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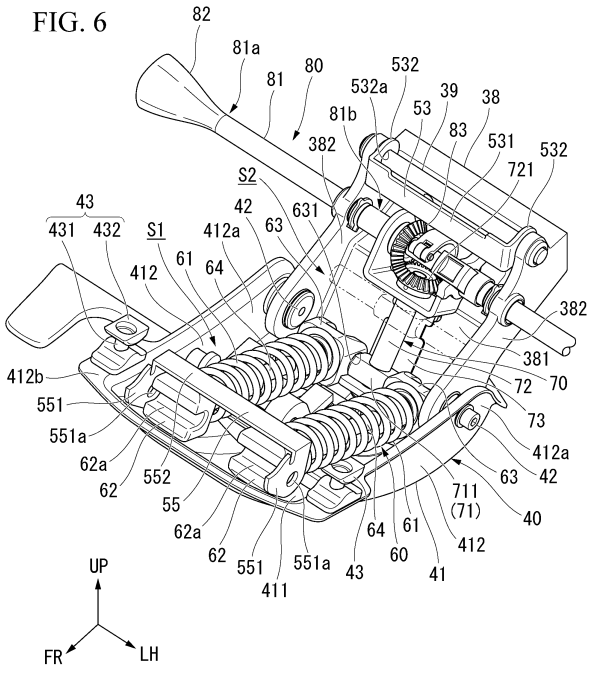
(54) **CHAIR**

(57) A chair (1) includes a support base body portion (41); a backrest (20) rotatably supported with respect to the support base body portion on an axis in a width direction of the support base body portion and being displaceable from an initial state to an inclined state of being inclined rearward; a biasing member (60) configured to bias the backrest in the inclined state, in a direction of returning to the initial state; an adjuster (70) configured to adjust a biasing force of the biasing member; and an operating member (80) joined to the adjuster and configured to operate the adjuster, wherein the biasing member is provided in the backrest or the support base body portion, the adjuster is provided in the backrest, and the operating member is disposed behind the axis and on one side of the backrest in the width direction.

FIG. 6



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Description

Technical Field

[0001] The present invention relates to a chair.

[0002] Priority is claimed on Japanese Patent Application No. 2021-155841, filed on September 24, 2021, the content of which is incorporated herein by reference.

Background Art

[0003] In the related art, as a chair used for an office or the like, a chair is known that includes a backrest that is rotatably supported with respect to a support structure on an axis in the width direction of the support structure, and biasing means that biases the backrest in a direction of returning the backrest to the initial state thereof.

[0004] In the chair described in Patent Document 1, the backrest is supported by the support structure to be inclinable, and the biasing means is disposed behind a backrest portion of the backrest with respect to the support structure. Patent Document 1 describes a configuration in which the downward movement of a lower end portion of the biasing means is restricted inside the support structure, but an upper end portion thereof is disposed behind the backrest in a state where the upper end portion can move downward and in a state where the axis direction thereof is directed to be parallel with the up-down direction.

Document of Related Art

Patent Document

[0005] [Patent Document 1] Japanese Unexamined Patent Application, First Publication No. H8-214983

Summary of Invention

Problems to be Solved by Invention

[0006] However, in the chair described in Patent Document 1, the biasing means is pushed and moved by the inclined backrest to accumulate a biasing force serving as a returning force to the initial state. Then, when the biasing means as a whole is provided behind a rotation support portion of the backrest, operation means for adjusting the biasing force of the biasing means is also disposed in a rear portion of a lower surface of the seat of the chair. Therefore, a seated person can finally access the operation means by further lowering the hand below a position where the seated person lowers the hand in a normal sitting state. Thus, there is a problem in operability, and there is room for improvement in usability.

[0007] Therefore, the present invention was made in view of the above circumstances and provides a chair can improve the operability related to adjustment of a returning force for an inclined backrest.

Means for Solving Problems

[0008] In order to obtain the above-described object, the present invention employs the following means.

[0009] That is, a chair according to an aspect of the present invention includes a support structure; a backrest rotatably supported with respect to the support structure on an axis in a width direction of the support structure and being displaceable from an initial state to an inclined state of being inclined rearward; a biasing member configured to bias the backrest in the inclined state, in a direction of returning to the initial state; an adjuster configured to adjust a biasing force of the biasing member; and an operating member joined to the adjuster and configured to operate the adjuster. The biasing member is provided in the backrest or the support structure, the adjuster is provided in the backrest, and the operating member is disposed behind the axis and on one side of the backrest in the width direction.

[0010] In the chair configured in this manner according to the aspect, the biasing member is provided in the backrest or the support structure, the adjuster is provided in the backrest, and further, the operating member is disposed behind the axis by which the backrest is rotatably supported and on one side of the backrest in the width direction. That is, in a state where the adjuster is provided in the backrest, the operating member can be disposed outside the backrest in the width direction. Therefore, in the present invention, the operating member can be disposed at a position in a rear section of the chair, and at a portion of the backrest in an upper section the chair. Thus, the seated person can easily access the operating member only by lowering the hand from the normal sitting state, and it is possible to improve usability as an operation related to adjustment of the returning force of the inclined backrest.

[0011] In addition, in the chair according to the aspect of the present invention, the backrest may include two side walls spaced apart from each other in the width direction, the adjuster may be disposed between the two side walls, and the operating member may include an operation shaft extending in the width direction and having an outer end portion in the width direction and an inner portion in the width direction, the outer end portion protruding outward from a space between the two side walls, and the inner portion being joined to the adjuster at a position between the two side walls, and an operation lever provided in the outer end portion of the operation shaft.

[0012] In the chair configured in this manner, the adjuster can be disposed at a position close to the operating member provided between the two side walls of the backrest. That is, it is possible to make a joining portion between the operation shaft of the operating member and the adjuster have a simple structure. As described above, in the present invention, although the biasing member is disposed at the upper portion of the support structure, the adjuster can be disposed with a margin by using a

space between the two side walls without using a space above the support structure.

[0013] In addition, in the present invention, since the adjuster can be shielded by the two side walls in the right-left direction (i.e., the width direction), it is possible to prevent deterioration of an appearance.

[0014] In addition, in the chair according to the above aspect of the present invention, the adjuster may be located above the support structure.

[0015] In the chair configured in this manner, the adjuster can be disposed with a margin by using a space above the support structure.

[0016] Further, in this case, since the adjuster can be shielded from below by the support structure, it is possible to further prevent the deterioration of the appearance.

[0017] In addition, in the chair according to the aspect of the present invention, the adjuster may include an acting member that acts on the biasing member, and a support member that movably supports the acting member, and the support member may be fixed to the backrest.

[0018] In the chair configured in this manner, since the adjuster includes the acting member and the support member, it is possible to stabilize movement of the acting member with respect to the backrest by fixing the support member to the backrest in an unmovable state.

[0019] In addition, in the chair according to the aspect of the present invention, the acting member may include an action shaft that supports the biasing member, and an adjustment shaft that is disposed such that an axis direction thereof is parallel with a front-rear direction when viewed from above and that enables the action shaft to move in the axis direction, and the action shaft may be displaced along the adjustment shaft by operating the operating member.

[0020] In the chair configured in this manner, it is possible to displace the action shaft along the adjustment shaft and to move the action shaft to a desired position by the seated person operating the operating member. As a result, since the position of the biasing member joined to the action shaft is changed, it is possible to adjust a biasing force of the biasing member in accordance with the position of the action shaft, that is, the position of the biasing member.

[0021] In addition, in the chair according to the aspect of the present invention, the biasing member may include a spring that biases the backrest in the inclined state, in the direction of returning to the initial state. In the chair configured in this manner, a structure that biases the backrest in the direction of returning to the initial state can be made to a simplified structure using the spring and not using other power sources.

[0022] In addition, in the chair according to the aspect of the present invention, the spring may be a compression coil spring that makes bias in a front-rear direction above the support structure, and a rear end portion of the compression coil spring may be located to be close to the backrest and is joined to the adjuster.

[0023] In the chair configured in this manner, the compression coil spring that is the biasing member can be accommodated above the support structure in a state of being directed laterally (i.e., the front-rear direction). Then, the rear end portion of the compression coil spring can be located to be close to the backrest to be joined to the adjuster, and thus it is possible to join the adjuster and the operating member to each other by a simple structure. In the present invention as described above, since the adjuster and the operating member can be disposed in a rear section of the chair, it is possible to dispose the operating member at a position that the seated person easily accesses.

[0024] In addition, in the chair according to the aspect of the present invention, a seat-receiving member receiving a seat may be supported at an upper portion of the support structure to be slidable in the front-rear direction, a front end portion of the compression coil spring may be fixed to a front portion of the seat-receiving member, and the seat-receiving member may move rearward to compress the compression coil spring from front, when the backrest is displaced toward the inclined state

[0025] In the chair configured in this manner, since the seat-receiving member also moves rearward when the backrest is inclined, a biasing force for compressing the compression coil spring from the front is obtained by the rearward movement of the seat-receiving member. Therefore, in the present invention, when the backrest is in the inclined state, the compression coil spring is biased and compressed from both the backrest and the seat-receiving member, and thus it is possible to increase the biasing force.

Effects of Invention

[0026] According to the chair according to the present invention, it is possible to improve the operability related to the adjustment of the returning force of the inclined backrest.

Brief Description of Drawings

[0027]

FIG. 1 is a perspective view of a chair according to an embodiment of the present invention when diagonally viewed from front.

FIG. 2 is a perspective view of a state where a tensile material is removed from the chair according to the embodiment of the present invention when diagonally viewed from rear.

FIG. 3 is an exploded perspective view of the chair according to the embodiment of the present invention.

FIG. 4 is a partially exploded side view showing configurations of a biasing member, an adjuster, and an operating member of the chair according to the embodiment of the present invention.

FIG. 5 is a side view in which a rear cover is removed

in FIG. 4.

FIG. 6 is a perspective view of FIG. 5 when diagonally viewed from above front.

FIG. 7 is a plan view of FIG. 6 when viewed from above.

FIG. 8 is a cross-sectional view taken along line VIII-VIII shown in FIG. 7.

FIG. 9 is a perspective view of the adjuster and the operating member when diagonally viewed from rear.

FIG. 10 is a vertical cross-sectional view showing a main portion of the adjuster and the operating member.

FIG. 11 is a view showing a state in which the chair shown in FIG. 8 is inclined.

FIG. 12 is a view showing a state in which the chair is inclined when an action shaft is moved to a position above an adjustment shaft.

Embodiments of Invention

[0028] A chair according to an embodiment of the present invention is described below with reference to FIGS. 1 to 12.

[0029] In the following description, for convenience of description, a direction in which a seated person sitting on a seat 17 (described below) in a normal posture is directed forward is referred to as "front", and a direction opposite thereto is referred to as "rear". In addition, up-down and right-left directions in the following description mean directions that coincide with directions in which the seated person is regarded as the center when the seated person sits on the seat 17 in the normal posture. In the following description, the right-left direction at this time is also referred to as a width direction. Note that in some drawings, an arrow FR pointing forward, an arrow UP pointing upward, and an arrow LH pointing leftward are shown.

[0030] As shown in FIG. 1, a chair 1 according to the present embodiment includes a leg portion 10 configured to be placed on a floor surface F, a support base 40 that has a box shape and is provided on an upper portion of the leg portion 10, the seat 17 attached to an upper portion of the support base 40, a backrest 20 that is attached to a rear portion of the support base 40 and supports a back portion of a seated person, and an armrest 19 that extends to an upper side of the seat 17 from both side portions of a lower portion side of the seat 17 in the right-left direction and is configured such that an elbow or an arm tip of the seated person are placed.

[0031] The leg portion 10 includes manifold legs 11 with casters 11a, and a pedestal 12 that is erected from a central portion of the manifold legs 11 and that has a built-in gas spring (not shown) as a lifting mechanism. The pedestal 12 includes an outer cylinder 13 and an inner cylinder 14. The outer cylinder 13 is supported by being non-rotatably fitted to the manifold legs 11. A lower portion of the inner cylinder 14 is rotatably supported by the outer cylinder 13 in a horizontal direction. An upper portion of the inner cylinder 14 is fixed to the support base 40. A lifting adjustment mechanism of the pedestal 12 and an inclination mechanism of the backrest 20 are built in the support base 40.

[0032] The backrest 20 includes a backrest structure 20A (refer to FIG. 2) and a tensile material 26 that covers the backrest structure 20A. The backrest structure 20A receives the back of the seated person. As shown in FIG. 2, the backrest structure 20A includes a backrest support 21 and a backrest main body 23 supported by the backrest support 21.

[0033] The backrest support 21 supports the back of the seated person. The backrest support 21 includes a backrest support member 30 (i.e., a support structure) and a rearward overhanging member 22.

[0034] As shown in FIG. 3, the backrest support member 30 includes an inner member 31 and an outer member 32. The inner member 31 has an elongated shape in the up-down direction. The inner member 31 is formed in a flat plate shape.

[0035] Plate surfaces of the inner member 31 are directed substantially in the front-rear direction. The inner member 31 includes an inner up-down extension portion 33 and an inner upper overhanging portion 34. The inner up-down extension portion 33 includes an inner curved upper portion 331, an inner curved lower portion 332, an inner lower portion 333, and an inner lower fixing portion 334.

[0036] The outer member 32 includes an outer up-down extension portion 35 and an outer upper overhanging portion 36. The outer up-down extension portion 35 includes an outer curved upper portion 351, an outer curved lower portion 352, and an outer lower portion 353. The inner member 31 and the outer member 32 are joined to each other by screws.

[0037] The backrest support member 30 is provided with a rotating member 38 that is fixed to the inner member 31 and the outer member 32 and that is rotatable on a rotation main shaft 42 (i.e. an axis) extending at a rear portion of the support base 40 in an axis direction parallel with the width direction (i.e. the right-left direction). As shown in FIGS. 4 and 5, the rotating member 38 can rotate around the axis in the right-left direction with respect to the support base 40. A bolt 38a is inserted from an attachment recess portion 353a of the outer lower portion 353 of the outer member 32 into an attachment hole 353b, an attachment hole 334a of the inner lower fixing portion 334 of the inner member 31, and an attachment hole formed in the rotating member 38. A nut is fastened to the bolt 38a. As a result, the inner member 31 and the outer member 32 are integrally fixed to the rotating member 38.

[0038] As shown in FIG. 3, the rotating member 38 and the outer lower portion 353 of the outer member 32 are covered with a rear cover 37 from the rear side.

[0039] As shown in FIGS. 1 and 2, the backrest 20 configured in this manner is rotatably supported by the

backrest support member 30 on an axis in the width direction of the backrest support member 30. The backrest 20 is provided to be displaceable from an initial state P1 in which an upper end portion 20a is located relatively forward to an inclined state P2 (refer to FIG. 11) in which the upper end portion 20a is located relatively rearward. That is, the backrest 20 is displaceable between the initial state P1 and the inclined state P2 of being inclined rearward from the initial state P1.

[0040] As shown in FIGS. 4 and 5, a seat shell 51 that holds the seat 17 from below is provided below the seat 17. The seat shell 51 attaches the seat 17 to a seat-receiving member 50 supported from below by the support base 40. A locking portion (not shown) provided on a rear end lower surface of the seat shell 51 is locked so as to be hooked from the rear of the seat-receiving member 50, and the seat shell 51 is fixed to a front edge portion 50a of the seat-receiving member 50 by fixing means such as a screw.

[0041] The seat-receiving member 50 includes the seat shell 51 described above, a main body portion 52 that has a rectangular shape in a plan view and that has an upper end edge to which the seat shell 51 can be attached, a rear attachment portion 53 extending rearward from a rear end portion 52a of the main body portion 52, a long hole 54 extending in the front-rear direction on both sides of a front lower surface 52b of the main body portion 52 in the right-left direction, and a spring front end-receiving portion 55 fixed to a front portion of the main body portion 52. The seat-receiving member 50 is, for example, a strength member made of a drawn sheet metal or a metal material such as aluminum die-cast, and has a saucer shape in which the upper side thereof in the up-down direction is open.

[0042] Specifically, the seat-receiving member 50 includes a bottom wall portion 501 and a side wall portion 502 that erects from a peripheral edge portion of the bottom wall portion 501 (refer to FIG. 8). The above-described seat shell 51 is attached to an upper end portion of the side wall portion 502. The bottom wall portion 501 is formed with a recess portion 503 that is recessed upward in a shape along the outer shape of a compression coil spring 61 (described below) so as not to interfere with the compression coil spring 61.

[0043] As shown in FIGS. 6 and 7, the rear attachment portion 53 is provided in the rotating member 38 of the backrest support member 30 and is rotatably joined to an auxiliary shaft 39 (described below) of the operating member 80 that extends in the right-left direction. That is, the rear attachment portion 53 includes a support material 531 extending in the right-left direction, and joining pieces 532 provided in both ends of the support material 531 in the longitudinal direction thereof and having rotation shaft holes 532a that penetrate in the right-left direction (refer to FIG. 8). The auxiliary shaft 39 is rotatably inserted into the rotation shaft holes 532a. The rear attachment portion 53 (that is, the seat-receiving member 50) is rotatable on the auxiliary shaft 39 with respect to the rotating member 38. That is, as shown in FIG. 5, when the backrest 20 is changed from the initial state P1 to the inclined state P2, the seat-receiving member 50 moves rearward with respect to the support base 40. Here, an arrow E1 shown in FIG. 5 indicates the movement direction of the seat-receiving member 50 when the initial state P1 is changed to the inclined state P2.

[0044] As shown in FIGS. 4 and 5, long holes 54 are provided on both sides of a front portion of the bottom wall portion 501 in the right-left direction. As shown in FIGS. 6 and 7, a slide-engaging portion 43 that protrudes upward from the front portion of the support base 40 is engaged with each of the two long holes 54 to be slidable in the longitudinal direction (i.e., the front-rear direction) of the long hole 54, in a state where a downward falling movement of the slide-engaging portion 43 from the long hole 54 is restricted. When the backrest 20 is inclined, the long hole 54 side slides rearward with respect to the slide-engaging portion 43 provided in the support base 40, and thus the seat-receiving member 50 moves rearward. That is, when the seat-receiving member 50 moves rearward, the position of the slide-engaging portion 43 with respect to the long hole 54 in the front-rear direction is a position moved from the rear side to the front side.

[0045] The spring front end-receiving portion 55 includes two fixing portions 551 that are provided on both sides thereof in the right-left direction and are fixed to the lower surface of the bottom wall portion 501, and a joining portion 552 that joins the two fixing portions 551 to each other in the right-left direction.

[0046] The fixing portion 551 is provided with a front spring reaction force-receiving shaft 553 (refer to FIG. 8) that is supported in a state of being inserted into the two fixing portions 551 and that has an axis direction extending in the right-left direction. The fixing portion 551 is formed with an insertion hole 551a through which the front spring reaction force-receiving shaft 553 is inserted.

[0047] The joining portion 552 is provided in a position where the joining portion 552 does not interfere with the compression coil spring 61 (described below) supported by the front spring reaction force-receiving shaft 553.

[0048] As shown in FIG. 8, the front spring reaction force-receiving shaft 553 is a rod material having a circular cross-section. Each of both ends of the front spring reaction force-receiving shaft 553 in the axis direction is inserted into and fixed to the insertion hole 551a of the fixing portion 551, and thus the front spring reaction force-receiving shaft 553 is provided so as not to move in the right-left direction with respect to the two fixing portions 551. The front end portions of the two compression coil springs 61 biased in a compression direction from the rear are supported by the front spring reaction force-receiving shaft 553.

[0049] As shown in FIGS. 6 to 8, the support base 40 includes a support base body portion 41 (i.e., the support structure) fixed to the upper portion of the pedestal 12 (refer to FIG. 5), a rotation main shaft 42 (i.e., the axis) that rotatably supports the rotating member 38 of the

backrest support member 30 in a direction in which the rotating member 38 is inclined with respect to the support base body portion 41, and the slide-engaging portion 43 that slidably support the seat-receiving member 50 in the front-rear direction.

[0050] The support base body portion 41 includes a bottom plate 411 and side plates 412 that extend upward from both the right and left sides of the bottom plate 411. The support base body portion 41 is formed in a bowl shape that opens upward as a whole. The two compression coil springs 61 are accommodated in a first internal space S 1 above the support base body portion 41. As shown in FIG. 5, a rear end portion 41a of the support base body portion 41 protrudes rearward from an upper rear portion 412a of the side plate 412. The upper rear portions 412a of the side plates 412 positioned on both the right and left sides of the support base body portion 41 are provided with the rotation main shaft 42.

[0051] As shown in FIGS. 6 to 8, a front portion of the rotating member 38 of the backrest support member 30 is rotatably supported by the rotation main shaft 42 inside the rear portion of the support base body portion 41. The rotation centers of portions of the rotation main shaft 42 provided in both the right and left side plates 412 are coaxial with each other.

[0052] The slide-engaging portions 43 are provided in a state of protruding upward at the front upper ends 412b of the side plates 412 on both the left and right sides of the support base body portion 41. The slide-engaging portion 43 includes a protrusion portion 431, and a sliding portion 432 that is provided in the upper end of the protrusion portion 431 and that is formed to have a diameter greater than the protrusion. The protrusion portion 431 is formed to have a circular cross-section having substantially the same diameter as the width of the long hole 54 (refer to FIG. 5) of the seat-receiving member 50. In the slide-engaging portion 43, the protrusion portion 431 is inserted into the long hole 54, and the sliding portion 432 is disposed inside the seat-receiving member 50. Note that the inner portion of the seat-receiving member 50 in which the sliding portions 432 are disposed is a portion above the upper surface of the bottom wall portion 501 and between the facing surfaces of the side wall portions 502. A sliding region of the sliding portion 432 in the inner portion of the seat-receiving member 50 is a position other than the recess portion 503 (refer to FIG. 8) that is recessed upward in a shape along the outer shape of the compression coil spring 61 described above, and is a space in which the sliding portion 432 that slides does not interfere with other portions. That is, the sliding regions of the long holes 54 and the sliding portions 432 are set to positions on both the right and left sides other than the two compression coil springs 61 in a top view.

[0053] The support base body portion 41 of the support base 40 and the rotating member 38 are provided with a biasing member 60 including the compression coil springs 61 that bias the backrest 20 in the inclined state P2 (refer to FIG. 11), in a direction of returning to the initial state P1, an adjuster 70 that adjusts a biasing force of the compression coil spring 61, and an operating member 80 that is joined to the adjuster 70 and that operates the adjuster 70.

[0054] The rotating member 38 includes a rear wall 381 and two side walls 382 that extend from both right and left ends of the rear wall 381 in a direction orthogonal to the rear wall 381 and are spaced apart from each other in the width direction. The adjuster 70 and the operating member 80 are accommodated in a second internal space S2 on the front side of the rotating member 38. In addition, a rear end portion of the compression coil spring 61 is supported in the front portion of the second internal space S2.

[0055] The two side walls 382 of the rotating member 38 are rotatably supported by the rotation main shaft 42 with respect to the upper rear portions 412a of the side plates 412 of the support base body portion 41. As shown in FIG. 8, the adjuster 70 and the operating member 80 are disposed in the second internal space S2 located behind the rotation main shaft 42 of the rotating member 38. The front portion of the rotating member 38 supports the rotation main shaft 42. In addition, the rear portion of the rotating member 38 includes the auxiliary shaft 39 to which the rear attachment portion 53 of the seat-receiving member 50 is attached. Then, an intermediate portion between the front portion and the rear portion of the rotating member 38 supports an operation shaft 81 of the operating member 80.

[0056] As shown in FIG. 7, the auxiliary shaft 39 extends in the right-left direction and is supported by the side walls 382 on both the right and left sides. The joining pieces 532 of the rear attachment portion 53 of the seat-receiving member 50 are rotatably supported by the auxiliary shaft 39. That is, the rear portion of the seat-receiving member 50 is rotatably supported with respect to the rotating member 38.

[0057] The biasing member 60 is a structure that generates a returning force for returning the inclined backrest 20 to an original position (i.e., the initial state P1 shown in FIG. 8) by the biasing force thereof. The biasing member 60 includes the compression coil springs 61, spring front end-supporting portions 62 provided in one end portions (i.e., the front end portions) of the compression coil springs 61, and spring rear end-supporting portions 63 provided in the other end portions (i.e., the rear end portions) of the compression coil springs 61.

[0058] The front end of the compression coil spring 61 is compressed rearward, and the rear end thereof is compressed forward. The two compression coil springs 61 in which the biasing directions of the springs are directed in the front-rear direction are accommodated in the first internal space S 1 of the support base body portion 41 in a state of being arranged in the right-left direction. The two compression coil springs 61 is attached in a state of being normally compressed and biased even though the backrest 20 is in each of the initial state P1 or the inclined state P2 (refer to FIG. 11). The compression coil spring

61 when the backrest 20 is in the inclined state P2 is compressed more largely than when the backrest 20 is in the initial state P1.

[0059] The spring front end-supporting portion 62 and the spring rear end-supporting portion 63 are joined to each other by an extensible joining shaft 64 that is inserted into the compression coil spring 61. In the biasing member 60, the extensible joining shaft 64 extends and retracts due to a change in spacing between the spring front end-supporting portion 62 and the spring rear end-supporting portion 63 caused by the extension and compression of the compression coil spring 61.

[0060] The spring front end-supporting portion 62 abuts on the front end of the compression coil spring 61 from the front. The spring front end-supporting portion 62 is formed in a U-shape that is open forward when viewed in the right-left direction. A recess portion 62a that is recessed in a U-shape is engaged with the front spring reaction force-receiving shaft 553 of the spring front end-receiving portion 55 provided in the seat-receiving member 50 in a state of being pressed on the front spring reaction force-receiving shaft 553 from the rear. That is, the front spring reaction force-receiving shaft 553 receives a reaction force from the compression coil spring 61 even in a state where the backrest 20 is in each of the initial state P1 or the inclined state P2.

[0061] The spring rear end-supporting portion 63 abuts on the rear end of the compression coil spring 61 from the rear. The spring rear end-supporting portion 63 includes a through-hole 631 (refer to FIG. 6) penetrating it in the right-left direction. An action shaft 71 (i.e., a shaft portion 712) extending in the right-left direction of the adjuster 70 (described below) is supported in a state of being inserted into the through-hole 631.

[0062] The spring rear end-supporting portion 63 is in a state where a spring force is applied to the action shaft 71 from the front. That is, the action shaft 71 receives a reaction force from the compression coil spring 61 even in a state where the backrest 20 is in each of the initial state P1 or the inclined state P2.

[0063] The adjuster 70 has a function of adjusting the biasing force of the compression coil spring 61 of the biasing member 60 and adjusting the returning force of the backrest 20 in the inclined state P2 (refer to FIG. 11). The adjuster 70 is accommodated in the second internal space S2 between the side walls 382 of the rotating member 38 of the backrest 20.

[0064] The adjuster 70 includes the action shaft 71 (i.e., an acting member) that acts on the biasing force of the biasing member 60 (i.e., the compression coil spring 61), an adjustment shaft 72 (i.e., the acting member) that movably supports the action shaft 71, and a support member 73 that rotatably supports the adjustment shaft 72 with respect to the operating member 80. In other words, the adjuster 70 includes an acting member 74 that acts on the biasing member 60, and the support member 73 that movably supports the acting member 74. The acting member 74 includes the action shaft 71 that supports the biasing member 60 (i.e., the compression coil spring 61), and the adjustment shaft 72 that is disposed such that the axis direction thereof is parallel to the front-rear direction when viewed from above and that enables the action shaft 71 to move in the axis direction. Note that the axis of the adjustment shaft 72 is parallel to the front-rear direction when viewed from above, in other words, the axis may be in a direction other than the up-down direction among directions orthogonal to the right-left direction.

[0065] The adjustment shaft 72 is integrally provided with a second transmission gear 721 including a bevel gear at the upper end thereof. The second transmission gear 721 meshes with a first transmission gear 83 (described below) of the operating member 80, and the rotational force is transmitted from the first transmission gear 83 to the second transmission gear 721 by operating the operating member 80, so that the adjustment shaft 72 rotates in both the forward and reverse directions. A male screw (not shown) with which the action shaft 71 is engaged is formed in the adjustment shaft 72 on the entire length in the axis direction.

[0066] As shown in FIG. 8, in the initial state P1, the adjustment shaft 72 is disposed such that in the side view, the axis direction thereof is inclined, a shaft lower end portion 72b thereof is positioned forward, and a shaft upper end portion 72a thereof is positioned rearward. The adjustment shaft 72 extends diagonally in the up-down direction and the front-rear direction. The shaft lower end portion 72b is located below the rotation main shaft 42. The shaft upper end portion 72a is located above and behind the rotation main shaft 42. That is, the action shaft 71 that moves along the adjustment shaft 72, in other words, the spring rear end-supporting portion 63 that is provided in the rear end of the compression coil spring 61 joined to the action shaft 71, is configured to move between a position below the rotation main shaft 42 (refer to FIG. 11) and a position above and behind the rotation main shaft 42 (refer to FIG. 12).

[0067] The adjuster 70 is configured such that, when the adjustment shaft 72 rotates, the action shaft 71 engaged with the male screw moves in the axis direction of the adjustment shaft 72 in accordance with a rotational position of the adjustment shaft 72. That is, in the adjuster 70, the position of the action shaft 71 can be adjusted by moving the action shaft 71 along the adjustment shaft 72. When the action shaft 71 moves on the adjustment shaft 72, the compression coil spring 61 rotates around the spring front end-supporting portion 62, so that only the angle thereof when viewed in the right-left direction changes.

[0068] As shown in FIGS. 9 and 10, the support member 73 includes a fixing plate 731 that extends in the up-down direction and that is fixed to the rear wall 381 of the rotating member 38 by a screw (not shown), and an upper support plate 732 and a lower support plate 733 that extend forward from upper and lower ends of the fixing plate 731. The adjustment shaft 72 is disposed be-

tween the upper support plate 732 and the lower support plate 733. As shown in FIG. 8, in the adjustment shaft 72, the shaft upper end portion 72a is rotatably supported by the upper support plate 732, and the shaft lower end portion 72b is rotatably supported by the lower support plate 733.

[0069] As shown in FIGS. 6 and 7, the action shaft 71 includes a nut portion 711 including a female screw engaged with the adjustment shaft 72, and the shaft portions 712 extending to both right and left sides of the nut portion 711. The nut portion 711 moves along the adjustment shaft 72 by the adjustment shaft 72 rotating. The spring rear end-supporting portions 63 of the biasing member 60 are joined to the shaft portions 712.

[0070] As shown in FIGS. 5 and 6, the operating member 80 is provided in the rotating member 38. The operating member 80 is a member that can be operated by a person such as a seated person. The operating member 80 includes the operation shaft 81 extending in the right-left direction, an operation lever 82 provided in a protrusion tip (one end) of the operation shaft 81 protruding outward from the side wall 382, and the first transmission gear 83 that is provided in an intermediate portion of the operation shaft 81 and that includes a bevel gear located in the second internal space S2.

[0071] That is, in the operating member 80, the outer end portion of the operation shaft 81 in the width direction protrudes from the side wall 382 in the width direction, and the inner portion thereof in the width direction is disposed in the second internal space S2 and is joined to the adjuster 70.

[0072] The operation shaft 81 is rotatably supported by the upper portions of the side walls 382 provided on both the right and left sides of the rotating member 38. The operation shaft 81 is disposed above the adjustment shaft 72 and is disposed such that the axial center of the operation shaft 81 and the axial center of the adjustment shaft 72 are located on the same plane.

[0073] The first transmission gear 83 provided in the intermediate portion of the operation shaft 81 in the axis direction meshes with the second transmission gear 721 provided in the adjustment shaft 72. That is, the rotation of the operation shaft 81, in other words, the rotation of the first transmission gear 83 on the axial center in the right-left direction, is converted into the rotation of the second transmission gear 721 on the axial center of the adjustment shaft 72.

[0074] The operation lever 82 is located behind the seat-receiving member 50 at a position on one side of the side walls 382 of the rotating member 38 in the width direction. That is, the operation lever 82 is located at a position above and behind the seat-receiving member 50, and is located at a position where the hand of the seated person who sits on the seat 17 on the seat-receiving member 50 easily accesses the operation lever 82. The shape of the operation lever 82 is not particularly limited as long as the seated person can operate the operation lever 82. Examples thereof include a cylinder having a diameter greater than that of the operation shaft 81, a conical shape, a spindle shape, or a shape extending in a direction intersecting the extending direction of the operation shaft 81.

[0075] In the chair 1 configured in this manner, when the reaction force (i.e., the returning force) of the backrest 20 is to be adjusted, first, if the operation lever 82 of the operating member 80 is rotated on the central axis of the operation shaft 81, the action shaft 71 at the same position as the spring rear end-supporting portion 63 of the compression coil spring 61 moves upward or downward along the adjustment shaft 72. For example, by rotating the operation lever 82 in one direction, the adjustment shaft 72 rotates in one direction through the first transmission gear 83 and the second transmission gear 721, so that the nut portion 711 engaged with the adjustment shaft 72, that is, the action shaft 71, moves upward along the adjustment shaft 72.

[0076] As described above, since the action shaft 71 moves on the adjustment shaft 72, the distance between the spring front end-supporting portion 62 and the spring rear end-supporting portion 63 of the biasing member 60 changes, so that it is possible to adjust the compression amount of the compression coil spring 61, that is, the biasing force (i.e., the reaction force) of the compression coil spring 61. That is, it is possible to adjust the returning force when the backrest 20 returns from the inclined state P2 to the initial state P1.

[0077] Note that the adjuster 70 of the present embodiment has a configuration in which the action shaft 71 moves on the adjustment shaft 72, thereby changing the position of the action shaft 71, that is, the position of the spring rear end-supporting portion 63 of the compression coil spring 61, to adjust the biasing force (i.e., the returning force of the backrest) of the compression coil spring 61. In addition, in the present embodiment, as shown in FIG. 12, the action shaft 71 that moves on the adjustment shaft 72 can be mechanically adjusted to a position above the rotation main shaft 42 in the up-down direction.

[0078] In the chair 1 configured in this manner, the biasing member 60 is provided in the support base body portion 41, the adjuster 70 is provided in the backrest 20, and further the operating member 80 is disposed behind the axis (i.e., the rotation main shaft 42) by which the backrest 20 is rotatably supported, and on a side portion of the backrest 20 in the width direction. That is, in a state where the adjuster 70 is provided in the backrest 20, the operating member 80 can be disposed in the outer side area of the backrest 20.

[0079] Therefore, in the present embodiment, the operating member 80 can be disposed at a position in the rear of the chair 1 and at a portion (in the present embodiment, the side wall 382 of the rotating member 38) of the backrest as an upper portion of the chair 1. Thus, the seated person can easily access the operation lever 82 of the operating member 80 only by lowering the hand from the normal sitting state, and it is possible to improve the usability as an operation related to adjustment of the

returning force of the inclined backrest 20.

[0080] In addition, in the chair 1 of the present embodiment, the adjuster 70 can be disposed at the position close to the operating member 80 provided between the side walls 382 of the backrest 20. That is, it is possible to make the joining portion between the operation shaft 81 of the operating member 80 and the adjuster 70 have a simple structure. As described above, in the present embodiment, since it is possible to adopt a configuration in which the adjuster 70 in addition to the biasing member 60 is not disposed in the upper portion of the support base body portion 41, the adjuster 70 can be disposed with a margin by using the space between the side walls 382.

[0081] In addition, in the present embodiment, since the adjuster 70 can be shielded by the side walls 382 in the right-left direction, it is possible to prevent the deterioration of the appearance.

[0082] In addition, in the present embodiment, since the second internal space S2 is located above the support base body portion 41, the adjuster 70 can be disposed with a margin by using the spaces between the side walls 382 and above the support base body portion 41.

[0083] Further, in this case, since the adjuster 70 can be shielded from below by the bottom plate 411 of the support base body portion 41, it is possible to further prevent the deterioration of the appearance.

[0084] In addition, in the chair 1 according to the present embodiment, since the adjuster 70 includes the acting member (i.e., the action shaft 71 and the adjustment shaft 72) and the support member 73, it is possible to stabilize the movement of the acting member with respect to the backrest 20 by fixing the support member 73 to the rotating member 38 of the backrest 20 in the unmovable state.

[0085] In addition, in the chair 1 according to the present embodiment, the action shaft 71 can be displaced to a desired position on the adjustment shaft 72 by the seated person operating the operation lever 82 of the operating member 80. As a result, the position of the spring rear end-supporting portion 63 of the compression coil spring 61 joined to the action shaft 71 is changed, and thus, it is possible to adjust the biasing force of the biasing member 60 in accordance with the position of the action shaft 71, that is, the position of the compression coil spring 61.

[0086] Further, in the present embodiment, the compression coil spring 61 can be accommodated in the first internal space S1 above the support base body portion 41 in a state where the compression coil spring 61 is directed laterally (i.e., in the front-rear direction). In addition, the rear end portion (i.e., the spring rear end-supporting portion 63) of the compression coil spring 61 can be joined to the adjuster 70 by being located in the second internal space S2 formed in the rotating member 38 of the backrest 20, and thus it is possible to join the adjuster 70 and the operating member 80 by a simple structure. As described above, in the present embodiment, since the adjuster 70 and the operating member 80 can be disposed in the rear of the chair 1, it is possible to dispose the operation lever 82 of the operating member 80 at a position that the seated person further easily accesses.

[0087] Furthermore, in the chair 1 according to the present embodiment, since the seat-receiving member 50 that receives the seat 17 is supported by the upper portion of the support base body portion 41 to be slidable in the front-rear direction, and the front end portion of the compression coil spring 61 is fixed to the front portion of the seat-receiving member 50, the seat-receiving member 50 also moves rearward when the backrest 20 is inclined, and thus the biasing force by which that the compression coil spring 61 is compressed from the front is applied by the rearward movement of the seat-receiving member 50. Therefore, in the present embodiment, when the backrest 20 is in the inclined state P2, the compression coil spring 61 is biased from both the backrest 20 and the seat-receiving member 50, and thus it is possible to increase the biasing force.

[0088] The chair 1 of the present embodiment includes a support base body portion 41; a backrest 20 rotatably supported with respect to the support base body portion 41 on an axis in a width direction of the support base body portion 41 and being displaceable from an initial state P1 to an inclined state P2 of being inclined rearward; a biasing member 60 configured to bias the backrest 20 in the inclined state P2, in a direction of returning to the initial state P1; an adjuster 70 configured to adjust a biasing force of the biasing member 60; and an operating member 80 joined to the adjuster 70 and configured to operate the adjuster 70, wherein the biasing member 60 is provided in the backrest 20 or the support base body portion 41, the adjuster 70 is provided in the backrest 20, and the operating member 80 is disposed behind the axis and on one side of the backrest 20 in the width direction.

[0089] The backrest 20 includes two side walls 382 spaced apart from each other in the width direction, the adjuster 70 is disposed between the two side walls 382, and the operating member 80 includes an operation shaft 81 extending in the width direction and having an outer end portion 81a in the width direction and an inner portion 81b in the width direction, the outer end portion 81a protruding outward from a space between the two side walls 382, and the inner portion 81b being joined to the adjuster 70 at a position between the two side walls 382, and an operation lever 82 provided in the outer end portion 81a of the operation shaft 81.

[0090] The adjuster 70 is located above the support base body portion 41.

[0091] The adjuster 70 includes an acting member 74 that acts on the biasing member 60, and a support member 73 that movably supports the acting member 74, and the support member 73 is fixed to the backrest 20.

[0092] The acting member 74 includes an action shaft 71 that supports the biasing member 60, and an adjustment shaft 72 that is disposed such that an axis direction thereof is parallel with a front-rear direction when viewed

from above and that enables the action shaft 71 to move in the axis direction, and the action shaft 71 is displaced along the adjustment shaft 72 by operating the operating member 80.

[0093] The biasing member 60 includes a spring that biases the backrest 20 in the inclined state P2, in the direction of returning to the initial state P1.

[0094] The spring is a compression coil spring 61 that makes bias in a front-rear direction above the support base body portion 41, and a rear end portion of the compression coil spring 61 is located to be close to the backrest 20 and is joined to the adjuster 70.

[0095] A seat-receiving member 50 receiving a seat 17 is supported at an upper portion of the support base body portion 41 to be slidable in the front-rear direction, a front end portion of the compression coil spring 61 is fixed to a front portion of the seat-receiving member 50, and the seat-receiving member 50 moves rearward to compress the compression coil spring 61 from front, when the backrest 20 is displaced toward the inclined state P2.

[0096] Note that the technical scope of the present invention is not limited to the above embodiment, and it is possible to make various changes thereto within the scope of the present invention.

[0097] For example, in the embodiment described above, a configuration is adopted in which the biasing member 60 is provided in the support base body portion 41 (i.e., the support structure), but a configuration can be adopted in which the biasing member 60 is provided in the backrest 20. The point is that it is sufficient the operating member 80 is disposed behind the rotation main shaft 42 (i.e., the axis) and on one side of the backrest 20 in the width direction.

[0098] In addition, in the present embodiment, the rotating member 38 of the backrest 20 is provided with the two side walls 382 spaced apart from each other in the width direction, and the adjuster 70 is disposed in the space (i.e., the second internal space S2) between the side walls 382, but a configuration may be adopted in which the two side walls 382 are not provided in the rotating member 38.

[0099] In addition, in the present embodiment, the second internal space S2 is a portion of the first internal space S 1, but the present invention is not limited thereto, and the first internal space S1 and the second internal space S2 may be separated without overlapping each other.

[0100] Further, in the present embodiment, a configuration is adopted in which the adjuster 70 includes the acting member (i.e., the action shaft 71 and the adjustment shaft 72) that acts on the biasing member 60 and the support member 73 that movably supports the acting member, and the support member 73 is fixed to the backrest 20, but a configuration may be adopted in which the support member 73 is not fixed to the backrest 20.

[0101] Note that, as the disposition of the operating member 80, it is sufficient that the operation lever 82 is disposed in the side area of the backrest 20 in the width direction, and thus, for example, a form can be adopted in which a portion that pivotably supports the operation shaft 81 on an axis in the width direction protrudes from the back surface (corresponding to a reference sign 38b shown in FIG. 8) of the rotating member 38.

[0102] Furthermore, the specific configurations and dispositions of the biasing member 60, the adjuster 70, and the operating member 80 can be appropriately changed. For example, although the two compression coil springs 61 are adopted as the biasing member in the present embodiment, another biasing member can be adopted. The biasing member 60 may include one or three or more compression coil springs 61. Instead of the compression coil spring 61, the biasing member 60 may include a spring that biases the backrest 20 in the inclined state P2, in the direction of returning to the initial state P1, and the spring may include a tension coil spring, a leaf spring, and the like. When the tension coil spring is used, the tension coil spring may be provided on an opposite side of the adjustment shaft 72 to the compression coil spring 61 shown in FIGS. 7 and 8. When the leaf spring is used, the leaf spring may be provided such that a direction of the biasing force to be generated (for example, a direction in which the leaf surface of the leaf spring is directed) is a direction intersecting the extending direction of the adjustment shaft 72 shown in FIG. 8.

[0103] In addition, it is possible to appropriately replace the constituent elements of the above-described embodiment with well-known constituent elements within the scope of the present invention, and such modifications may be combined as appropriate.

Description of Reference Signs

[0104]

1: Chair
12: Pedestal
17: Seat
20: Backrest
20A: Backrest structure
30: Backrest support member
38: Rotating member
39: Auxiliary shaft
40: Support base
41: Support base body portion (support structure)
42: Rotation main shaft (axis)
50: Seat-receiving member
60: Biasing member
61: Compression coil spring
62: Spring front end-supporting portion
63: Spring rear end-supporting portion
70: Adjuster
71: Action shaft
72: Adjustment shaft
73: Support member
74: Acting member

80: Operating member
81: Operation shaft
82: Operation lever
382: Side wall
S1: First internal space
S2: Second internal space (space)

Claims

1. A chair comprising:

a support structure;
a backrest rotatably supported with respect to the support structure on an axis in a width direction of the support structure and being displaceable from an initial state to an inclined state of being inclined rearward;
a biasing member configured to bias the backrest in the inclined state, in a direction of returning to the initial state;
an adjuster configured to adjust a biasing force of the biasing member; and
an operating member joined to the adjuster and configured to operate the adjuster, wherein
the biasing member is provided in the backrest or the support structure,
the adjuster is provided in the backrest, and
the operating member is disposed behind the axis and on one side of the backrest in the width direction.

2. The chair according to claim 1, wherein

the backrest includes two side walls spaced apart from each other in the width direction,
the adjuster is disposed between the two side walls, and
the operating member includes

an operation shaft extending in the width direction and having an outer end portion in the width direction and an inner portion in the width direction, the outer end portion protruding outward from a space between the two side walls, and the inner portion being joined to the adjuster at a position between the two side walls, and
an operation lever provided in the outer end portion of the operation shaft.

3. The chair according to claim 2, wherein
the adjuster is located above the support structure.

4. The chair according to any one of claims 1 to 3, wherein

the adjuster includes an acting member that acts on the biasing member, and a support member that movably supports the acting member, and the support member is fixed to the backrest.

5. The chair according to claim 4, wherein

the acting member includes an action shaft that supports the biasing member, and an adjustment shaft that is disposed such that an axis direction thereof is parallel with a front-rear direction when viewed from above and that enables the action shaft to move in the axis direction, and
the action shaft is displaced along the adjustment shaft by operating the operating member.

6. The chair according to any one of claims 1 to 5, wherein
the biasing member includes a spring that biases the backrest in the inclined state, in the direction of returning to the initial state.

7. The chair according to claim 6, wherein

the spring is a compression coil spring that makes bias in a front-rear direction above the support structure, and
a rear end portion of the compression coil spring is located to be close to the backrest and is joined to the adjuster.

8. The chair according to claim 7, wherein

a seat-receiving member receiving a seat is supported at an upper portion of the support structure to be slidable in the front-rear direction,
a front end portion of the compression coil spring is fixed to a front portion of the seat-receiving member, and
the seat-receiving member moves rearward to compress the compression coil spring from front, when the backrest is displaced toward the inclined state.

FIG. 1

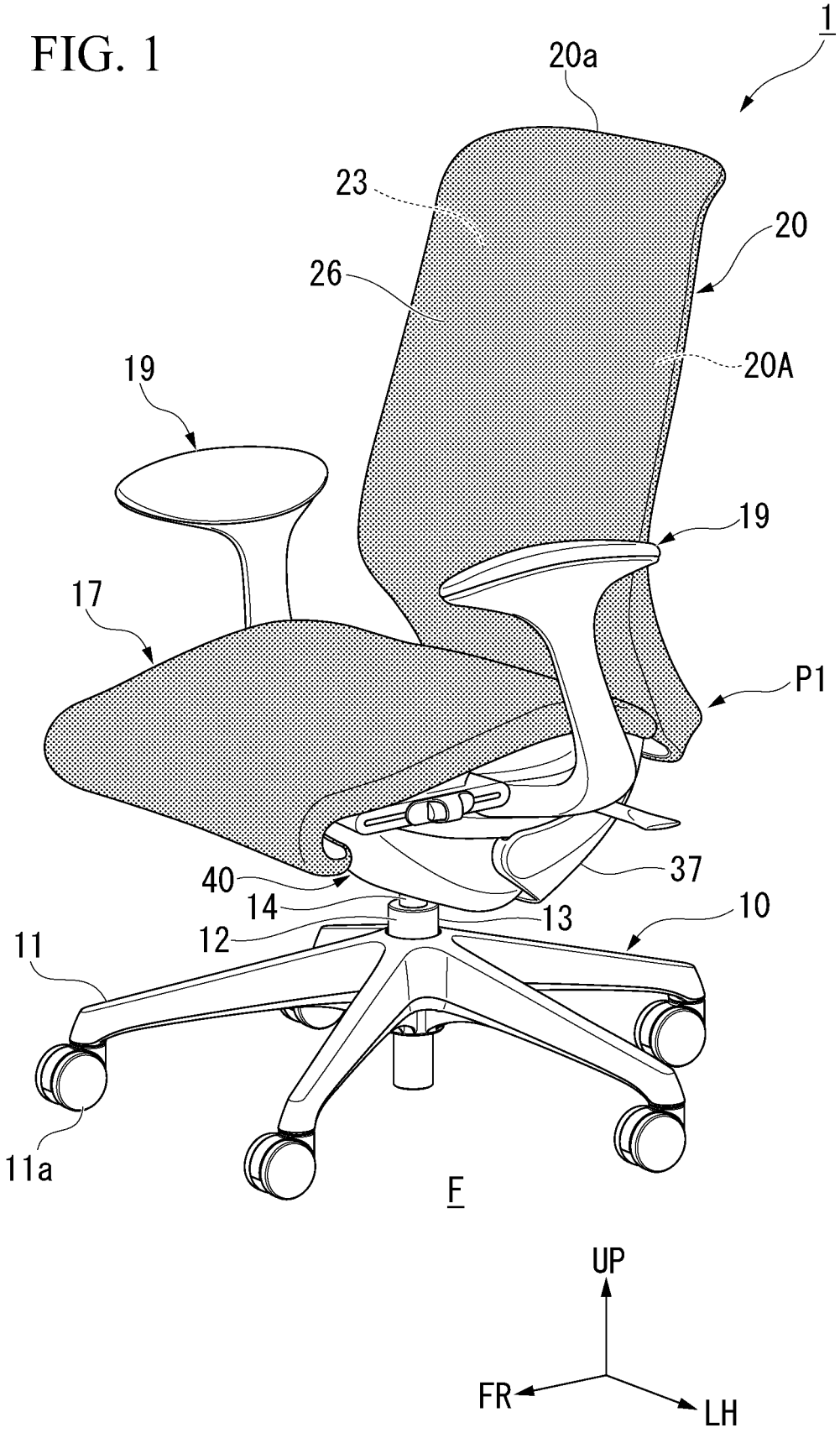

FIG. 2

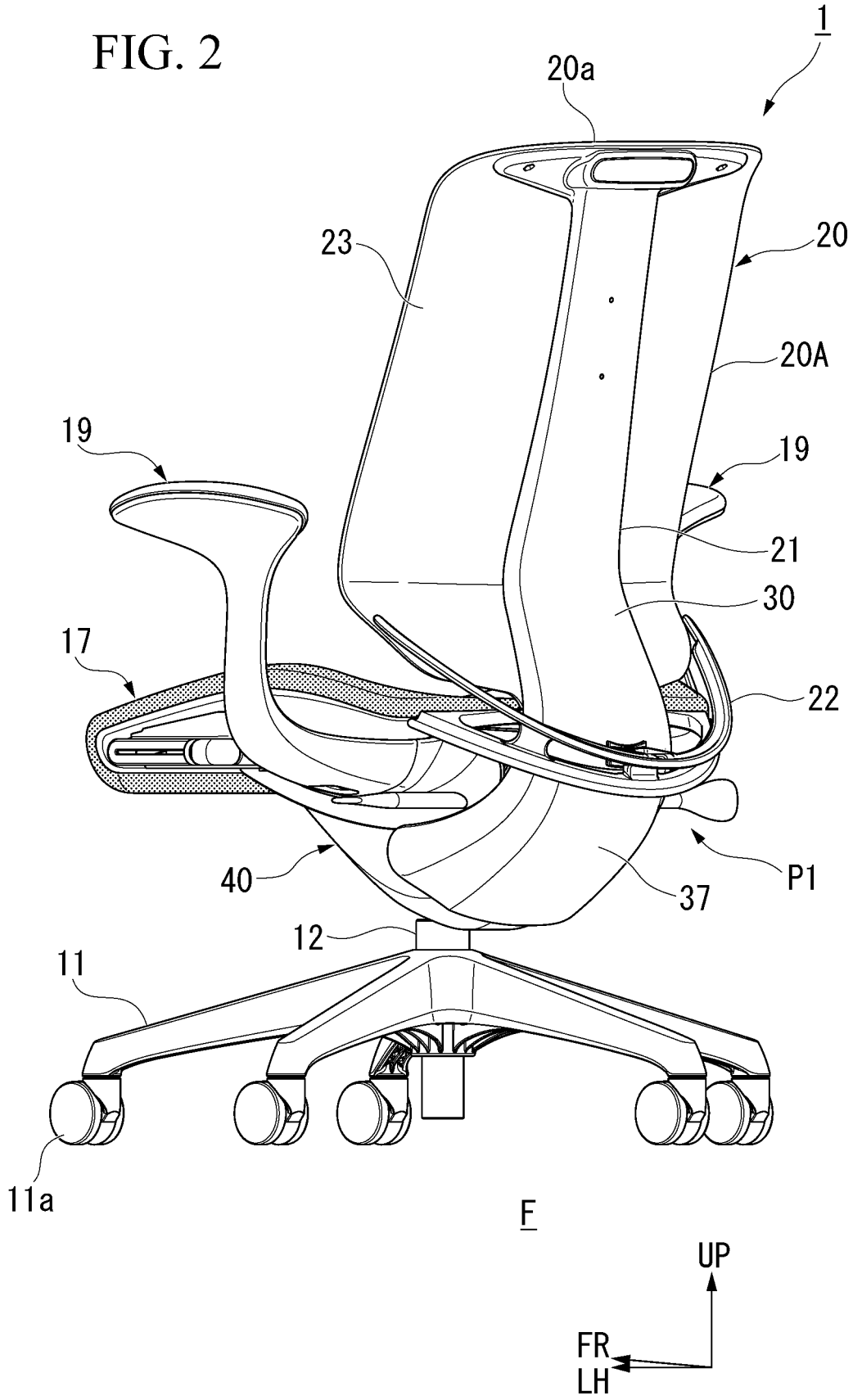

FIG. 3

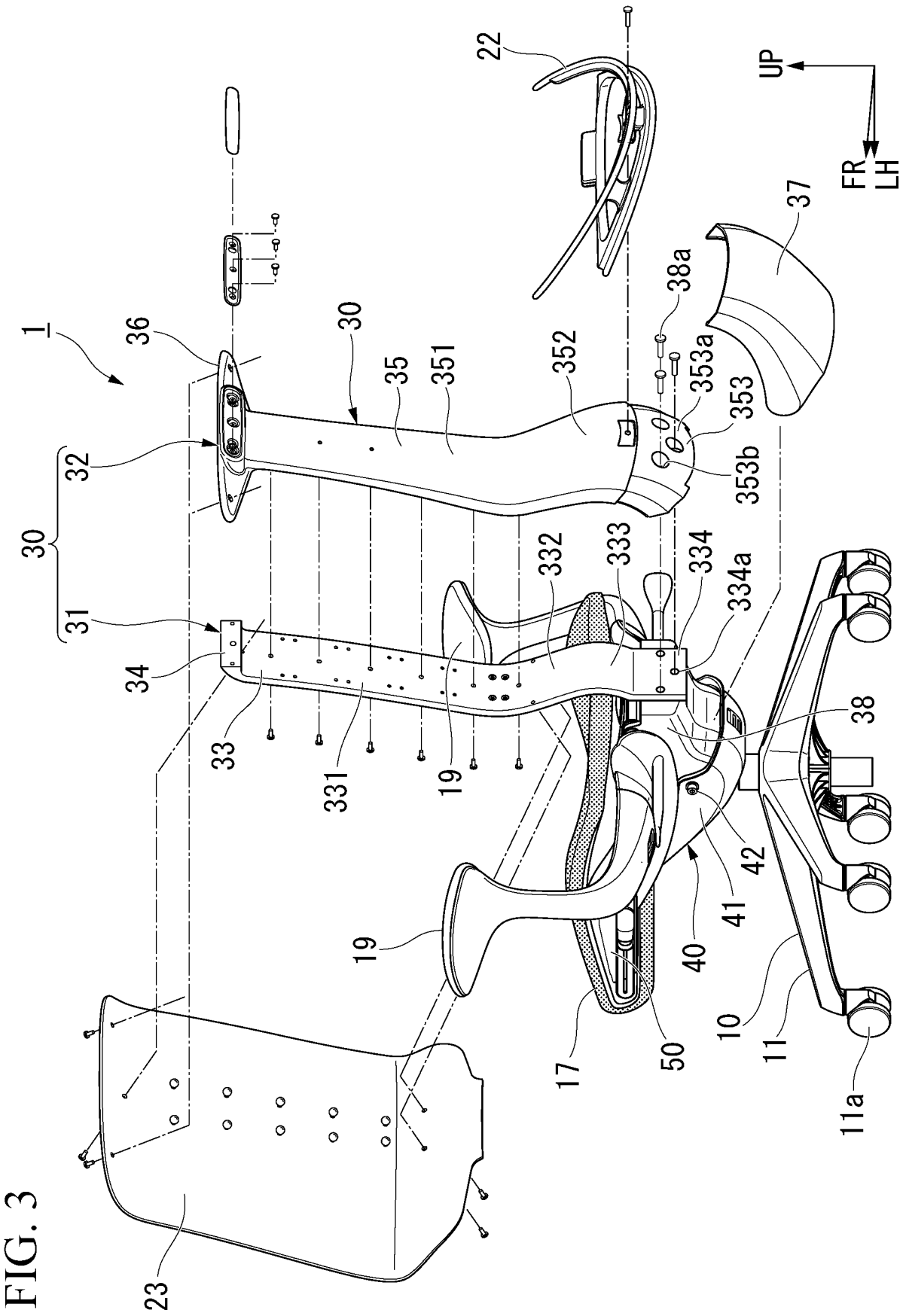
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FIG. 4

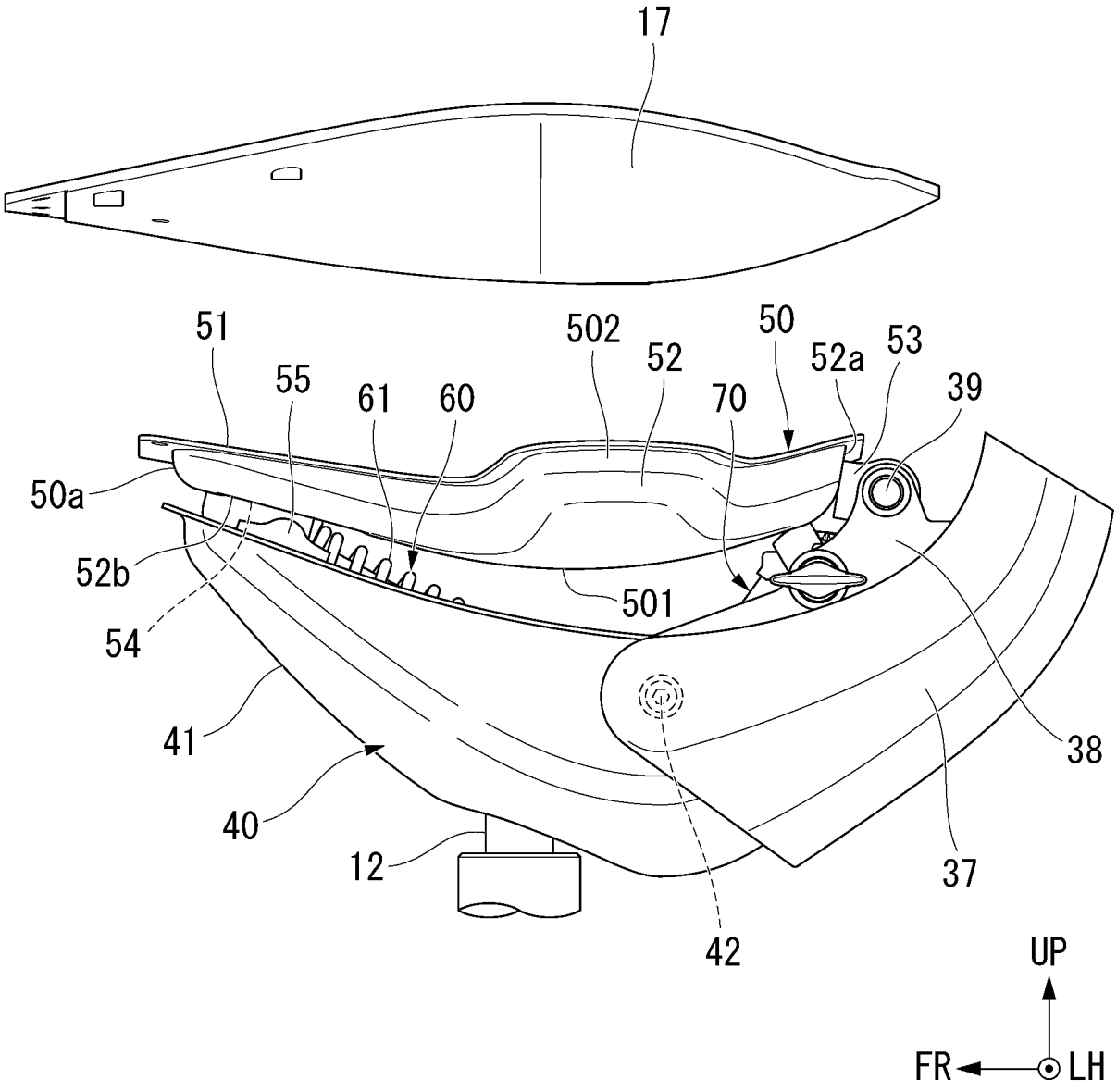
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FIG. 5

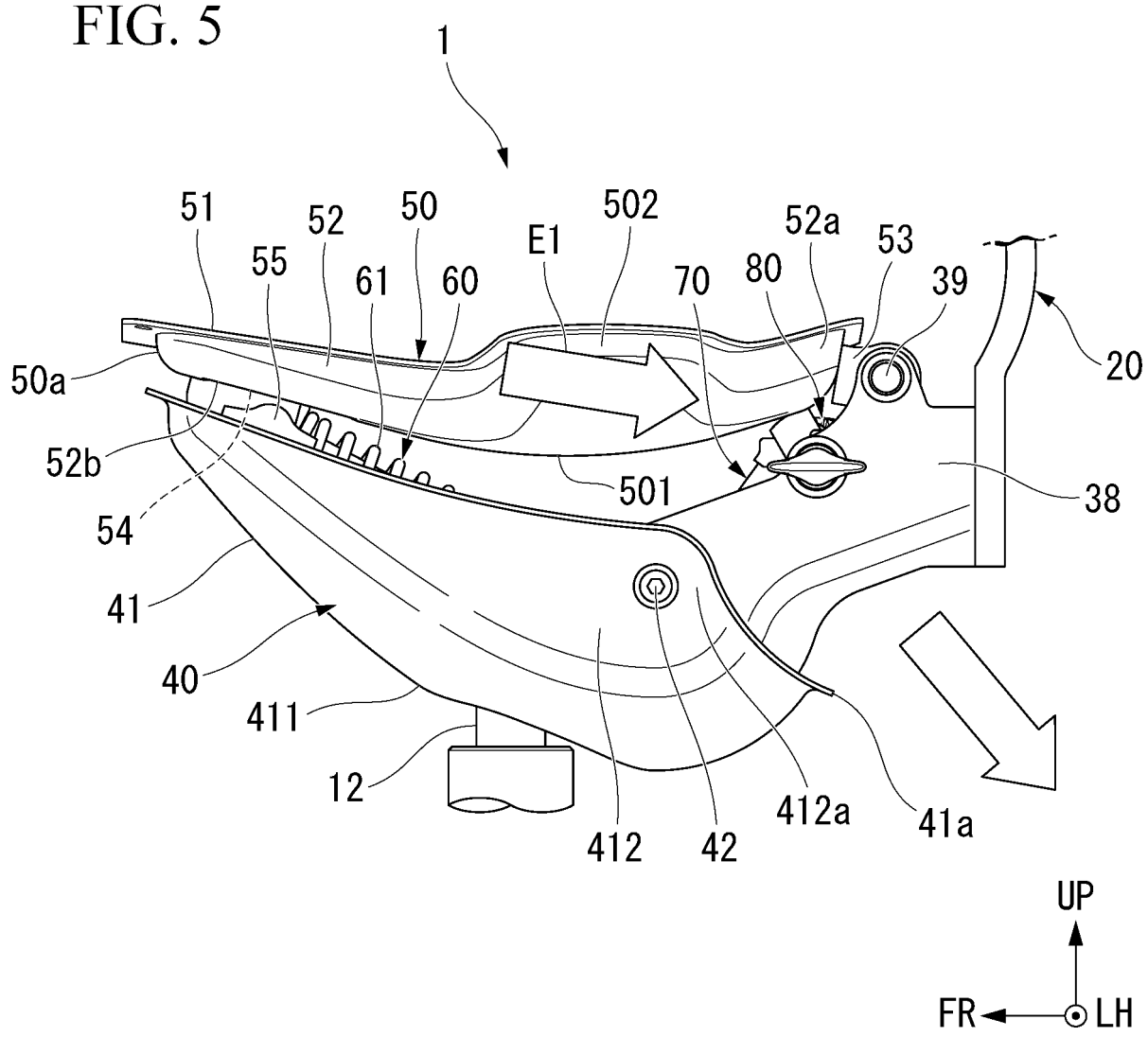
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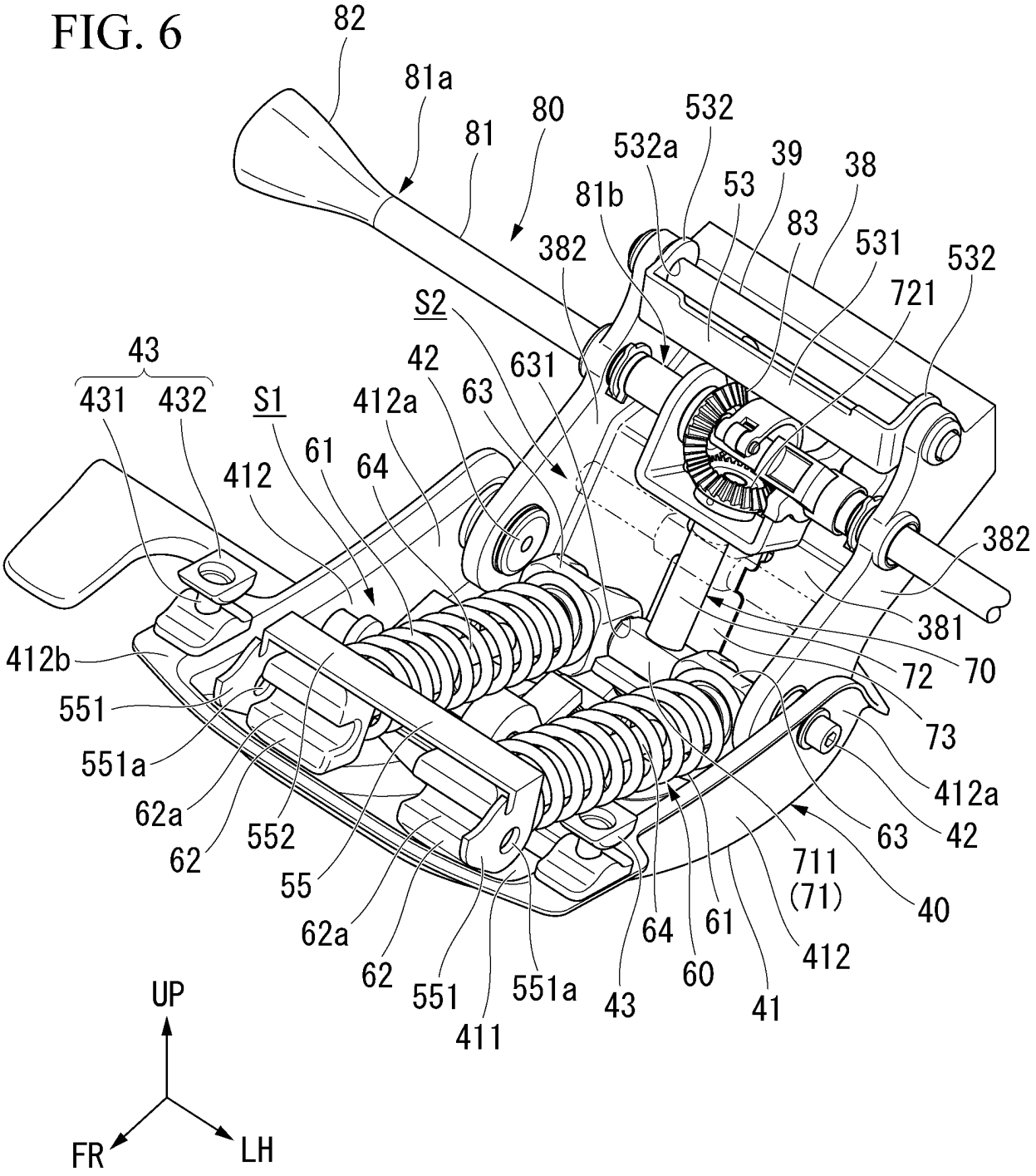
FIG. 6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631
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FIG. 7

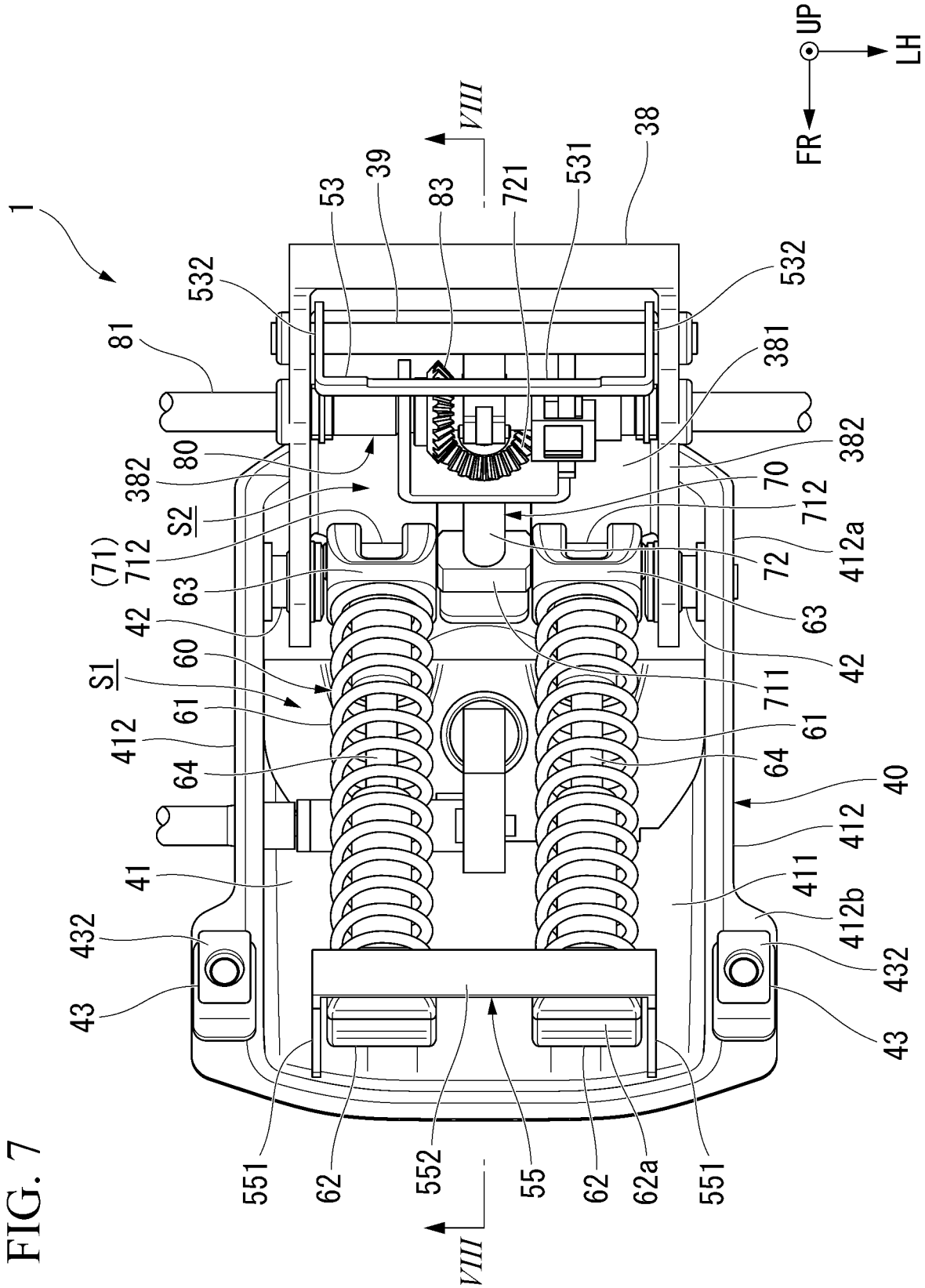
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FIG. 8

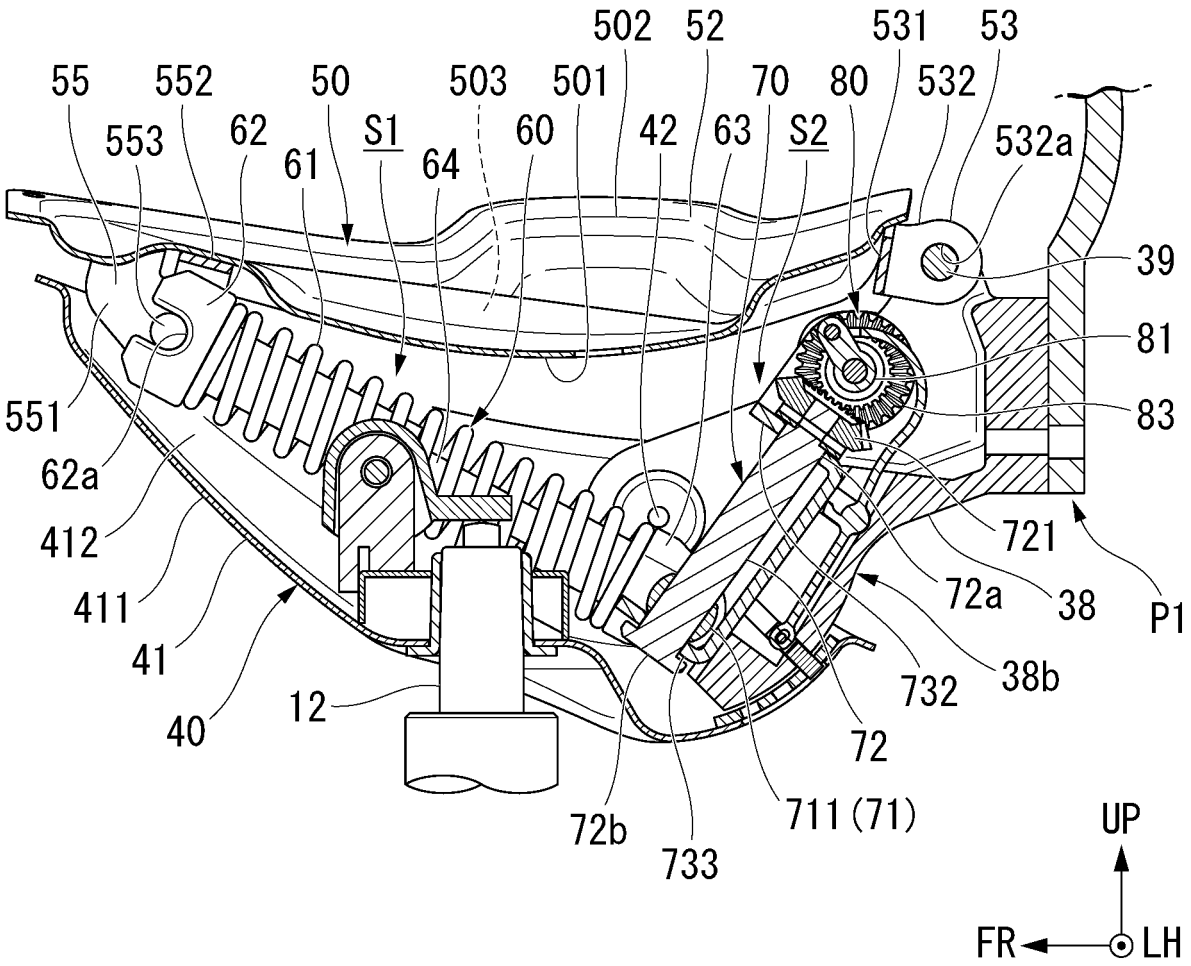
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FIG. 9

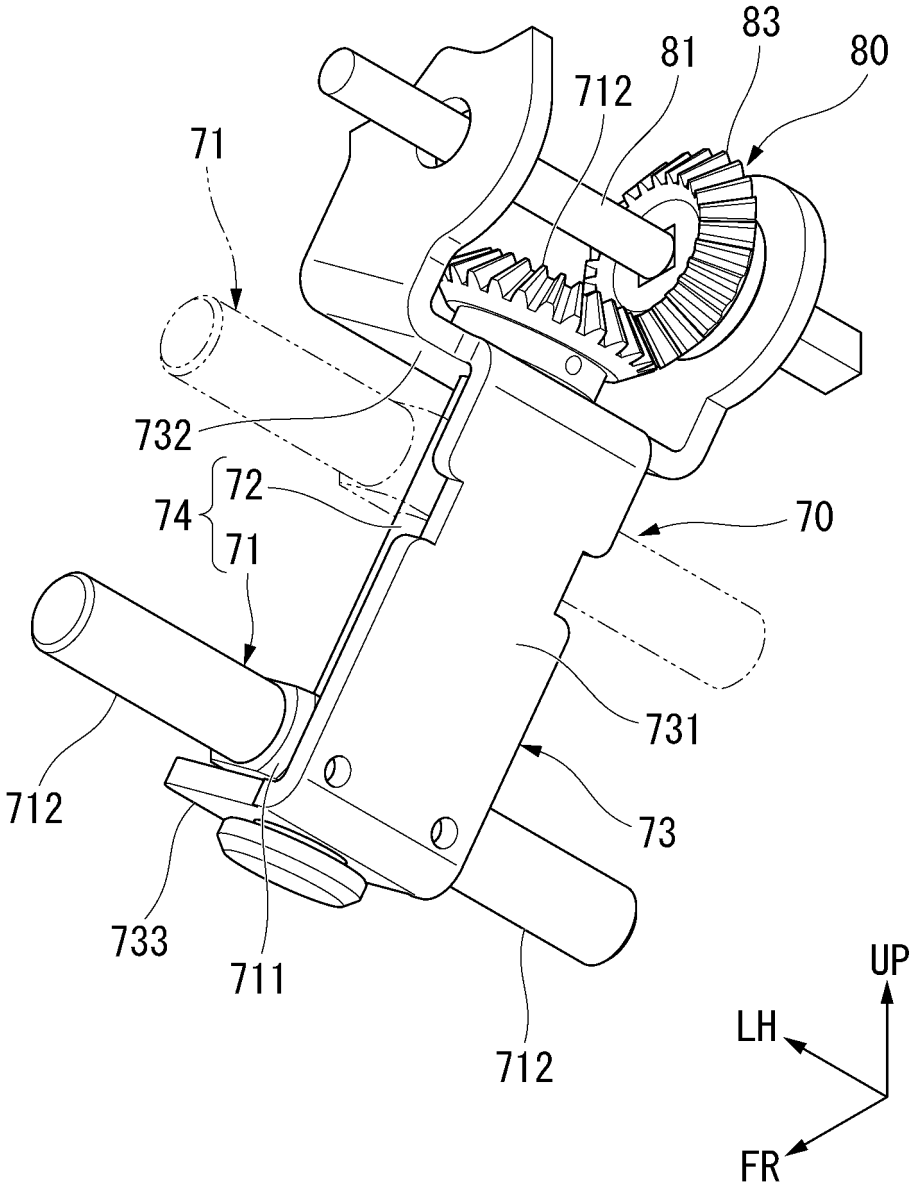


FIG. 10

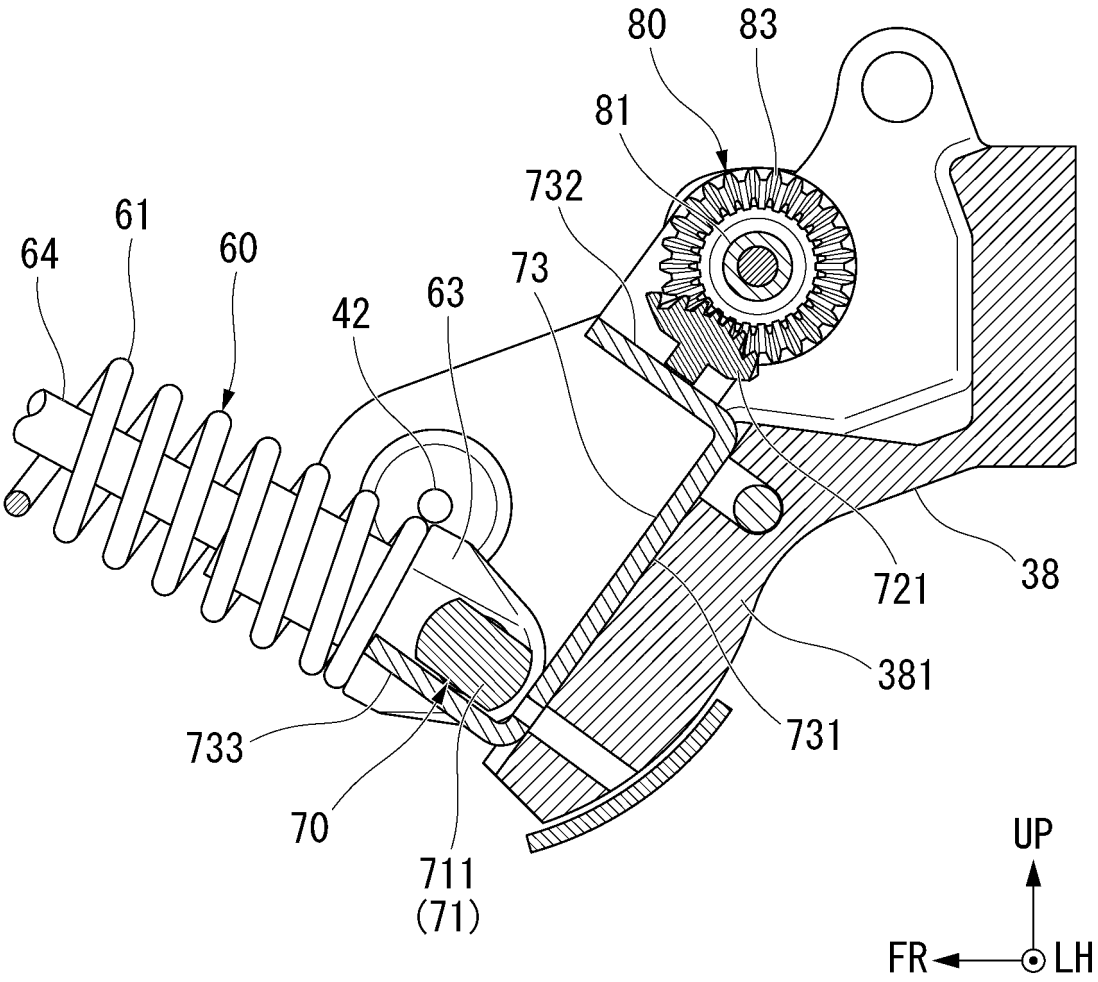


FIG. 11

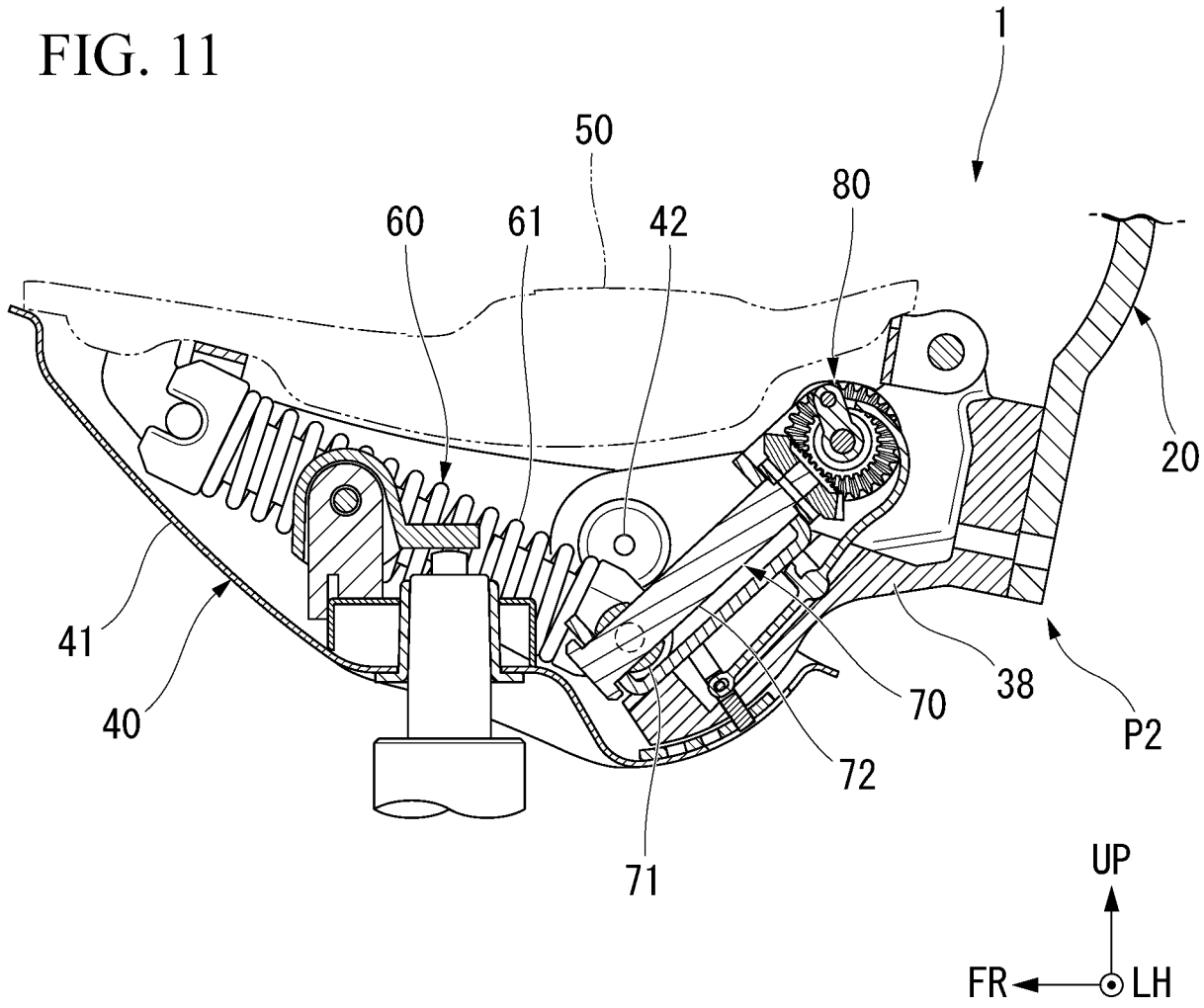
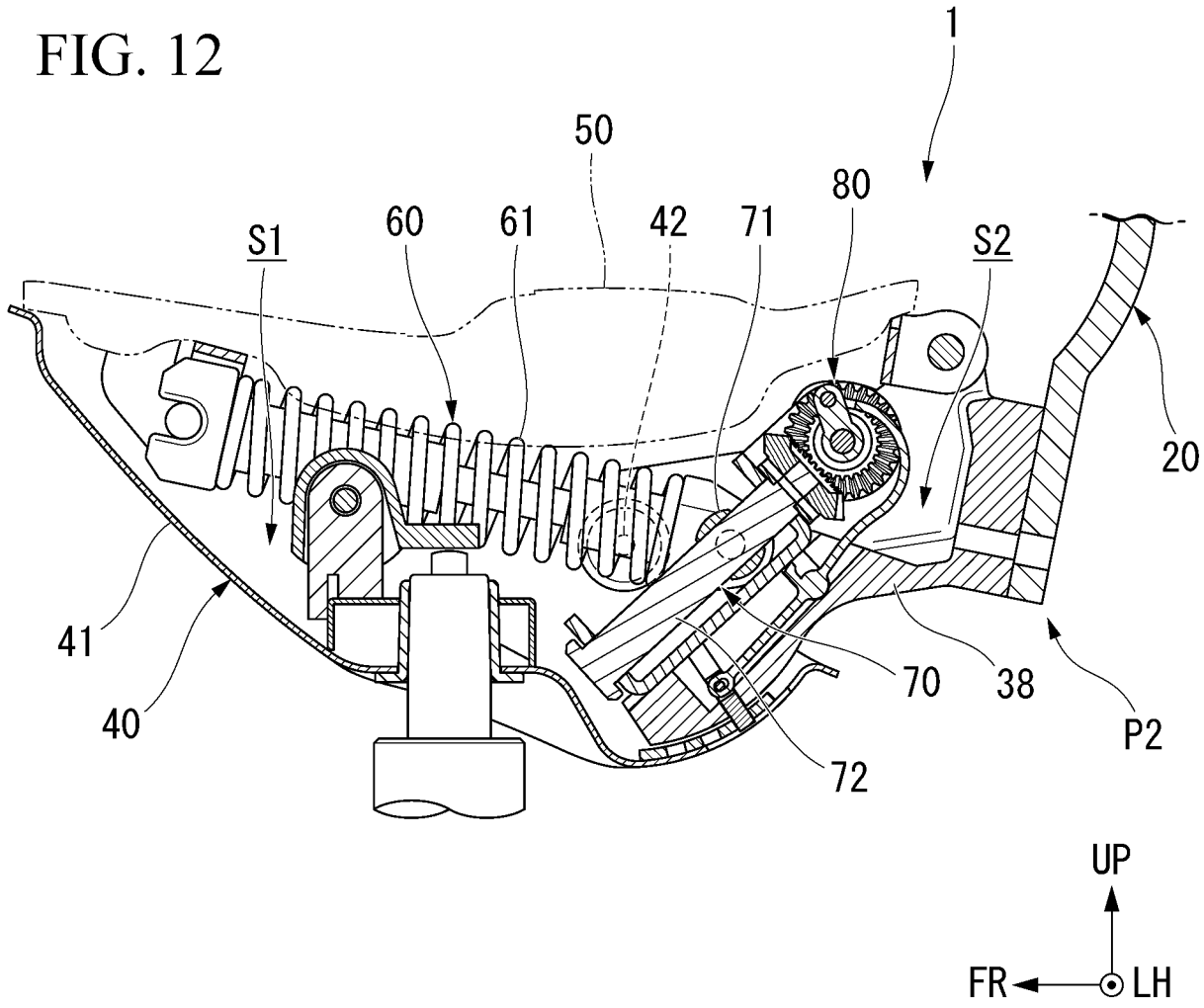


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/009723

A. CLASSIFICATION OF SUBJECT MATTER

A47C 7/44(2006.01)i; ***A47C 3/026***(2006.01)i
FI: A47C7/44; A47C3/026

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)

A47C7/44; A47C3/02-3/03

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

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2015-92901 A (QUALI KK) 18 May 2015 (2015-05-18) paragraphs [0015]-[0021], fig. 1-3	1, 4-6
A		2-3, 7-8
A	JP 2008-302082 A (ITOKI CORP.) 18 December 2008 (2008-12-18)	1-8
A	JP 2009-165662 A (KOKUYO CO., LTD.) 30 July 2009 (2009-07-30)	1-8
A	JP 6-38849 A (MEEKOO KOGYO KK) 15 February 1994 (1994-02-15)	1-8

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
06 April 2022	**19 April 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/009723

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2015-92901 A	18 May 2015	(Family: none)	
JP 2008-302082 A	18 December 2008	(Family: none)	
JP 2009-165662 A	30 July 2009	US 2010/0244521 A1 WO 2009/090770 A1 EP 2233043 A1 CN 101909488 A	
JP 6-38849 A	15 February 1994	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2021155841 A **[0002]**
- JP H8214983 A **[0005]**