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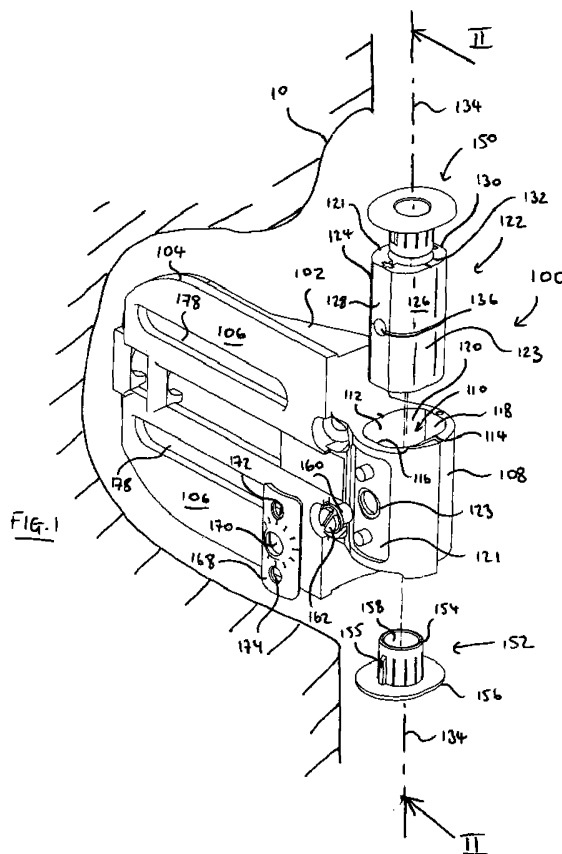
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(54) **Adjustable hinge**

(57) A hinge is provided with a door leaf sub-assembly (100) having a seal compression adjustment mechanism through a movable bush (122) and a horizontal adjustment mechanism through a reversible carriage (176) and a door frame sub-assembly (200) having a vertical adjustment mechanism through a self contained attachment bracket (232) and a hinge pin (244) retention formation formed on the hinge pin (254) and a knuckle (230).



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Description

[0001] The present invention relates to an adjustable hinge. More specifically, the present invention relates to a 3D adjustable hinge for a double rebate domestic door, such as a PVC door.

[0002] Domestic exterior doors are commonly double rebate, meaning that the door sash and the frame abut at a first relief on the sash, and at a second relief on the frame. The sash and frame therefore abut on two offset, parallel planes. Such doors are often constructed from a plastics material frame (such as PVC) frame reinforced with metal. Doors of this type are often used as external doors on domestic properties.

[0003] Hinges for double rebate doors comprise a hinge frame for attachment to a door frame and a hinge leaf for attachment to a door sash. Both the frame and the leaf comprise a knuckle through which a hinge pin is installed. The two knuckles are therefore engageable to pivot such that the door sash can be rotated relative to the door frame. Such hinges are often adjustable in three perpendicular linear directions; vertically, horizontally (i.e. within the plane of the door sash when closed), and in seal compression (i.e. perpendicular to the plane of the door sash when closed).

[0004] In known doors, the compression adjustment can be controlled by an eccentric cam installed in one of the frame or leaf knuckles which the other of the frame or leaf knuckles follows. A problem with using an eccentric cam is that the two knuckles will inevitably move relative to each other in two dimensions (usually compression, which is the desired movement, and horizontally, which is often undesirable because a compensatory horizontal adjustment must be made at the same time). Thus, a side effect of aligning the seal compression position of the door is that the horizontal position is affected.

[0005] The vertical adjustment is normally provided for by adjusting the vertical position of the door leaf knuckle relative to the frame knuckle. Vertical adjustment is also provided between a mounting bracket and a knuckle body. The mounting bracket is installed to the door frame, and the knuckle body mounted to it to be vertically adjustable. A problem with this design is that the knuckle must be provided in at least two parts to enable attachment to the frame.

[0006] A hinge may be used on a variety of door leaf designs. In order to install the hinge leaf to the door, several screws must be engaged with the metal reinforcement within the sash. Such screws are normally engaged through a carriage in the hinge leaf, which is fixed to the door via the screws but slidable within the leaf to provide horizontal adjustment. In order to provide for a large range of door designs, the carriage is often given a large range of sliding movement. A problem with this is that it is desirable to make the door leaf as small as possible for aesthetic and cost reasons, and as such large door leaves are undesirable.

[0007] In known door designs, an upwardly depending

shaft or pin is carried on the hinge frame knuckle, which can be located into a bush on the leaf knuckle to support the door. A problem with this design is that there is always more than one hinge, and as such all hinges must be aligned before the door leaf can be lowered into position. This operation commonly takes two or more people.

[0008] Furthermore, this design requires that there is sufficient clearance above the door to lift it to move the leaf knuckles clear of the hinge pins. This is not always possible with inwardly opening doors in which the lintel projects directly above where the door leaf must sit, inhibiting vertical movement of the door.

[0009] It is an aim of the present invention to provide an improved hinge.

[0010] According to a first aspect of the invention there is provided a domestic door hinge sub-assembly comprising:

a hinge knuckle,
an attachment portion configured for attachment to a door component,
a bush defining a bore for receiving a hinge pin, the bore defining a hinge axis, in which the bush is mounted within the knuckle to be linearly movable relative thereto in a direction substantially perpendicular to the hinge axis, and,
an adjustment mechanism arranged between the knuckle and the bush, for selective linear movement of the bush relative to the knuckle in the direction substantially perpendicular to the hinge axis.

[0011] By attachment portion we mean the hinge leaf or frame.

[0012] By making the pin bush linearly adjustable within the knuckle, a single degree of freedom can be independently controlled. In this way, compression adjustment will not affect horizontal position.

[0013] Preferably the attachment portion is a hinge leaf defining an attachment face for attachment to a planar face of a door sash, and the bush is mounted to be linearly movable in a direction substantially perpendicular to the attachment face.

[0014] Alternatively, the attachment portion could be a hinge frame defining an attachment face for attachment to a planar face of a door frame, and the bush is mounted to be linearly movable in a direction substantially perpendicular to the attachment face.

[0015] Preferably the adjustment mechanism comprises a threaded member engaged in a threaded bore in the bush, the threaded member being linearly constrained in the knuckle.

[0016] Preferably the bush defines a flat end face in which the threaded bore is defined.

[0017] Preferably the threaded member comprises a flange, the flange being constrained between a surface of the knuckle and a retention plate mounted to the knuckle.

[0018] Preferably the threaded member comprises a

tool engagement formation, and the retention plate defines an orifice through which the tool engagement formation is accessed by a tool.

[0019] Preferably the retention plate defines a plurality of markings for visual indication of the degree of rotational movement of the threaded member.

[0020] Preferably the bush is mounted in a slot defined in the knuckle.

[0021] Preferably the bush defines two opposing side faces, the slot defined two opposing side faces, and the side faces of the bush are arranged to slide along the side faces of the bush.

[0022] Preferably the bush defines two opposing end faces, in which the end faces and the side faces are joined by curved faces.

[0023] Preferably the curved faces correspond to interior curved faces of the slot.

[0024] Preferably the domestic door hinge sub-assembly comprises a knuckle defining a first bore for receiving a hinge pin, the first bore defining a hinge pin axis, a mounting bracket comprising an attachment formation for attachment of the mounting bracket to a door component, wherein the knuckle and the mounting bracket are relatively linearly moveable in a direction substantially parallel to the hinge pin axis, and, an adjustment mechanism between the knuckle and the mounting bracket for selective relative linear movement of the knuckle and the mounting bracket in the direction substantially parallel to the hinge pin axis, wherein the knuckle and the mounting bracket are attached such that the attachment formation is accessible in at least one installed relative position of the knuckle and mounting bracket.

[0025] Preferably, the mounting bracket forms part of a hinge leaf.

[0026] According to a second aspect of the invention there is provided a domestic door hinge sub-assembly comprising:

a knuckle defining a first bore for receiving a hinge pin, the first bore defining a hinge pin axis,
a mounting bracket comprising an attachment formation for attachment of the mounting bracket to a door component, wherein the knuckle and the mounting bracket are relatively linearly moveable in a direction substantially parallel to the hinge pin axis, and,
an adjustment mechanism between the knuckle and the mounting bracket for selective relative linear movement of the knuckle and the mounting bracket in the direction substantially parallel to the hinge pin axis,
wherein the knuckle and the mounting bracket are attached such that the attachment formation is accessible in at least one installed relative position of the knuckle body and mounting bracket.

[0027] In this way, the subassembly can be provided as a pre-assembled unit, because the attachment forma-

tion can be accessed without having to disassemble the subassembly.

[0028] Preferably the mounting bracket forms part of a hinge frame.

[0029] Alternatively the mounting bracket forms part of a hinge leaf.

[0030] Preferably the attachment formation comprises a fastener bore defined in the mounting bracket, the bore defining an axis substantially perpendicular to, and intersecting the hinge pin axis.

[0031] Preferably the knuckle body comprises:

a centre portion to which the mounting bracket is attached, and,

a first arm and a second arm, each projecting from the centre portion in a direction perpendicular to the hinge pin axis, the first arm defining the first bore, the second arm defining a second bore, in which the second bore is concentric with the hinge pin axis.

[0032] Preferably the first arm and the second arm are positioned at opposite ends of the mounting bracket.

[0033] Preferably the adjustment mechanism comprises a threaded member engaged with a threaded bore in the knuckle body, in which one end of the threaded member abuts the mounting bracket.

[0034] Preferably the threaded member defines an adjustment axis parallel to the hinge pin axis.

[0035] Preferably the threaded member defines a tool engagement formation for rotation of the threaded member, the tool engagement formation being accessible from an outer surface of the knuckle. The tool engagement formation may be concealed by a removable cover.

[0036] According to a third aspect of the invention there is provided a domestic door hinge sub-assembly comprising:

a knuckle defining a hinge pin axis,
a hinge leaf attached to the knuckle and comprising a mounting carriage having an attachment formation for attachment of the mounting bracket to a door sash, the carriage having a first end and a second end opposite the first end,
wherein the mounting carriage is formed to be installed in the hinge leaf in a first orientation with the first end proximate the hinge pin axis, and a second orientation with the second end proximate the hinge pin axis.

[0037] By making the carriage reversible, a smaller leaf can be made because one end of the desired range of adjustment positions can be accessed with the carriage in the first orientation, and the other end of the desired range in the second orientation.

[0038] Preferably the leaf and the mounting carriage are relatively linearly moveable in a direction substantially perpendicular to the hinge pin axis.

[0039] Preferably an adjustment mechanism is provided

ed between the leaf and the mounting carriage for selective relative linear movement of the leaf and the mounting carriage in the direction substantially perpendicular to the hinge pin axis.

[0040] Preferably the adjustment mechanism engages the second end of the mounting carriage when the mounting carriage is in the first orientation, and the first end of the mounting carriage when the mounting carriage is in the second orientation

[0041] Preferably the adjustment mechanism comprises a threaded member engaged with a threaded bore defined in the mounting carriage, the threaded member being linearly constrained in the leaf.

[0042] Preferably the threaded member comprises a tool engagement formation exposed at an end of the leaf opposite the hinge pin axis.

[0043] Preferably the attachment formation comprises an asymmetrical formation of bores defined in the mounting carriage for receiving fasteners.

[0044] According to a fourth aspect of the invention there is provided a domestic door hinge comprising:

- a first knuckle defining a first bore to receive a hinge pin,
- a second knuckle defining a second bore to receive a hinge pin,
- a hinge pin defining a hinge pin axis and movable along the hinge pin axis from a first position in which the hinge pin engages the first bore but not the second bore, into a second position in which the hinge pin engages the first bore and the second bore,
- a retaining formation on one or both of the hinge pin and first knuckle to retain the hinge pin in the first position during alignment of the first bore and the second bore.

[0045] By providing a retaining formation, the hinge pin can be positioned on the knuckle, alignment of that hinge can take place, and the hinge pin can be knocked into position by a single user. More than one hinge can be assembled sequentially. No simultaneous alignment of the hinge pins is required as they can be sequentially inserted. Any required positional adjustment of the frame and the door made as each pin is inserted.

[0046] The first knuckle may be a hinge frame knuckle and the second knuckle a hinge leaf knuckle. Alternatively the first knuckle may be a hinge leaf knuckle and the second knuckle a hinge frame knuckle

[0047] Preferably the first knuckle comprises a centre portion, a first arm and a second arm, each arm projecting from the centre portion in a direction perpendicular to the hinge pin axis, the first arm defining the first bore, the second arm defining a third bore, in which the third bore is concentric with the first bore and a part of the second knuckle defining the second bore is received between the first arm and the second arm.

[0048] Preferably the retaining formation comprises a resilient projection within the first bore configured to grip

the hinge pin in the first position.

[0049] Preferably the retaining formation comprises a plurality of circumferentially spaced resilient projections.

[0050] Preferably the retaining formation comprises an indent on the hinge pin configured to receive the resilient projection or projections in the first position.

[0051] A resilient projection can be defined within the third bore, the resilient projection configured to engage the indent with the hinge pin in the second position.

[0052] An example hinge will now be described with reference to the accompanying drawings in which:

Figure 1 is an exploded perspective view of a hinge leaf sub-assembly in accordance with the present invention,

Figure 2 is a section view of the hinge leaf sub-assembly of figure 1 along line II-II of figure 1,

Figure 3 is a top view of the hinge leaf sub-assembly of figure 1,

Figure 4 is a front view of the hinge leaf sub-assembly of figure 1,

Figure 5 is a perspective view of the hinge leaf sub-assembly of figure 1,

Figure 6a is a front view of the hinge leaf sub-assembly of figure 1 in a first configuration,

Figure 6b is a front view of the hinge leaf sub-assembly of figure 1 in a second configuration,

Figure 7a is an exploded perspective view of a hinge frame sub-assembly in accordance with the present invention,

Figure 7b is a perspective view of the hinge frame sub-assembly of figure 7a,

Figure 8 is an end view of the hinge frame sub-assembly of figure 7a,

Figure 9 is a section view along IX-IX of figure 9,

Figure 10 is a perspective view of an alternative assembly of the hinge leaf sub-assembly of figures 1 to 6b.

Figure 11 is an exploded perspective view of a second hinge leaf sub-assembly in accordance with the present invention, and

Figure 12 is a section view of the hinge leaf sub-assembly of figure 11 along line XII-XII of figure 11.

[0053] Referring to figures 1 to 5, a door hinge leaf sub-assembly 100 is shown. The door hinge leaf sub-assembly 100 comprises a hinge leaf 102 having an attachment portion 104 for attachment to a door sash 10 (shown cut away). The attachment portion 104 comprises an attachment face 106 which abuts the door sash 10 when the hinge of which the sub-assembly 100 is a part is in use. The attachment portion 104 comprises a cover 105 visible in figure 3, and in hidden line in figure 5.

[0054] The sub-assembly 100 comprises a knuckle 108 extending from the leaf 102 in a direction generally parallel with the attachment face 106. The knuckle 108 is a collar defining an open bore 110. The open bore 110 is defined by a first side face 112, a second side face

114, a first end face 116 and a second end face 118, each joined by curved faces 120. The knuckle 108 defines a rectangular recess 121 having two locating pegs 125 projecting therefrom. The knuckle 108 defines an open bore 123 through the first end face 116.

[0055] The sub-assembly 100 comprises a bush 122. The bush 122 is an elongate prismatic body having a first external side face 124 and a second external side face 126 joined by a pair of flat end faces 128, 130. The side faces 124, 126 are generally curved with flats 121, 123 midway along their length, the flats 121, 123 being perpendicular to the end faces 128, 130. The bush defines a circular through bore 132 having a pivot axis 134 parallel to the end faces 128, 130.

[0056] Each end face 128, 130 defines a threaded bore 136, 138 respectively. The threaded bores 136, 138 are diametrically opposed across the pivot axis 134 and in communication with the through bore 132.

[0057] The through bore 132, as can be seen in figure 2, comprises a central neck portion 140 separating a first tapered portion 142 and a second tapered portion 144. Each tapered portion 142, 144 tapers outwardly towards the ends of the bush 122 and defines a locating groove 146, 148 respectively.

[0058] The bush 122 comprises a first end cap 150 and a second end cap 152. The end caps 150, 152 are substantially identical and therefore only the end cap 152 will be described in detail.

[0059] The end cap 152 comprises a hollow shaft portion 154 with a radially projecting tab 155. At one end of the shaft portion 154 there is an elliptical flange 156. A through-bore 158 runs through the end cap 152.

[0060] The hinge sub-assembly 100 is assembled by inserting the bush 122 into the bore 110. It will be noted that the bush 122 is dimensioned such that the flats 121, 123 contact the side faces 112, 114.

[0061] The bush 122 can slide within the bore 110 in direction S (see figure 2) on the flats 121, 123 perpendicular to the face 106.

[0062] When the bush 122 is inserted, the end caps 150, 152 are inserted into the tapered portions 142, 144 of the bore 132. The tab 155 engages with the locating groove 146 to retain the end caps 150, 152 in position with respect to the bush 122.

[0063] An adjustment screw 160 is provided having a head 162 for receiving a screwdriver, a threaded shaft 164 and a flange 166 therebetween. The screw 160 is inserted through the unthreaded bore 123 to engage the threaded bore 136 of the bush 122. The flange 166 abuts the outside surface of the knuckle 108. The bush 122 is retained from sliding along the pivot axis 134 by the adjustment screw 160.

[0064] A cover plate 168 is then placed over the screw. The cover plate 168 comprises an access bore 170 and two location bores 172, 174 which engage with the locating pegs 125. The access bore 170 has a diameter larger than the head 162 but smaller than the flange 166 to retain the screw 160 in place relative to the knuckle

108.

[0065] In use, a screwdriver (not shown) can be used to rotate the screw 160 which, because it is engaged with the bush 122, moves the bush 122 in the direction S. When the hinge is installed, this provides seal compression adjustment (i.e. movement of the door sash 10 in a direction perpendicular to the door sash- i.e. away from and towards the door frame).

[0066] Turning to figures 6a and 6b, the hinge sub-assembly 100 is shown attached to a door sash 10 (in hidden line). The cover 105 is not visible.

[0067] The attachment portion 104 comprises a pair of elongate parallel slots 178 which pass through to the attachment face 106 (see figure 1). The hinge sub-assembly 100 comprises a carriage 176 on the opposite side of the attachment portion to the attachment face 106. The carriage 176 comprises a first leg 180 and a second leg 182 which are parallel and spaced. The legs are similar (a mirror image of each other) and as such only the leg 182 will be described. The leg 182 defines three fixing apertures 184. The fixing apertures 184 are positioned nearer to a first end 186 than a second end 188 of the leg. It will be appreciated that the carriage 176 is therefore asymmetrical. At the second end 188 of the leg, a fixing post 190 (see figure 3) projects through the slot 178 to the attachment face 106 and into the door sash 10.

[0068] The legs 180, 182 are joined by a bridge 192 which contains a threaded through bore 194. A screw 196 is provided in the hinge sub-assembly 100, engaged with the bore 194 and the head of the screw 196 is constrained within the attachment portion 104 such that rotation of the screw 196 moves the carriage 176 relative to the attachment portion 104 in a direction C.

[0069] When the hinge sub-assembly 100 is installed onto a door sash 10, the posts 190 are aligned to a corresponding orifice on the door sash 10, and a plurality of screws are fastened through the apertures 184, through the slots 178 to reinforcement of the door sash 10.

[0070] Different door sash designs may have different structures, and the metal reinforcements to which the hinge sub-assembly 100 is fastened may be in different positions. In order to facilitate variations in door sash geometry, the carriage 176 is configured to be reversed- i.e. turned 180 degrees with the first ends 186 and the second ends 188 of the legs 180, 182 reversed as shown in figure 6b. Because the bore 194 is a through-bore, the screw 196 can engage it from either end. Also, the carriage 196 is in the shape of an "H" with the grooves made between the legs 180, 182 and the bridge 192 being able to receive the head of the screw 196 to afford a full range of motion in either orientation. Although the apertures 184 are asymmetrical in the carriage 196, the outer profile of the carriage 196 is symmetrical and therefore reversible.

[0071] Turning to figures 7a to 9, a hinge sub-assembly 200 is shown, which attaches to a door frame 12. Referring to figure 7a, the hinge sub-assembly 200 comprises

a knuckle 202 having a centre portion 204, a first arm 206 and a second arm 208. The arms 206, 208 are offset, parallel and perpendicular to the centre portion 204. Each of the arms 206, 208 defines a through bore 210, 212 (see figure 9) which are aligned along a hinge axis 214.

[0072] The hinge sub-assembly 200 comprises a first insert 216 and a second insert 218. The inserts are substantially identical and only the insert 216 will be described here. The insert 216 comprises a flange 220 with a projecting shaft 224. The shaft 224 extends into a plurality of resilient fingers 226 which are radially movable but resile to their original position. The fingers 226 have radially outwardly extending tabs 228 at their ends, and some of the fingers 226 have radially inwardly extending tabs 230. The shaft defines a through bore 225.

[0073] The inserts 216, 218 are positioned within the bores 210, 212 such that the flanges 220 are facing each other. The tabs 228 snap onto corresponding features in the arms 206, 208 to hold the inserts 216, 218 in place. When installed, the bores 225 are coaxial with the hinge axis 214 as shown in figure 9.

[0074] The centre portion 204 comprises a threaded bore 240 proximate the first arm 206. The bore 240 receives a threaded adjustment bolt 242 which can be moved in a direction parallel to the hinge axis 214 by turning.

[0075] The hinge sub-assembly 200 comprises a hinge frame 232. The hinge frame 232 comprises a plate 234 having a pair of projecting attachment posts 236 and a pair of countersunk fixing holes 238 defined there-through. The hinge frame is attached to the door frame 12 (see figure 7a) by inserting the posts 236 in appropriate recesses and securing in place with screws through the fixing holes 238.

[0076] The hinge frame 232 is slideably mounted in the centre portion 204 of the sub-assembly 200, and can slide in a direction parallel to the hinge axis 214. The adjustment bolt 242 abuts the hinge frame 232 and therefore the relative position of the knuckle 202 and the hinge frame 232 may be adjusted.

[0077] A hinge pin 244 is shown. The hinge pin 244 is generally cylindrical with a flange 246 at a first end 248. The hinge pin 244 comprises a first, second and third axially spaced circumferential grooves 250, 252, 254.

[0078] In order to assemble the hinge, the hinge pin 244 is inserted into the bore 225 of the first insert in an insertion direction I (see figure 7a). The third groove 254 is engaged by the tabs 230 of the first insert 216 to axially retain the pin 244 in the position shown in figures 7b, 8 and 9 such that it does not enter the space between the legs 206, 208.

[0079] The leaf sub-assembly 100 and the frame sub-assembly 200 are then aligned with the knuckle 108 of the leaf sub-assembly 100 between the first leg 206 and the second leg 208 of the frame sub-assembly 200. The axes 134 and 214 are aligned.

[0080] With the door sash 10 in position, an axial force is applied to the pin 244 to disengage the tabs 230 from

the third groove 254 (the fingers 226 will resile radially outwardly). The pin can then be engaged with the knuckle 108 of the leaf sub-assembly 100 and inserted into the second leg 208. Once in position, the third groove 254 can engage with the tabs 230 of the second insert 218 to "click" the pin in place, whilst the first groove 250 is engaged by the tabs 230 of the first insert 216. In order to secure the pin 244 in position, a grub screw is inserted through the threaded bore 138 (see figure 2) in the bush 122.

[0081] It will be noted that as well as retaining the pin 244 in the position shown in figures 7b, 8 and 9, the combination of grooves and tabs provides a "click" upon full insertion of the pin 244 to indicate to the user that the pin 244 has been inserted to its full extent. This engagement also prevents the pin 244 from moving axially before it is secured.

[0082] When assembled, the hinge can be adjusted in seal compression by rotation of the adjustment screw 160. Furthermore, the vertical position of the door sash can be adjusted by rotation of the bolt 242. The horizontal position of the door sash can be adjusted by rotation of the screw 196. All three degrees of freedom are completely separately controlled, and adjustment of one does not influence the others.

[0083] Referring to figures 11 and 12, a door hinge leaf sub-assembly 300 is shown. The door hinge leaf sub-assembly 300 is similar to the door hinge leaf sub-assembly 100 and similar components are numbered 200 greater.

[0084] Referring to figure 11, a difference between the sub-assembly 100 and the sub-assembly 300 is the existence of an indicator tab 400 projecting radially from the first end-cap 350. The indicator tab 400 extends past the edge of the knuckle 308 to face the same direction as the screw 160.

[0085] As shown in figure 12, when the knuckle 308 is installed between the first arm 206 and the second arm 208 to rotate about the axis, the indicator tab 400 protrudes between the knuckle 308 and the first arm 206 such that it is visible from the side on which the screw 160 can be adjusted. As such, the installer can determine the position of the bush 322 within the knuckle 308 by the amount the tab 400 protrudes. The tab 400 is a brightly coloured component so as to contrast with the surrounding componentry. As the tab 400 is integral with the insert 350, the insert 350 may be entirely constructed from a brightly coloured plastics material.

[0086] The indicator tab 400 may have measurement lines indicated on it to show the position of the bush 322 within the knuckle 308.

[0087] Variations of the above embodiment fall within the scope of the present invention.

[0088] For example, referring to figure 10, the leaf sub-assembly 100 may be assembled such that the head 162 of the adjustment screw 160 protrudes from the front of the knuckle 108. In this configuration, compression adjustment may be performed without opening the door

sash first by removing the cover.

Claims

1. A domestic door hinge sub-assembly comprising:

a hinge knuckle,
an attachment portion configured for attachment to a door component,
a bush defining a bore for receiving a hinge pin, the bore defining a hinge axis, in which the bush is mounted within the knuckle to be linearly movable relative thereto in a direction substantially perpendicular to the hinge axis, and,
an adjustment mechanism arranged between the knuckle and the bush, for selective linear movement of the bush relative to the knuckle in the direction substantially perpendicular to the hinge axis.

2. A domestic door hinge sub-assembly according to claim 1 in which the attachment portion is a hinge leaf defining an attachment face for attachment to a planar face of a door sash, and the bush is mounted to be linearly movable in a direction substantially perpendicular to the attachment face.

3. A domestic door hinge sub-assembly according to claim 1 in which the attachment portion is a hinge frame defining an attachment face for attachment to a planar face of a door frame, and the bush is mounted to be linearly movable in a direction substantially perpendicular to the attachment face.

4. A domestic door hinge sub-assembly according to any of claims 1 to 3 in which the adjustment mechanism comprises a threaded member engaged in a threaded bore in the bush, the threaded member being linearly constrained in the knuckle.

5. A domestic door hinge sub-assembly according to claim 4 in which the bush defines a flat end face in which the threaded bore is defined.

6. A domestic door hinge sub-assembly according to claim 4 or 5 in which the threaded member comprises a flange, the flange being constrained between a surface of the knuckle and a retention plate mounted to the knuckle.

7. A domestic door hinge sub-assembly according to claim 6 in which the threaded member comprises a tool engagement formation, and the retention plate defines an orifice through which the tool engagement formation is accessed by a tool.

8. A domestic door hinge sub-assembly according to

claim 6 or 7 in which the retention plate defines a plurality of markings for visual indication of the degree of rotational movement of the threaded member.

9. A domestic door hinge sub-assembly according to any preceding claim in which the bush is mounted in a slot defined in the knuckle.

10. A domestic door hinge sub-assembly according to claim 9 in which the bush defines two opposing side faces, the slot defines two opposing side faces, and the side faces of the bush are arranged to slide along the side faces of the slot.

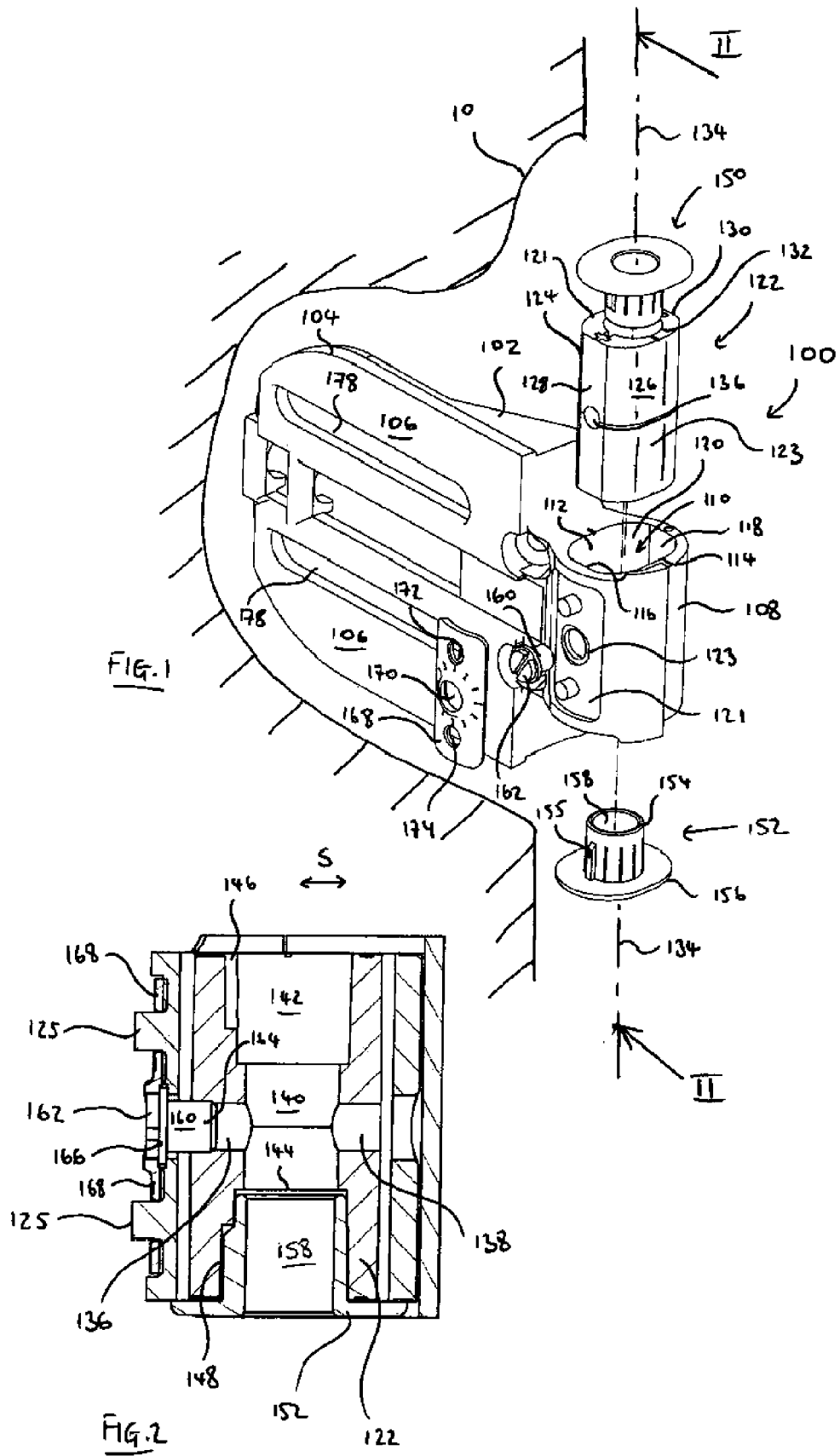
11. A domestic door hinge sub-assembly according to claim 10 in which the bush defines two opposing end faces, in which the end faces and the side faces are joined by curved faces.

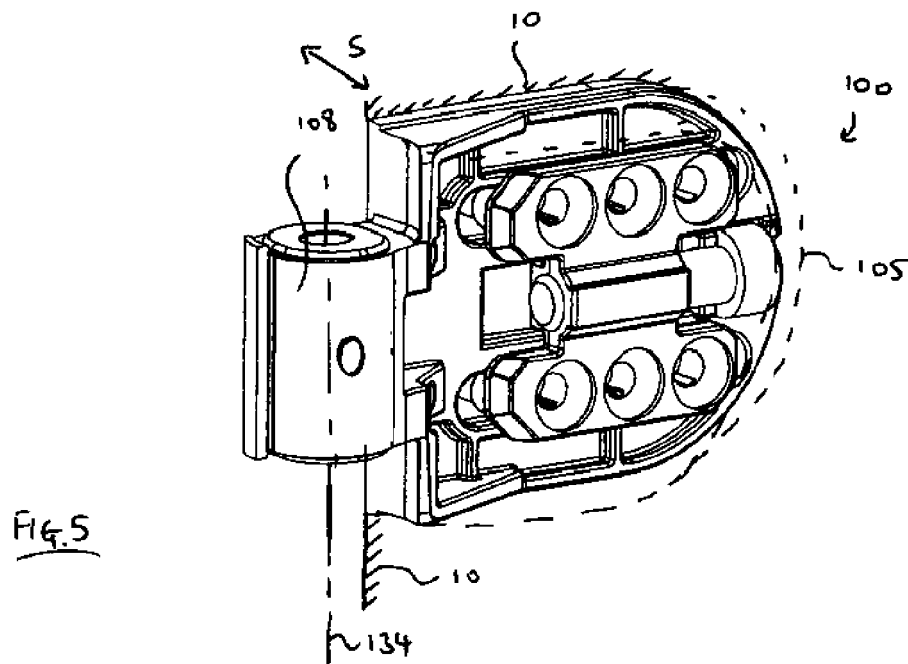
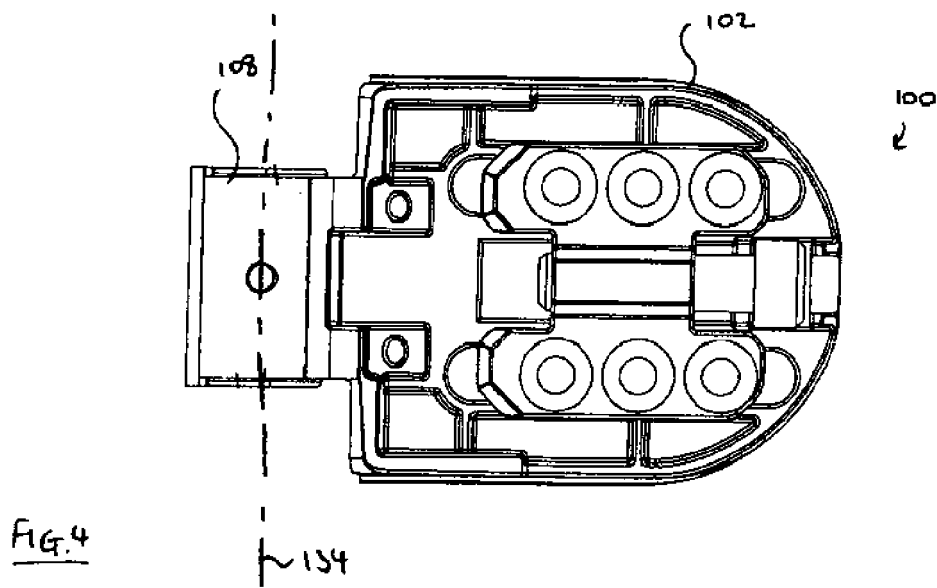
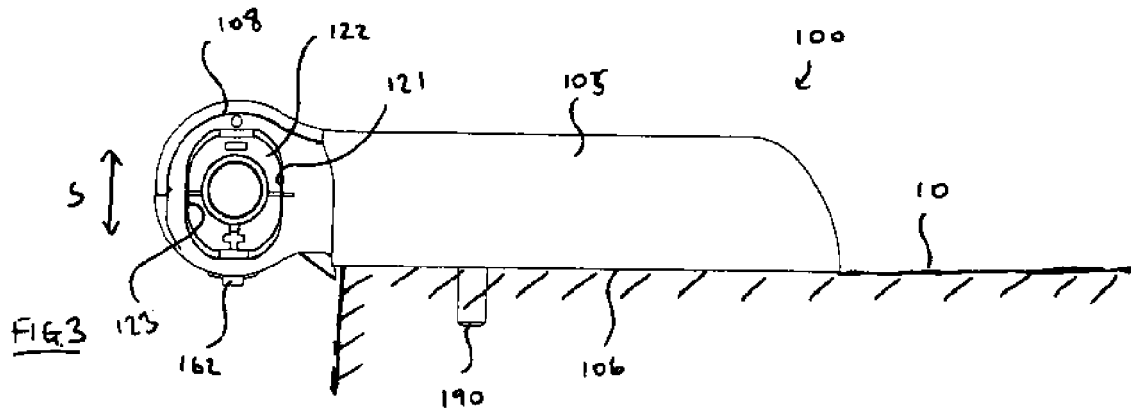
12. A domestic door hinge sub-assembly according to claim 11 in which the curved faces correspond to interior curved faces of the slot.

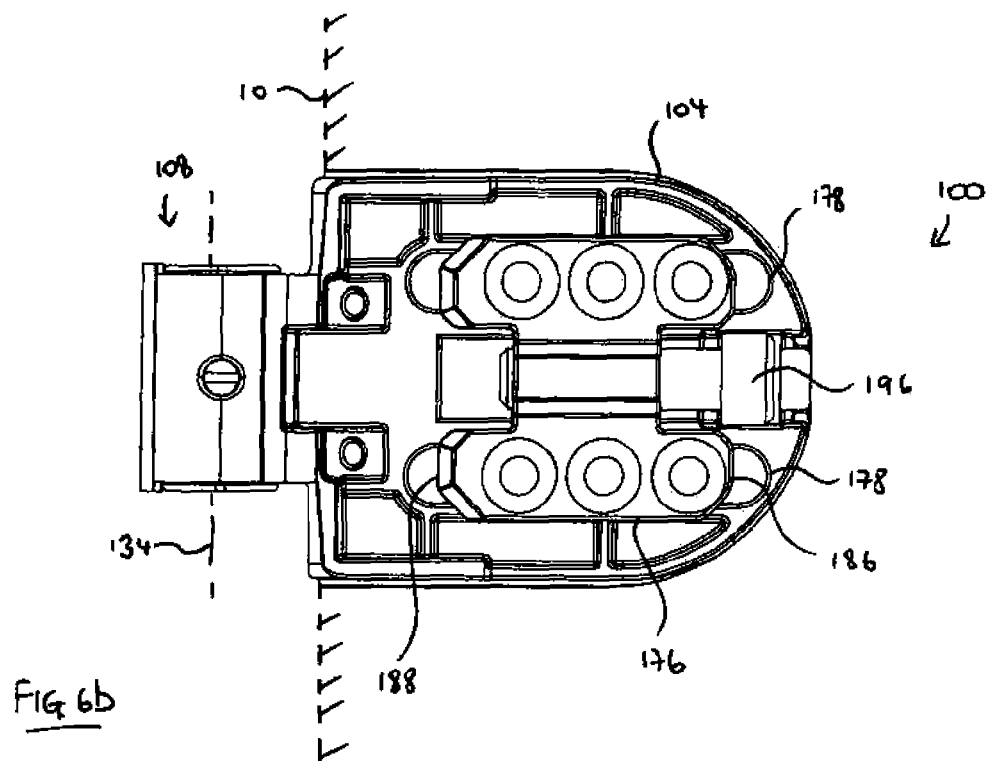
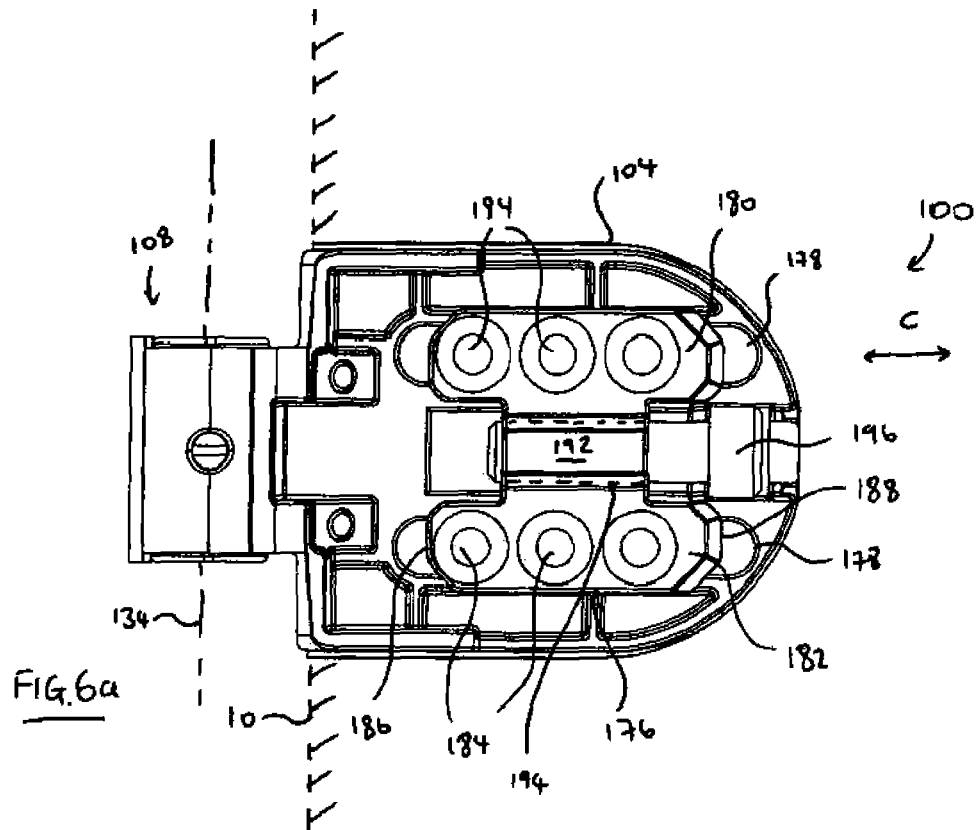
13. A domestic door hinge sub-assembly according to any preceding claim further comprising an indicator tab moveable with the bush relative to the knuckle in which a part of the indicator tab is positioned proximate an outer surface of the knuckle for indication of the relative position of the knuckle and the bush.

14. A domestic door hinge sub-assembly according to claim 13 in which the indicator tab is integral with an end-cap of the bush.

15. A domestic door hinge sub-assembly according to claim 13 or claim 14 in which the indicator tab is coloured to contrast with the hinge knuckle.







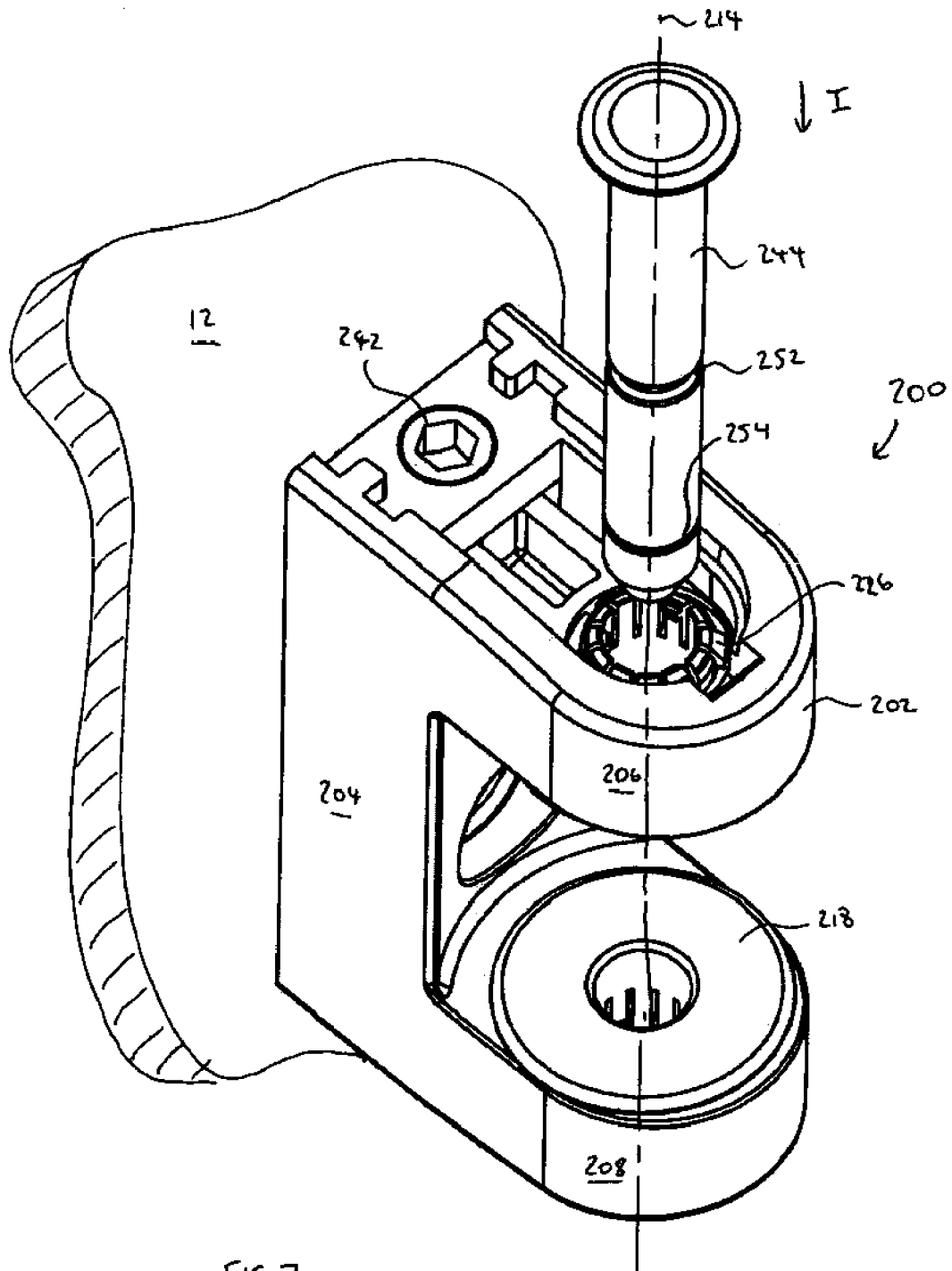


FIG. 7a

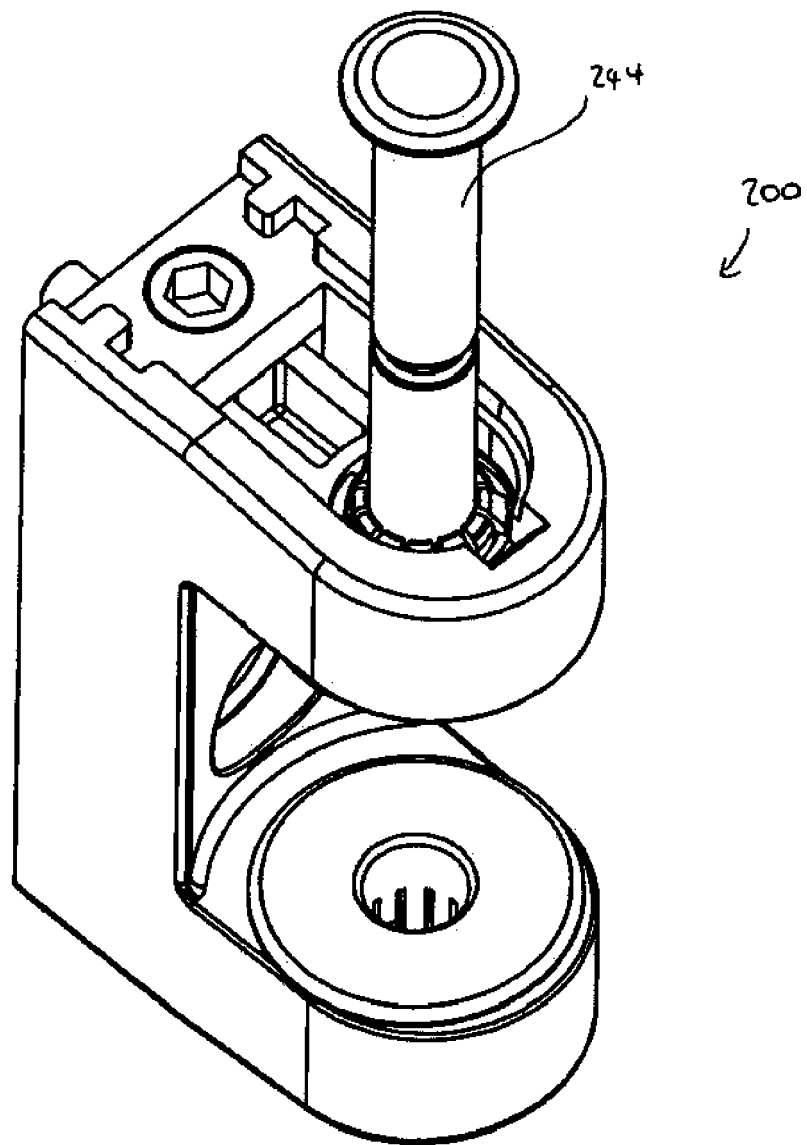
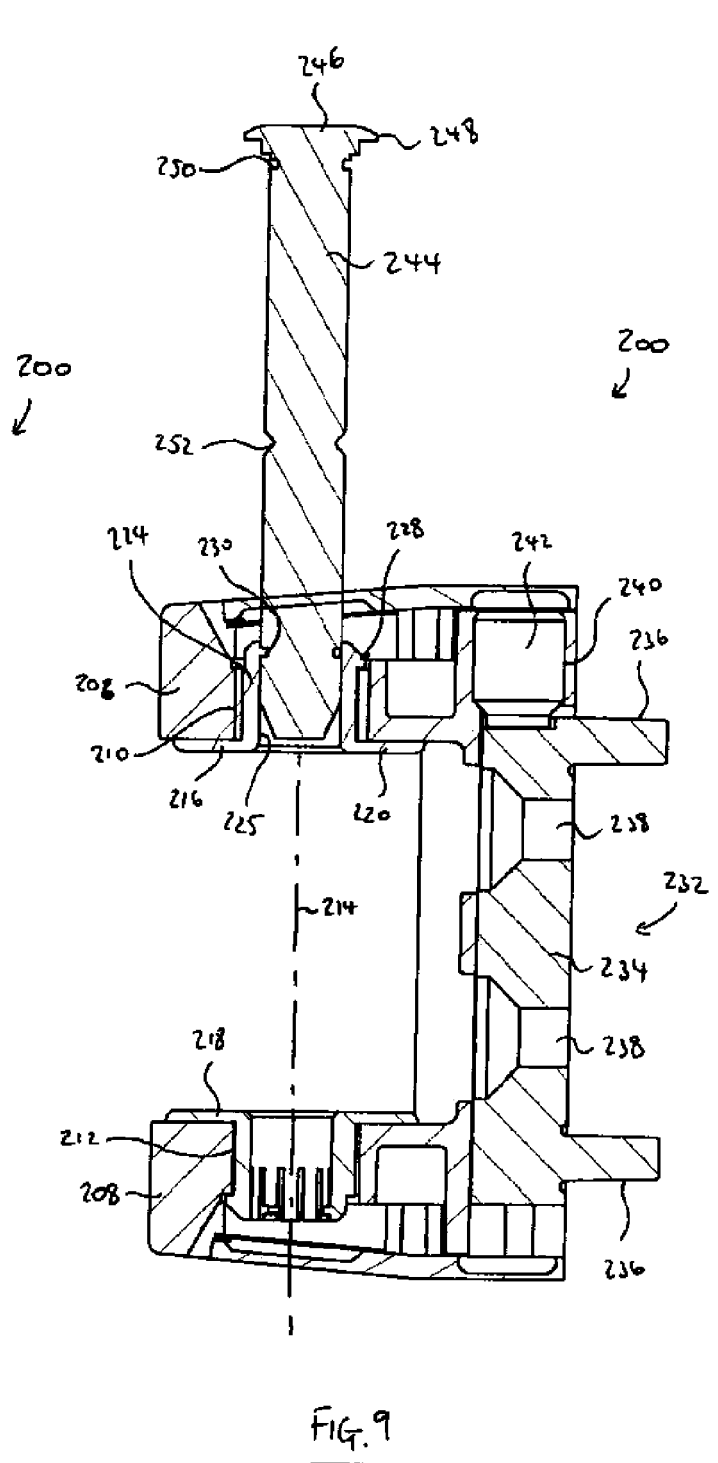
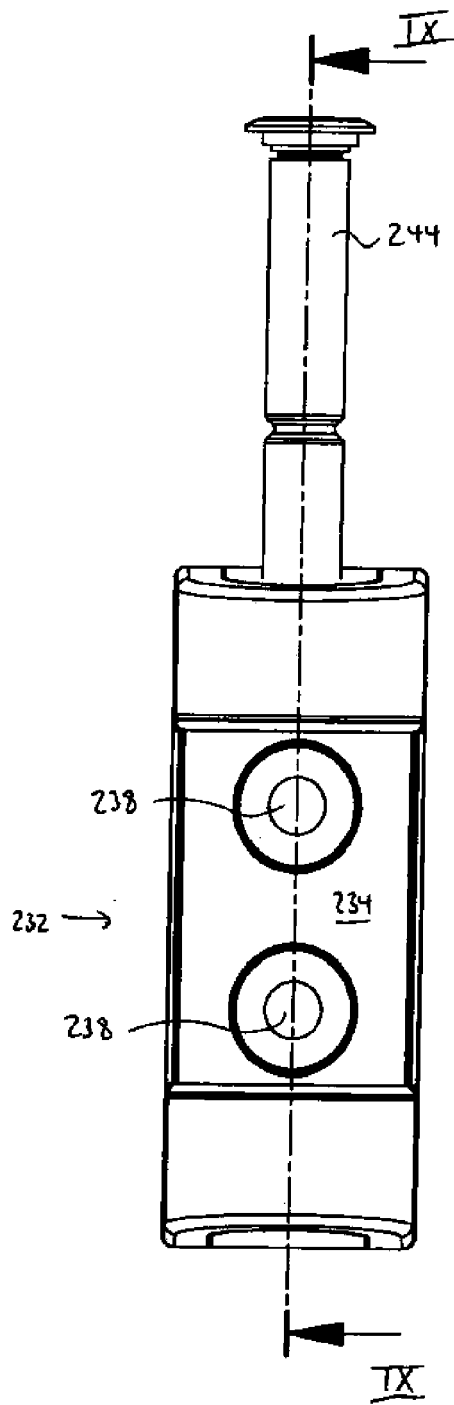


FIG. 75



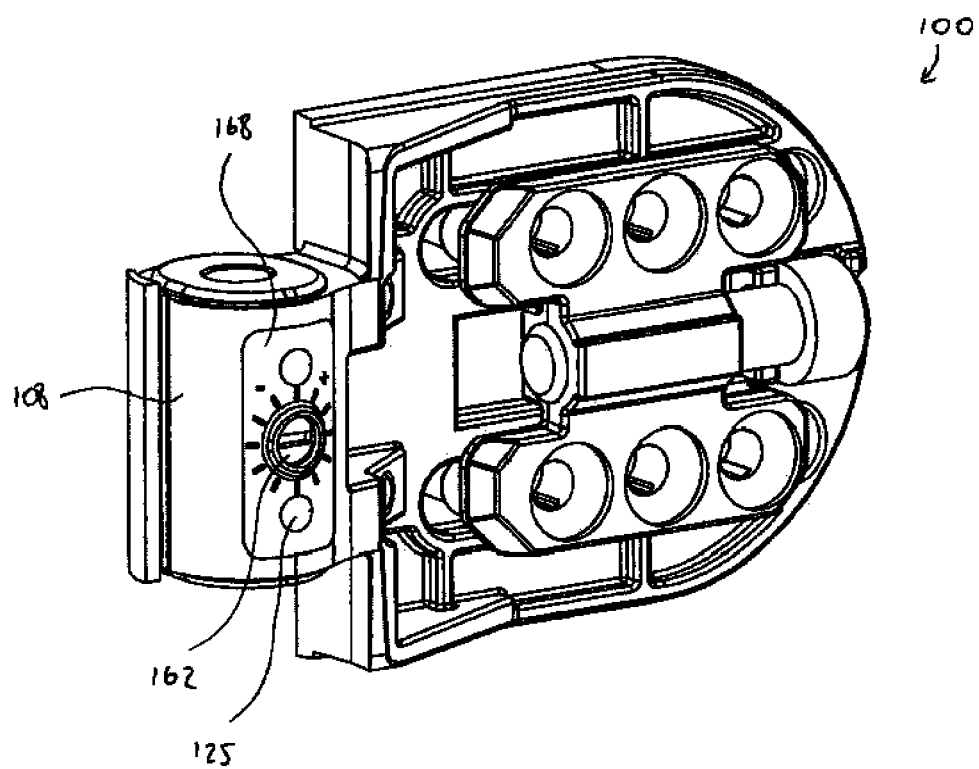


FIG. 10

