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⑤④ **Butt hinges.**

⑤⑦ A hinge joint has flanged pin members (30) received in shoulders (16) on an outer part (10) between which a shoulder (22) on an inner part (12) of a butt hinge is located. Each pin member has an eccentric stub pin (28) projecting through a bush 28 in the shoulder (22). A formation on each flange enables the pin member to be rotated to adjust the location of the pivot axis of the inner part. Grub screws entering grooves (40) lock the pin members. In modifications the two pin members are replaced by single pins.

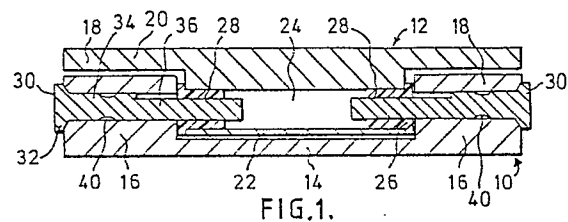


FIG.1.

Description

BUTT HINGES

This invention relates to an improved butt hinge, and in particular to such a hinge in which the relative position and attitude of inner and outer relatively movable parts of the hinge may be adjusted without disassembling the hinge. When a pair of the hinges is used to mount a door to a frame, the position and axis of swing of the door may be adjusted without dismounting the door from its frame. The hinges of the invention are not limited to a door hinge, and a similar construction may be used in hinges for windows.

According to the present invention, a butt hinge having an inner part received between a pair of shoulders on an outer part is characterized by pin means journaled in first hinge bearing means in one of said inner and outer parts and rotatable in second bearing means in the other of said inner and outer parts under the control of clamp means, the pin means being formed with a first portion or portions defining the hinge axis offset from second portions defining the axis of rotation of said pin means in said other part, and with a formation by which said pin means may be rotated.

In one embodiment of the invention each shoulder has a flanged pin member received endwise therein and rotatable in a bore through the shoulder, each pin member terminating at a stub pin eccentric to the member, which stub pin is received in the inner part, and formations are provided on the stud flange by which the stud may be rotated to adjust the location and attitude of the pivot axis.

Some forms of the hinge provide for adjustment of the position but not the attitude of the hinge axis. A preferred form that provides both adjustments includes a pin that has a larger diameter portion journaled in one shoulder of the outer part and an eccentrically located smaller diameter portion extending from one shoulder to the other of the outer part. The end of the smaller diameter portion is received in a hole in a bush journaled for rotation in the other shoulder of the outer part. Clamping means is providing for angular and axial location of the pin and the bush. In a preferred clamping mechanism, the larger diameter portion of the hinge and the side surface of the bush are formed with circumferential grooves for entry by grub screws in respective shoulders of the outer part, the grub screws entering the grooves for axial location of the pin and the bush and being tightenable for angular location thereof.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic cross-section of an assembled hinge;

Figure 2 is a side view of part of the hinge of Figure 1;

Figure 3 is an end view of the hinge of Figure 1;

Figure 4 is a diagrammatic section of a second form of hinge;

Figure 5 is an exploded view of a third form of hinge;

Figure 6 is an exploded view of a fourth form of hinge; and

Figure 7 is an exploded view of a fifth form of hinge.

Referring to Figures 1 to 3, a butt hinge is formed from an outer part 10 for attachment to a door face and an inner part 12 for attachment to a door. The outer part 10 has a central plate region 14 and a pair of hinge shoulders 16 formed with axially aligned through holes 18. The inner part 12 has a plate region 20 carrying a central shoulder 22 formed with a relatively large through hole 24 into the ends of which fits a pair of bushes 26 of nylon or other suitable material, the bushes 26 having coaxial through holes 28. An assembly of the inner part 12 and the bushes 26 fits between the shoulders 16 of the outer part 10.

The outer and inner parts 10, 12 are held together by means of pin members 30 each having a flanged end portion 32 defining its axial position, a central barrel portion 34 by which it rotatably fits into the shoulder 16 and an eccentrically mounted pin portion or stub pin 36 that fits into the through hole 28 of a respective bush 26. The end portion 30 is formed with a hexagonal or other formation 38 by which the pin member 30 may be rotated. Rotation of the pin members 30 enables the position of the inner part 12 to be adjusted relative to the outer part 14 within an envelope of adjustability defined by the eccentricity of pin portion 36 relative to the barrel portion 34. The barrel portion 34 of each pin member 30 is formed with a circumferential groove 40 that is engageable with a grub-screw 42 in a respective shoulder 16. Slackening the grub-screws 42 permits the pin members 30 to be rotated with the screws 42 still partly in the grooves 40 so that the axial position of the pin members 30 is maintained, and retightening them locks the pin members 30 in position. As seen in Figure 3, each end face of the outer part 10 is provided with a datum mark 43 which is alignable with a reference mark 44 on the flanged end portion 32 of the pin member 30. Alignment of the marks 43, 44 at each end of the hinge brings the inner and outer parts 10, 12 to an initial or datum relative position and attitude.

Figure 4 shows a form of the hinge in which the position of the hinge axis can be adjusted, but the attitude of the hinge axis remains unaltered. As in the form of the hinge shown in Figures 1 to 3, a butt hinge is formed from an outer part 10 for attachment to a door face and an inner part 12 for attachment to a door. The outer and inner parts may be zinc die-castings, used in association with steel pin means and nylon washers, sleeves or bushes. The outer part 10 has a central plate region 14 and a pair of hinge shoulders 16 formed with axially aligned through holes 18. The inner part 12 has a plate region 20 carrying a central shoulder 22 formed with a relatively large through hole 24. A flanged bush 50

e.g. of self-lubricating material such as nylon is inserted into the inner end of one of the through holes 18. A pin 52 is provided which has a larger diameter middle region 54 and smaller diameter end regions 55, 56. The end regions 55, 56 are eccentric to the middle region 54. Allen key recesses or sockets 58 are formed in the ends of the regions 55, 56 and the region 54 is formed at a mid-position with a circumferential groove 60.

To assemble the hinge, the pin 52 is introduced endwise into the other of the through-holes 18 which are of sufficiently large diameter to allow diagonal passage of the larger diameter region 54 of the pin 52. A washer 62 is fed onto the pin 52, after which the pin 52 is fed through the through hole 24 of the inner part 12 and its end 56 is inserted into the bush 50. A sleeve 64, also of nylon, is fitted over the smaller diameter region 55.

A grub screw in the central shoulder 22 of the inner part 12 enters the groove 60 to maintain the pin 52 in axial position, and when tightened also serves to maintain a given rotational position of the pin 52 relative to the inner part 12. The rotational position of the pin 52 may be adjusted by an Allen key inserted into a recess 58 to move the position of the inner member 12 relative to the hinge axis, after which the grub screw is tightened.

Assembly of the hinge is facilitated by chamfering the ends 55, 56 of the pin 52 and by providing a similar chamfer on the bush 50.

A third form of the hinge is shown in Figure 5 and again provides for adjustment of the relative positions of the inner and outer parts of the hinge without affecting the attitude of the hinge axis. A pair of flanged plastics bushes 70 are push fitted into opposite ends of the through hole 24 and fit between the central shoulder 22 and the hinge shoulders 16, serving to transmit axial loads in the hinge and to act as hinge journals. A steel pin 72 has a relatively short larger diameter portion 74 formed with a flange 76 and an end recess 78 for receiving an Allen key, and has a relatively long eccentrically located smaller diameter portion 80 terminating in a threaded end 82. The region 22 pivots on the smaller diameter region 80 via bushes 70. The region 74 fits rotatably into one of the bores 18, and the threaded end 82 is inserted into an eccentrically located blind hole 84 of a flanged steel bush 85. Rotation of the pin 72 moves the pivot axis defined by portion 80 relative to the outer member 10, and when the desired position has been reached, grub screws in bores 43 bear on the region 74 of the pin 72 and on the bush 85 to lock the pin 72 in position.

The hinge structure of Figure 6 is similar, except that the steel bush 85 is replaced by a bush 90 having an eccentric blind hole 92 and an eccentric minor diameter region 94.

A preferred form of the hinge is shown in Figure 7, and again uses a pair of nylon bushes 70 inserted into the ends of bore 44. A steel pin 93 has a relatively short larger diameter portion 96 formed with a circumferential groove 97 for entry of a first grub screw 98 in hinge shoulder 16. The pin 93 is flanged at 99 to define an axial location relative to the hinge outer part 10 and the flange 99 is formed with a

socket 100 for receiving an Allen key 101. The pin 93 has a relatively long plain eccentrically located smaller diameter portion 102 that locates in a plain hole 103 in a flanged steel bush 104 that fits into the through hole 18. The bush 104 is axially located by a circumferential groove 105 into which a second grub screw 106 in the other hinge shoulder 16 fits. The end face of the bush 104 is formed with a second socket (not shown) to receive an Allen key. The grub screws 98, 106 may be slackened individually or together. With them slackened together, the pin 93 and bush 104 may be rotated in the same direction, or they may be rotated in opposite directions, in the latter case giving a degree of twist and providing for adjustment of both the position and the attitude of the hinge axis, as in the hinge shown in Figures 1 to 3.

Claims

1. A butt hinge having an inner part (12) received between a pair of shoulders (16) of an outer part (10), is characterized by pin means (30, 52, 72, 93) journaled in first hinge bearing means (18, 22, 70) in one of said inner and outer parts and rotatable in second bearing means (16) in the other of said inner and outer parts under the control of clamp means (42, 98, 106), the pin means being formed with a first portion or portions (20, 80, 102) defining the hinge axis offset from second portions (34, 55, 56, 74, 85, 90, 96, 104) defining the axis of rotation of said pin means in said other part, and with a formation (38, 78) by which said pin means may be rotated.

2. A butt hinge according to Claim 1, characterized in that said pin means comprises two flanged pin members (30), received endwise respectively in said shoulders and rotatable in bores through the shoulders, each pin member terminating at a stub pin eccentric to the member, which stub pin is received in the inner part, and formations (38) on the pin member flange by which the pin member may be rotated to adjust the location and attitude of the pivot axis.

3. A hinge according to Claim 1, characterized in that the inner part has a shoulder (22) formed with a bore (24) into opposed ends of which a pair of bushes (28) fits, and each stub pin fits into one of the bushes.

4. A hinge according to Claim 2 or 3, characterized in that an end face of each shoulder and the flange in the shoulder carry datum marks (43, 44) indicating an undeviated position of the hinge.

5. A hinge according to any one of Claims 2 to 4, characterized in that circumferential grooves in the pin members (30) are engaged by grub screws (42) in the shoulders of the outer part for angular and axial location of the pin members relative to the outer part.

6. A hinge according to Claim 1, characterized in that the pin means is a single pin (52, 72, 93).

7. A hinge according to claim 6, characterized in that the pin means has a larger diameter inner part (54) terminating in smaller diameter stubs (55, 56) received in the outer part, and the inner part is provided with clamping means for immobilising the pin means relative to the inner part.

8. A hinge according to Claim 6, characterized in that the inner part has a shoulder (22) formed with a bore (24) into opposed ends of which a pair of bushes (70) fits, and a single pivot pin (72, 102) having a relatively small eccentrically located hinge region passes through the bushes.

9. A hinge according to any one of Claims 6 to 8, characterized in that a circumferential groove (60, 97, 105) in the pin or in a bush (104) connected to the pin is engaged by a grub screw in one of said inner and outer parts for angular and axial location of the pin relative to

said part.

10. A hinge according to Claim 1, characterized in that said pin means comprises a pin which has a larger diameter portion (74, 96) journaled in one shoulder of the outer part and an eccentrically located smaller diameter portion (80, 102) extending from one shoulder to the other of the outer part, the end of the smaller diameter portion being received in a hole (84, 103) in a bush (70, 104) journaled for rotation in the other shoulder of the outer part and clamping means providing for angular and axial location of the pin and the bush.

11. A hinge according to Claim 10, characterized in that the larger diameter portion of the pin and the side surface of the bush are formed with circumferential grooves (97, 105) for entry by grub screws in respective shoulders of the outer part, the grub screws entering the grooves for axial location of the pin and the bush and being tightenable for angular location thereof.

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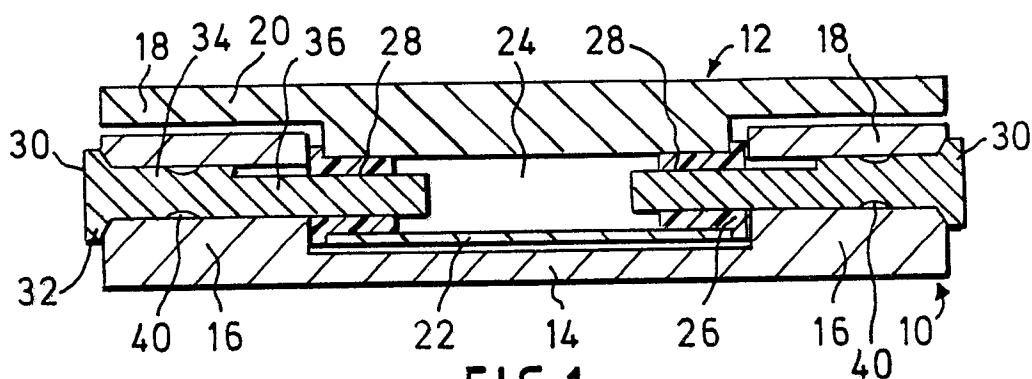


FIG. 1.

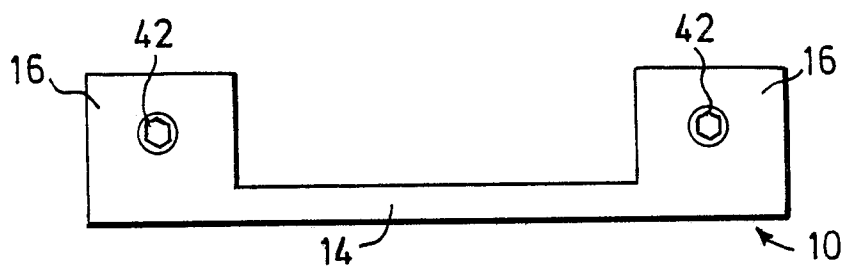


FIG. 2.

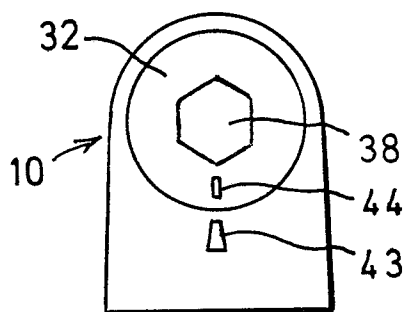


FIG. 3.

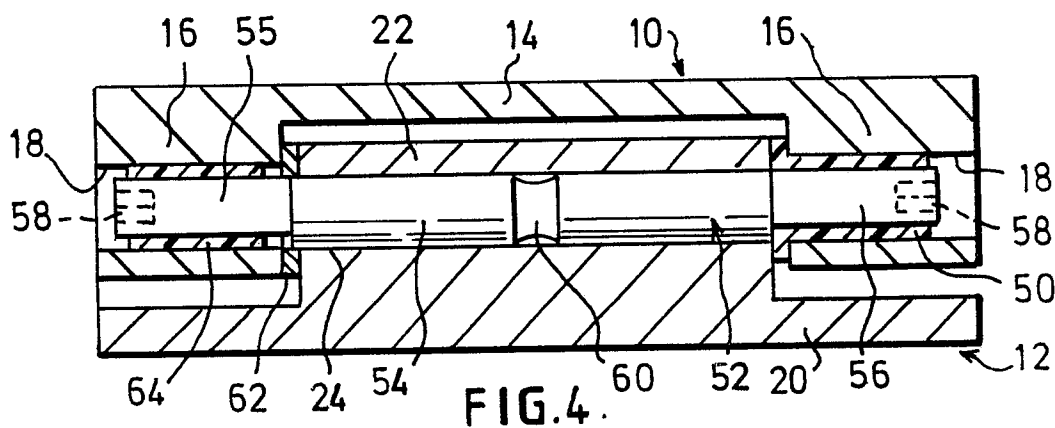


FIG. 4.

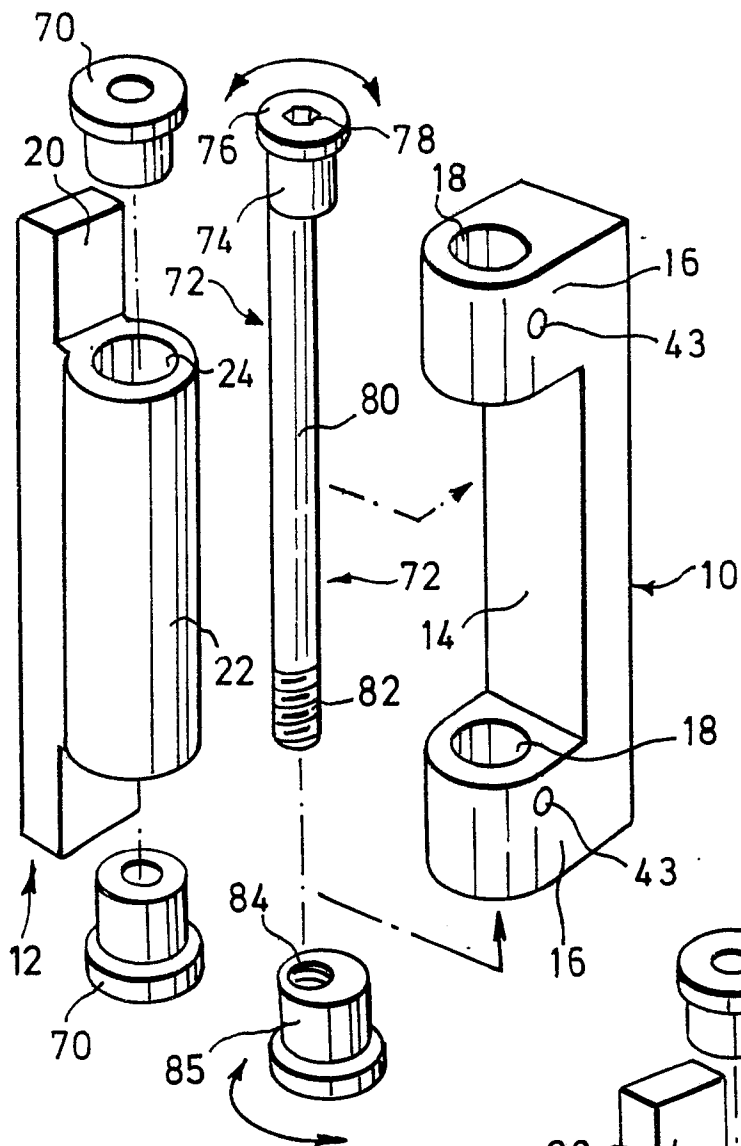
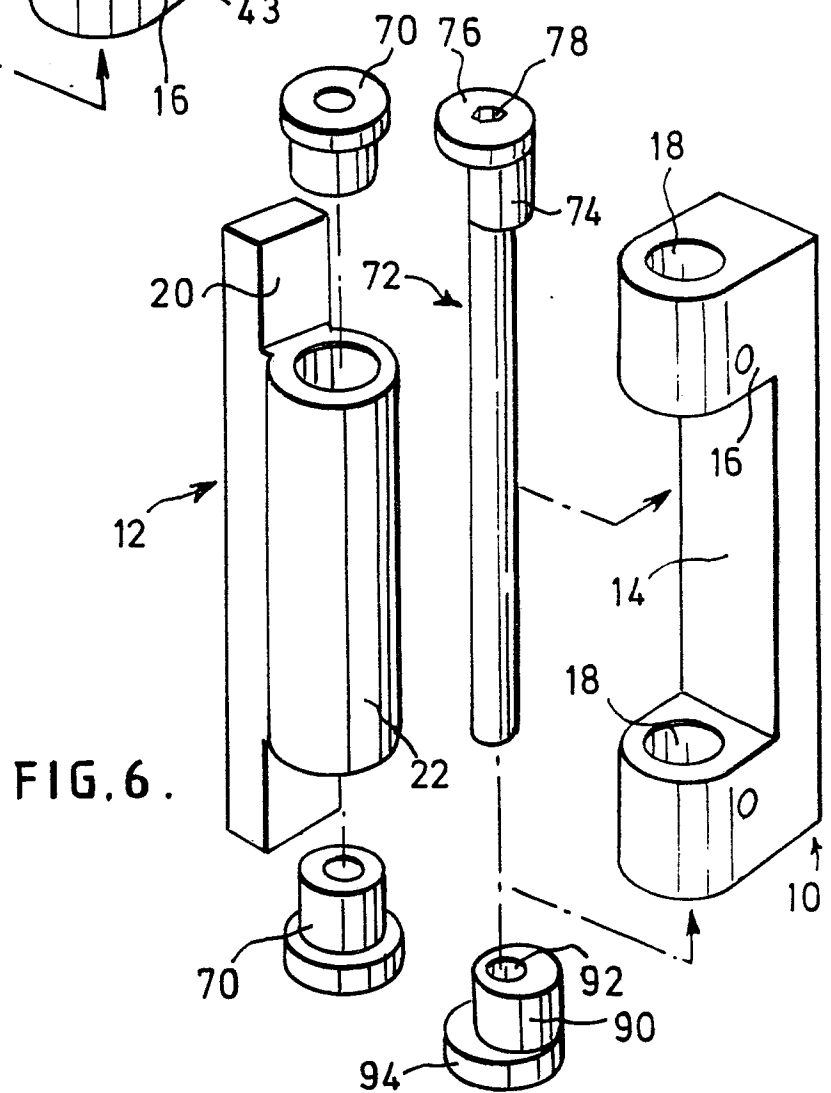


FIG. 5.



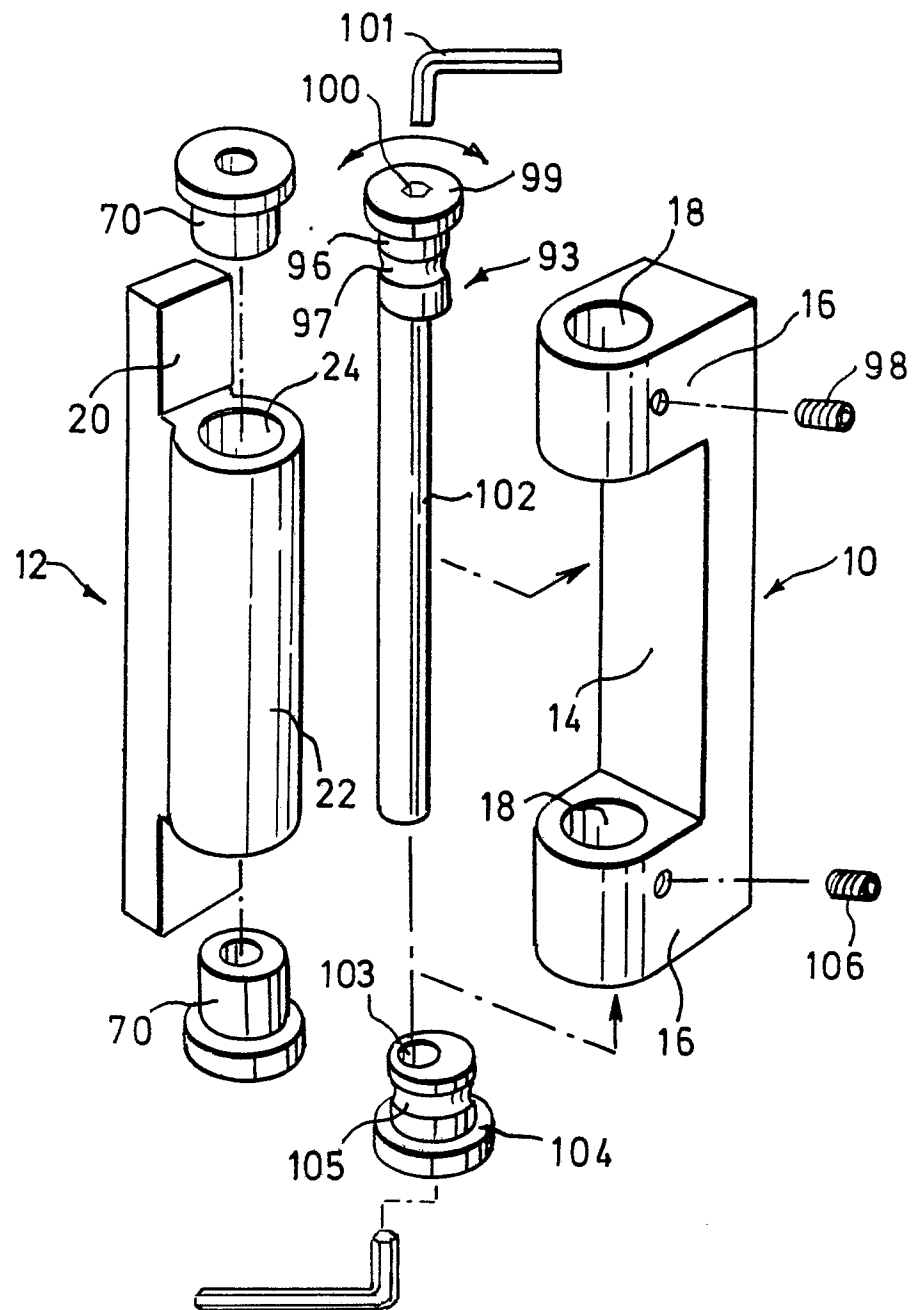


FIG.7.



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
X	DE-A-3 504 921 (DORMA) * Page 7, lines 32,33; page 8, lines 1-34; page 9, lines 1-33; page 10, lines 1-25; figure 1 *	1,6,7	E 05 D 7/04 E 05 D 5/12
Y	---	2,3	
A		9	
Y	US-A-3 015 126 (AHLGREN) * Column 1, lines 70-72; column 2, lines 1-15; figures 3-5 *	2,3	
A	---	5,8	
A	FR-A- 488 965 (WAY) * Whole document *	1,6,8, 10,11	
A	---	1,3	
A	GB-A-2 119 434 (WORCESTER PARSONS) * Abstract *		
A	---	1	
A	DE-A-3 044 673 (HAPS) * Whole document *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			E 05 D
Place of search THE HAGUE		Date of completion of the search 09-01-1989	Examiner NEYS B.G.
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			