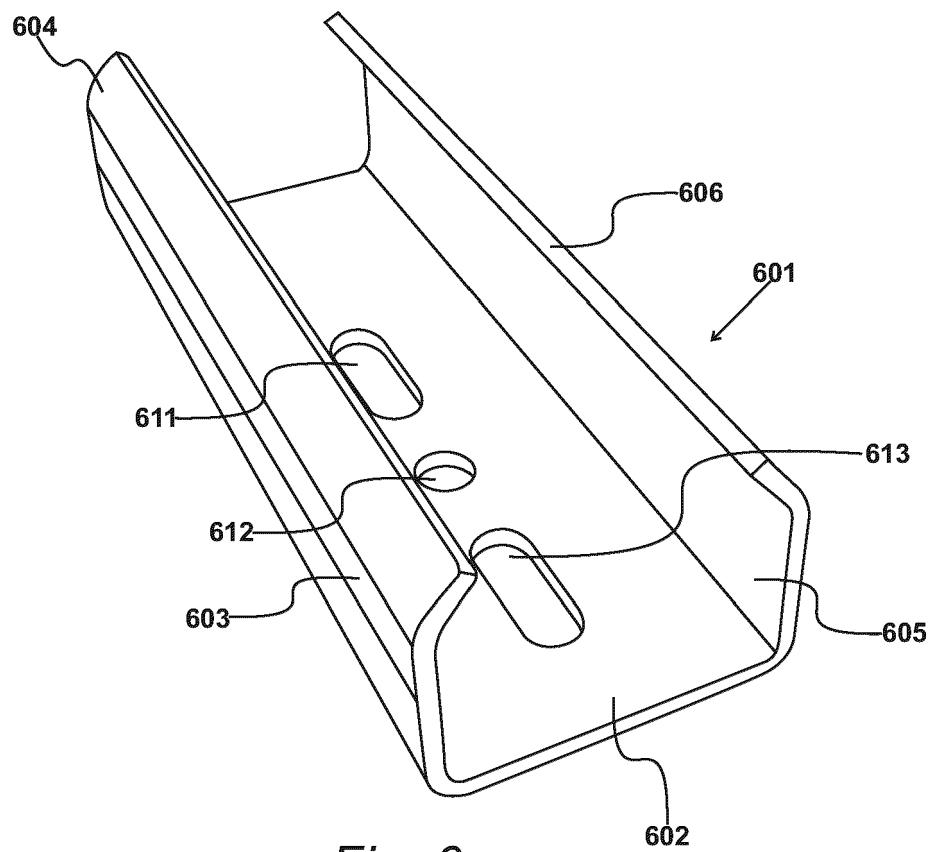


Fig. 6

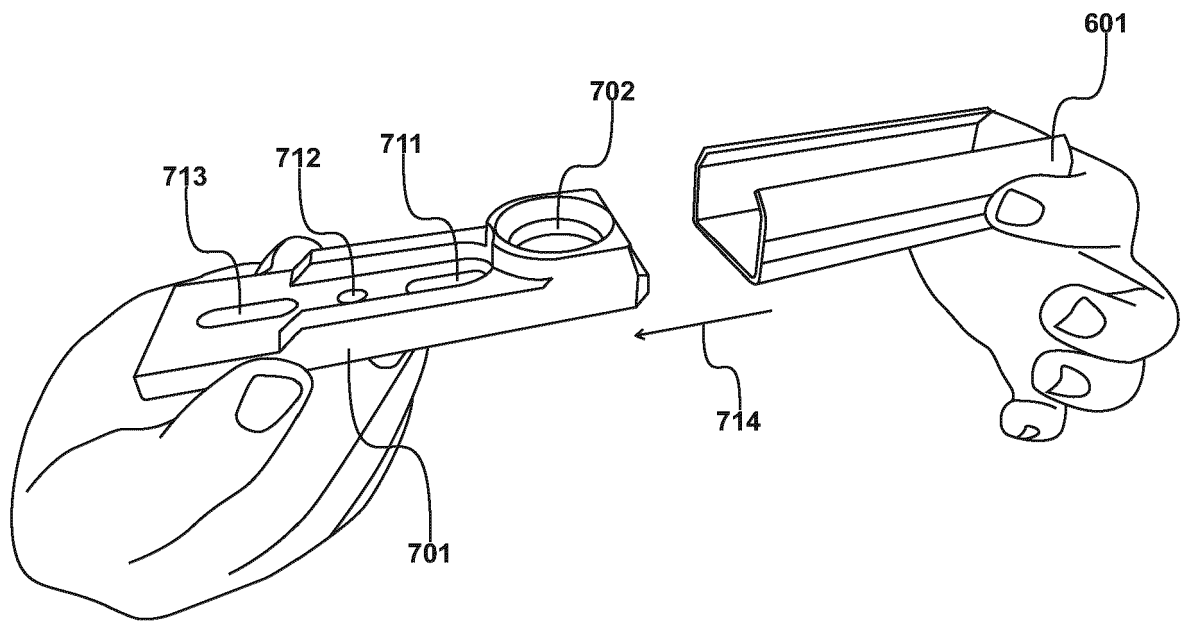


Fig. 7

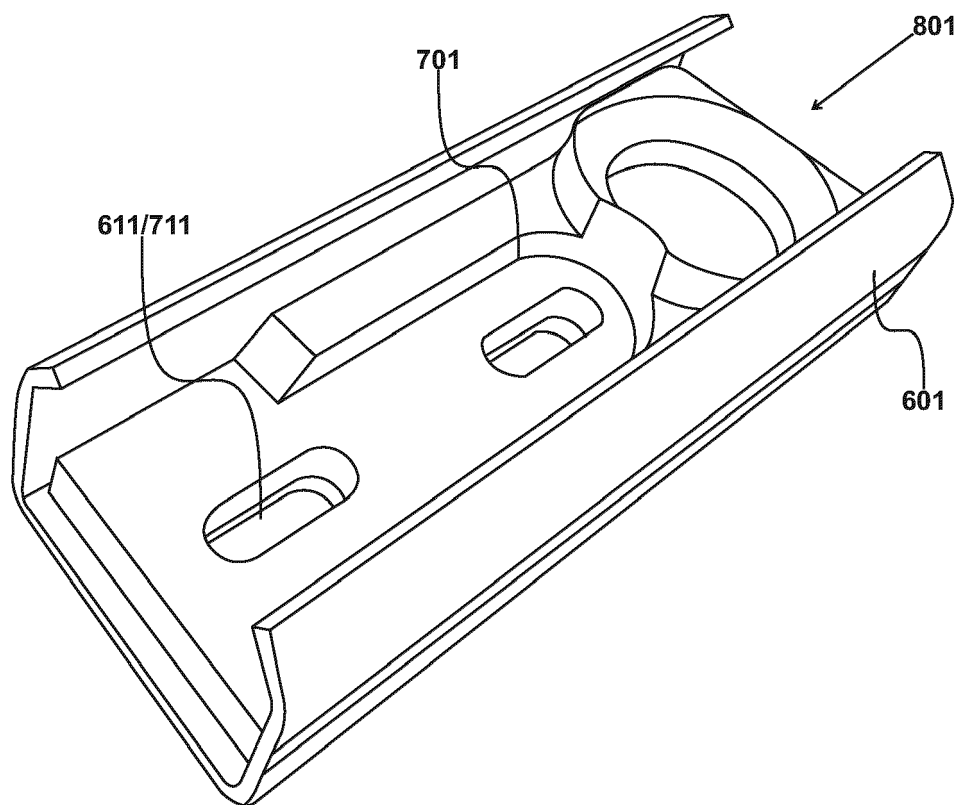


Fig. 8

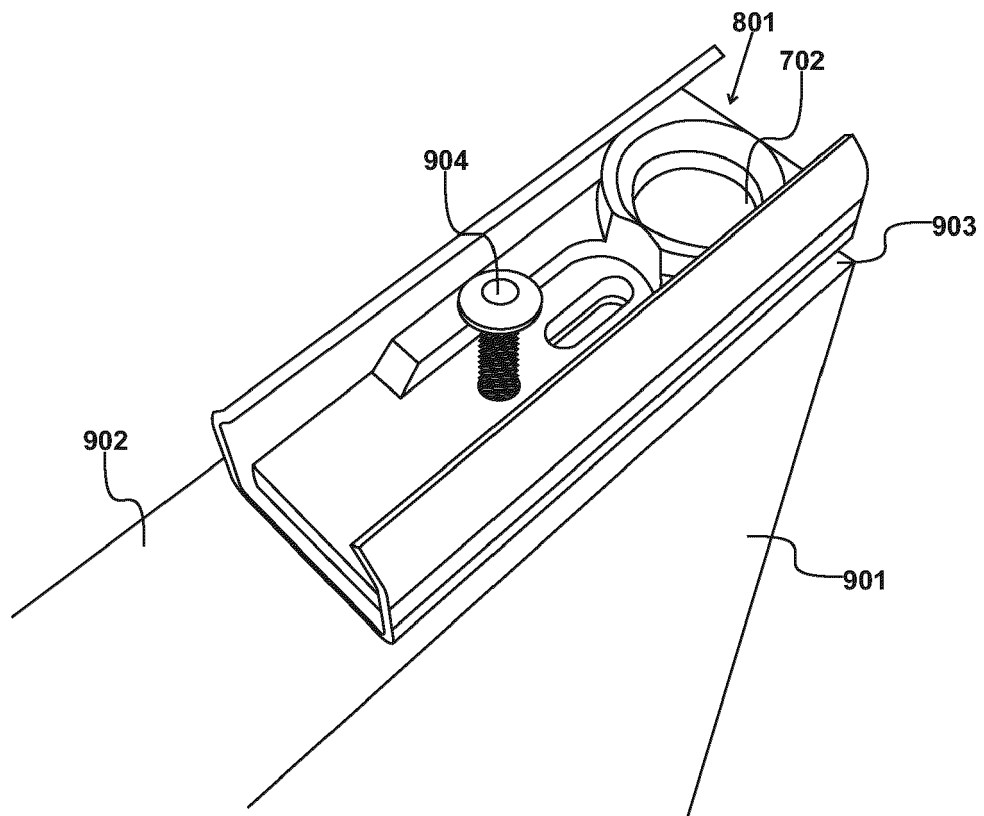


Fig. 9

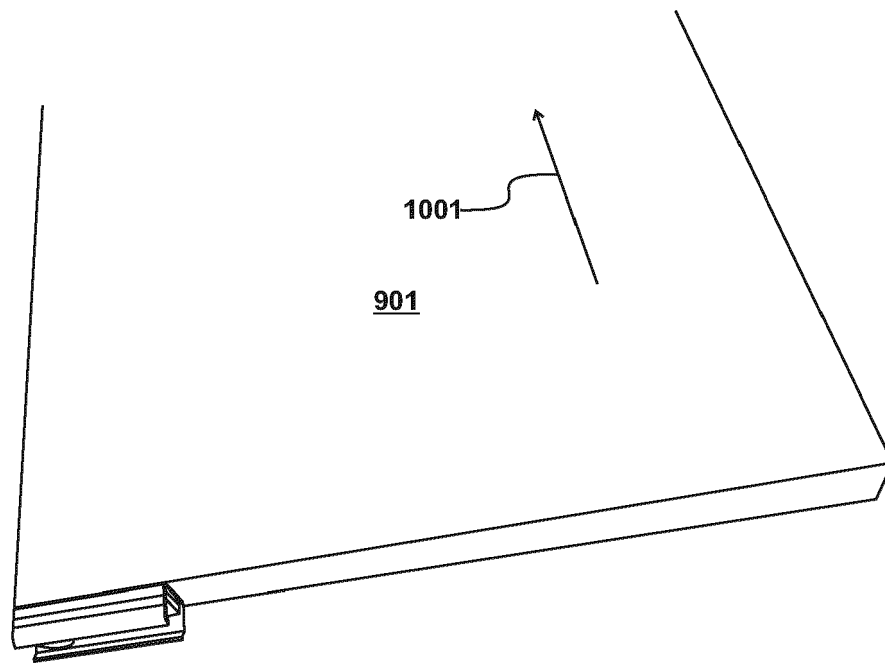


Fig. 10

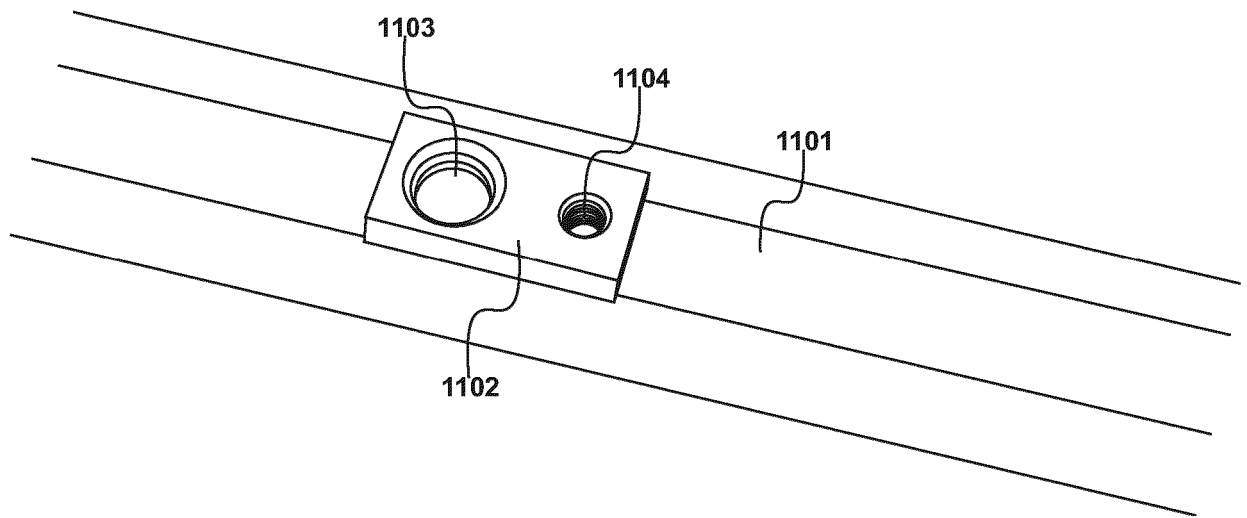


Fig. 11

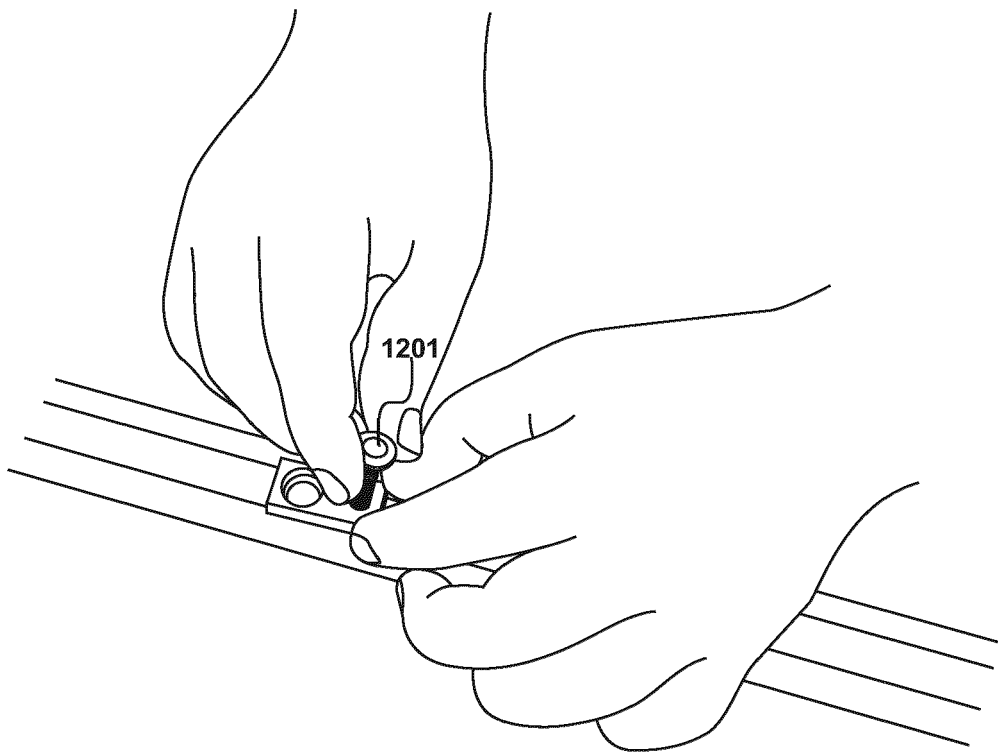


Fig. 12

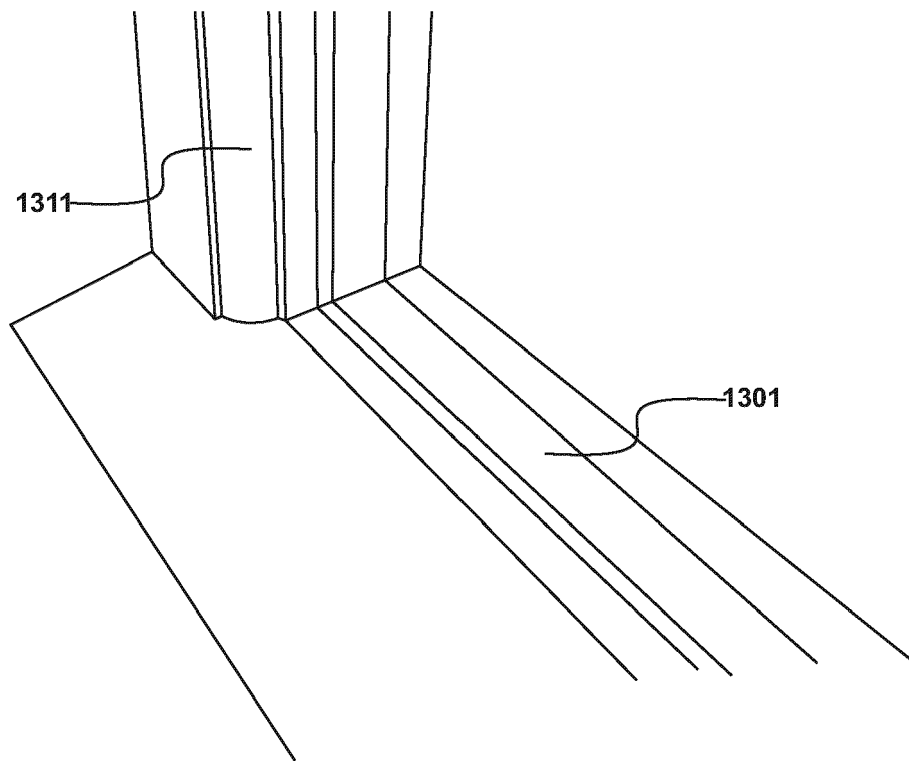


Fig. 13

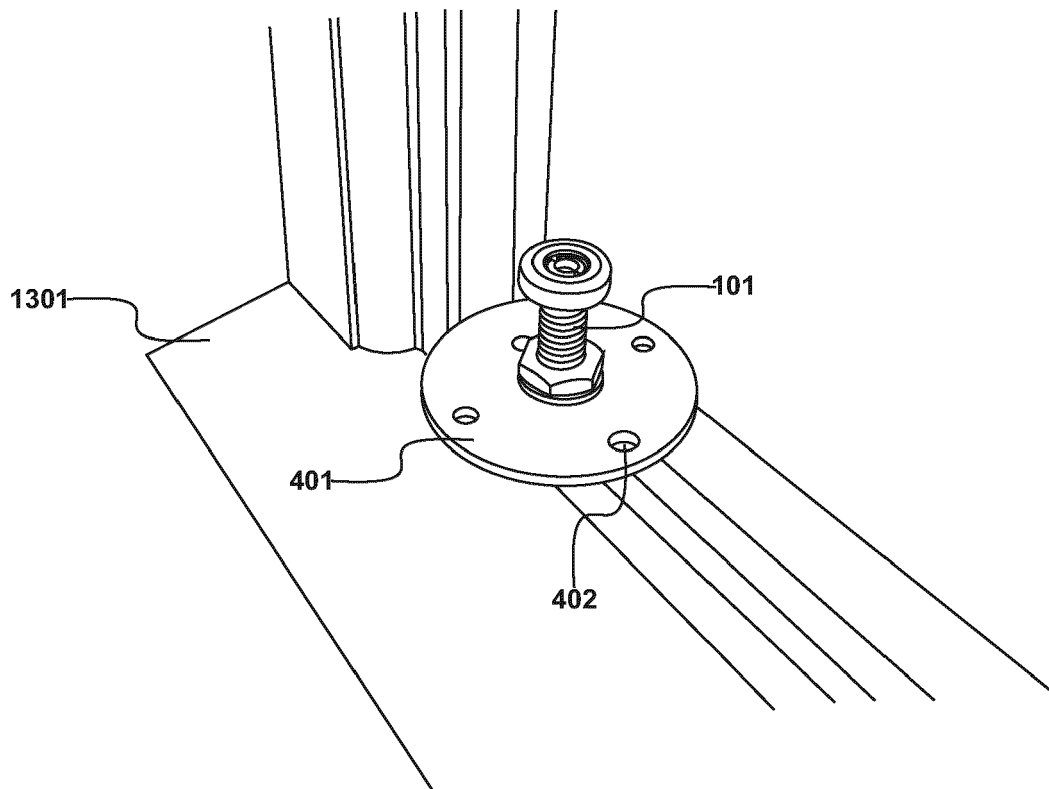


Fig. 14

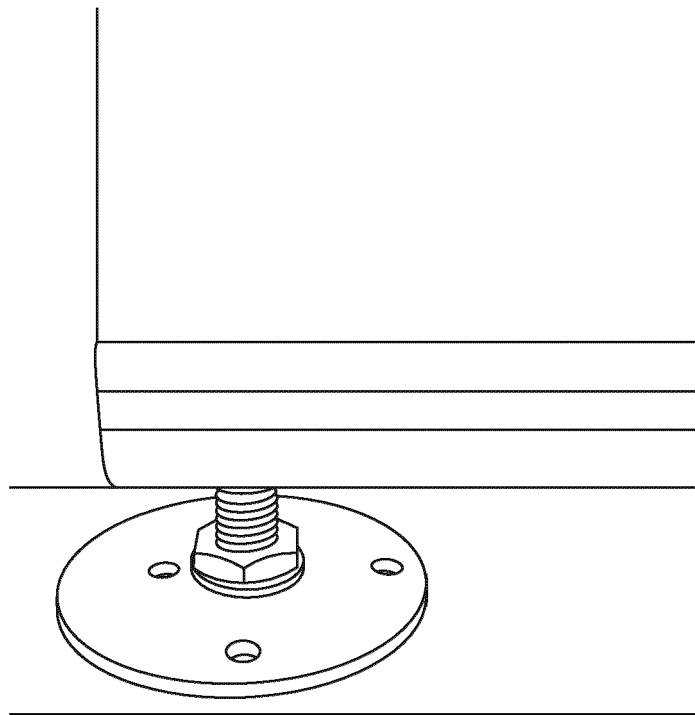


Fig. 15

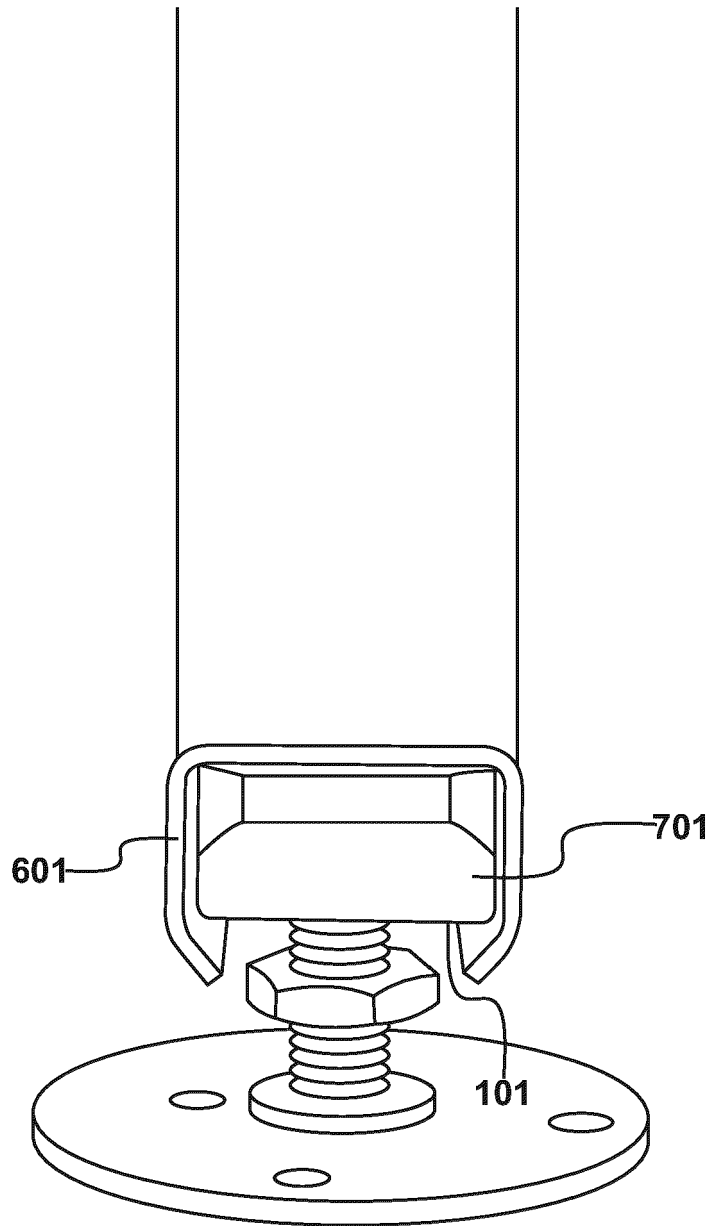


Fig. 16



EUROPEAN SEARCH REPORT

Application Number

EP 22 18 2421

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 3 932 913 A (JOHNSON LARRY K) 20 January 1976 (1976-01-20)	1-3, 9-11, 13	INV. E05D7/081
A	* column 5, line 37 - column 6, line 49; figures 12-15 *	4-8, 12, 14, 15	E05D5/14 E05D5/16

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	* page 9, line 16 - page 10, line 4; figures 1, 2 *		

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	* page 4, line 1 - page 5, line 33; figures 1-6 *		

			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 November 2022	Examiner Klemke, Beate
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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