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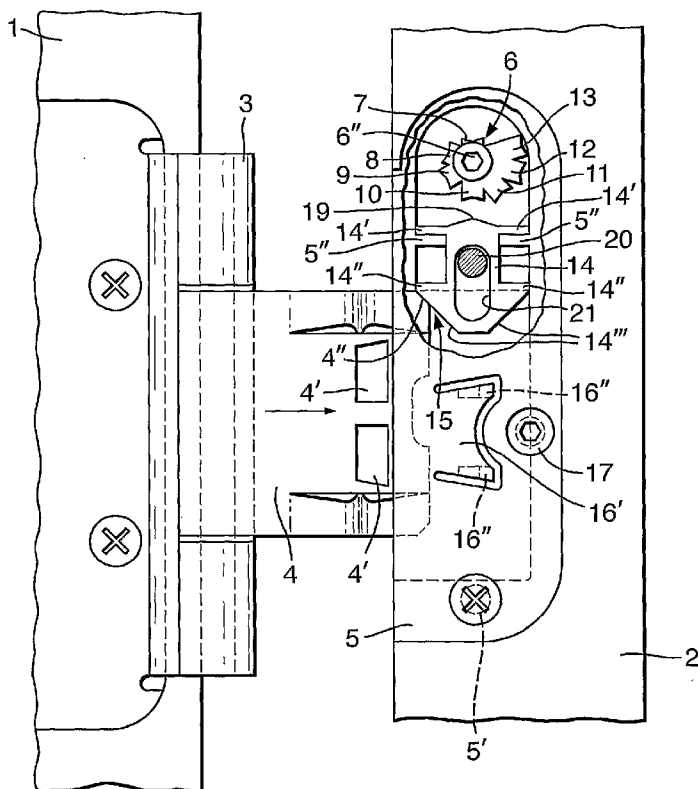
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(54) Title: HEIGHT ADJUSTMENT DEVICE FOR A HINGE



(57) Abstract: A height adjustment device for a hinge having one hinge leaf (4) that can be snapped into or inserted into a receiving part (5) mounted on a door leaf (2) or on a door frame (1), and with a height adjustment mechanism in the receiving part (5) which has abutment against an edge of the hinge leaf (4). The height adjustment mechanism has a slide (14) that is limitedly movable in the receiving part (5), and a rotatable height adjustment member (6). The slide (14) has a portion for abutment against an edge of the hinge leaf. The height adjustment member (6) has a plurality of radially directed, angularly separated arms (6-13) of different lengths, wherein an end portion of such an arm is adapted to engage with an adapted engaging portion (19) of the slide (14).



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Height adjustment device for a hinge

The present invention relates to a height adjustment device for a hinge, wherein a first of the hinge's hinge leaves is attachable to a door leaf and a second hinge leaf is attachable to an adapted door frame, wherein a height adjustment mechanism is arranged to bear against an adjacent, longitudinal edge on one of said hinge leaves, and wherein the height adjustment mechanism has a rotary height adjustment member with adjustment means at respective different distance from a rotation centre of the adjustment member, as disclosed in the preamble of attached claim 1.

Some prior art devices of this kind are e.g. known from NO 309619, NO 318487 and WO 03/029589. Other types of adjustable devices are found e.g. in US 5,799,370 and FR 2368596.

Earlier height adjustment devices have been found to have a number of limitations in as regards the range of possible height adjustment which is present within the available area. Many of these known devices also have a tendency to tip over and out of a set position and thus lose their bearing capacity in the set position.

The object of the present invention is to solve some of the drawbacks associated with the prior art, and the height adjustment device according to the invention is characterised in that the height adjustment mechanism is mounted either on the door leaf or on the door frame and consists of a limitedly movable slide and a rotatable height adjustment member, wherein the slide has an end portion intended for abutment against said longitudinal edge of the hinge leaf, and

- that the height adjustment member has:
- either a plurality of radially directed, angularly separated arms or rods of different lengths, wherein an end portion of such an arm upon rotation of the height adjustment member to required rotary is adapted to releasably engage with an engaging portion on the an edge of the slide that is opposite said end portion of the slide;
- or a polygonal disc having a plurality of edges each of which has different spacing from a rotational centre of the disc, and wherein such an edges is adapted upon rotation of the disc to an electable required position to bear against an end edge of the slide;
- or a disc member having a plurality of angularly separated portions spaced at

a different radial distance from a centre of rotation of the disc member, an engaging means being located at an end edge of the slide for engagement, upon rotation of the disc member to required position, with a portion of the disc member located opposite said end edge.

According to one embodiment of the invention, it is characterised in that it is especially adapted to a receiving part for one hinge leaf of a hinge of the snap-in type or insertion type, that the receiving part is mountable on either a door leaf or a door frame, that the slide is limitedly movable in the receiving part, and that the rotatable height adjustment member is rotatably mounted in the receiving part.

Additional embodiments of the aforementioned height adjustment device will be set forth in the attached subsidiary claims 2 - 18, and also in the description which follows below with reference to the attached drawings.

Figures 1 and 2 show a hinge for heavy doors that is adjustable vertically and laterally, Figure 2a showing vertical or height adjustment and Fig. 2b (prior art) showing the principle of lateral or sideways adjustment.

Figures 3a and 3b show the device illustrated in Figures 1 and 2 in additional height adjustment positions.

Figures 4a- 4c show on an enlarged scale a detail of the height adjustment device of figures 3a and 3b.

Figure 5 shows section V-V on figure 3b

Figure 6 shows section VI-VI on figure 3b.

Figure 7 shows the same view as on figure 3a, but with a slight modification of the height adjustment device.

Figures 8a – 8c show on an enlarged scale a detail of the height adjustment device of figure 7.

Figures 9a and 9b show the height adjustment device in connection with doors designed for the snapping in of the hinge leaf from the right or the left side, figure 9b being section IXb – Ixb on figure 9a.

Figures 10a and 10b show a variant of the solution in Figures 9a and 9b, Figure 10b being section Xb-Xb on figure 10a.

Figures 11a - 11d show a modification of the device depicted in Figs. 10a and 10b.

Figures 12a, 12b and 14 show another variant of the height adjustment as shown in Figs. 9a and 9b.

Figure 13a shows the section XIIIa-XIIIa in Fig. 14.

Figure 13b shows the section XIIIb-XIIIb in Fig. 14, a longitudinal centre section of a hinge leaf for snap insertion into a hinge leaf receiving part.

Figures 15a - 15c show an alternative embodiment of a height adjustment device intended for abutment against the upper side of an insertable hinge leaf, wherein the height adjustment device is mounted on a door leaf.

Figures 16a - 16c show an alternative embodiment of a height adjustment device intended for abutment against the bottom of an insertable hinge leaf, wherein the height adjustment device is mounted on a door frame.

Figures 17a - 17c show yet another alternative solution, where the hinge is not of the snap-in type, but has a hinge leaf that is insertable into a receiving part, and wherein the receiving part is mounted on the door frame.

Figure 18 shows a variant of the embodiment illustrated in Figs. 17a - 17c, where the hinge is not of the snap-in type, but has a hinge leaf that is insertable into a receiving part, and wherein the receiving part is mounted on the door leaf.

Although basically the invention is utilisable for height adjustment of hinges where the hinge leaves of the hinge are both fastened with screws to a door leaf and a door frame respectively, the present invention is first and foremost described for a hinge of the snap-in type, wherein a first of the hinge's hinge leaves can be snapped into a receiving

part mounted on a door leaf and a second hinge leaf is attachable to an adapted door frame, and wherein a height adjustment mechanism is fitted in the receiving part and is adapted to bear against an adjacent, longitudinal edge on said first hinge leaf.

It is also conceivable that a first of the hinge's hinge leaves is attachable to a door leaf and a second hinge leaf can be snapped into a receiving part mounted on an adapted door frame, and wherein a height adjustment mechanism is fitted in the receiving part and adapted to bear against an adjacent, longitudinal edge on said second hinge leaf.

Figure 1 shows a door frame 1 and a door 2 with a hinge 3, the hinge 3 having a hinge leaf 4 configured as an insertion tongue for insertion into a receiving part 5 and its operational components. A rod-shaped "rotor" 6 is shown having a plurality of rods or pins 7-13. The rods or pins are provided outermost with a recess, for example, having a pointed or curved shape, i.e., a V or a U shape, or a right-angled shape, as e.g. indicated by 10'' or 13'' in Fig. 4a. The rod rotor 6 has a centre of rotation from which the rods 7-13 extend. The number of rods and their length may be variable, as required. The reference numeral 6'' indicates a notch for a rotary tool. The turning of the rotor 6 permits a stepwise height adjustment.

On the receiving part 5 which is fastened to the door 2 by screws, such as the screw 5', there is a projection 5'' which is arranged to cooperate with a slide 14 that has upper hooks or projections 14' which rest on the projections 5'' when the hinge members 3, 4 and 5 respectively are separated. When the hinge leaf 4 is inserted into the receiving part 5 in a pocket therein, the slide 14 is pushed upwards with maximum movement until contact portions or hooks 14'' rest against the projections 5''. The slide 14 will be moved upwards when the hinge leaf 4 bears against a bevelled edge portion 14''' on the slide 14 at a first point of contact 15, this point of contact 15 gradually moving downwards on the slide 14 as the hinge leaf 4 is pushed into the receiving part 5. The slide 14, on upward movement, will move until a pointed engaging portion 19 comes to rest against the one of the rods 10 which is vertically positioned pointing downwards. When the hinge leaf 4 is fully inserted into the receiving part 5', as indicated in Figure 2, a snap-in function 16 will come into action, i.e., that a spring tongue 16' provided with bosses 16'' on the receiving part 5 will snap into hole 4' in the hinge leaf 4.

In Figure 2b it is shown how it may be possible to adjust the hinge laterally. The hinge leaf 4 in this figure has a waved or ridged portion 4' and at its free end a cut-out for engagement with a groove 1' in an adjusting screw 17. Figure 2b thus shows the

section IIb-IIb when the hinge member 18, upon the closing of the door 2 against the frame, remains lying essentially parallel against the receiving part 5.

Figures 3 and 4 show different positions of the height adjustment device rod rotor 6 for an upper and a lower position, respectively.

The rod rotor 6 is shown in more detail in Figures 4, 4b and 4c and is indicated in these figures in engagement with the pin or pointed engaging portion 19. The engaging portion 19 may, for example, have a pointed or curved shape, i.e., a V or a U shape, or a right-angled shape. The arms rods or pins 7 - 13 may respectively have different lengths D1-D7. The rod rotor 6, as shown in Figs. 4a, 4b and 4c, is rotatable in one direction or the other, depending on whether the distance between the rotor centre is to be made smaller or greater. In Figure 4c it is shown how the rod rotor 6 can be turned counter-clockwise in order to bring a rod 9 having, for example, shorter length D3 down into engagement with the engaging portion 19.

A modified rod rotor 6' and a modified upper part of the slide 40 are shown on Figure 7 and in more detail on Figures 8a - 8c. It is seen that the rotor 6' has a plurality of pointed arms or rods 7' - 13' which are configured to selectively enter into engagement with a recessed portion 19' on the slide 40'. The pointed ends of the rods 7'-13' may have e.g. a shallow V or U shape, e.g. as indicated by 13''' on fig. 8a, whereas the recessed portion 19' may have a corresponding shape to receive such rod end. The rods or pins 7' - 13' may have different lengths D1' - D7', respectively. As for the embodiment of figs. 3a - 6, the rod rotor 6', as shown on Figures 8a - 8c is rotatable in one direction or the other, depending on whether the distance between the rotor centre is to be made smaller or greater. In Figure 8c it is shown how the rod rotor 6' can be turned counter-clockwise in order to bring a rod 9' having, for example, shorter length D3' down into engagement with the engaging portion 19'.

Thus, the embodiment of Figures 7 and 8a - 8c are functionally operating in an equivalent manner to the embodiments shown on Figures 3a, 3b, 4a - 4c, 5 and 6.

When the desired stepwise adjustable height of the door leaf 2 in relation to the frame 1 has thus been adjusted in the disclosed manner, a fixing screw 20 is tightened, but the slide 40 will still have possible free motion relative to the screw 20 via the elongate cut-out 21 in the slide 40. The screw 5' and the screw 20 thus serve to fasten the receiving

part properly to the door leaf 2, whilst the slide 40 will still have free motion relative to the screw 20.

As shown in Figure 5, the height adjustment member has a spindle 6'' which is supported in the two opposing side faces 5'', 5''' of the receiving part 5. As will be seen from all the figures, the screw 20; 50; 64 is positioned to be located closer to the upper edge of an inserted hinge leaf than the rotational axis of the height adjustment member.

Figure 6 shows the section VI-VI in Fig. 3b. Compared to Fig. 1, the stops 14', 14'' and 5'' cannot be found in Fig. 3b. Instead a spacer ring 20', which fits into the hole 21, is provided around the screw 20. The hole 21 must in any case be present, and the spacer ring therefore acts as an appropriate stop.

Figures 9a and 9b show a variant of that shown in the preceding figures, where there is a hinge 22 with a hinge leaf 23 that is designed for insertion into a receiving part 24 mounted on a door leaf 25, the hinge's 22 other hinge leaf 26 being fastened to a door frame 27 by three screws 28 - 30, of which screw 30 may serve as an adjusting screw for lateral adjustment of the hinge, as for example indicated correspondingly in Fig. 2b for the screw 17. The hinge 22 is designed to be inserted from either the right or the left side of the door leaf 25, depending upon how the hinge leaf 26 is fastened to the door frame 27, for example for a left or right opening door. Since the hinge leaf 23 can be inserted from one side or the other of the receiving part 24 in order to be able, via holes 23', 23'' in the hinge leaf, to engage with snap elements 31, 32 on the receiving part 24, this results in a greater scope of application of the snap-in capability. This two-way snap-in insertability into the receiving part 24 is per se independent of the height adjustment that can be made.

Figures 10a and 10b show a variant of the solution illustrated in Figures 9a and 9b, that is to say, a modified form of the receiving part, indicated in these figures by the reference numeral 33, attached to a door leaf 25 on which there are snap elements 34, 35 for engagement with respective holes 23', 23'' in the hinge leaf 23 of the hinge 22. At the insertion end of the hinge leaf 23 there is provided an oblique bevel 23''' to enable the hinge leaf 23 to be passed more easily into the receiving part 33, the edge 23'''' of the hinge leaf 23 (see Fig. 11b) thus being prevented from striking against and thereby being impeded in its movement by the snap element 34 or 35 (depending on the

insertion direction) upon insertion into the receiving part. The bevel 23''' shown in Fig. 9a has the same function relative to the snap elements 31, 32.

It will be seen from Figs. 9a and 10a that the receiving part is fastened by four screws 36 - 39, of which the screws 36, 37 limit the downward movement of the slide 41, in that there are shoulders 41' on the slide which will bear against the said screws 36, 37. As the receiving part in this case is advantageously of a plastic material, the four fixing screws 36 - 39 are essential, but as the screws are fastened into solid material, there is no need for deflections or supporting rings. The use of four screws may be desirable with a receiving part of steel, but with sufficient rigidity of the steel, two screws are usually enough, as shown in Figure 11.

When the receiving part is of plastic, it is advantageous to allow the snap engagement parts 31, 32; 34, 35 to be located on the upper side of the receiving part 24; 33. When the receiving part is of steel, a snap function will work badly as shown in Fig. 10, as the tiltable snap parts will quite simply be too stiff to lift in connection with engagement or disengagement.

In the solution shown in Figures 11a - 11d there is a hinge 22' with an insertion member 23 for snap fastening, as shown for Figs. 10a and 10b. The hinge leaf that is to be secured in a door frame 42 is indicated by the reference numeral 43 and is fastened to the door frame by five screws 44 - 48, of which the screw 48 is an adjusting screw for lateral adjustment of the hinge, as shown in Fig. 2b, and where the screws 44 - 47 can be passed into elongate holes, so that there is also the possibility of depth adjustment of the hinge. The receiving part is indicated by the reference numeral 49 and in this case is chosen to be of metal, for instance steel, and may be fastened, for example, by two screws 50, 51 to a door leaf 52. As mentioned, it is then difficult to have the snap function in the upper side of the receiving part or, to be more precise, the side that faces away from the door leaf. Instead, it is proposed to provide engaging or snap elements 53, 54 in the underside of the receiving part, for example of 0.5 mm spring steel. The release of the hinge leaf is effected, as shown in Figures 11a and 11b, by pressing the engaging element 53 down, for example, with a screw driver, so that it is disengaged from the hole 23' in the hinge leaf 23. The slide which cooperates with the rod-shaped rotor 6 is in Figure 11 indicated by the reference numeral 55 and has an elongate hole 56 which cooperates with the screw 50, as explained for the corresponding embodiment in Figures 4 and 7. Figure 11c indicates how lateral adjustment may be effected, i.e., by

loosening the screws 44 - 47 slightly, adjusting the screw 48 and then retightening the screws 44 - 47.

It is important to note that the two snap functions associated with the holes 23', 23'' and related to the embodiment in Figures 9 - 11 are offset in a zigzag fashion, so that snap engagement does not take place in the wrong holes.

Such incorrect snap engagement could also easily have happened in the embodiment that can be seen from Figures 12a, 12b and 14.

A common feature of the solutions shown in connection with Figures 1-10 is thus that there is a plurality of radially directed, angularly separated rods or arms 6' of different lengths and wherein the end portion of such a rod or arm is adapted to engage with the pointed engaging portion 19; 19'; 19'' on the upper edge of the slide 14; 40; 41; 55.

The invention will now be further described in connection with the embodiments that can be seen in Figures 12 - 14. The said rod rotor 6 with a plurality of radially directed, angularly separated arms or rods of different lengths, as shown in Figures 1-10, is in the embodiment in Figures 12 and 14 shown replaced by a polygonal disc 57 having a plurality of edges 58 - 62 (see Figure 12b), each of which has mutually different spacing from the rotational centre 57' of the disc 57, and where such edges 58 - 62 are adapted so that any one selectively can bear against the upper edge 63' of the slide 63. The slide is movable relative to a screw 64 by means an elongate hole 65 in the slide 63. A further screw 75 secures the receiving part 67 to the door leaf 68. The insertable hinge leaf, indicated in these figures by the reference numeral 66, may be of a type that is capable of being snapped into the receiving part 67 from either the right or the left side of the door leaf 68 edge. When the desired vertical position of the door leaf 68 relative to a door frame has been set, the slide 63 will not be capable of being brought out of position from its abutment against an edge of the disc 57, provided the door leaf is not lifted up and the disc turned.

Figures 13a and 13b show respectively how a snap-in door hinge leaf 66 which is located in the receiving part 67 on the door leaf 68 can be disengaged by using a tool 69 for upward tilting of an engaging tongue 70. The sections XIIIa-XIIIa and XIIIb-XIIIb in Figure 14 refer to Figures 13a and 13b respectively

To counter said possible incorrect snap engagement when the snap pins 70, 71 in the receiving part 67 do not lie in a zig zag path but in a straight line, it is important that the first or most forward hole 72 in the insertable hinge leaf 66 has a bevel 72', whilst the rear hole 73 should not have such a bevel. Similarly, the forward edge of the hinge leaf 66 may have a bevel.

Said projections or pins 5'' as described, inter alia, in connection with Figures 1 and 2, but which can also be seen in Figures 12a, 12b which have a slide solution, will, when said screw 20; 64 is tightened, be adapted to limit the possible screwing in of the screw into the door leaf and thus the receiving part. This means that the slide will not become locked or clamped by such a screw and thus prevented from being able to be moved as required. The need for the use of a locking screw to secure the height adjustment member or the slide in the desired, set position also no longer applies.

Figures 1, 2a, 3 and 4 show that at the bottom the slide has the bevelled portion 14''' which is designed for sliding contact with a corresponding bevel 4'' on the upper edge of the hinge leaf. However, such a bevel 4'' is not absolutely necessary for the functionality and can, if desired, be omitted.

As will be seen from the illustrated embodiments, a line between the one of the arms or rods which is in engagement with the pointed engaging portion extends vertically and through the rotational axis of the height adjustment member. It is thus ensured that the height adjustment member cannot turn in the event of an accident. The hinge leaf will in any case be held in place against withdrawal from the receiving part by snap engagement.

Figures 15a - 15c show how a rod-shaped rotor 76 can be arranged in a receiving part 77 mounted on a door leaf of a door assembly and where slide 78 is arranged to rest against the upper edge of a snap-in or insertable hinge leaf 79.

Similarly, Figures 16a - 16c show how a rod-shaped rotor 76' can be arranged in a receiving part 77' and where a slide 78' is arranged to rest against the lower edge of a snap-in or insertable hinge leaf 79, the receiving part in this case being mounted in the frame part of the door assembly. The object of the solution shown in these figures is to make the adjustment member as short as possible in the vertical direction of the door.

Figure 17a illustrates a solution wherein a hinge of the snap-in type is not used, but instead a hinge of the insertion type, but where the height adjustment device is nevertheless fully utilisable in a modified form. A hinge 80 is shown in this figure having hinge leaf 80' for fastening to a door frame 81 by screws 83 and a hinge leaf 80'' for insertion into a pocket 84' in a receiving part 84 on a door leaf 82, and where it is fastened by screw 85 which is passable through a hole 85' in the receiving part and an elongate hole 86 in the hinge leaf 80''. The height adjustment mechanism, as previously described, consists of a rod-shaped "rotor" 87 having a plurality of rods or pins 88 - 92. The rods or pins are provided outermost with a recess, for example, having a pointed or curved shape, i.e., a V shape or a U shape, or a right-angled shape. In a similar way, there is provided a slide 93 having an engaging portion 94 adapted to the outer end of the rods or pins, i.e., having a corresponding pointed or curved shape, i.e., a V shape or a U shape, or a right-angled shape. The movement of the slide 93 is limited by the cooperation between a screw or pin 95 and an elongate opening 96 in the slide. The height adjustment mechanism is mounted in the receiving part housing 97, so that the "rotor" 87 is rotatably anchored therein and the slide 93 is slidable relative thereto. The screw 95 and additional screw 98 effect a fastening of respectively the height adjustment mechanism and said housing or cover 97 to the door leaf 82. On adjustment of the height-related position of the hinge leaf 80'' on the door leaf 82, the fixing screws 85 and 95 can be loosened a little, so that the hinge leaf 80'' and the slide 93 can thus be moved up or down in relation to the receiving part 84. When the right position has been set by means of the height adjustment mechanism 87 and the uppermost edge of the hinge leaf 80'' bears against the free edge 93' of the slide, the screws 85 and 95 are tightened.

Figure 18 illustrates a solution that is similar to that shown and explained in connection with Figures 17a - 17c. A hinge 99 is shown in this figure with hinge leaf 99'' for fastening to a door leaf 100 by screws 101, and a hinge leaf 80'' for insertion into a receiving part 102 on a door frame 103 and which is fastened by screw 104 which can be passed through a hole in the receiving part and an elongate hole 105 in the hinge leaf 99''. The height adjustment mechanism, as previously described, consists of a rod-shaped "rotor" 106 having a plurality of rods or pins 107 - 11. The rods or pins are provided outermost with a recess, for example, having a pointed or curved shape, i.e., a V shape or a U shape or a right-angled shape. In a similar way, there is provided a slide 112 having an engaging portion 112' adapted to the outer end of the rods or pins, i.e., having a corresponding pointed or curved shape, i.e., a V shape or a U shape, or a right-angled shape, or a shape as indicated on figures 7 and 8a - 8c. The movement of the

slide 112 is limited by the cooperation between a screw or pin 113 and an elongate opening 114 in the slide. The height adjustment mechanism is mounted in the receiving part 102 housing 115, so that the "rotor" 106 is rotatably anchored therein and the slide 112 is slidable relative thereto. The screw 113 also effects a fastening of the height adjustment mechanism and a screw 116 secures said housing 115 to the door frame 82. On adjustment of the height-related position of the hinge leaf 99'' on the door frame 103, the screws 104 and 113 can be loosened a little, so that the hinge leaf 80'' and the slide 112 thus can be moved up or down in relation to the receiving part 102. When the right position has been set by means of the height adjustment mechanism 106 and the lowermost edge of the hinge leaf 80'' bears against the free edge 112' of the slide, the screws 104 and 113 are tightened.

In the solutions shown it will be understood that the height adjustment device is stable when the door leaf hangs with its weight in cooperation with the device, but is adjustable when the door leaf is lifted up with force, and after any adjustment is lowered for setting the door leaf at a possible new desired height.

P a t e n t c l a i m s

1.

A height adjustment device for a hinge, wherein a first of the hinge's hinge leaves is attachable to a door leaf and a second hinge leaf is attachable to an adapted door frame, and wherein a height adjustment mechanism is adapted to bear against an adjacent, longitudinal edge on one of said hinge leaves, and wherein the height adjustment mechanism has a rotary height adjustment member with adjustment means at respective different distance from a rotation centre of the adjustment member characterised in

- that the height adjustment mechanism consists of a limitedly movable slide and a rotatable height adjustment member, wherein the slide has an end portion designed for abutment against said longitudinal edge of the hinge leaf; and
- that the height adjustment member has:
- either a plurality of radially directed, angularly separated arms or rods of different lengths, wherein an end portion of such an arm upon rotation of the height adjustment member to required rotary position is adapted to releasably engage with an engaging portion on an end edge of the slide that is opposite said end portion of the slide;
 - or a polygonal disc having a plurality of edges each of which has different spacing from a rotational centre of the disc, and wherein such an edge is adapted upon rotation of the disc to an electable required position to bear against an end edge of the slide;
 - or a disc member having a plurality of angularly separated portions spaced at a different radial distance from a centre of rotation of the disc member, an engaging means being located at an end edge of the slide for engagement, upon rotation of the disc member to required position, with a portion of the disc member located opposite said end edge.

2.

A height adjustment device as disclosed in claim 1, characterised in

- that it is adapted to a receiving part for one hinge leaf of a hinge of the snap-in type or the insertion type;
- that the receiving part is mountable on either a door leaf or a door frame;
- that the slide is limitedly movable in the receiving part; and
- that the rotatable height adjustment member is rotatably mounted in the receiving part.

3.

A height adjustment device as disclosed in claim 1, characterised in

- that said recesses have a pointed, curved or right-angled shape; and
- . said pin has a corresponding shape.

4.

A height adjustment device as disclosed in claim 1, characterised in that the slide at its end portion has at least one bevelled portion designed for sliding contact with a bevel or a corner on a forward part of the hinge leaf.

5.

A height adjustment device as disclosed in claim 1, 2, 3 or 4, characterised in that a line through the one of said arms on the height adjustment member that is in engagement with said engaging portion extends vertically and through the rotational axis of the height adjustment member.

6.

A height adjustment device as disclosed in claim 1, characterised in that a line through the arm or rod or a pin or recess or pins on the slide and a selected one of the engaging recesses or pins on the height adjustment member disc extends vertically and through the rotational axis of the disc.

7.

A height adjustment device as disclosed in one or more of claims 2 - 6, characterised in that the slide is made having a cut-out along a portion of the longitudinal edges of the slide, wherein said cut-out cooperates with projections or pins on the receiving part for limiting the up or down movement of the slide.

8.

A height adjustment device as disclosed in one or more of preceding claims 2 - 7, characterised in that the height adjustment member has a spindle that is supported in the two opposing side faces of the receiving part.

9.

A height adjustment device as disclosed in claim 7, characterised in that said projections or pins, upon the tightening of said screw, are adapted to limit the possible screwing in of the screw into the door leaf and thus the receiving part.

10.

A height adjustment device as disclosed in one or more of preceding claims 2 - 9, characterised in that the screw is positioned to be located closer to an inserted hinge leaf's upper edge than the rotational axis of the height adjustment member.

11.

A height adjustment device as disclosed in one or more of preceding claims 2 - 10, characterised in that the insertion end of the hinge leaf has a bevel in order, on the insertion of the hinge leaf into the receiving part, to push a snap element therein to the side before it is then allowed to snap into a notch in the hinge leaf.

12.

A height adjustment device as disclosed in one or more of preceding claims 2 - 11, characterised in that the receiving part has snap engagement elements that are positioned offset horizontally and vertically relative to each other.

13.

A height adjustment device as disclosed in one or more of claims 2 - 11, characterised in that the receiving part has snap engagement elements that are positioned offset horizontally but not vertically relative to each other.

14.

A height adjustment device as disclosed in claim 13, characterised in

- that the insertable hinge leaf has engaging holes designed for snap engagement with said snap engagement elements; and
- that the engaging hole closest to the free end of the hinge leaf has a bevel at its rear portion.

15.

A height adjustment device as disclosed in claim 2, characterised in that the slide has an elongate cut-out designed for free motion and selective engagement with a screw in the receiving part.

16.

A height adjustment device as disclosed in claim 15, characterised in that the screw together with the mounted spacer ring which fits into the cut-out is adapted to limit the vertical movement of the slide in the receiving part.

17.

A height adjustment device as disclosed in any one of the preceding claims, characterised in

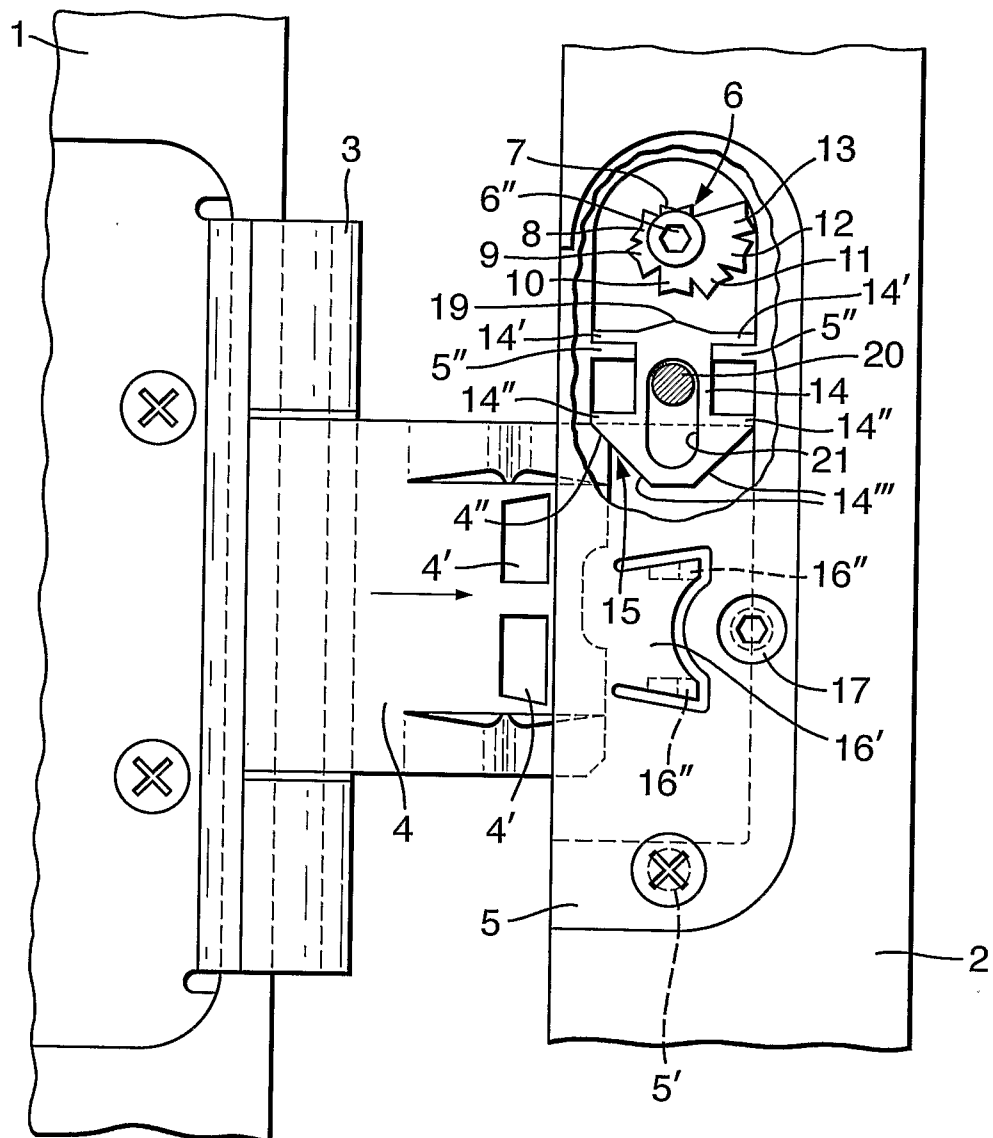
- that said end portion is formed of a downward facing edge on the slide; and
- that the longitudinal edge on the hinge leaf is the upper edge of the hinge leaf.

18.

A height adjustment device as disclosed in any one of preceding claims 1-16, characterised in

- that said end portion is formed of an upward facing edge on the slide; and
- that the longitudinal edge of the hinge leaf is the lower edge of the hinge leaf.

Fig.1.



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Fig.2a.

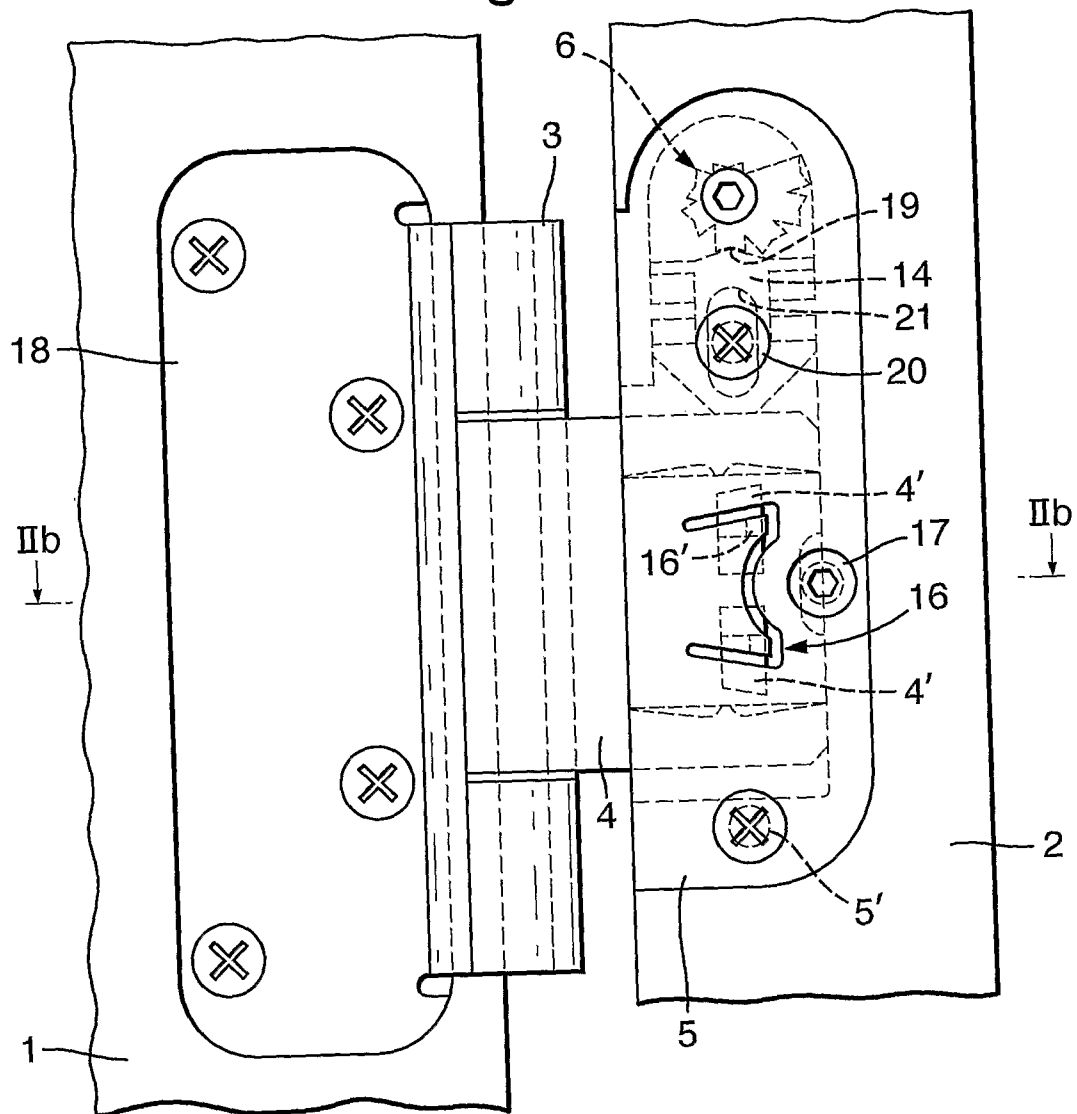
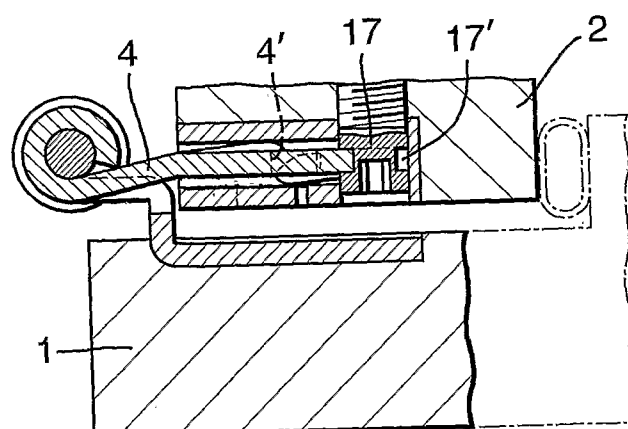


Fig.2b.

Prior Art



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Fig.3a.

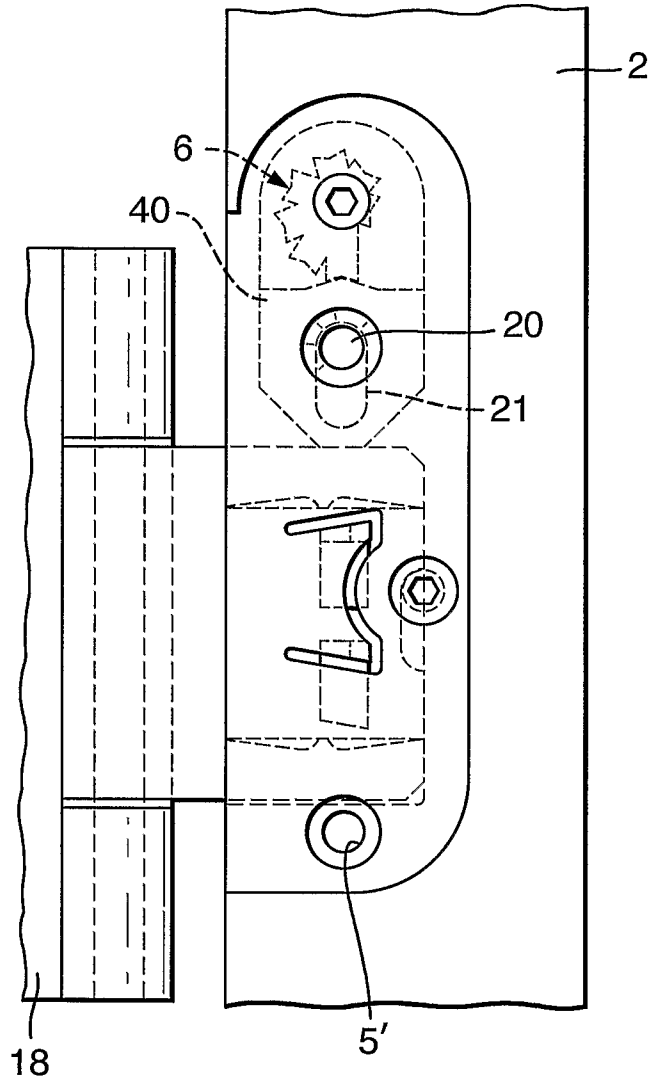


Fig.3b.

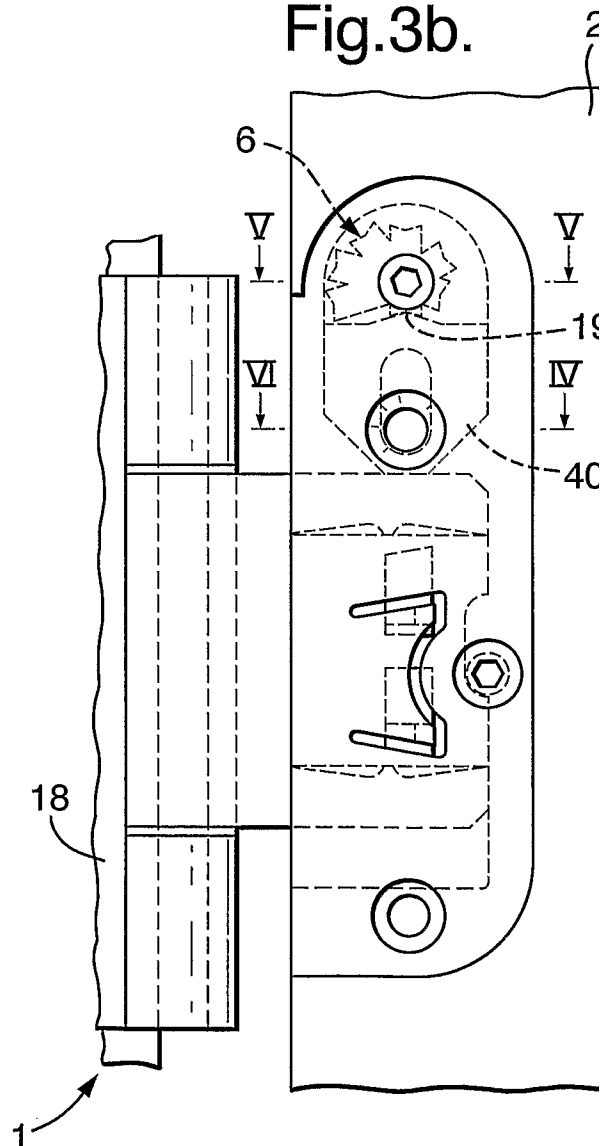


Fig.4a.

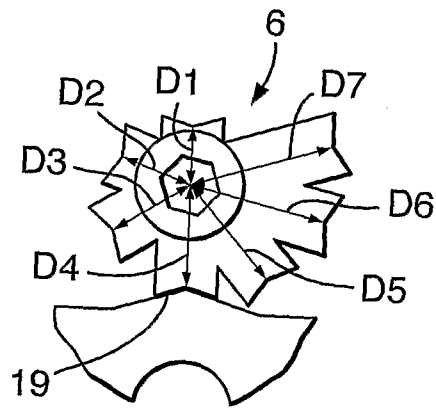


Fig.4b.

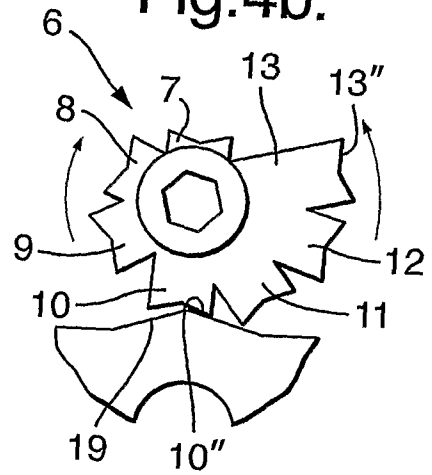


Fig.4c.

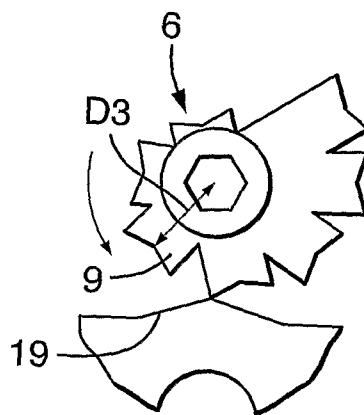


Fig.5.

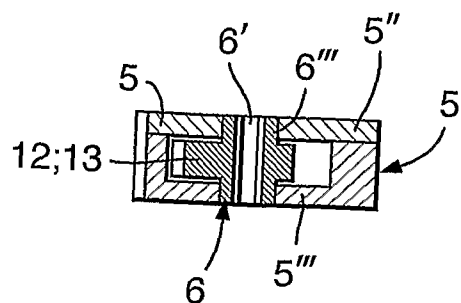
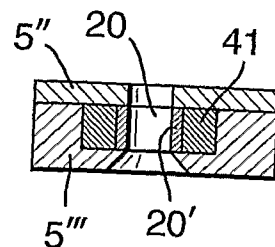


Fig.6.



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Fig.7.

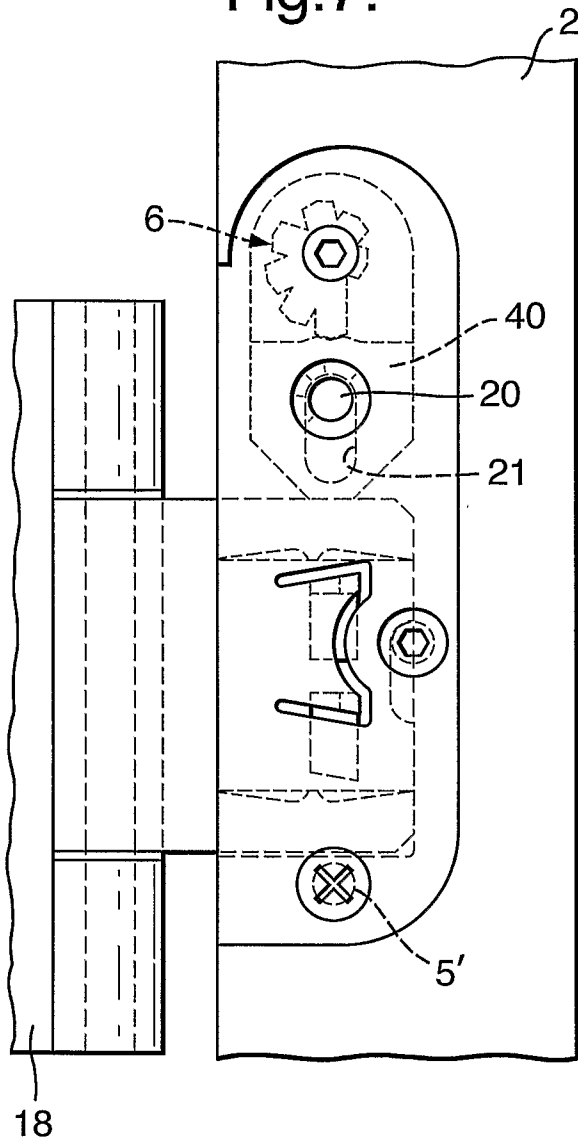


Fig.8a.

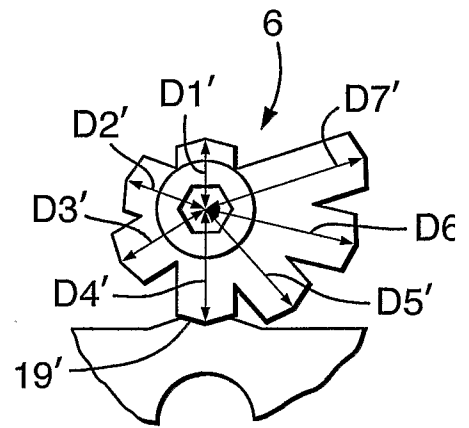


Fig.8b.

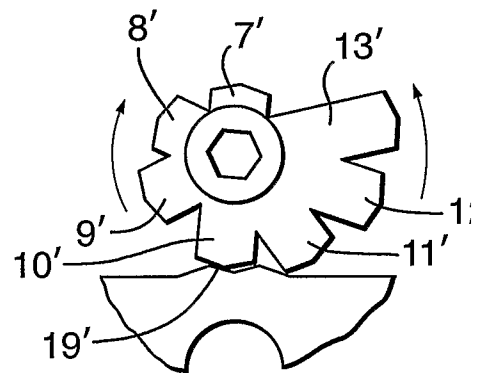
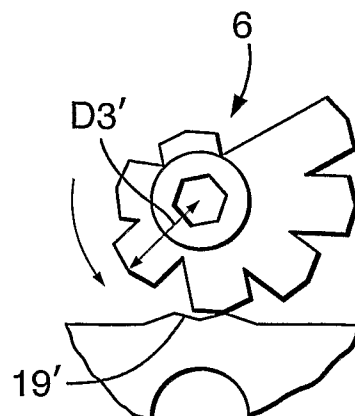


Fig.8c.



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Fig.9a.

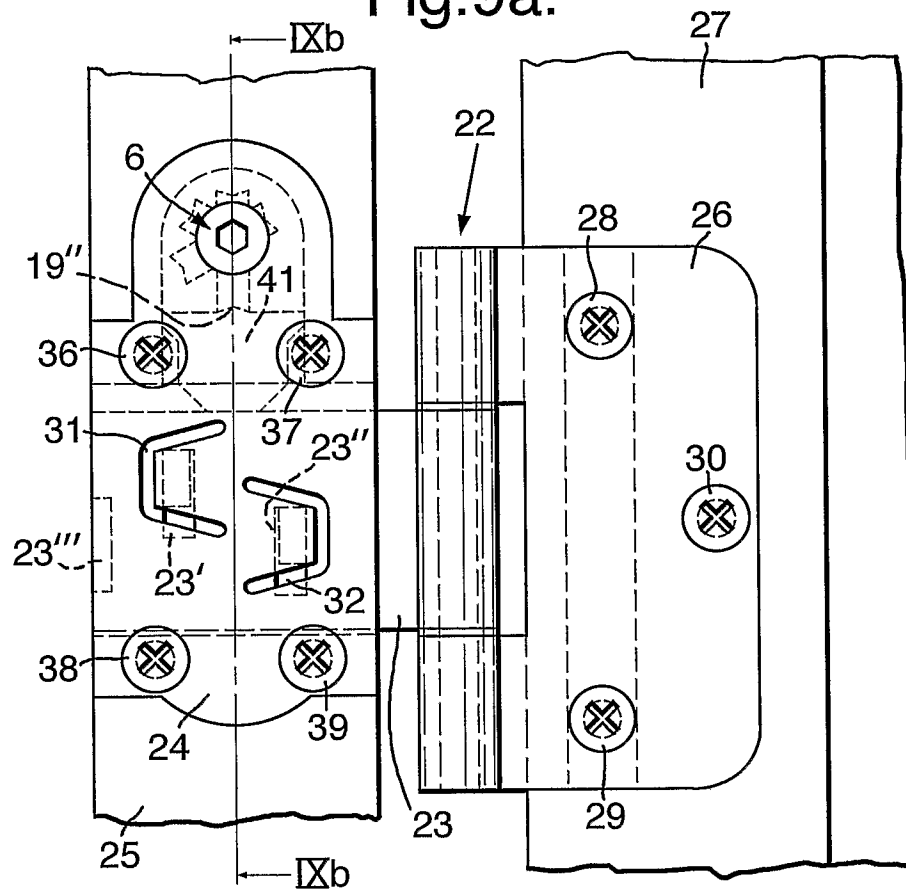
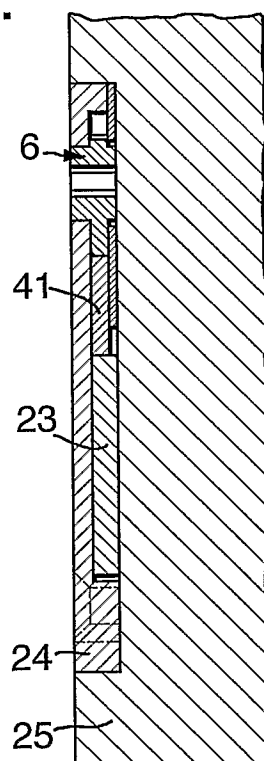


Fig.9b.



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Fig.10a.

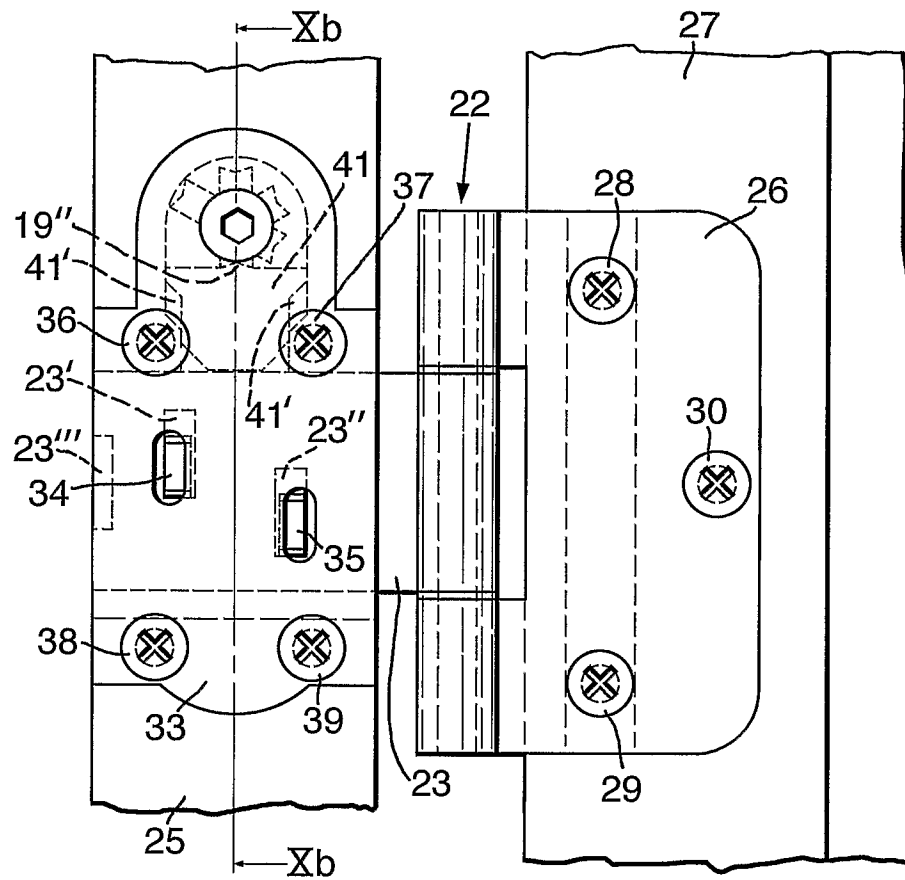
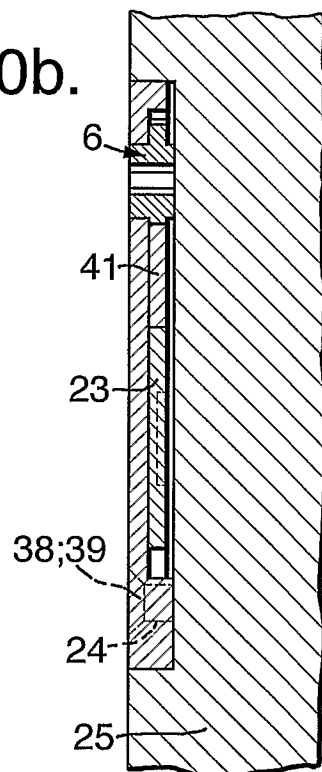


Fig.10b.



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Fig.11a.

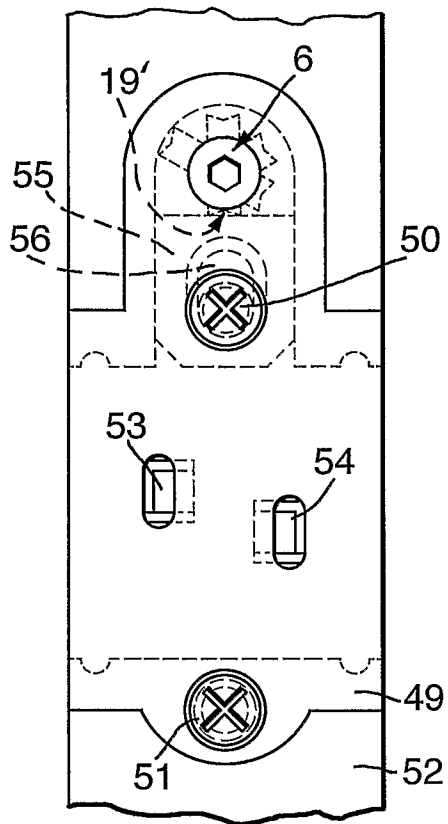


Fig.11b.

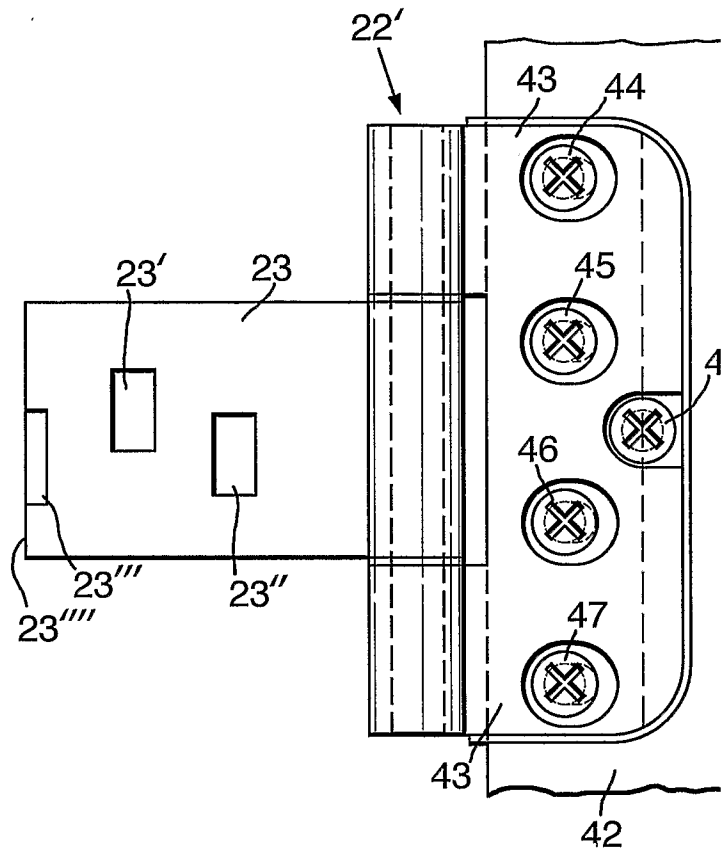


Fig.11d.

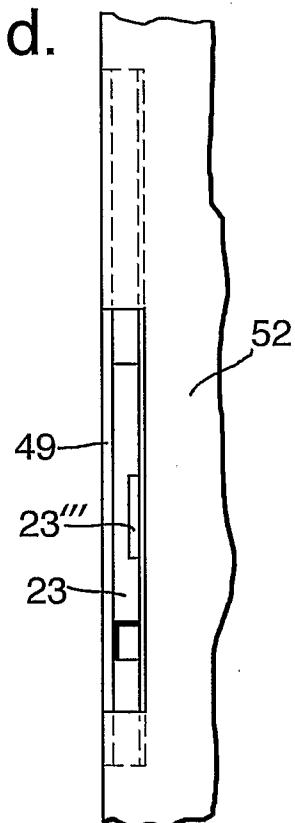


Fig.11c.

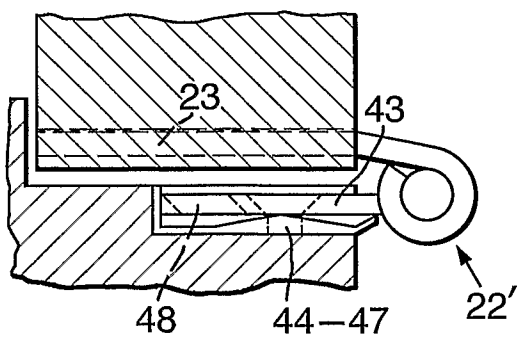


Fig.12a.

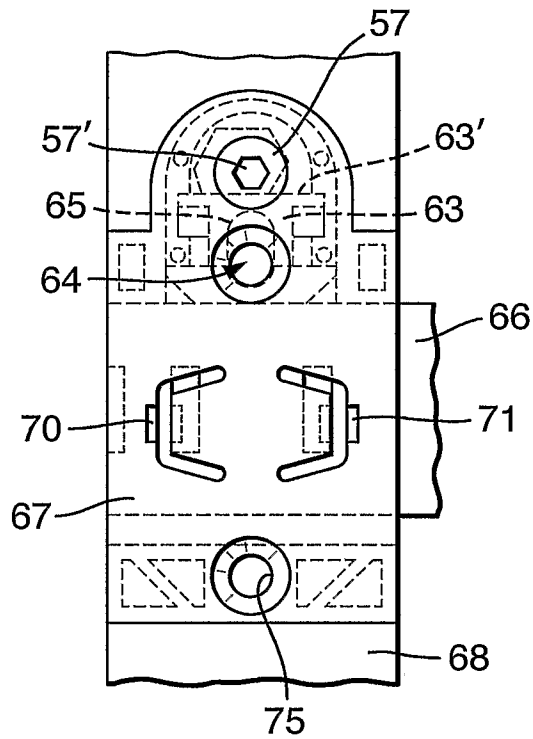


Fig.12b.

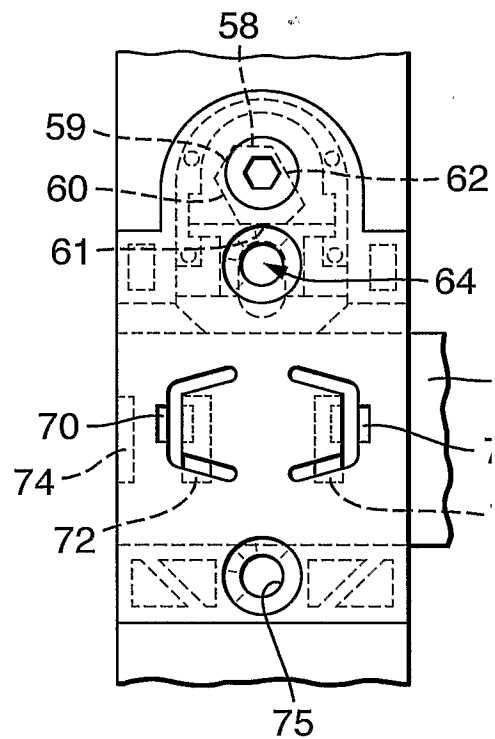


Fig.13a.

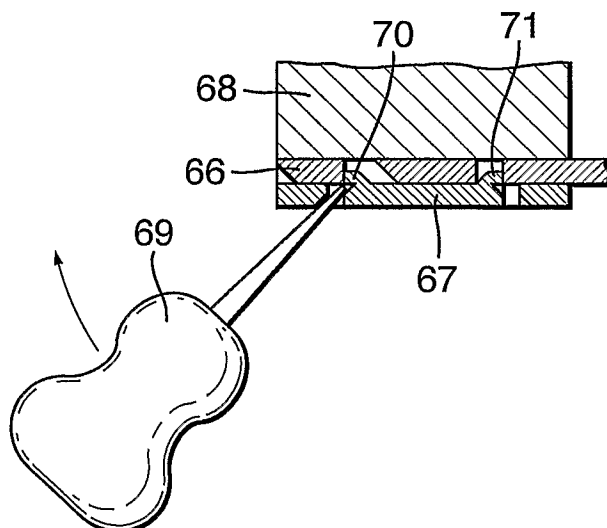


Fig.13b.

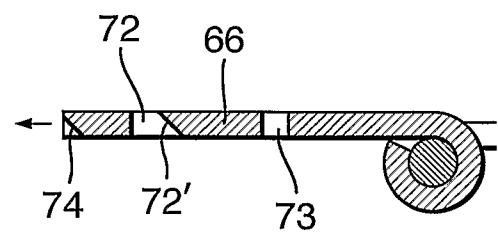
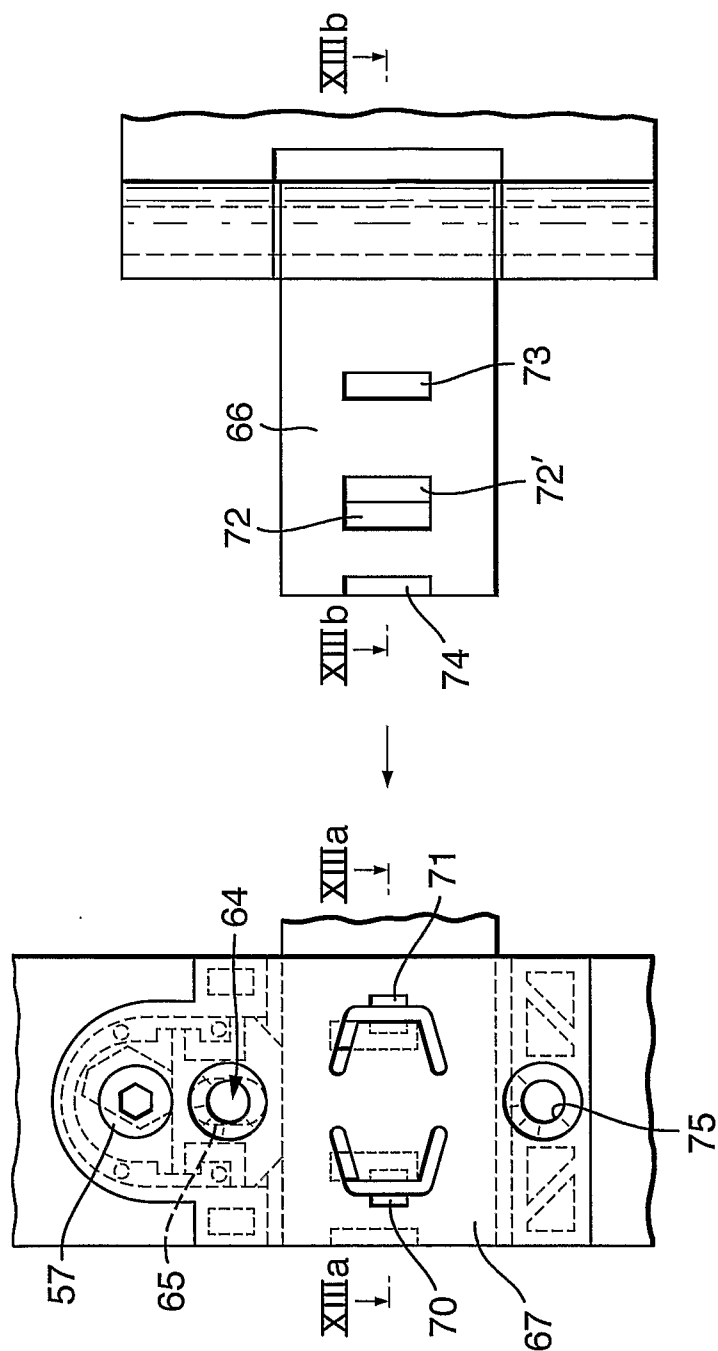


Fig.14.



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Fig.15a.

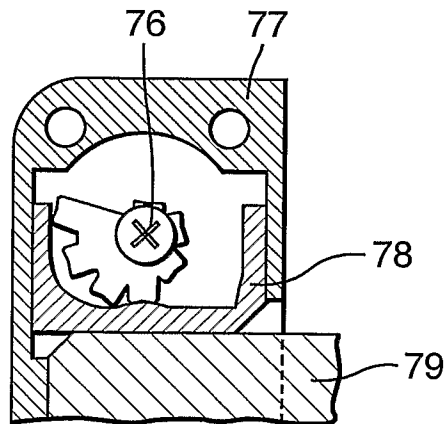


Fig.15b.

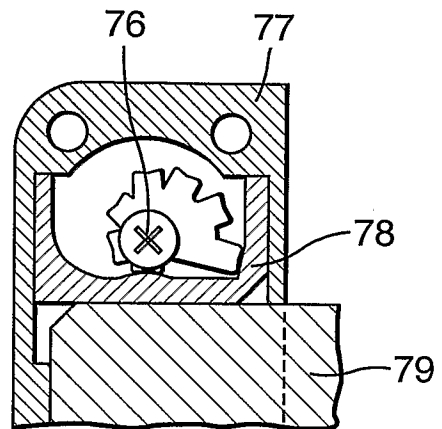


Fig.15c.

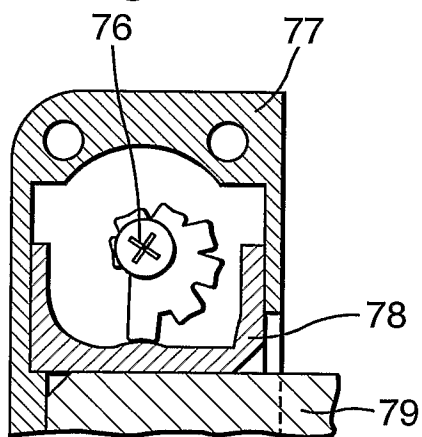


Fig.16a.

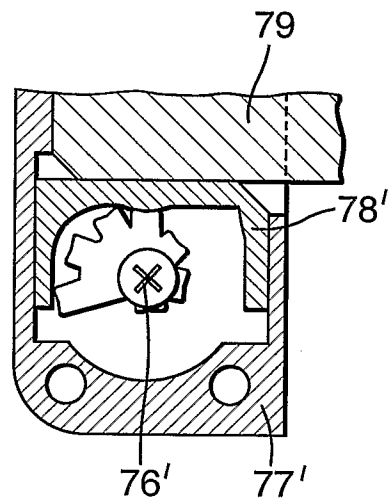


Fig.16b.

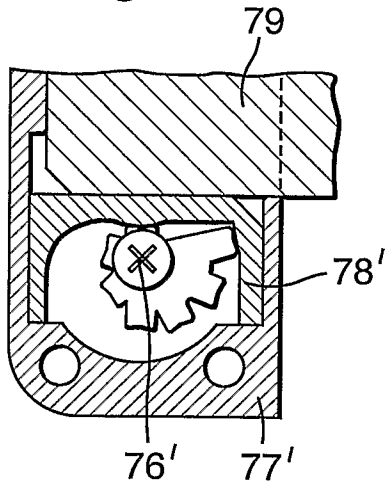
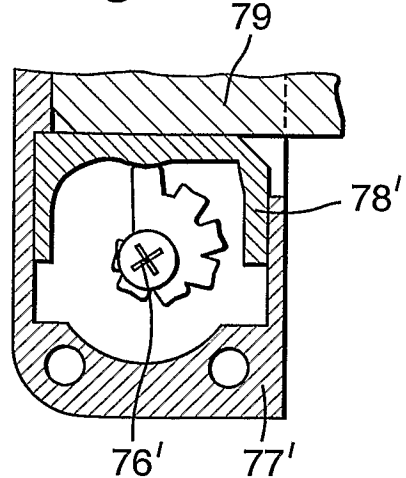


Fig.16c.



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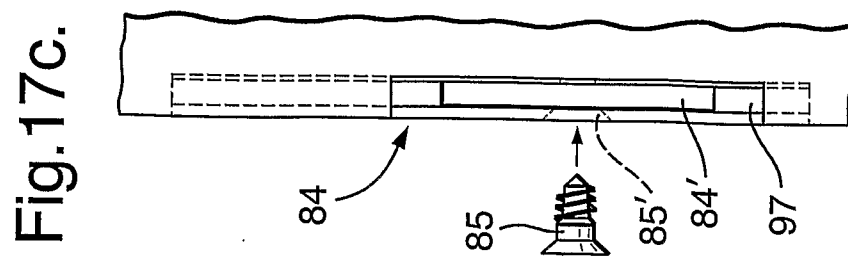
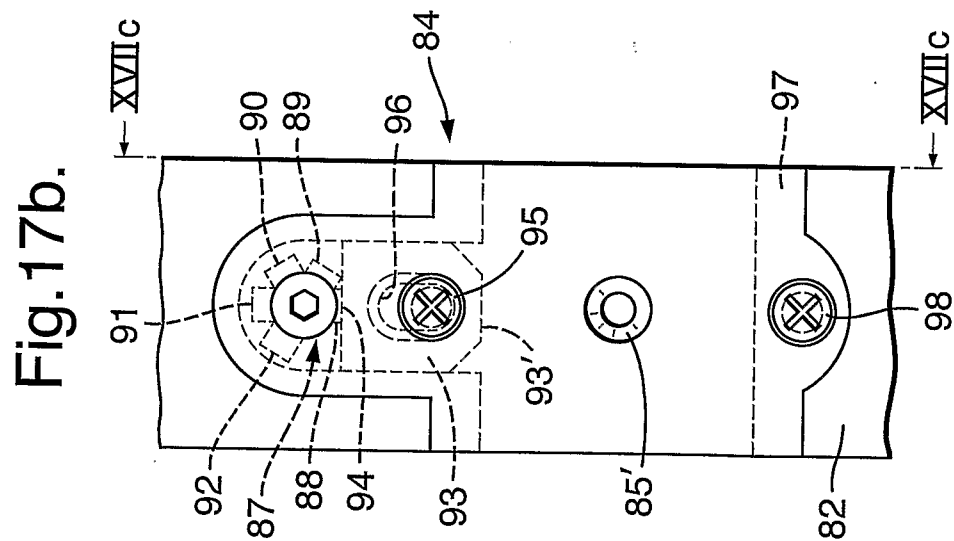
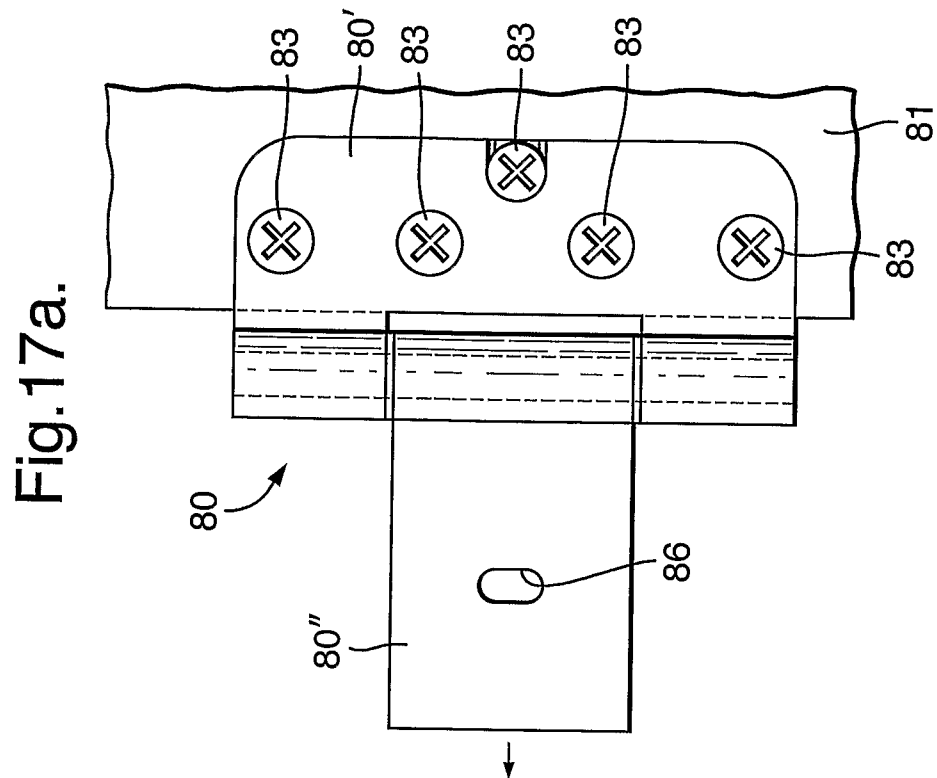
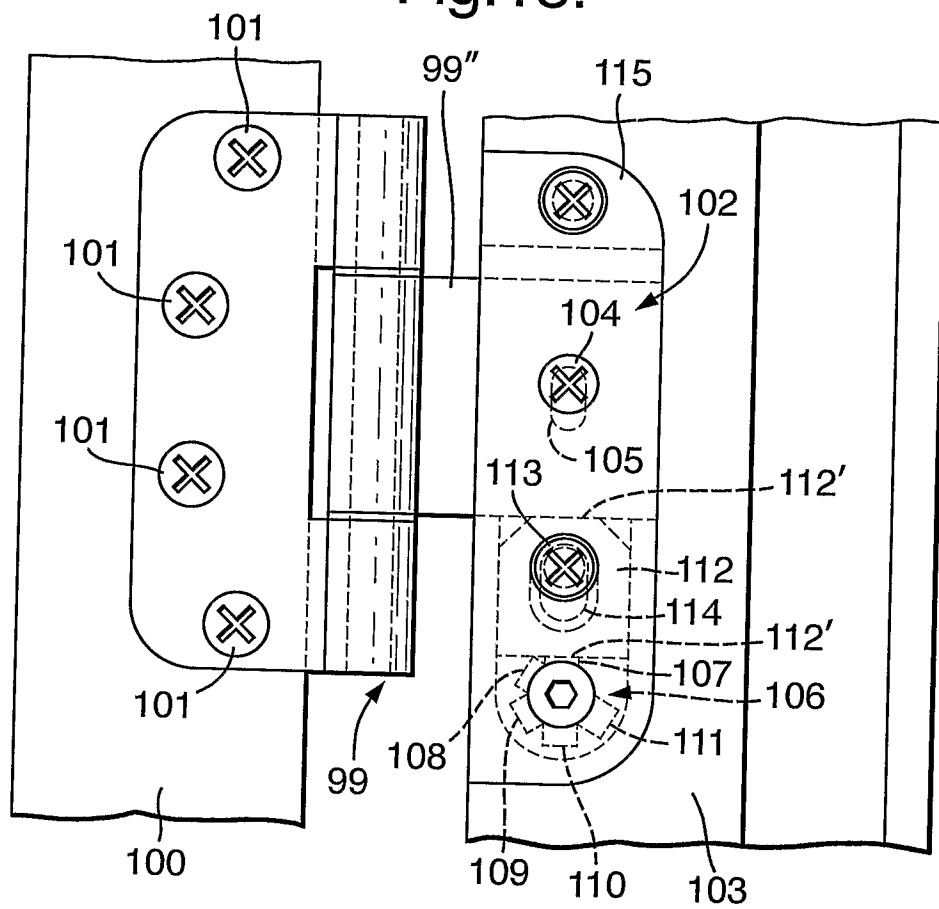


Fig.18.



INTERNATIONAL SEARCH REPORT

International application No
PCT/NO2007/000119

A. CLASSIFICATION OF SUBJECT MATTER

INV. E05D7/04 E05D7/12 E05D7/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05D

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y A	DE 37 01 698 A1 (HAHN GMBH & CO KG DR [DE]) 4 August 1988 (1988-08-04) column 6, line 53 - line 68 figure 3	3 5,6
Y	US 6 715 181 B1 (FRIES BROR [SE]) 6 April 2004 (2004-04-06) column 3, line 65 - column 4, line 3 column 4, line 30 - line 46 figures 5,6	11,18
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☒ See patent family annex.

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Date of the actual completion of the international search

13 July 2007

Date of mailing of the international search report

27/08/2007

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Authorized officer

Van Kessel, Jeroen

INTERNATIONAL SEARCH REPORT

International application No

PCT/N02007/000119

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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International application No

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