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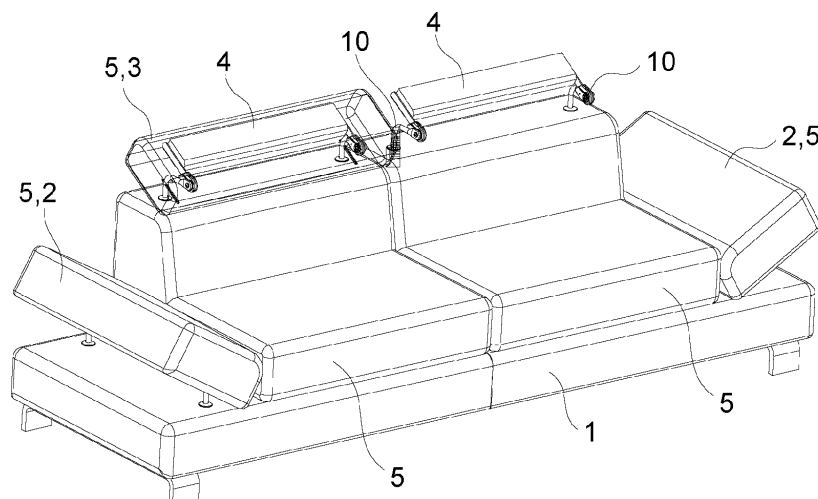
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(54) **ANGLE ADJUSTER AND FURNITURE ITEM USING THE SAME**

(57) Provided is an angle adjuster (10) that can avoid destruction or damage of components when an overload is applied and that is reusable after the overload is removed, and a furniture item using the angle adjuster (10). The angle adjuster (10) includes a support (20), a rotating shaft (40) supported at one end of the support (20) so as not to rotate, a winding and tightening member (50) in pressure contact with an outer peripheral surface of the rotating shaft (40), and a rocking body (30) having an

attachment portion (32) on one end, the attachment portion (32) being connected to the rotating shaft (40) via the winding and tightening member (50), in which when an overload is applied to the rocking body (30), an increase in a frictional force of the winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40) is restricted, and the overload causes the winding and tightening member (50) to slide on the outer peripheral surface of the rotating shaft (40) and rotate.

Fig. 1



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Description

BACKGROUND

Technical Field

[0001] The present invention relates to an angle adjuster used for a furniture item or the like, and particularly to an angle adjuster capable of avoiding destruction or damage of components when an overload is applied to the furniture item or the like.

Related Art

[0002] As an angle adjuster used for a furniture item or the like, for example, a joint device having a configuration in which an inclination angle of a headrest or an armrest of a sofa can be adjusted to an angle preferred by a user is known (see JP 4519555 B2).

[0003] That is, as shown in FIG. 2 of JP 4519555 B2, a claw piece 4 is inserted in an engagement allowable portion 3a of a cam plate 3. Then, when a predetermined load is applied to a first metal jig 1, the load is received by the claw piece 4 at an engagement blocking portion 3b and a boundary step portion 32 with the engagement blocking portion 3b.

[0004] However, in the joint device, when an extremely large overload is applied to the first metal jig 1, an overload is also applied to the cam plate 3, the claw piece 4, and the like as components. As a result, the cam plate 3 or the like is broken and destroyed, or the cam plate 3 or the like is plastically deformed and damaged. When such destruction or damage occurs, for example, in a joint device built into a sofa, the sofa needs to be disassembled to be repaired. In particular, there is a problem that the entire sofa is to be disposed of when the repair needs extra work and high costs.

SUMMARY

[0005] In view of the above problems, an object of the present invention is to provide an angle adjuster that can avoid destruction or damage of components of the angle adjuster when an overload is applied and that is reusable after the overload is removed, and a furniture item using the angle adjuster.

[0006] In order to solve the above problems, an angle adjuster according to the present invention includes a support, a rotating shaft supported at one end of the support so as not to be rotatable, a winding and tightening member in pressure contact with an outer peripheral surface of the rotating shaft, and a rocking body having an attachment portion on one end, the attachment portion being connected to the rotating shaft via the winding and tightening member, in which the winding and tightening member includes a winding and tightening member body in pressure contact with the rotating shaft, a winding and tightening portion having a substantially J shape, extend-

ing from the winding and tightening member body, and in pressure contact with the outer peripheral surface of the rotating shaft, and a support portion extending from a free end of the winding and tightening portion and connected to an attachment portion of the rocking body, a rotation of the rocking body in a forward rotation direction reduces a tightening force of the winding and tightening member to the outer peripheral surface of the rotating shaft and reduces a frictional force due to contact between the outer peripheral surface of the rotating shaft and an inner surface of the winding and tightening portion of the winding and tightening member, and thus the rotation of the rocking body in the forward rotation direction is allowed, a rotation of the rocking body in a reverse rotation direction increases the tightening force of the winding and tightening member to the outer peripheral surface of the rotating shaft and increases the frictional force due to the contact between the outer peripheral surface of the rotating shaft and the inner surface of the winding and tightening portion of the winding and tightening member, and thus the rotation of the rocking body in the reverse rotation direction is blocked, and when an overload is applied to the rocking body in the reverse rotation direction, an increase in the frictional force of the winding and tightening member to the outer peripheral surface of the rotating shaft is restricted, and the overload causes the winding and tightening member to slide on the outer peripheral surface of the rotating shaft and rotate.

[0007] In the present invention, the winding and tightening member rotates before the components undergo plastic deformation, thereby preventing the components from being destroyed or damaged, and thus the angle adjuster that is reusable after the overload is removed can be obtained.

[0008] In an embodiment of the present invention, a pair of the winding and tightening members may clamp the attachment portion of the rocking body.

[0009] In the present embodiment, the pair of winding and tightening members clamp the rocking body, which increases a holding strength.

[0010] In another embodiment of the present invention, the pair of winding and tightening members may clamp an annular flange protruding from the outer peripheral surface of the rotating shaft.

[0011] In the present embodiment, the pair of winding and tightening members clamp the annular flange of the rotating shaft, which increases the holding strength.

[0012] In still another embodiment of the present invention, the winding and tightening restraining shaft provided on the attachment portion of the rocking body may be configured to abut on a position restraining protrusion provided on the winding and tightening member body to restrain the rotation of the rocking body and restrict an increase in the frictional force of the winding and tightening member to the outer peripheral surface of the rotating shaft, and the overload may cause the winding and tightening member to slide on the outer peripheral sur-

face of the rotating shaft and rotate.

[0013] In the present embodiment, the winding and tightening member slides on the outer peripheral surface of the rotating shaft and rotates before the overload causes the components to be destroyed or damaged. It is therefore possible to obtain the angle adjuster that can avoid destruction or damage of the components and that is reusable after the overload is removed.

[0014] In a different embodiment of the present invention, the winding and tightening portion may be configured to abut on a position restraining protrusion provided on the winding and tightening member body to restrain the rotation of the rocking body and restrict an increase in the frictional force of the winding and tightening member to the outer peripheral surface of the rotating shaft, and the overload may cause the winding and tightening member to slide on the outer peripheral surface of the rotating shaft and rotate.

[0015] In the present embodiment, the winding and tightening portion abuts on the position restraining protrusion provided on the winding and tightening member body to restrain the rotation of the rocking body. Therefore, an angle adjuster having less components and less assembling processes can be obtained.

[0016] In another embodiment of the present invention, the winding and tightening restraining shaft provided on the attachment portion of the rocking body may be in pressure contact with one end of a winding and tightening restraining elongated hole provided in the support portion of the winding and tightening member to restrain the rotation of the rocking body and restrict an increase in the frictional force of the winding and tightening member to the outer peripheral surface of the rotating shaft, and the overload may cause the winding and tightening member to slide on the outer peripheral surface of the rotating shaft and rotate.

[0017] In the present embodiment, the frictional force against the overload can be adjusted by appropriately selecting a position, shape, size, and number of the winding and tightening restraining elongated holes, and thus the angle adjuster that is easy to design and manufacture can be obtained.

[0018] A furniture item of the present invention includes the angle adjuster described above.

[0019] In the present invention, it is possible to obtain the furniture item that can avoid destruction or damage of the components of the angle adjuster and that is reusable after the overload is removed. This eliminates the need for repairs because of destruction or damage of the components due to an overload and for a disposal of the entire furniture item.

BRIEF DESCRIPTION OF DRAWINGS

[0020]

FIG. 1 is a perspective view for explaining an example when an angle adjuster of the present invention

is applied to, for example, a sofa;

FIG. 2 is an enlarged perspective view of a main part of the sofa shown in FIG. 1;

FIG. 3 is an overall perspective view showing an initial position according to a first embodiment of the angle adjuster of the present invention;

FIG. 4 is an exploded perspective view of the angle adjuster shown in FIG. 3;

FIG. 5 is an exploded perspective view of the exploded perspective view shown in FIG. 4 viewed from a different angle;

FIG. 6 is a partial front view showing a state in which a cover and a reinforcing plate are removed from the angle adjuster shown in FIG. 3;

FIG. 7 is a sectional view taken along line VII-VII shown in FIG. 6;

FIG. 8 is an enlarged exploded perspective view of a main part of the angle adjuster shown in FIG. 6;

FIG. 9 is a front view showing a positional relationship of an initial state (first state) of the angle adjuster of the present invention;

FIG. 10 is an enlarged view of a main part of the angle adjuster shown in FIG. 9;

FIG. 11 is a front view showing a positional relationship of a second state displaced from the initial state (first state) in FIG. 9;

FIG. 12 is an enlarged view of a main part of the angle adjuster shown in FIG. 11;

FIG. 13 is a front view showing a positional relationship of a third state displaced from the state in FIG. 11 due to application of an overload;

FIG. 14 is an enlarged view of a main part of the angle adjuster shown in FIG. 13;

FIG. 15 is a front view showing a positional relationship of a fourth state displaced from the state in FIG. 11;

FIG. 16 is an enlarged view of a main part of the angle adjuster shown in FIG. 15;

FIG. 17 is a front view showing a positional relationship of a fifth state displaced from the state in FIG. 15;

FIG. 18 is an enlarged view of a main part of the angle adjuster shown in FIG. 17;

FIG. 19 is a front view showing a positional relationship of a sixth state displaced from the state in FIG. 17;

FIG. 20 is an enlarged view of a main part of the angle adjuster shown in FIG. 19;

FIG. 21 is a front view showing a positional relationship of the initial state (first state) according to a second embodiment of the angle adjuster of the present invention;

FIG. 22 is an enlarged view of a main part of the angle adjuster shown in FIG. 21;

FIG. 23 is a front view showing a state in which an overload is applied to the angle adjuster shown in FIG. 21;

FIG. 24 is an enlarged view of a main part of the angle adjuster shown in FIG. 23;

FIG. 25 is a front view showing a positional relationship of the initial state (first state) according to a third embodiment of the angle adjuster of the present invention;

FIG. 26 is an enlarged view of a main part of the angle adjuster shown in FIG. 25;

FIG. 27 is a front view showing a state in which an overload is applied to the angle adjuster shown in FIG. 25; and

FIG. 28 is an enlarged view of a main part of the angle adjuster shown in FIG. 27.

DETAILED DESCRIPTION

[0021] Embodiments of an angle adjuster of the present invention will be described with reference to the accompanying drawings of FIGS. 1 to 28.

[0022] As shown in FIGS. 1 and 2, an angle adjuster 10 according to a first embodiment is applied to an armrest 2 and a headrest 3 of a sofa 1. For example, the headrest 3 is formed by attaching a cushion material (not shown) to a core material 4 bridged between a pair of angle adjusters 10 and 10 disposed side by side and covering the headrest 3 with upholstery 5 such as leather or cloth.

[0023] As shown in FIGS. 3 to 5, the angle adjuster 10 is roughly configured by a support 20 and a rocking body 30.

[0024] As shown in FIG. 4, the support 20 has a shape in which a round bar member is bent into a substantially L shape. Then, in the support 20, a retaining washer 22 and a washer 23 are inserted into an internal screw 21 provided at a lower end of the support 20, and a base material (not shown) disposed between the retaining washer 22 and the washer 23 can be fixed with a hexagon nut 24.

[0025] Further, the rocking body 30 can be connected to the support 20 by screwing a bolt 27 through the washer 26 into a flanged hexagon nut 28 inserted into a hexagonal hole 25 provided at a horizontal end of the support 20 (FIG. 7).

[0026] The rocking body 30 is provided with a rib 31 for fixing the core material 4 with screws at one end of the rocking body 30 and an attachment portion 32 at the other end of the rocking body 30. As shown in FIG. 8, the attachment portion 32 is provided with a bearing recess 33 at a center of a tip of the attachment portion 32. Further, the attachment portion 32 is provided with a lower receiving portion 34 at a lower edge of the tip of the attachment portion 32, and an upper protrusion 35 is provided at an upper edge of the tip of the attachment portion 32. Further, the attachment portion 32 is provided with a caulking hole 36 and a shaft hole 37.

[0027] Then, as shown in FIG. 4, winding and tightening members 50 and 50 disposed so as to clamp an annular flange 42 of a rotating shaft 40 is attached to the attachment portion 32 of the rocking body 30 via a pair of reinforcing plates 62 and 62. Thus, the rotating shaft

40 is located on an extension line of the rocking body 30.

[0028] As shown in FIG. 8, the rotating shaft 40 has a hexagonal hole 41, and the annular flange 42 protruding from an outer peripheral surface 46 of the rotating shaft 40 is provided with a first claw portion 43, a second claw portion 44, and a third claw portion 45 at a predetermined pitch so as to protrude.

[0029] Each winding and tightening member 50 includes a winding and tightening member body 51, a winding and tightening portion 52 extending from the winding and tightening member body 51, having a shape that can be engaged with the outer peripheral surface 46 of the rotating shaft 40, and having a substantially J shape, and a support portion 53 extending from a free end of the winding and tightening portion 52. Thus, the outer peripheral surface 46 of the rotating shaft 40 and an inner surface 54 of the winding and tightening portion 52 can be brought into surface contact (FIG. 7). Further, the winding and tightening member body 51 is provided with a caulking hole 55 and an elongated hole 56 and with a position restraining protrusion 57 so as to protrude. Further, the support portion 53 is provided with a caulking hole 58.

[0030] Next, a method of assembling the angle adjuster 10 according to the first embodiment will be described.

[0031] After the winding and tightening members 50 and 50 are assembled from both sides of the rotating shaft 40, the attachment portion 32 of the rocking body 30 is inserted between the support portions 53 and 53 of the winding and tightening members 50 and 50 for positioning.

[0032] Then, a winding and tightening restraining shaft 60 is fitted into a shaft hole 37 of the attachment portion 32, and a release shaft 61 is fitted into the elongated hole 56 of each winding and tightening member 50.

[0033] Further, the reinforcing plates 62 and 62 are assembled on outward surfaces of the winding and tightening members 50 and 50, respectively, and fitting holes 62a of the reinforcing plates 62 and 62 are fitted to the winding and tightening restraining shaft 60. Then, a first rivet 63 is inserted into the caulking hole 62b of the reinforcing plate 62, the caulking hole 58 of each winding and tightening member 50, and the caulking hole 36 of the rocking body 30 to be caulked and fixed.

[0034] Similarly, a second rivet 64 is inserted into a caulking hole 62c of the reinforcing plate 62 and the caulking hole 55 of the winding and tightening member 50, is fitted into the bearing recess 33 of the rocking body 30, and is caulked and fixed, and thus assembling of the rocking body 30 is completed.

[0035] Thus, distances between fulcrums of the first rivet 63 and the second rivet 64 and the winding and tightening restraining shaft 60 are constant. Further, the release shaft 61 is held without falling off.

[0036] Then, covers 70 and 72 having a front shape capable of entirely covering winding and tightening member 50 are combined from front and rear, and are detachably engaged and integrated with each other. Then, the

flanged hexagon nut 28 is inserted through a fitting hole 71 of the cover 70, inserted into the hexagonal hole 41 of the rotating shaft 40, and then projected from a fitting hole 73 of the cover 72. Further, a tip of the flanged hexagon nut 28 projecting from the fitting hole 73 is inserted into the hexagonal hole 25 of the support 20, and the bolt 27 is screwed through the washer 26. As a result, the support 20 and the rocking body 30 are connected and integrated, and the rotating shaft 40 is supported so as not to rotate with respect to the support 20.

[0037] Next, an operation process of the angle adjuster according to the first embodiment will be described with reference to FIGS. 9 to 20.

[0038] In a first state as an initial position, as shown in FIGS. 9 and 10, the winding and tightening member 50 having spring elasticity is fitted to the outer peripheral surface 46 of the rotating shaft 40. Thus, the winding and tightening member body 51 and the winding and tightening portion 52 having a substantially J shape are in surface contact with the outer peripheral surface 46 of the rotating shaft 40 at a predetermined pressure, and a frictional force is generated. Therefore, the rocking body 30 is not rattled. At this time, a distance between the winding and tightening member body 51 and the winding and tightening portion 52 is l_0 .

[0039] In a second state, as shown in FIGS. 11 and 12, when the rocking body 30 in the first state is raised in an arrow P direction (forward rotation direction) and rotated, the rocking body 30 rotates with the second rivet 64 as a fulcrum. At this time, the winding and tightening member body 51 is pressed against the outer peripheral surface 46 of the rotating shaft 40 via the second rivet 64 and is not displaced, but the winding and tightening portion 52 is pulled up via the first rivet 63. Therefore, the distance between the winding and tightening member body 51 and the winding and tightening portion 52 is expanded to a distance $l_1 (> l_0)$, and a winding and tightening force of the winding and tightening member 50 to the rotating shaft 40 is reduced. Therefore, a frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 is reduced, and the rocking body 30 can be raised to an inclination angle preferred by a user.

[0040] Then, for example, when the user puts his or her head on the headrest 3 in the second state and applies a predetermined load to the rocking body 30 in an arrow Q direction (reverse rotation direction), the rocking body 30 rotates with the second rivet 64 as a fulcrum. At this time, the winding and tightening member body 51 is pressed against the outer peripheral surface 46 of the rotating shaft 40 via the second rivet 64 and is not displaced, but the winding and tightening portion 52 is pulled down via the first rivet 63. Thus, the winding and tightening portion 52 approaches the winding and tightening member body 51 to decrease the distance therebetween to a distance $l_2 (< l_0)$, and a tightening force of the winding and tightening member 50 to the rotating shaft 40 increases. Therefore, the frictional force between the outer

peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 increases, the rocking body 30 cannot rotate, and the headrest 3 maintains an inclination angle preferred by the user. The same applies when the angle adjuster is applied to the armrest 2.

[0041] In the second state, when an extremely large overload is applied in the arrow Q direction (reverse rotation direction), the second state turns into a third state shown in FIGS. 13 and 14.

[0042] That is, the rocking body 30 rotates with the second rivet 64 as a fulcrum, and the winding and tightening portion 52 is further pulled down as compared with the second state. Thus, the distance between the winding and tightening member body 51 and the winding and tightening portion 52 is reduced to a distance $l_3 (< l_2)$, but the winding and tightening restraining shaft 60 abuts on the position restraining protrusion 57 of the winding and tightening member body 51, and the rotation of the rocking body 30 is blocked. As a result, the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 reaches a maximum frictional force, and the frictional force does not increase any more.

[0043] Thus, when the overload in the arrow Q direction (reverse rotation direction) applied to the rocking body 30 exceeds the above-mentioned maximum frictional force, the winding and tightening member 50 slides on the outer peripheral surface 46 of the rotating shaft 40 and rotates. Therefore, not only the winding and tightening member 50 but also components such as the rotating shaft 40 and the rocking body 30 are not destroyed or damaged, and the angle adjuster 10 is not destroyed or damaged.

[0044] In short, in the angle adjuster of the present invention, there is an advantage that the components such as the winding and tightening member 50, the rotating shaft 40, the rocking body 30 and so on are not destroyed or damaged, and the angle adjuster 10 can be prevented from being broken or damaged when an overload is applied.

[0045] Next, in a fourth state shown in FIGS. 15 and 16, the rocking body 30 is further rotated in the arrow P direction (forward rotation direction) from the second state and displaced to a maximum range in which the inclination angle can be adjusted. At this time, the release shaft 61 is locked to the second claw portion 44 of the rotating shaft 40 and is in pressure contact with the lower receiving portion 34. Further, the distance between the winding and tightening member body 51 and the winding and tightening portion 52 is the distance l_1 .

[0046] Then, when a load is applied to the rocking body 30 in the arrow Q direction (reverse rotation direction), the rocking body 30 rotates with the second rivet 64 as a fulcrum. At this time, the winding and tightening member body 51 is pressed against the outer peripheral surface 46 of the rotating shaft 40 via the second rivet 64 and is not displaced, but the winding and tightening por-

tion 52 is pulled via the first rivet 63. Thus, the winding and tightening portion 52 approaches the winding and tightening member body 51 to reduce the distance therebetween to the distance $l_2 (< l_0)$, and the tightening force of the winding and tightening member 50 to the rotating shaft 40 increases. As a result, the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 increases, and the rocking body 30 cannot rotate. Therefore, the headrest 3 maintains an inclination angle preferred by the user.

[0047] In a fifth state, as shown in FIGS. 17 and 18, the rocking body 30 is further rotated in the arrow P direction (forward rotation direction) from the fourth state.

[0048] That is, when the rocking body 30 is rotated, the lower receiving portion 34 runs over the release shaft 61 locked to the second claw portion 44, and is in a locked state. Therefore, the release shaft 61 is in pressure contact with the rotating shaft 40 via the winding and tightening member body 51 to restrain a displacement of the winding and tightening member body 51. At the same time, the upper protrusion 35 abuts on the third claw portion 45 and is positionally restrained. As a result, the distance between the winding and tightening member body 51 and the winding and tightening portion 52 is a distance $l_4 (> l_0)$, and the winding and tightening force of the winding and tightening member 50 to the rotating shaft 40 decreases. Therefore, a state is maintained in which the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 is reduced, and the rocking body 30 can rotate in the arrow Q direction (reverse rotation direction).

[0049] In a sixth state, as shown in FIGS. 19 and 20, when the rocking body 30 is rotated in the arrow Q direction (reverse rotation direction) from the fifth state, the winding and tightening member body 51 rotates in a reverse direction with the second rivet 64 as a fulcrum. Then, the release shaft 61 is locked to the first claw portion 43 and positionally restrained. Thus, the lower receiving portion 34 running over the release shaft 61 is released from the release shaft 61. Further, by rotating the rocking body 30 in the arrow Q direction (reverse rotation direction), the sixth state returns to the first state as the initial state.

[0050] After that, the rocking body 30 can be operated by performing the same operation.

[0051] As shown in FIGS. 21 to 24, a second embodiment of the angle adjuster of the present invention is substantially the same as the first embodiment described above.

[0052] That is, when the rocking body 30 is rotated in the arrow P direction (forward rotation direction) in the first state (initial state) shown in FIGS. 21 and 22, the distance l_0 between the winding and tightening member body 51 and the winding and tightening portion 52 extends to the distance l_1 (not shown). Therefore, the tightening force of the winding and tightening member body

51 and the winding and tightening portion 52 to the rotating shaft 40 is reduced, and the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 is reduced. As a result, the rocking body 30 can be adjusted to a desired inclination angle.

[0053] Then, when a normal load is applied to the rocking body 30 in the arrow Q direction (reverse rotation direction), the rocking body 30 rotates with the second rivet 64 as a rotation fulcrum. At this time, the winding and tightening member body 51 is pressed against the outer peripheral surface 46 of the rotating shaft 40 via the second rivet 64 and is not displaced, but the winding and tightening portion 52 is pulled down via the first rivet 63. Therefore, the distance between the winding and tightening portion 52 and the winding and tightening member body 51 is reduced, and the tightening force of the winding and tightening member body 51 and the winding and tightening portion 52 is increased. As a result, the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 increases, and the rocking body 30 is held at an inclination angle preferred by the user.

[0054] However, as shown in FIGS. 23 and 24, when an extremely large overload is applied to the rocking body 30, the winding and tightening portion 52 directly abuts on the position restraining protrusion 57 and is positionally restrained, and the rotation of the rocking body 30 is blocked. Thus, the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 reaches the maximum frictional force, and the frictional force does not increase any more. As a result, when an overload exceeding the maximum frictional force is applied to the rocking body 30, the winding and tightening member 50 slides on the outer peripheral surface 46 of the rotating shaft 40, and the rocking body 30 rotates. Therefore, not only the winding and tightening member 50 but also the components such as the rotating shaft 40 and the rocking body 30 are not destroyed or damaged, and the angle adjuster 10 can be prevented from being destroyed or damaged.

[0055] The other configurations are almost the same as those of the first embodiment described above, and the same parts are therefore given the same number and the description thereof will be omitted.

[0056] In the present embodiment, there is an advantage that the winding and tightening restraining shaft 60 is not required, and an angle adjuster having less components and less assembling processes than in the first embodiment can be obtained.

[0057] As shown in FIGS. 25 to 28, a third embodiment of the angle adjuster of the present invention is substantially the same as the first embodiment described above.

[0058] A difference is that the winding and tightening restraining shaft 65 provided in the attachment portion 32 of the rocking body 30 is fitted into a winding and

tightening restraining elongated hole 59 provided in the support portion 53 of the winding and tightening member 50.

[0059] Then, when the rocking body 30 is rotated in the arrow P direction (forward rotation direction) in the first state (initial state) shown in FIGS. 25 and 26, the distance between the winding and tightening member body 51 and the winding and tightening portion 52 extends from the distance l_0 to the distance l_1 (not shown). Therefore, the tightening force of the winding and tightening member body 51 and the winding and tightening portion 52 to the rotating shaft 40 is reduced, and the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 is reduced. As a result, the rocking body 30 can be adjusted to an inclination angle desired by the user.

[0060] On the other hand, when a normal load is applied to the rocking body 30 in the arrow Q direction, the rocking body 30 rotates with the second rivet 64 as a rotation fulcrum. At this time, the winding and tightening member body 51 is in pressure contact with the rotating shaft 40 and is not displaced, but the winding and tightening portion 52 is pulled down via the first rivet 63. Therefore, the distance between the winding and tightening portion 52 and the winding and tightening member body 51 is reduced, and the tightening force of the winding and tightening member body 51 and the winding and tightening portion 52 is increased. As a result, the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 increases, and the rocking body 30 is held at an inclination angle preferred by the user.

[0061] However, as shown in FIGS. 27 and 28, when an overload is applied to the rocking body 30 in the arrow Q direction (reverse rotation direction), the winding and tightening restraining shaft 65 is pressure contact with one end of the winding and tightening restraining elongated hole 59 and is positionally restrained. At this time, even if the winding and tightening portion 52 and the winding and tightening member body 51 come close to each other and the distance is $l_3 (< l_0)$, the distance is not reduced any further. Thus, the frictional force between the outer peripheral surface 46 of the rotating shaft 40 and the inner surface 54 of the winding and tightening portion 52 reaches the maximum frictional force, and the frictional force does not increase any more. As a result, when an overload exceeding the maximum frictional force is applied to the rocking body 30, the winding and tightening member 50 slides on the outer peripheral surface 46 of the rotating shaft 40, and the rocking body 30 rotates. Therefore, not only the winding and tightening member 50 but also the components including the rotating shaft 40 and the rocking body 30 are not destroyed or damaged, and the angle adjuster 10 can be prevented from being destroyed or damaged.

[0062] The other configurations are almost the same as those of the first embodiment described above, and

the same parts are therefore given the same number and the description thereof will be omitted.

[0063] In the third embodiment, the maximum frictional force can be designed by adjusting the shape and positional relationship of the winding and tightening restraining elongated hole 59 and the winding and tightening restraining shaft 65. Therefore, there is an advantage that the angle adjuster operating stably is easily designed and manufactured.

[0064] The present invention is applicable not only to headrests and armrests of sofas as described above, but also to furniture items such as foldable beds and seats of vehicles, airplanes, and the like.

Claims

1. An angle adjuster (10) comprising:

a support (20);
a rotating shaft (40) supported at one end of the support (20) so as not to be rotatable;
a winding and tightening member (50) in pressure contact with an outer peripheral surface of the rotating shaft (40); and
a rocking body (30) having an attachment portion (32) on one end, the attachment portion (32) being connected to the rotating shaft (40) via the winding and tightening member (50),
wherein the winding and tightening member (50) includes a winding and tightening member body (51) in pressure contact with the rotating shaft (40), a winding and tightening portion (52) having a substantially J shape, extending from the winding and tightening member body (51), and in pressure contact with the outer peripheral surface of the rotating shaft (40), and a support portion (53) extending from a free end of the winding and tightening portion (52) and connected to an attachment portion (32) of the rocking body (30),
a rotation of the rocking body (30) in a forward rotation direction (P) reduces a tightening force of the winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40) and reduces a frictional force due to contact between the outer peripheral surface of the rotating shaft (40) and an inner surface of the winding and tightening portion (52) of the winding and tightening member (50), and thus the rotation of the rocking body (30) in the forward rotation direction (P) is allowed,
a rotation of the rocking body (30) in a reverse rotation direction (Q) increases the tightening force of the winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40) and increases the frictional force due to the contact between the outer peripheral surface of the rotating shaft (40) and the inner sur-

- face of the winding and tightening portion (52) of the winding and tightening member (50) , and thus the rotation of the rocking body (30) in the reverse rotation direction (Q) is blocked, and when an overload is applied to the rocking body (30) in the reverse rotation direction (Q), an increase in the frictional force of the winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40) is restricted, and the overload causes the winding and tightening member (50) to slide on the outer peripheral surface of the rotating shaft (40) and rotate. 5 10
2. The angle adjuster (10) according to claim 1, wherein a pair of the winding and tightening members (50,50) clamp the attachment portion (32) of the rocking body (30). 15
3. The angle adjuster (10) according to claim 1 or 2, wherein the pair of winding and tightening members (50) clamp an annular flange protruding from the outer peripheral surface of the rotating shaft (40). 20
4. The angle adjuster (10) according to any one of claims 1 to 3, wherein the winding and tightening restraining shaft (60) provided on the attachment portion of the rocking body (30) abuts on a position restraining protrusion (57) provided on the winding and tightening member body (51) to restrain the rotation of the rocking body (30) and restrict an increase in the frictional force of the winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40), and the overload causes the winding and tightening member (50) to slide on the outer peripheral surface of the rotating shaft (40) and rotate. 25 30 35
5. The angle adjuster (10) according to any one of claims 1 to 3, wherein the winding and tightening portion (52) abuts on a position restraining protrusion provided on the winding and tightening member body (51) to restrain the rotation of the rocking body (30) and restrict an increase in the frictional force of the winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40) , and the overload causes the winding and tightening member (50) to slide on the outer peripheral surface of the rotating shaft (40) and rotate. 40 45
6. The angle adjuster (10) according to any one of claims 1 to 3, wherein the winding and tightening restraining shaft (60) provided on the attachment portion (32) of the rocking body (30) is in pressure contact with one end of a winding and tightening restraining elongated hole (59) provided in the support portion (53) of the winding and tightening member (50) to restrain the rotation of the rocking body (30) and restrict an increase in the frictional force of the 50 55
- winding and tightening member (50) to the outer peripheral surface of the rotating shaft (40) , and the overload causes the winding and tightening member (50) to slide on the outer peripheral surface of the rotating shaft (40) and rotate.
7. A furniture item comprising the angle adjuster (10) according to any one of claims 1 to 6.

Fig.1

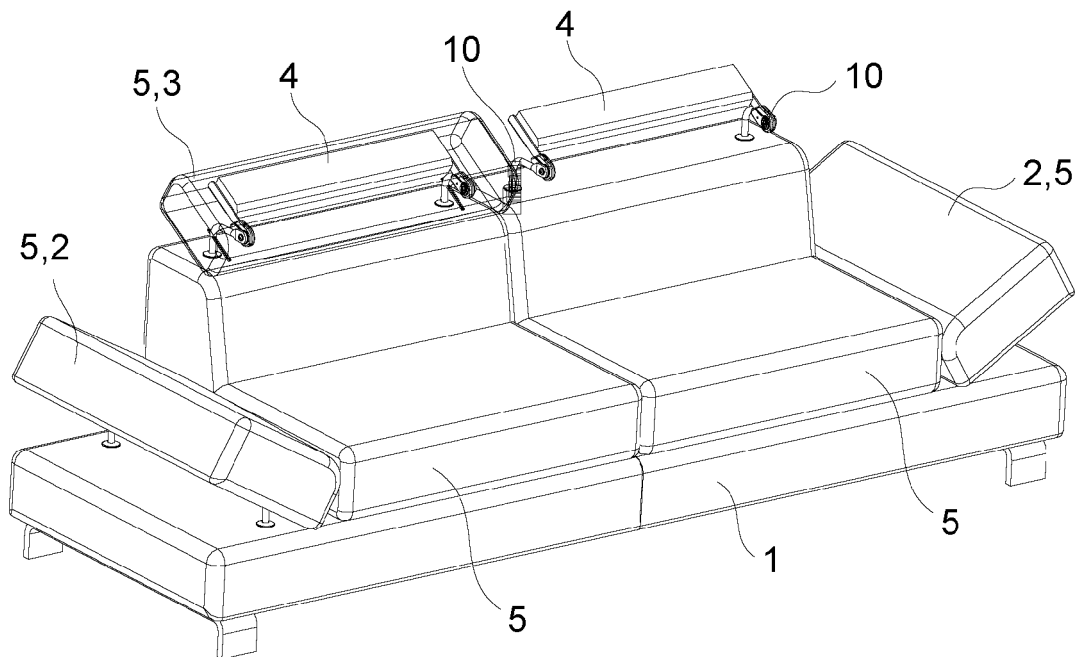


Fig.2

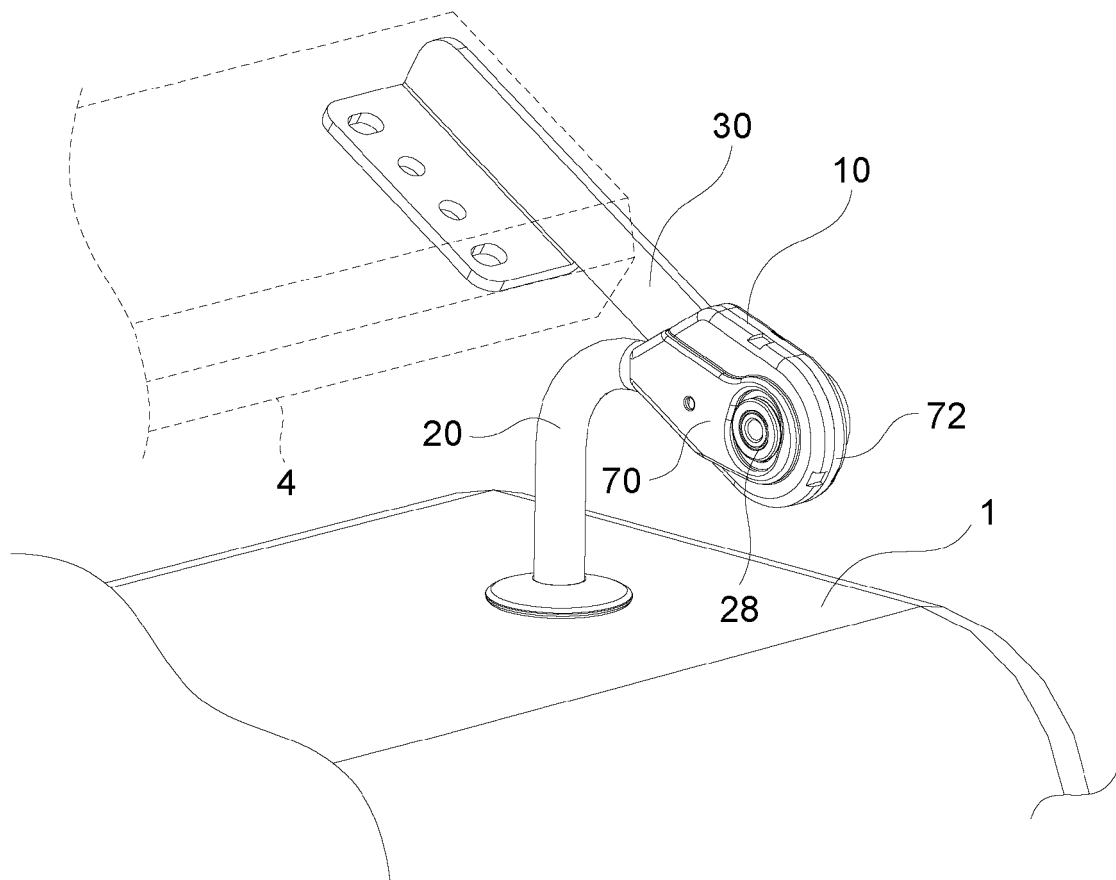


Fig.3

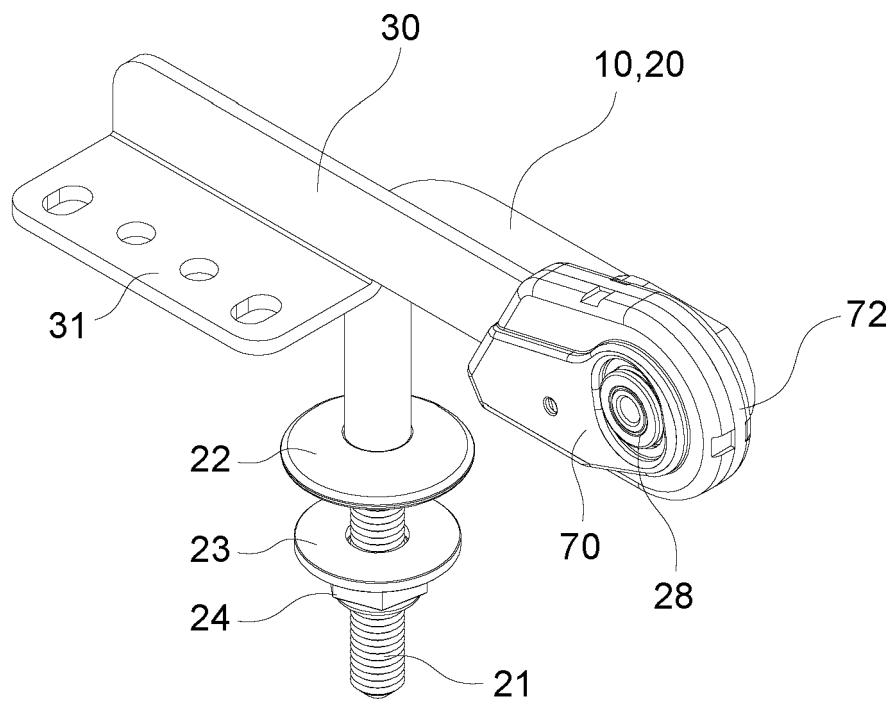
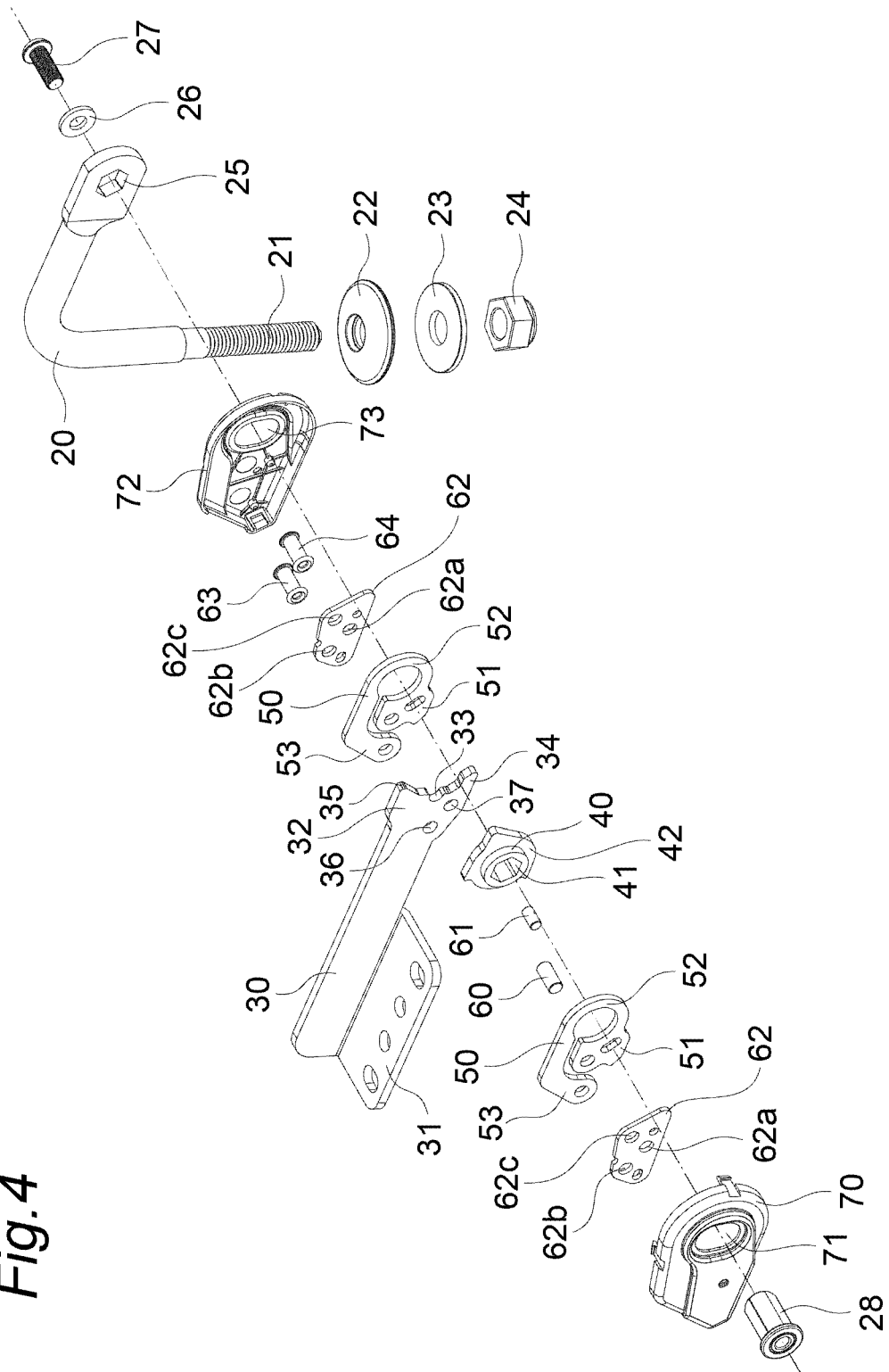


Fig.4



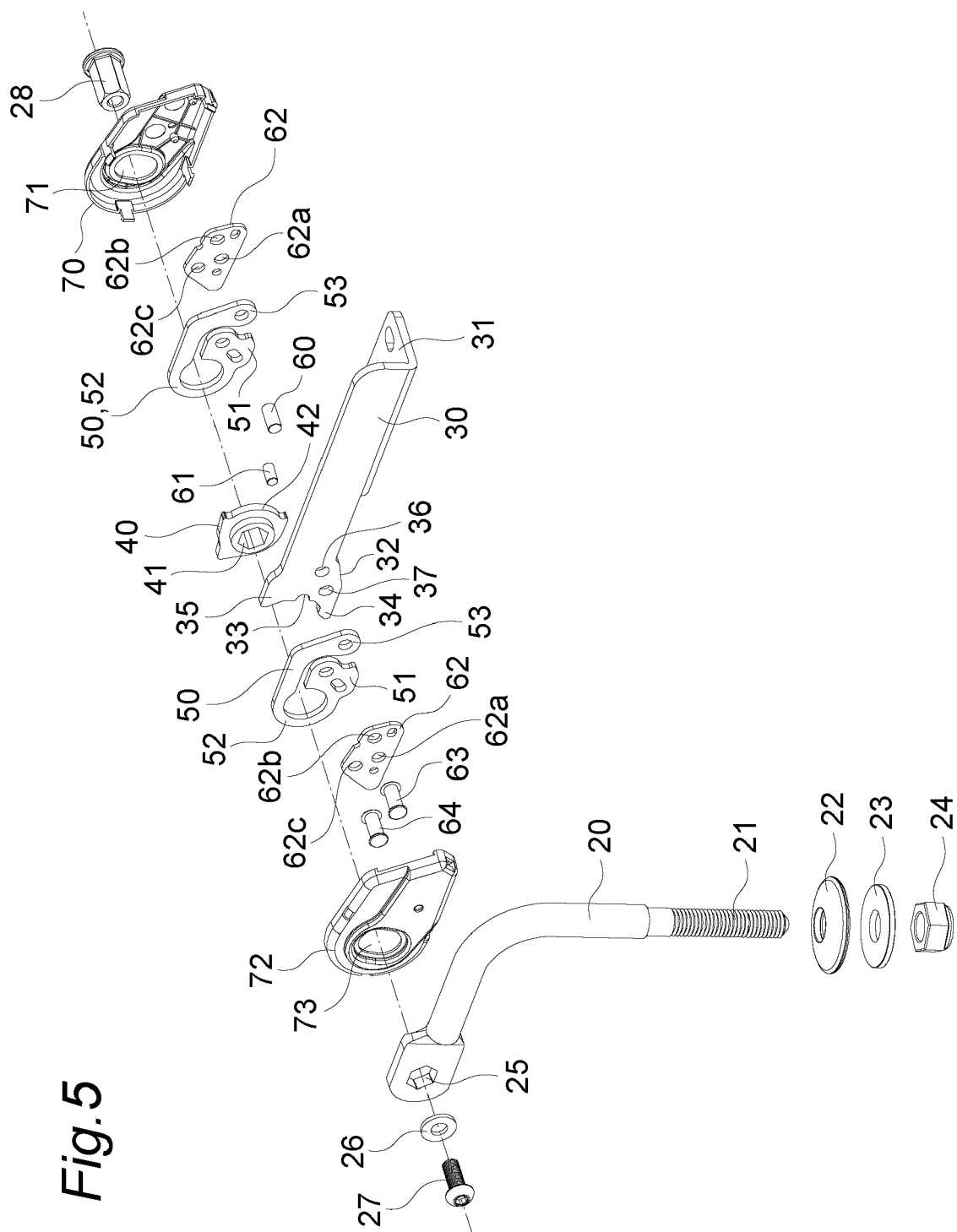


Fig. 6

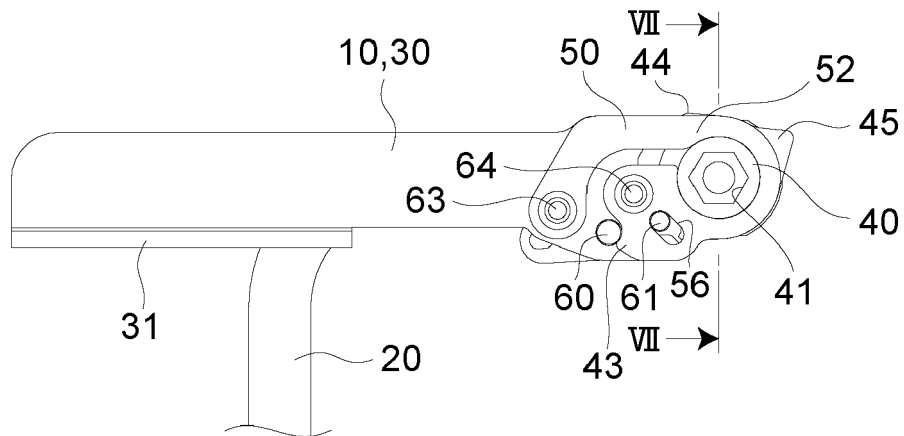


Fig. 7

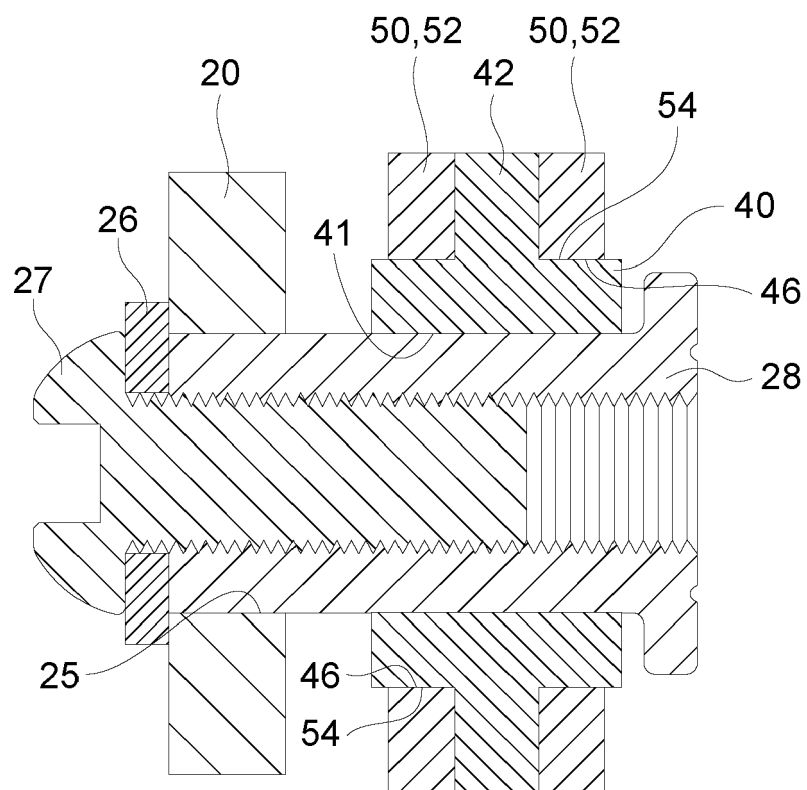


Fig. 8

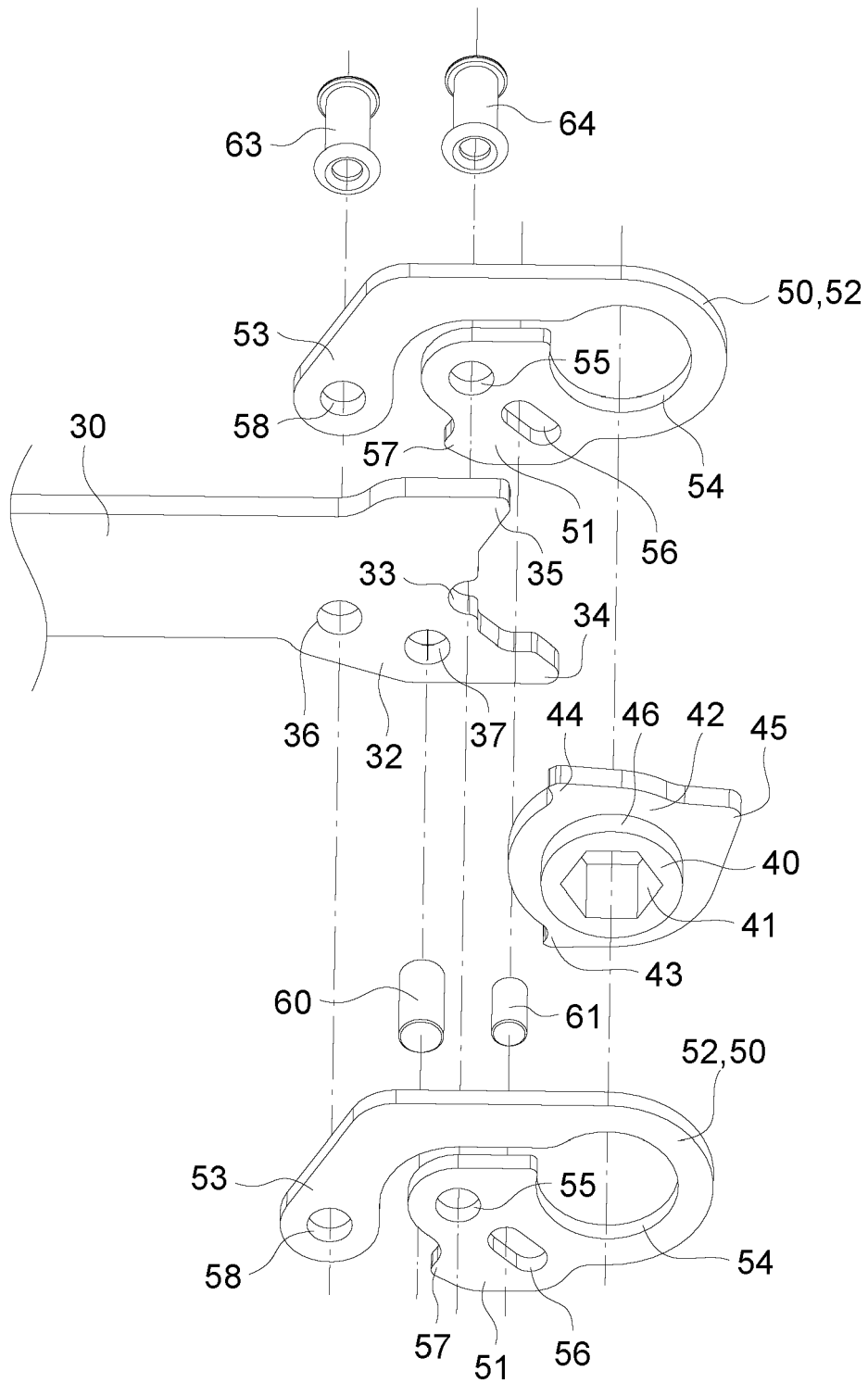


Fig.9

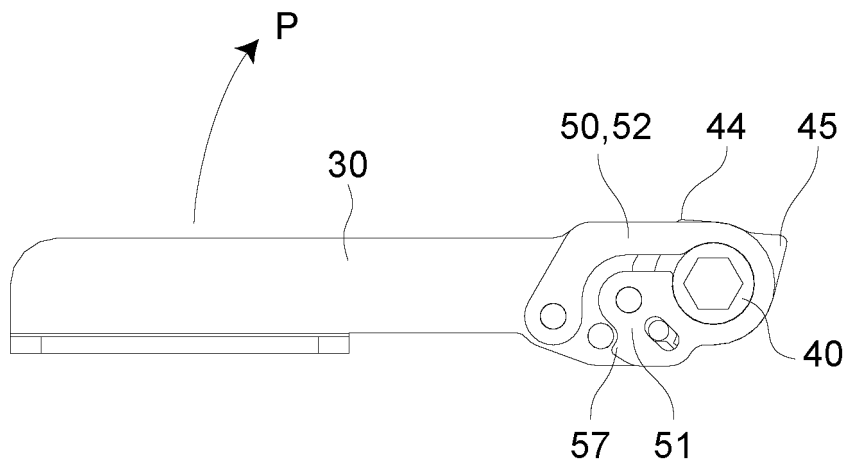


Fig.10

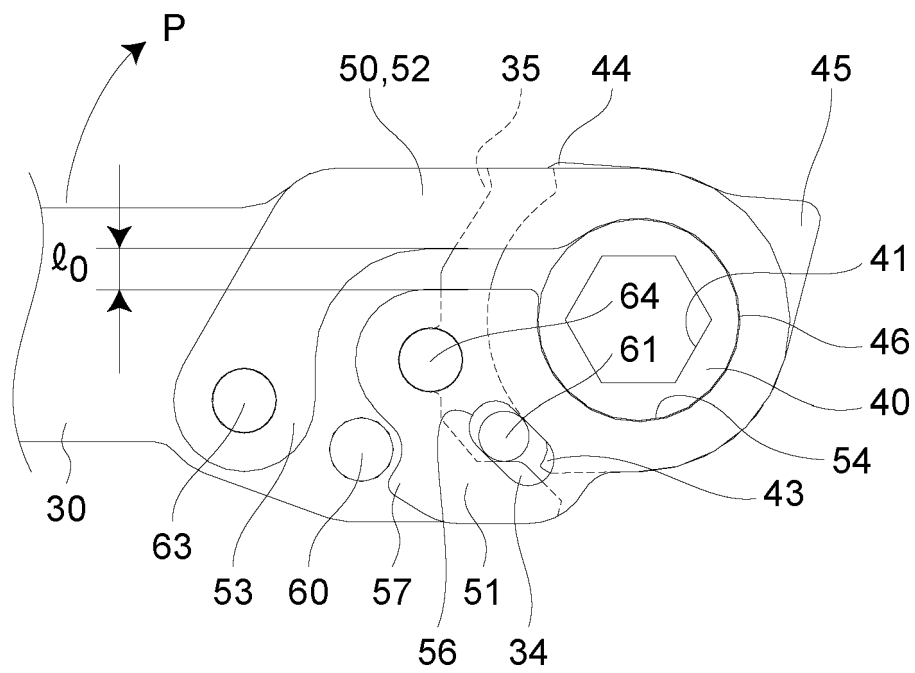


Fig. 11

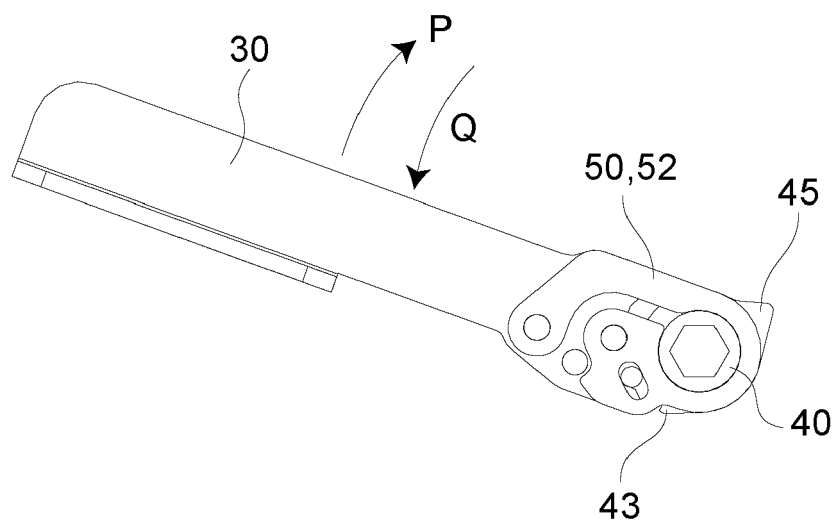


Fig. 12

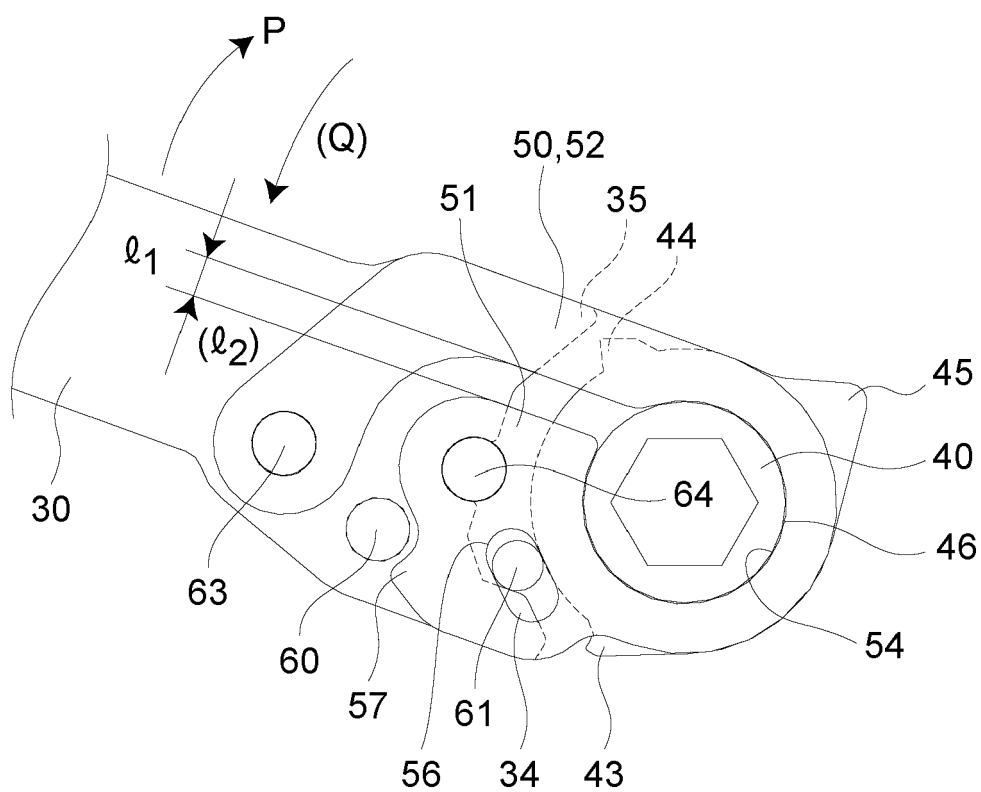


Fig.13

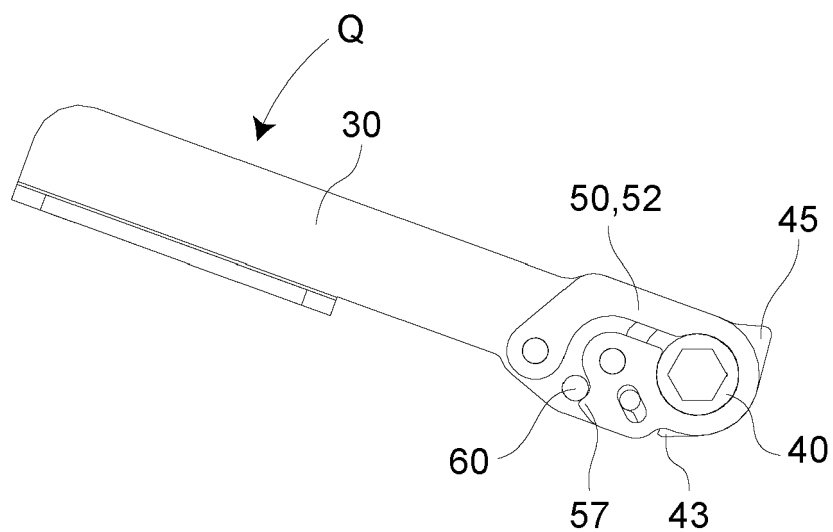


Fig.14

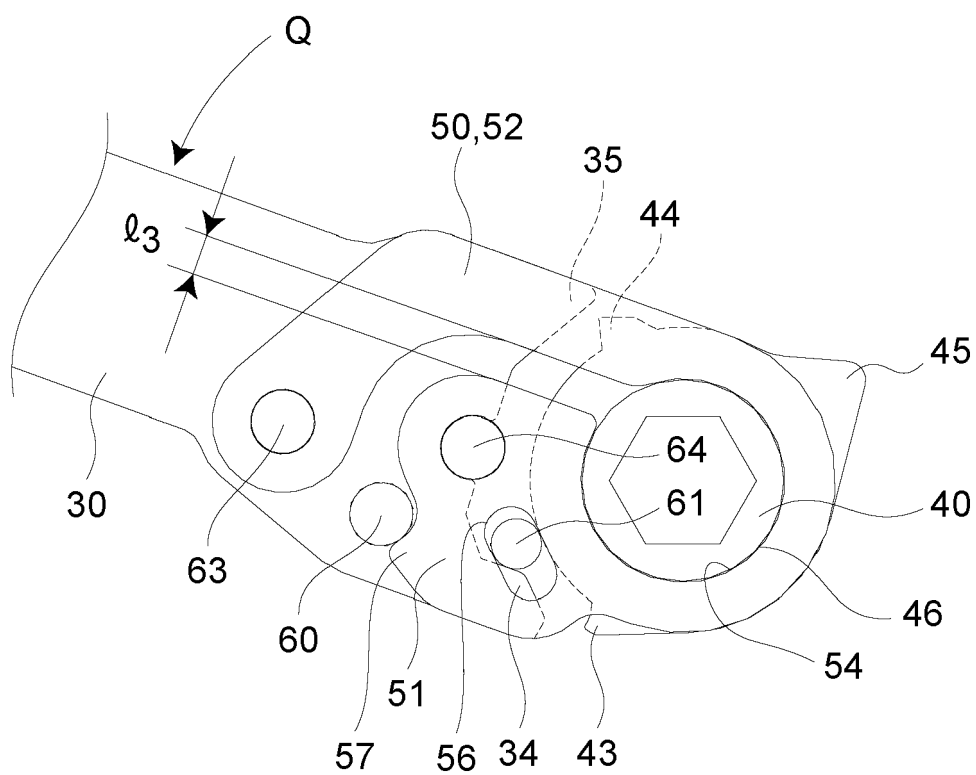


Fig. 15

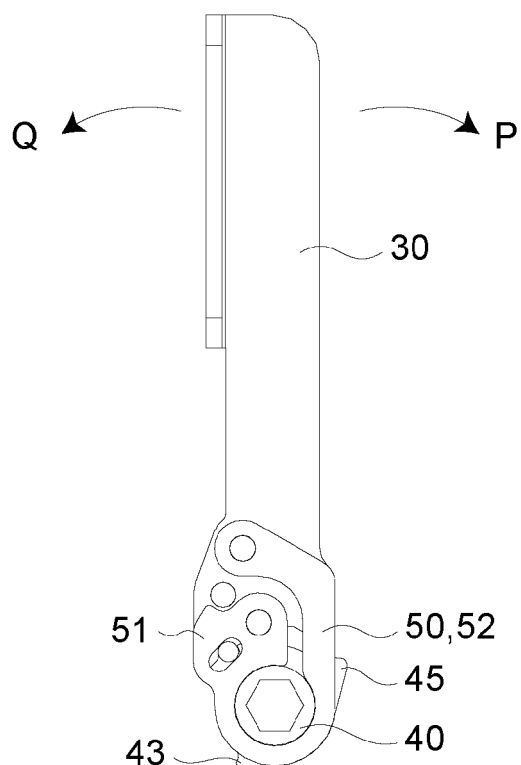


Fig. 16

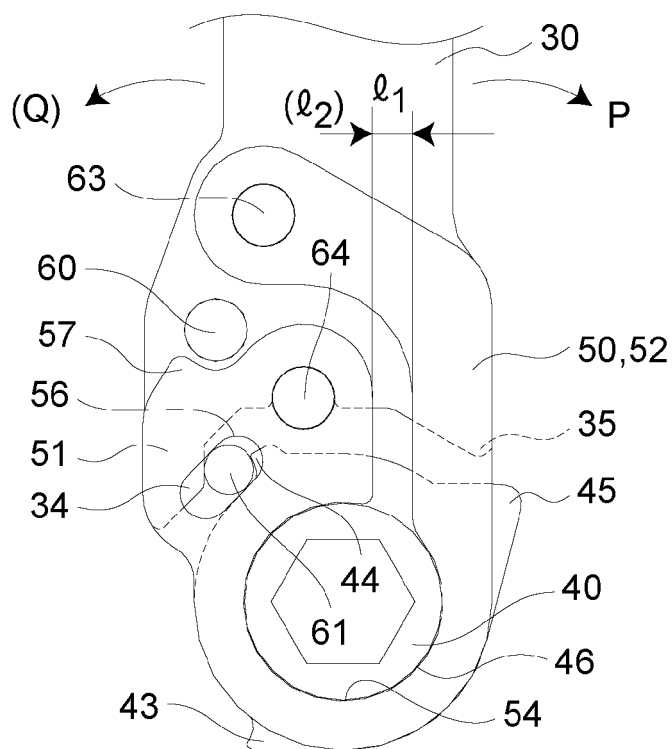


Fig. 17

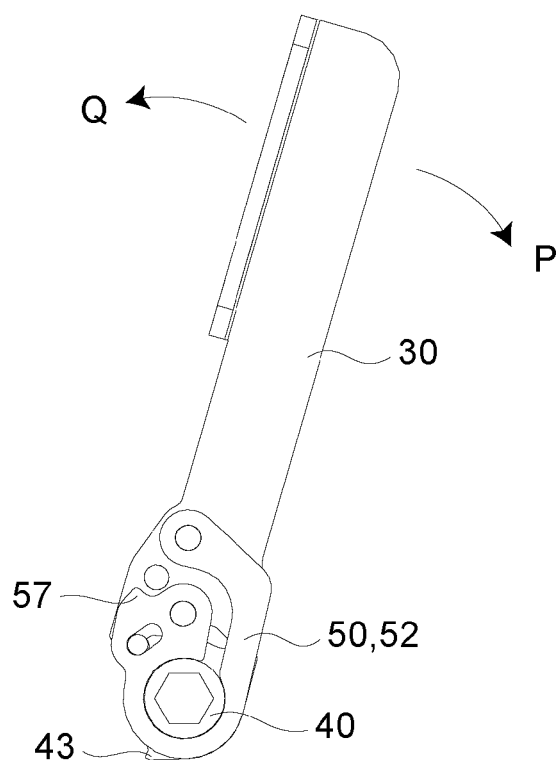


Fig. 18

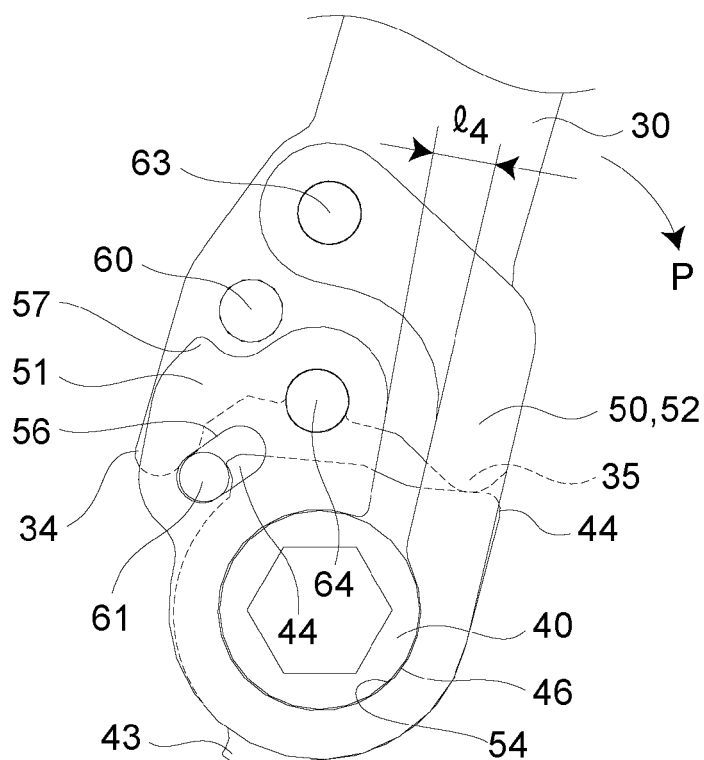


Fig.19

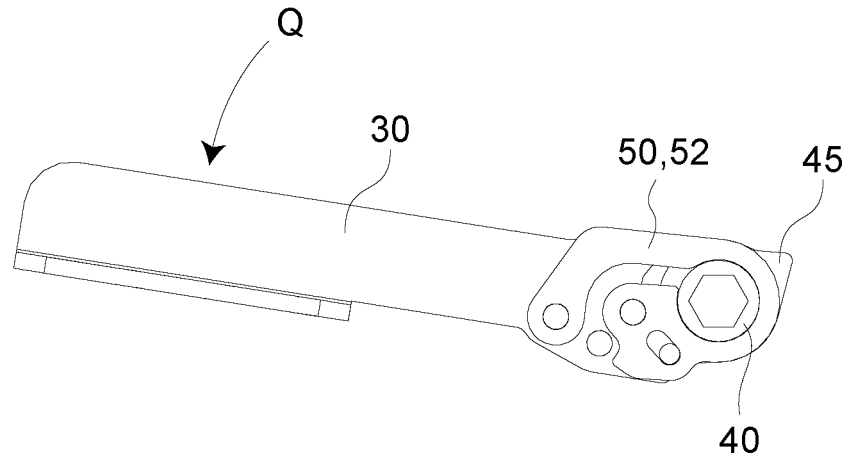


Fig.20

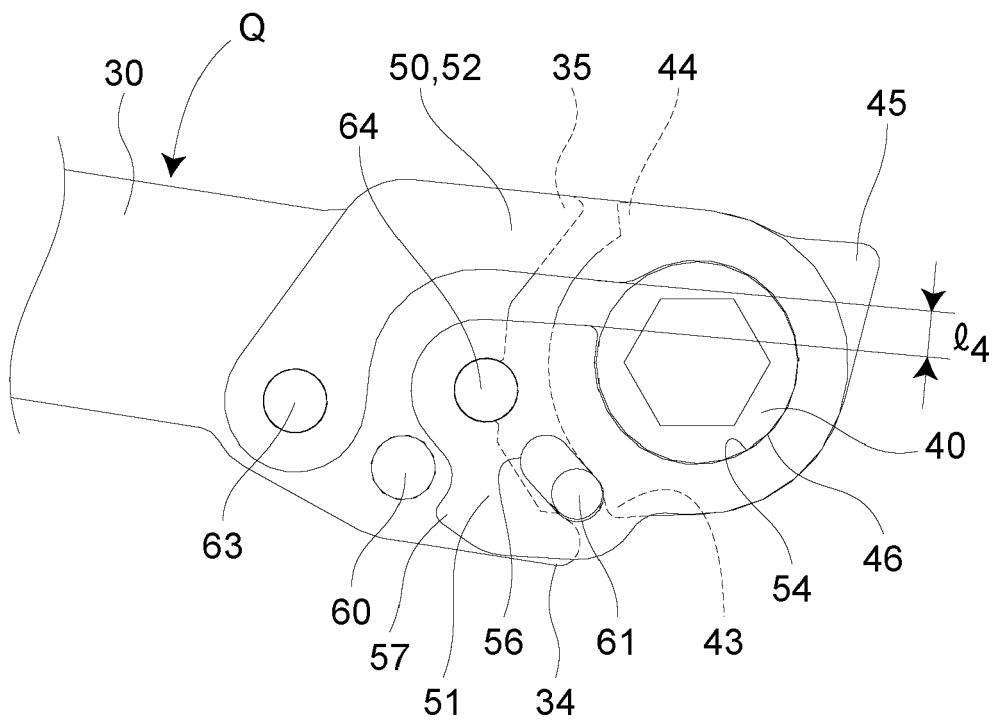


Fig.21

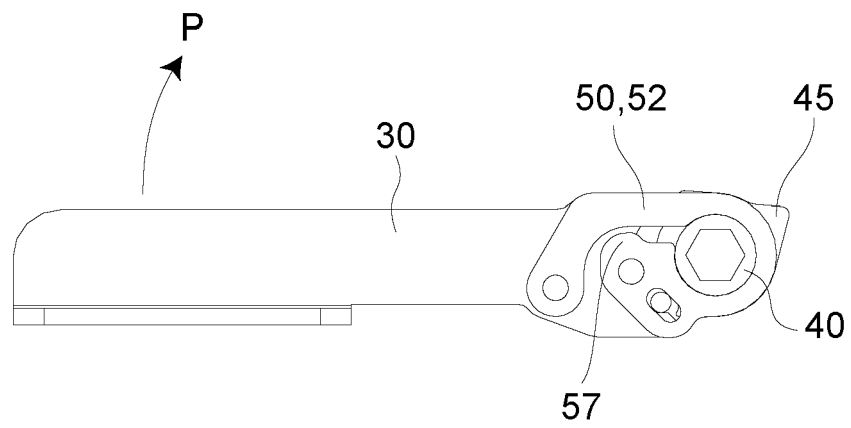


Fig.22

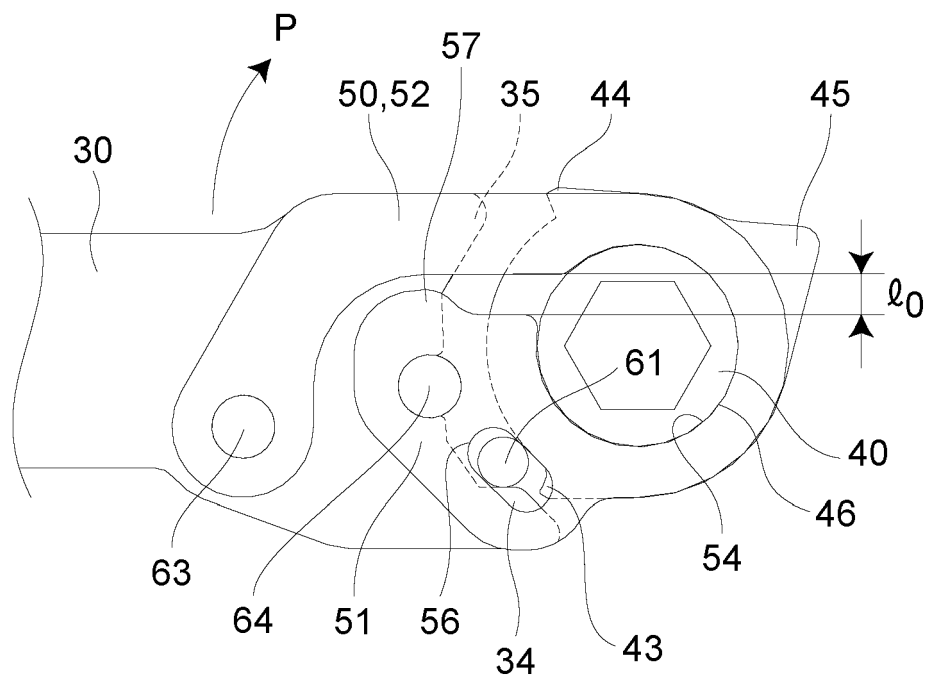


Fig.23

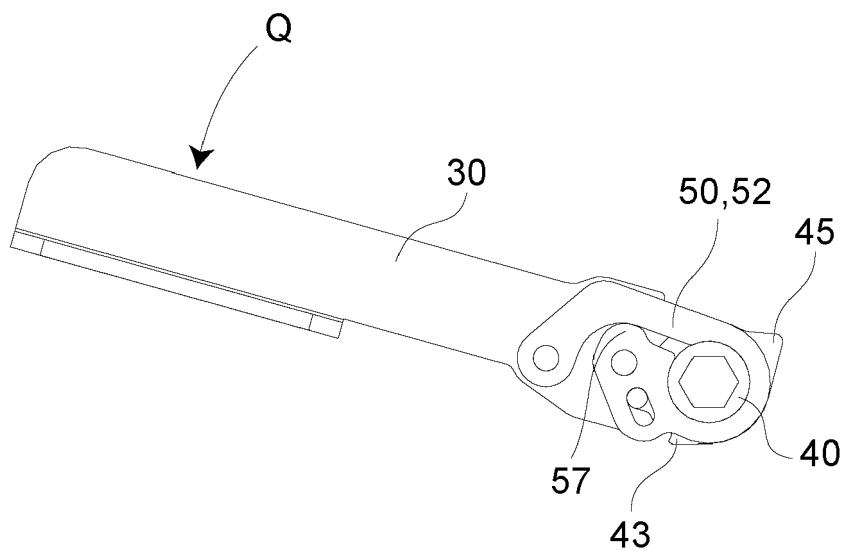


Fig.24

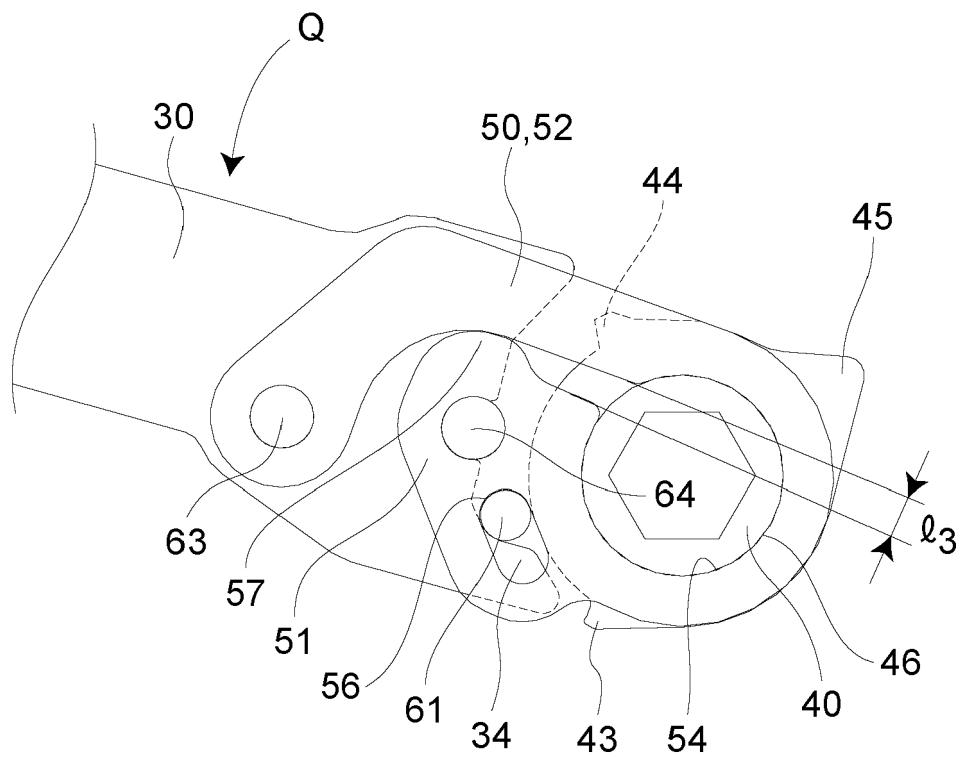


Fig.25

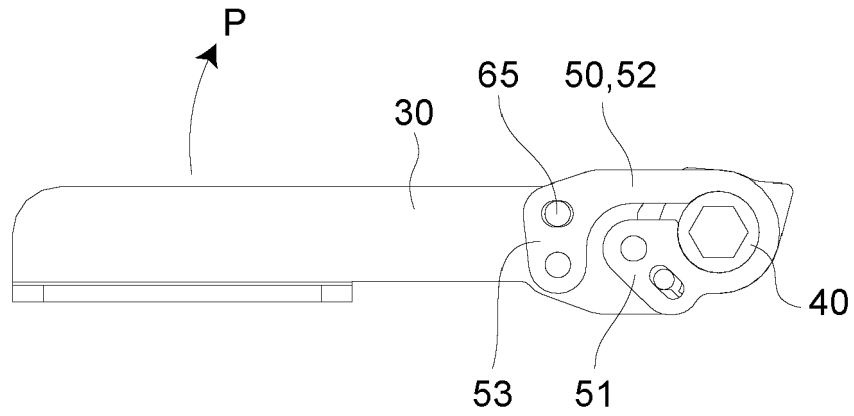


Fig.26

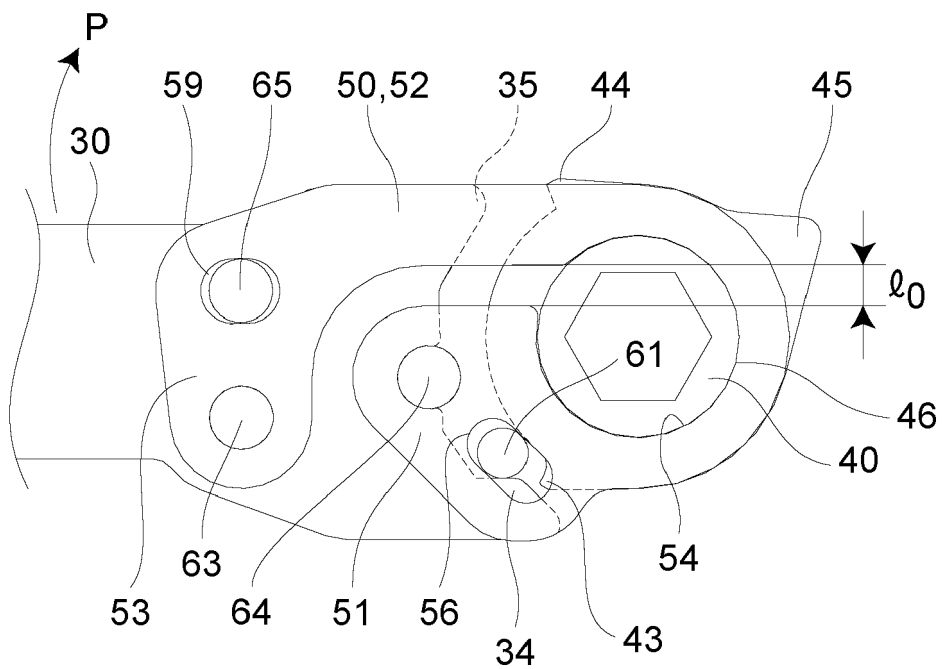


Fig.27

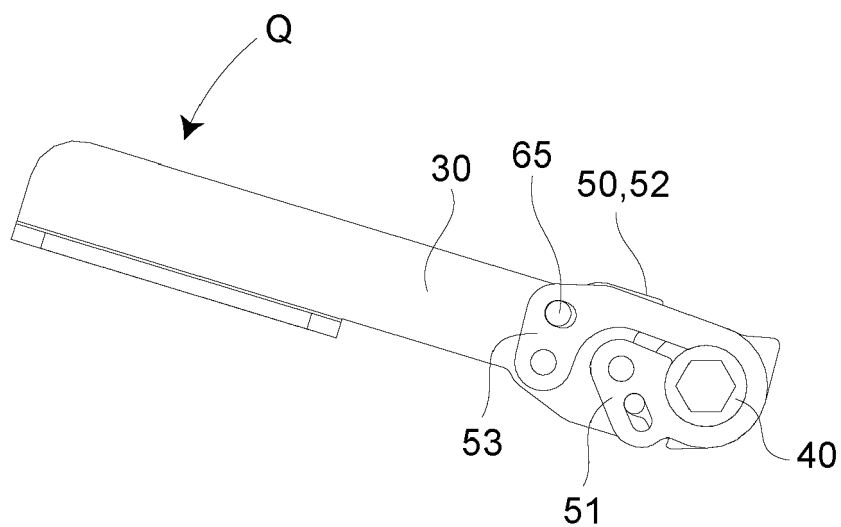
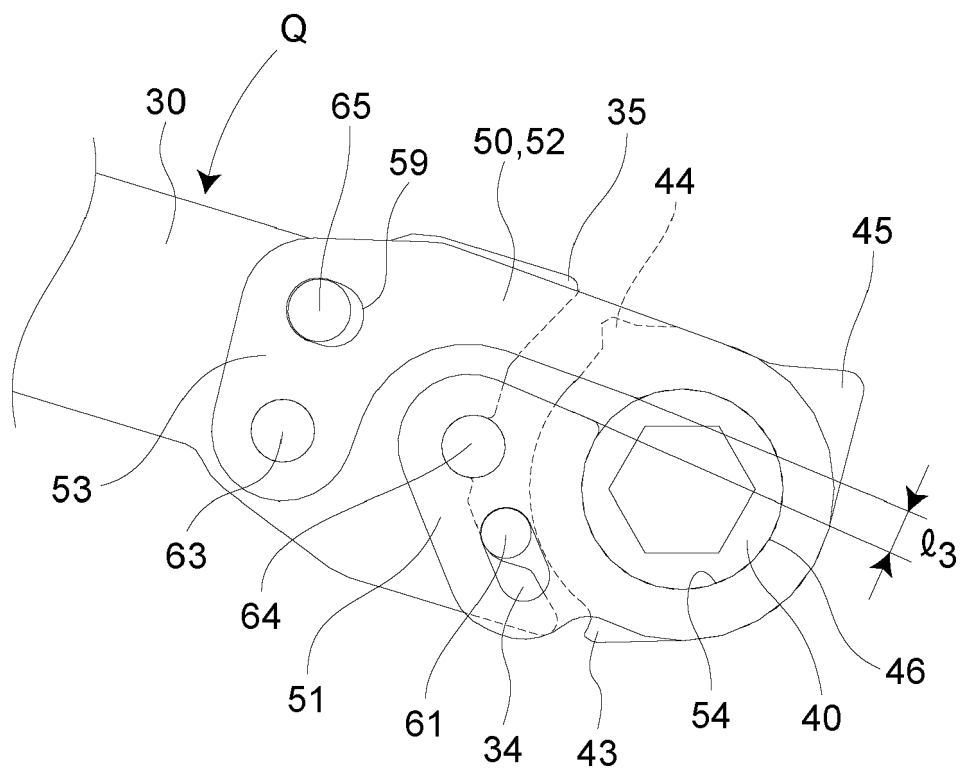


Fig.28





EUROPEAN SEARCH REPORT

Application Number
EP 21 17 8713

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 845 515 A1 (HIKARI CO LTD [JP]) 11 March 2015 (2015-03-11)	1-3,7	INV. A47C1/027 A47C7/38 A47C1/03
A	* paragraphs [0095] - [0098]; figures * -----	4-6	
A	WO 2016/010444 A1 (STALMOT & WOLMET SPÓLKA AKCYJNA [PL]) 21 January 2016 (2016-01-21) * figures *	1-7	
A	EP 3 031 357 B1 (SCHÄTTI AG [CH]; SCHÄTTI BULGARIA EOOD [BG]) 26 July 2017 (2017-07-26) * figures *	1-7	
A,D	JP 4 519555 B2 (HIKARI CORP) 4 August 2010 (2010-08-04) * figures * -----	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 October 2021	Examiner Kis, Pál
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 17 8713

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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28-10-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2845515 A1	11-03-2015	CN 104394736 A	04-03-2015
		EP 2845515 A1	11-03-2015
		HK 1206949 A1	22-01-2016
		JP 5232317 B1	10-07-2013
		JP 2013231487 A	14-11-2013
		TW 201350057 A	16-12-2013
		US 2015130246 A1	14-05-2015
		WO 2013164921 A1	07-11-2013

WO 2016010444 A1	21-01-2016	EP 3169192 A1	24-05-2017
		PL 228113 B1	28-02-2018
		WO 2016010444 A1	21-01-2016

EP 3031357 B1	26-07-2017	EP 3031357 A1	15-06-2016
		PL 3031357 T3	29-12-2017

JP 4519555 B2	04-08-2010	JP 4519555 B2	04-08-2010
		JP 2006034709 A	09-02-2006

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 4519555 B [0002] [0003]