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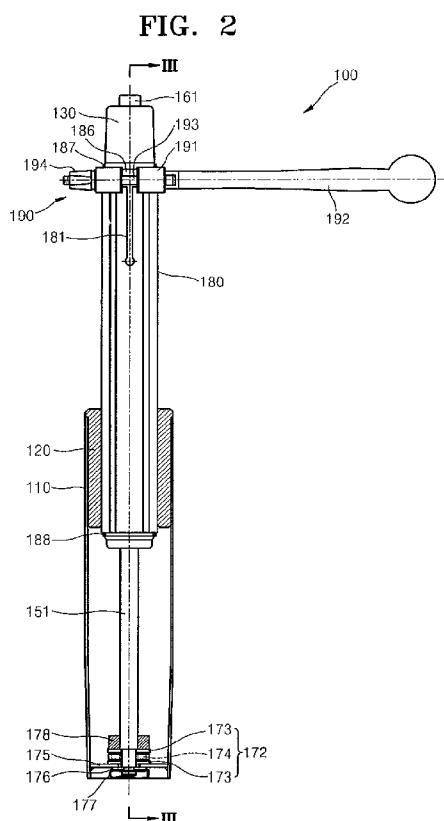
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(54) Title: A GAS CYLINDER



(57) Abstract: Provided is a gas cylinder, and more particularly, a gas cylinder for a chair that allows a user to select a height adjustable swivel chair function or a height adjustable non-swivel chair function as desired. The gas cylinder includes a spindle for performing an up and down reciprocating movement according to height adjustment; a cylinder mounted in the spindle and internally filled with a gas; a piston member for partitioning the inside of the cylinder into an upper part and a lower part; a valve member for sealing the upper part of the cylinder and for controlling an inflow and outflow of the gas filling the cylinder; a spindle guide to which at least a portion of the sleeve is inserted; and a tightening member for adjusting a separation distance between the sleeve and the spindle.



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A GAS CYLINDER

TECHNICAL FIELD

The present invention relates to a gas cylinder, and more particularly, to a gas cylinder for a chair that allows a user to select a height adjustable swivel chair function or a height adjustable non-swivel chair function as desired.

BACKGROUND ART

In general, a gas cylinder, which is applied to a chair, is formed of a base tube and a gas spindle which can move up and down so that a seat height of the chair can be adjusted.

FIG. 1 is a cross-sectional view of a structure of a conventional gas cylinder 10.

Referring to FIG. 1, the gas cylinder 10 includes a spindle 13 connected to a lower end of a chair seat, a base tube 11 for supporting the spindle 13, and a tube guide 12 inserted between the base tube 11 and the spindle 13 so as to prevent the spindle 13 from inclining to one side when the spindle 13 moves up or down.

To be more specific, the gas cylinder 10 includes a piston 23 performing an up and down reciprocating movement in the spindle 13, a piston load 22 on which the piston 23 is loaded, and a cylinder 16 being in a surface contact with an O-ring that is inserted toward an inner circumferential surface of the spindle 13 and thus mounted on an outer circumferential surface of the piston 23. Here, the cylinder 16 is divided into an upper chamber 20 and a lower chamber 21 by the piston 23.

The gas cylinder 10 also includes a gas sealing unit 24 for sealing a lower end of the cylinder 16, a pipe holder 17 for sealing an upper end of the cylinder 16, an opening-and-closing pin 15 inserted by penetrating a center of the pipe holder 17, and an open pin 14 for adjusting an opening and closing of the opening-and-closing pin 15 by moving up or down.

To be more specific, an orifice 18 for a flow of a gas is formed on one side of the pipe holder 17, and the orifice 18 is opened and closed by the opening-and-closing

pin 15. A gas flow path 19 along which a gas flows is formed between the cylinder 16 and the spindle 13, wherein the gas is exhausted via the orifice 18.

Hereinafter, functions of the conventional gas cylinder 10 including the above mentioned structure will be described by using a procedure example in which a user
5 sits on a seat of a chair.

First, when the user raises or lowers an operational lever (not shown) connected to the open pin 14 when sitting down on the seat, the open pin 14 is pressurized. When the open pin 14 is pressurized in a downward direction, the opening-and-closing pin 15 falls. When the opening-and-closing pin 15 falls, a gas
10 stored in the upper chamber 20 flows to the orifice 18 along a side surface of the opening-and-closing pin 15. After that, the gas that flowed to the orifice 18 flows to the lower chamber 21 along the gas flow path 19. Thus, a volume of the lower chamber 21 becomes greater than a volume of the upper chamber 20 so that the spindle 13 falls. When the user releases a force applied to the operational lever, the
15 flow of gas is discontinued. Thus, the chair is fixed at a user desired height.

By using the conventional gas cylinder 10 that operates according to the above mentioned principle, it is possible to adjust the height of the chair. Also, since a cross-section of an outer circumferential surface of the spindle 13 and a cross-section of an inner circumferential surface of the tube guide 12 are formed to be
20 circular-shaped, the spindle 13 can freely swivel with respect to the tube guide 12. In other words, by using the conventional gas cylinder 10, it is possible to simultaneously perform height adjustment and swivel the chair.

Meanwhile, a user may desire to only adjust the height of a chair and not to swivel the chair. In this case, although not illustrated in the drawings, a gas cylinder
25 may be developed for a chair whose direction is fixed in one direction at the time of manufacture so that a swivel function is unavailable but whose height can still be adjusted. For example, in the case where the cross-section of the outer circumferential surface of the spindle 13 and the cross-section of the inner circumferential surface of the tube guide 12 are formed to have polygonal-shapes
30 which are the same, a swivel function of the spindle 13 is disabled with respect to the tube guide 12. That is, in this case, it is possible to adjust the height of the chair but it is not possible to swivel the chair.

As described above, swivel chairs and non-swivel chairs separately exist from among conventional height adjustable chairs. However, since a chair may be used for various purposes, there is an increasing demand for development of a gas cylinder for a chair, which allows a user to select the chair to function as a height adjustable swivel chair or a height adjustable non-swivel chair as desired.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of a structure of a conventional gas cylinder.

FIG. 2 is a front view of a structure of a gas cylinder according to a first embodiment of the present invention.

FIG. 3 is a cross-sectional view of the gas cylinder of FIG. 2, taken along a line III-III'.

FIG. 4 is a front view of the gas cylinder of FIG. 2, in which a tightening member is unfastened to allow both chair swivel and chair height adjustment to be possible.

FIG. 5 is a front view of the gas cylinder of FIG. 2, in which the tightening member is tightened to disable chair swivel but still enable chair height adjustment.

FIG. 6 is a plane view of a tightening unit of the gas cylinder of FIG. 2.

FIG. 7 is a plane view of a tightening member supporter of the gas cylinder of FIG. 2.

FIG. 8 is a plane view of a tightening lever of the gas cylinder of FIG. 2.

FIG. 9 is a plane view for illustrating chair swivel and the operation of the tightening lever of the tightening member in the gas cylinder of FIG. 2.

FIG. 10 is a horizontal cross-sectional view of a sleeve of the gas cylinder according to the first embodiment of the present invention.

FIG. 11 is a horizontal cross-sectional view of a spindle guide of the gas cylinder according to the first embodiment of the present invention.

FIG. 12 is a horizontal cross-sectional view of a sleeve of the gas cylinder according to a revised embodiment of the first embodiment of the present invention.

FIG. 13 is a horizontal cross-sectional view of a spindle guide of the gas cylinder according to the revised embodiment of the first embodiment of the present invention.

FIG. 14 is a horizontal cross-sectional view of a sleeve of the gas cylinder according to another revised embodiment of the first embodiment of the present invention.

FIG. 15 is a horizontal cross-sectional view of a spindle guide of the gas cylinder according to the other revised embodiment of the first embodiment of the present invention.

FIG. 16 is a front view of a gas cylinder according to another revised embodiment of the first embodiment of the present invention.

FIG. 17 is a front view of a structure of a gas cylinder according to a second embodiment of the present invention.

FIG. 18 is a front view of the gas cylinder of FIG. 17, in which a tightening member is unfastened to allow both chair swivel and chair height adjustment to be possible.

FIG. 19 is a front view of the gas cylinder of FIG. 17, in which the tightening member is tightened to disable chair swivel but still enable chair height adjustment.

FIG. 20 is a front cross-sectional view of a gas cylinder according to a third embodiment of the present invention.

FIG. 21 is a front cross-sectional view of a gas cylinder according to a fourth embodiment of the present invention.

FIG. 22 is a horizontal cross-sectional view of the gas cylinder of FIG. 21.

FIG. 23 is a perspective view of the tightening member of the gas cylinder of FIG. 2.

FIG. 24 is a front cross-sectional view of a gas cylinder according to a fifth embodiment of the present invention.

FIG. 25 is a front view of a gas cylinder according to a sixth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

TECHNICAL PROBLEM

The present invention provides a gas cylinder for a chair for allowing a user to select a desired function between a height adjustable swivel chair function and a height adjustable non-swivel chair function.

TECHNICAL SOLUTION

According to an aspect of the present invention, there is provided a gas cylinder which is comprised in a chair and is formed in such a manner that a swivel function of a
5 seat of the chair can be enabled or disabled, wherein the seat is coupled to the gas cylinder.

The gas cylinder may include a spindle; and a sleeve formed to surround at least a portion of an outer circumferential surface of the spindle, wherein whether or not to swivel the seat is controlled by whether the spindle is tightly coupled to the
10 sleeve.

According to another aspect of the present invention, there is provided a gas cylinder including a spindle for performing an up and down reciprocating movement according to height adjustment; a cylinder mounted in the spindle and internally filled with a gas; a piston member for partitioning the inside of the cylinder into an upper part
15 and a lower part; a valve member for sealing the upper part of the cylinder and for controlling an inflow and outflow of the gas internally filling the cylinder; a sleeve formed to surround at least a portion of an outer circumferential surface of the spindle; a spindle guide to which at least a portion of the sleeve is inserted; and a tightening member for adjusting a separation distance between the sleeve and the spindle.

When the tightening member is tightened, the sleeve may be tightly coupled to the spindle, and when the tightening member is loosened, the sleeve is slightly separated from the spindle.
20

A groove may be formed in at least a portion of the sleeve, and when the tightening member is tightened, a width of the groove may be decreased whereby the sleeve is elastically deformed.
25

When the tightening member is tightened, an internal diameter of the sleeve may be decreased whereby the sleeve may be tightly coupled to the spindle.

The tightening member may include a tightening unit having a ring shape in which an opening is formed, and a tightening lever disposed in the tightening unit so as
30 to decrease a gap between the opening and the tightening unit.

The tightening lever may include a short radius whose length from a center of the tightening lever is relatively small, and a long radius whose length from the center of the tightening lever is relatively large.

When the tightening unit contacts the long radius of the tightening lever, the tightening unit may be tightened, and when the tightening unit contacts the short radius of the tightening lever, the tightening unit may be loosened.

5 A cross-section of the outer circumferential surface of the spindle and a cross-section of an inner circumferential surface of the sleeve may have substantially the same circular shapes whereby the spindle may be enabled to swivel with respect to the sleeve.

10 A cross-section of an outer circumferential surface of the sleeve and a cross-section of an inner circumferential surface of the spindle guide may have substantially the same polygonal shapes.

15 A protrusion may be formed in one of an outer circumferential surface of the sleeve and an inner circumferential surface of the spindle guide, and a groove corresponding to the protrusion may be formed in the other one of the outer circumferential surface of the sleeve and the inner circumferential surface of the spindle guide.

A bushing having a hollow cylindrical shape may be formed on an upper end of the sleeve, and the tightening member may be disposed outside the bushing.

20 A tightening member supporter having a ring shape may be formed in an upper part of the spindle, and a groove may be formed in one of the tightening member and the tightening member supporter and a protrusion corresponding to the groove may be formed in the other one, whereby the tightening member may be inserted into the tightening member supporter.

25 The tightening member may include a tightening unit having a ring shape whose inner surface is stepped; and a tightening screw inserted into the tightening unit, wherein the tightening unit is coupled to the sleeve.

When the tightening screw is tightened, the spindle may be fixed with respect to the sleeve, and when the tightening screw is loosened, the spindle may be enabled to swivel with respect to the sleeve.

30 The tightening member may include a tightening unit comprising a body unit in which an opening is formed, and protrusions which protrude from both ends of the body unit and which each have an individual through hole; and a tightening lever inserted into each through hole, wherein screw units with shapes corresponding to each other are respectively formed in each through hole and tightening lever.

When the tightening lever swivels in one direction, the protrusions of the tightening unit may be close to each other, and when the tightening lever swivels in a direction opposite to the one direction, the protrusions of the tightening unit may be separated from each other.

5 According to another aspect of the present invention, there is provided a gas cylinder including a spindle for performing an up and down reciprocating movement according to height adjustment; a cylinder mounted in the spindle and internally filled with a gas; a piston member for partitioning the inside of the cylinder into an upper part and a lower part; a valve member for sealing the upper part of the cylinder and for
10 controlling an inflow and outflow of the gas internally filling the cylinder; a sleeve for surrounding the spindle; a spindle guide for surrounding at least a portion of the sleeve; and a tightening member inserted into an outside of the sleeve, wherein the sleeve is coupled to the spindle guide, and the spindle is formed in such a manner that the
15 spindle is enabled to swivel with respect to the sleeve.

When the tightening member is tightened, the spindle may be fixedly coupled to the sleeve, and when the tightening member is loosened, the sleeve and the spindle may be enabled to swivel with respect to each other.

ADVANTAGEOUS EFFECTS

20 A gas cylinder according to one or more embodiments of the present invention can allow a user to select a desired function between a height adjustable swivel chair function and a height adjustable non-swivel chair function.

BEST MODE

25 < First embodiment >

FIG. 2 is a front view of a structure of a gas cylinder 100 according to a first embodiment of the present invention. FIG. 3 is a cross-sectional view of the gas cylinder 100 of FIG. 2, taken along a line III-III'.

Referring to FIGS. 2 and 3, the gas cylinder 100 according to the first
30 embodiment of the present invention includes a base tube 110, a spindle guide 120, a spindle 130, a cylinder 140, a piston member 150, a valve member 160, a sleeve 180 and a tightening member 190.

The base tube 110 acts as a main body of the gas cylinder 100. The spindle 130 is inserted into the base tube 110, thereby performing an up and down reciprocating movement.

The sleeve 180 is formed to surround an outer circumferential surface of the spindle 130. A predetermined groove 181 is formed in a portion of an upper part of the sleeve 180. A tightening member supporting unit 186 is formed on an outer circumferential surface of the upper part of the sleeve 180, and the tightening member 190 is inserted into the outer circumferential surface of the upper part of the sleeve 180, wherein the tightening member 190 is supported by the tightening member supporting unit 186. The tightening member 190 is formed to tighten the sleeve 180.

When the tightening member 190 tightens the sleeve 180, the sleeve 180 is tightly coupled to the spindle 130 so that the ability of the spindle 130 to swivel with respect to the sleeve 180 is disabled. On the other hand, when a pressure applied from the tightening member 190 to the sleeve 180 is released, the sleeve 180 and the spindle 130 are slightly separated from each other so that the spindle 130 is enabled to swivel with respect to the sleeve 180. Coupling among the spindle 130, the sleeve 180, the tightening member supporting unit 186, and the tightening member 190 will be described in detail with reference to FIGS. 4 through 9.

The spindle guide 120 is interposed between the base tube 110 and the sleeve 180, thereby supporting the spindle 130 and the sleeve 180. Here, a cross-section of an outer circumferential surface of the sleeve 180 and a cross-section of an inner circumferential surface of the spindle guide 120 may be formed to have substantially the same shapes. For example, the cross-section of the outer circumferential surface of the sleeve 180 and the cross-section of the inner circumferential surface of the spindle guide 120 may be formed to have the same polygonal-shapes. Otherwise, a protrusion may be formed in one of the outer circumferential surface of the sleeve 180 and the inner circumferential surface of the spindle guide 120 and a groove corresponding to the protrusion may be formed in the other one of the outer circumferential surface of the sleeve 180 and the inner circumferential surface of the spindle guide 120, so that the protrusion and the groove may be coupled to each other. In this manner, since the cross-section of the outer circumferential surface of the sleeve 180 and the cross-section of the inner circumferential surface of the spindle guide 120 are formed to have shapes corresponding to each other, the ability of the

sleeve 180 to swivel with respect to the spindle guide 120 is disabled. Coupling between the sleeve 180 and the spindle guide 120 will be described in detail with reference to FIGS. 10 through 15.

In addition, a separation preventing unit 187 may be further formed on an upper part of the tightening member 190. That is, the separation preventing unit 187 is forcibly inserted into an upper part of the spindle 130, thereby being formed on the upper part of the tightening member 190, so that the tightening member 190 is not separated in an upward direction.

Hereinafter, components related to an up and down reciprocating movement of the spindle 130 will be described.

The piston member 150 includes a piston load 151 inserted and fixed in the base tube 110, and a piston 152 mounted on an upper end of the piston load 151.

The cylinder 140 is mounted on an inner circumferential surface of the spindle 130, and thus is in surface contact with an outer circumferential surface of the piston 152. A gas sealing unit 170 for preventing a gas from leaking in a lower direction of the cylinder 140 is formed on a lower end of the cylinder 140. The gas sealing unit 170 includes gas sealing and a flange. By means of the gas sealing unit 170, the cylinder 140 remains at a constant pressure.

To be more specific, the cylinder 140 forms a gas chamber 141 having a predetermined length by means of the valve member 160 and the gas sealing unit 170, wherein a gas such as nitrogen is injected into the gas chamber 141. The gas chamber 141 is divided into an upper chamber 141a and a lower chamber 141b by the piston 152. Due to the up and down reciprocating movement of the spindle 130, volumes of the upper chamber 141a and the lower chamber 141b are changed.

Here, the upper chamber 141a and the lower chamber 141b constantly remain at a pressure higher than an air pressure. A gas flow path 135 is formed between the cylinder 140 and the spindle 130, wherein a gas between the upper chamber 141a and the lower chamber 141b flows along the gas flow path 135.

Meanwhile, the valve member 160 is formed at an upper end of the cylinder 140 so as to seal an upper part of the cylinder 140 and to control an inflow and outflow of a gas. To be more specific, the valve member 160 includes a pipe holder 163 for sealing the upper part of the cylinder 140, an opening-and-closing pin 162 mounted by penetrating a center of the pipe holder 163 so as to allow a gas in the cylinder 140 to

be exhausted, an open pin 161 formed on an upper part of the opening-and-closing pin 162 so as to press the opening-and-closing pin 162, and an orifice 164 formed in the pipe holder 163, wherein a gas filled in the cylinder 140 flows in and out via the orifice 164.

5 The open pin 161 is mounted on an upper part of the spindle 130 in a manner that the open pin 161 protrudes from a top surface of the spindle 130 by having a predetermined height. Also, the open pin 161 is connected to an operational lever (not shown) so as to fall when the operational lever is pressed or lowered.

10 Meanwhile, a lower end of the piston load 151 is mounted and fixed on a lower end of the base tube 110. To be more specific, a bottom part of the piston load 151 is supported and fixed by a fixing plate 175 mounted on the lower end of the base tube 110. A fixing pin 177 is coupled to a lower end of the piston load 151, thereby preventing the piston load 151 from being separated from the fixing plate 175. A washer 176 is inserted between the fixing plate 175 and the fixing pin 177. This
15 washer 176 functions to prevent the fixing plate 175 from being damaged due to direct contact with the fixing pin 177.

20 Also, a bearing 172 is formed on an upper part of the fixing plate 175, and a buffering member 178 is formed on the bearing 172. To be more specific, the bearing 172 includes a ball housing 174, on which a plurality of bearing balls are mounted, and a bearing supporter 173 formed on upper and lower parts of the ball housing 174. The buffering member 178, which is formed on the bearing 172, functions to lessen a shock that occurs due to a lower part of the spindle 130 colliding with the bearing 172 when the spindle 130 reaches its lowest position.

25 Hereinafter, a height adjustment mechanism of the gas cylinder 100 having the aforementioned structure will be described in relation to a manner in which a user sits on a chair.

30 First, when the user sits on the chair, the spindle 130 is slightly lowered due to a load corresponding to a body weight of the user. Thus, the volume of the upper chamber 141a is reduced such that a pressure in the cylinder 140 increases. That is, a previous pressure in the cylinder 140, wherein the previous pressure already exists before the user sits on the chair, and an additional pressure due to the body weight are applied to the upper chamber 141a.

In order to lower a height of the chair, the user sitting on the chair raises or lowers an operational lever connected to the open pin 161, thereby allowing the open pin 161 to be pressed. In this manner, when the open pin 161 is pressed in a lower direction, the opening-and-closing pin 162 contacting a lower part of the open pin 161 is also lowered along with the open pin 161. When the opening-and-closing pin 162 is lowered, the gas filled in the upper chamber 141a flows to the orifice 164 along a side surface of the opening-and-closing pin 162. The gas that flows to the orifice 164 flows along the gas flow path 135 to the lower chamber 141b. In this manner, the volume of the lower chamber 141b becomes greater than the volume of the upper chamber 141a so that the spindle 130 is lowered. After that, when the user releases a force applied to the operational lever, the flow of the gas is discontinued. Thus, the chair is fixed at a user desired height.

Hereinafter, components related to controlling a swivel movement of the gas cylinder 100 will be described.

FIG. 4 is a front view of the gas cylinder 100 of FIG. 2, in which a tightening member is loosened to allow both chair swivel and chair height adjustment to be possible. FIG. 5 is a front view of the gas cylinder 100 of FIG. 2, in which the tightening member is tightened to disable chair swivel but still enable chair height adjustment to be possible. FIG. 6 is a plane view of a tightening unit of the gas cylinder 100 of FIG. 2. FIG. 7 is a plane view of a tightening member supporter of the gas cylinder 100 of FIG. 2. FIG. 8 is a plane view of a tightening lever of the gas cylinder 100 of FIG. 2. FIG. 9 is a plane view for illustrating chair swivel and the operation of the tightening lever of the tightening member in the gas cylinder 100 of FIG. 2. FIG. 23 is a perspective view of the tightening member of the gas cylinder 100 of FIG. 2.

Referring to FIGS. 4 through 9, mutual coupling among a spindle 130, a sleeve 180, a tightening member 190, and a spindle guide 120 allows a user to select a desired function between a height adjustable swivel chair function and a height adjustable non-swivel chair function.

In other words, the sleeve 180 and the spindle guide 120 are coupled in such a manner that they cannot swivel with respect to each other but can only move up and down. The sleeve 180 and the spindle 130 are coupled in a manner that, when the tightening member 190 is tightened, they are tightly coupled and the ability to swivel

with respect to each other is disabled. However, when the tightening member 190 is loosened, the coupling is slightly loose so that they can swivel with respect to each other.

To be more specific, a cross-section of an outer circumferential surface of the sleeve 180 and a cross-section of an inner circumferential surface of the spindle guide 120 may have substantially the same polygonal shapes. For example, the cross-section of the outer circumferential surface of the sleeve 180 and the cross-section of the inner circumferential surface of the spindle guide 120 may have the same polygonal shapes such as a triangle, a quadrangle, a hexagon, etc.

Otherwise, a protrusion may be formed in one of the outer circumferential surface of the sleeve 180 and the inner circumferential surface of the spindle guide 120 and at least one groove corresponding to the protrusion may be formed in the other one of the outer circumferential surface of the sleeve 180 and the inner circumferential surface of the spindle guide 120, so that the protrusion and the groove may be coupled.

(Various shapes of the outer circumferential surface of the sleeve 180 and the inner circumferential surface of the spindle guide 120 will be described later with reference to FIGS. 10 through 15.) In this manner, since the outer circumferential surface of the sleeve 180 and the inner circumferential surface of the spindle guide 120 are formed to have shapes corresponding to each other, the ability of the sleeve 180 to swivel with respect to the spindle guide 120 is disabled. However, the sleeve 180 is enabled to move up and down with respect to the spindle guide 120.

On the other hand, the sleeve 180 is formed as a hollow cylindrical shape so as to surround an outer circumferential surface of the spindle 130. Here, a cross-section of an inner circumferential surface of the sleeve 180 and a cross-section of the outer circumferential surface of the spindle 130 are formed to be circular-shaped. Also, a diameter of the inner circumferential surface of the sleeve 180 is slightly greater than a diameter of the outer circumferential surface of the spindle 130. Thus, the spindle 130 is enabled to swivel in the inner circumferential surface of the sleeve 180.

Meanwhile, at least one predetermined groove 181 may be formed on a portion of an upper part of the sleeve 180. Due to the groove 181, a cross-section of an upper end of the sleeve 180 may be 'C'-shaped and a portion of the upper end may be open. Thus, when the tightening member 190 is tightened, the open portion may be elastically deformed to some extent so that the sleeve 180 may be very tightly coupled

to the spindle 130, thereby preventing the spindle 130 from swivelling with respect to the sleeve 180. Also, when the tightened tightening member 190 is loosened, the open portion recovers its original form, and thus, the spindle 130 is slightly separated from the sleeve 180 so that the spindle 130 is enabled to swivel with respect to the sleeve 180.

Here, the tightening member 190 includes a tightening unit 191, a tightening lever 192, a bolt 193, and an adjusting nut 194.

Referring to FIG. 6, the tightening unit 191 includes a cylindrical-shaped body 191a having an opening 191b which is formed on a side of the body 191a, and protrusions 191c and 191d which are protruded from both ends of the body 191a. In the protrusions 191c and 191d, a through hole 191g may be further formed so as to allow the bolt 193 to be inserted therethrough. Also, a concave shaped lever loader 191h may be further formed in the protrusion 191d, thereby allowing the tightening lever 192 to be loaded therein. Also, a groove 191e may be further formed in an inner side surface of the body 191a in the tightening unit 191. By allowing an upper part of an inner circumferential surface of the body 191a in the tightening unit 191 to slightly protrude, a prominence 191f may be formed in the upper part of the inner circumferential surface of the body 191a (refer to a dotted line of FIG. 6).

Referring to FIG. 7, the tightening member supporting unit 186 is circular-shaped, and a protrusion 186a is formed on an outer circumferential surface of the tightening member supporting unit 186. The tightening member supporting unit 186 and the spindle 130 may be formed in one body or may be manufactured as independent components and then coupled together by using an adhesive or the like.

A diameter of the outer circumferential surface of the tightening member supporting unit 186 may be almost the same as a diameter of an inner circumferential surface of the tightening unit 191. Thus, when the tightening unit 191 is inserted into the spindle 130, the prominence 191f of the tightening unit 191 is held in place in the tightening member supporting unit 186. Also, when the tightening unit 191 is inserted into the spindle 130, the protrusion 186a of the tightening member supporting unit 186 is inserted into the groove 191e of the tightening unit 191.

By coupling the groove 191e of the tightening unit 191 and the protrusion 186a of the tightening member supporting unit 186, the tightening member 190 and the spindle 130 swivel together. By doing so, no matter which direction the user swivels a

chair having the gas cylinder 100, a relative location of the tightening lever 192 with respect to the user is always the same, and thus, the user may conveniently manipulate the chair.

Meanwhile, referring to FIG. 8, a head 192a of the tightening lever 192 may have an asymmetrical curved surface. In other words, the head 192a may include a short radius 192d whose length R2 from a center of a rotation axis of the head 192a is relatively short, and a long radius 192c whose length R1 from the center of the rotation axis of the head 192a is relatively long. The oval-shaped head 192a may be loaded in the lever loader 191h which is formed in the protrusion 191d of the tightening unit 191.

Referring to FIGS. 9 and 23, the bolt 193 is inserted into the through hole 191g in the protrusions 191c and 191d of the tightening unit 191. Also, the adjusting nut 194 is coupled to one side end of the bolt 193, and the tightening lever 192 is coupled to the other side end of the bolt 193. To be more specific, a rotation axis 192b is formed in an approximate center of the head 192a, and the other side end of the bolt 193 is coupled to the rotation axis 192b. By doing so, the tightening lever 192 can swivel around the rotation axis 192b in a direction indicated by an arrow of FIG. 9.

An operation of the tightening member 190 will be described below.

First, as shown in FIG. 4 and in a B state of FIG. 9, the tightening lever 192 is loosened. In this B state, the short radius 192d of the oval-shaped head 192a is in contact with the tightening unit 191, and thus, no force is being applied to the tightening unit 191. Accordingly, no force is being applied to the opening 191b or to the protrusions 191c and 191d which protrude at both ends of the opening 191b so that a distance between the protrusion 191c and the protrusion 191d is remains constant at an initial state (a distance D). That is, since the tightening member 190 is loose, the spindle 130 and the sleeve 180 are slightly separated from each other so that the spindle 130 is enabled to swivel with respect to the sleeve 180.

On the other hand, as shown in FIG. 5 and in an A state of FIG. 9, the tightening lever 192 is tightened. In this A state, the long radius 192c of the oval-shaped head 192a is in contact with the tightening unit 191, and thus, a force is applied to the tightening unit 191 so as to gather the protrusion 191c and the protrusion 191d toward each other. Accordingly, the opening 191b and the protrusions 191c and 191d, which protrude at both ends of the opening 191b, are applied with the force causing them to be become close to each other, and are elastically deformed to some extent so that the

distance between the protrusion 191c and the protrusion 191d is smaller than the initial state (a distance D'). In this manner, when the tightening unit 191 is tightened, a portion where the groove 181 of the sleeve 180 is formed, wherein the sleeve 180 is internally coupled to the tightening unit 191, is also elastically deformed to some extent so that the sleeve 180 is very tightly coupled to the spindle 130, so that the ability of the spindle 130 to swivel with respect to the sleeve 180 is disabled.

According to the aforementioned structure, it is possible to allow a user to select a user desired function between a height adjustable swivel chair function and a height adjustable non-swivel chair function.

FIG. 10 is a horizontal cross-sectional view of the sleeve 180 of the gas cylinder 100 according to the first embodiment of the present invention. FIG. 11 is a horizontal cross-sectional view of the spindle guide 120 of the gas cylinder 100 according to the first embodiment of the present invention.

Referring to FIGS. 10 and 11, a cross-section of an inner circumferential surface 180b of the sleeve 180 is approximately circular-shaped. Also, a cross-section of an outer circumferential surface of the spindle 130 is approximately circular-shaped. A diameter of the inner circumferential surface 180b of the sleeve 180 is slightly greater than a diameter of the outer circumferential surface of the spindle 130. Thus, the spindle 130 can swivel in the sleeve 180.

Meanwhile, a cross-section of an outer circumferential surface 180a of the sleeve 180 has a polygonal-shape. Also, an inner circumferential surface 120a of the spindle guide 120 has a polygonal-shape that is substantially the same as that of the outer circumferential surface 180a of the sleeve 180. Referring to FIGS. 10 and 11, the cross-section of the inner circumferential surface 120a of the spindle guide 120 and the cross-section of the outer circumferential surface 180a of the sleeve 180 are hexagonally-shaped but embodiments of the present invention are not limited thereto. That is, as long as the cross-section of the inner circumferential surface 120a of the spindle guide 120 and the cross-section of the outer circumferential surface 180a of the sleeve 180 have the same shapes allowing them to be combined together, the cross-sections may have a variety of polygonal shapes such as a triangle, a quadrangle, a pentagon, etc. In this manner, the inner circumferential surface 120a of the spindle guide 120 and the outer circumferential surface 180a of the sleeve 180 have the same shapes corresponding to each other, and are coupled to each other,

and thus, the ability of the sleeve 180 to swivel with respect to the spindle guide 120 is disabled.

FIG. 12 is a horizontal cross-sectional view of a sleeve 280 of the gas cylinder 100 according to a revised embodiment of the first embodiment of the present invention. FIG. 13 is a horizontal cross-sectional view of a spindle guide 220 of the gas cylinder 100 according to the revised embodiment of the first embodiment of the present invention.

Referring to FIGS. 12 and 13, a cross-section of an inner circumferential surface 280b of the sleeve 280 is approximately circular-shaped. Also, a cross-section of an outer circumferential surface of a spindle is approximately circular-shaped. A diameter of the inner circumferential surface 280b of the sleeve 280 is formed to be slightly greater than a diameter of the outer circumferential surface of the spindle. By doing so, the spindle can swivel in the sleeve 280.

Meanwhile, a cross-section of an outer circumferential surface 280a of the sleeve 280 is approximately circular-shaped, and a predetermined number of grooves 280c are formed in the outer circumferential surface 280a of the sleeve 280. Also, an inner circumferential surface 220a of the spindle guide 220 is has a circular-shape that is substantially the same as that of the outer circumferential surface 280a of the sleeve 280, and a predetermined number of protrusions 220b are formed in the inner circumferential surface 220a of the spindle guide 220. Referring to FIGS. 12 and 13, three grooves and three protrusions are respectively formed in the outer circumferential surface 280a of the sleeve 280 and in the inner circumferential surface 220a of the spindle guide 220 but embodiments of the present invention are not limited thereto. That is, as long as the protrusions 220b of the inner circumferential surface 220a of the spindle guide 220 are inserted into the grooves 280c of the outer circumferential surface 280a of the sleeve 280, the number of grooves and protrusions is not limited. In this manner, the inner circumferential surface 220a of the spindle guide 220 and the outer circumferential surface 280a of the sleeve 280 are formed to have the same shapes corresponding to each other, and are coupled to each other. Thus, the ability of the sleeve 280 to swivel with respect to the spindle guide 220 is disabled.

FIG. 14 is a horizontal cross-sectional view of a sleeve 380 of the gas cylinder 100 according to another revised embodiment of the first embodiment of the present invention. FIG. 15 is a horizontal cross-sectional view of a spindle guide 320 of the

gas cylinder 100 according to the other revised embodiment of the first embodiment of the present invention.

Referring to FIGS. 14 and 15, a cross-section of an inner circumferential surface 380b of the sleeve 380 is approximately circular-shaped. Also, a cross-section of an outer circumferential surface of a spindle is approximately circular-shaped. A diameter of the inner circumferential surface 380b of the sleeve 380 is slightly greater than a diameter of the outer circumferential surface of the spindle. Thus, the spindle can swivel in the sleeve 380.

Meanwhile, a cross-section of an outer circumferential surface 380a of the sleeve 380 is approximately circular-shaped, and a predetermined number of protrusions 380c are formed in the outer circumferential surface 380a of the sleeve 380. Also, an inner circumferential surface 320a of the spindle guide 320 has a circular-shape that is substantially the same as that of the outer circumferential surface 380a of the sleeve 380, and a predetermined number of grooves 320b are formed in the inner circumferential surface 320a of the spindle guide 320. Referring to FIGS. 14 and 15, six protrusions and six grooves are respectively formed in the outer circumferential surface 380a of the sleeve 380 and in the inner circumferential surface 320a of the spindle guide 320 but embodiments of the present invention are not limited thereto. That is, as long as the grooves 320b of the inner circumferential surface 320a of the spindle guide 320 and the protrusions 380c of the outer circumferential surface 380a of the sleeve 380 are combined together, the number of grooves and protrusions is not limited. In this manner, the outer circumferential surface 380a of the sleeve 380 and the inner circumferential surface 320a of the spindle guide 320 are formed to have the same shapes corresponding to each other, and are coupled to each other. Thus, the ability of the sleeve 380 to swivel with respect to the spindle guide 320 is disabled.

FIG. 16 is a front view of a gas cylinder 400 according to another revised embodiment of the first embodiment of the present invention.

Referring to FIG. 16, the gas cylinder 400 according to the other revised embodiment of the first embodiment of the present invention includes a sleeve 480 on which a bushing 481 is formed. To be more specific, a tightening member 490 needs to be inserted into an upper end of the sleeve 480. However, as described above with reference to FIGS. 10 and 15, a cross-section of an outer circumferential surface of the

sleeve 480 has a polygonal-shape or has one or more protrusions formed thereon. Thus, in order for the tightening member 490 to be inserted into the upper end of the outer circumferential surface of the sleeve 480, an inner circumferential surface of the tightening member 490 also needs to have a polygonal-shape or to have one or more grooves formed therein, similar to the outer circumferential surface of the sleeve 480. However, if the tightening member 490 is formed as described above, a manufacturing procedure becomes complicated and manufacturing costs increase. Thus, according to the other revised embodiment of the first embodiment of the present invention, the bushing 481 having a cylindrical shape is disposed on the upper end of the outer circumferential surface of the sleeve 480, wherein the tightening member 490 is inserted into the upper end. By doing so, manufacturing of the tightening member 490 is simplified. Here, the bushing 481 and the sleeve 480 may be formed in one body or may be manufactured as separate components and then coupled to each other after undergoing a coupling procedure such as a bonding procedure.

In this manner, by means of the other revised embodiment of the first embodiment of FIG. 16, a manufacturing procedure and manufacturing costs, which are related to the tightening member 490, may be respectively simplified and reduced.

MODE OF THE INVENTION

< Second embodiment >

The second embodiment of the present invention is the same as the first embodiment, except that coupling among the tightening member, the spindle, and the sleeve in the second embodiment is different from that in the first embodiment. Thus, detailed descriptions of components of the second embodiment, which are equal to those of the first embodiment, will be omitted here.

FIG. 17 is a front view of a structure of a gas cylinder 500 according to a second embodiment of the present invention. FIG. 18 is a front view of the gas cylinder 500 of FIG. 17, in which a tightening member is loosened to allow both chair swivel and chair height adjustment to be possible. FIG. 19 is a front view of the gas cylinder 500 of FIG. 17, in which the tightening member is tightened to disable chair swivel but still enable chair height adjustment to be possible.

A base tube 510 acts as a main body of the gas cylinder 500. A spindle 530 is inserted into the base tube 510, thereby performing an up and down reciprocating movement.

A sleeve 580 is formed to surround an outer circumferential surface of the spindle 530. A predetermined groove 581 is formed in a portion of an upper part of the sleeve 580. Meanwhile, a tightening member 590 is inserted into an outer circumferential surface of an upper part of the sleeve 580, and is used to tighten the sleeve 580. An upper part separation preventing unit 586 is formed on an upper part of the tightening member 590, thereby functioning to prevent the tightening member 590 from being separated in an upward or downward direction.

When the tightening member 590 tightens the sleeve 580, the sleeve 580 is tightly coupled to the spindle 530 so that the ability of the spindle 530 to swivel with respect to the sleeve 580 is disabled. On the other hand, when a pressure applied from the tightening member 590 to the sleeve 580 is released, the sleeve 580 and the spindle 530 are slightly separated from each other so that the spindle 530 can swivel with respect to the sleeve 580. Coupling among the spindle 530, the sleeve 580, the upper part separation preventing unit 586, and the tightening member 590 will be described in detail with reference to FIGS. 18 and 19.

A spindle guide 520 is interposed between the base tube 510 and the sleeve 580, thereby supporting the spindle 530 and the sleeve 580. Here, an outer circumferential surface of the sleeve 580 and an inner circumferential surface of the spindle guide 520 may have substantially the same shapes.

Hereinafter, components related to controlling a swivel movement of the gas cylinder 500 will be described.

Referring to FIGS. 18 and 19, mutual coupling among the spindle 530, the sleeve 580, the tightening member 590, and the spindle guide 520 allows a user to select a desired function between a height adjustable swivel chair function and a height adjustable non-swivel chair function.

In other words, the sleeve 580 and the spindle guide 520 are coupled in a manner that they cannot swivel with respect to each other but only can move up and down. The sleeve 580 and the spindle 530 are coupled in a manner that, when the tightening member 590 is tightened, they are tightly coupled and unable to swivel with

respect to each other. However, when the tightening member 590 is loosened, the coupling is slightly loose so that they can swivel with respect to each other.

To be more specific, a cross-section of an outer circumferential surface of the sleeve 580 and a cross-section of an inner circumferential surface of the spindle guide 520 may have substantially the same polygonal shapes. For example, the outer circumferential surface of the sleeve 580 and the inner circumferential surface of the spindle guide 520 may have the same polygonal shapes such as a triangle, a quadrangle, a hexagon, etc. Otherwise, a protrusion may be formed in one of the outer circumferential surface of the sleeve 580 and the inner circumferential surface of the spindle guide 520 and at least one groove corresponding to the protrusion may be formed in the other one of the outer circumferential surface of the sleeve 580 and the inner circumferential surface of the spindle guide 520, so that the protrusion and the groove may be coupled together. In this manner, since the outer circumferential surface of the sleeve 580 and the inner circumferential surface of the spindle guide 520 have shapes corresponding to each other, the ability of the sleeve 580 to swivel with respect to the spindle guide 520 is disabled. However, the sleeve 580 can move up and down with respect to the spindle guide 520.

On the other hand, the sleeve 580 is formed as a hollow cylindrical shape so as to surround an outer circumferential surface of the spindle 530. Here, a cross-section of an inner circumferential surface of the sleeve 580 and a cross-section of the outer circumferential surface of the spindle 530 are circular-shaped. Also, a diameter of the inner circumferential surface of the sleeve 580 is slightly greater than a diameter of the outer circumferential surface of the spindle 530. Thus, the spindle 530 can swivel in the inner circumferential surface of the sleeve 580.

Meanwhile, at least one predetermined groove 581 may be formed in a portion of an upper part of the sleeve 580. Due to the groove 581, a cross-section of an upper end of the sleeve 580 may be 'C'-shaped and a portion of the upper end may be open. Thus, when the tightening member 590 is tightened, the open portion may be elastically deformed to some extent so that the sleeve 580 may be very tightly coupled to the spindle 530, thereby disabling the ability of the spindle 530 to swivel with respect to the sleeve 580. Also, when the tightened tightening member 590 is loose, the open portion recovers its original form, and thus, the spindle 530 is slightly separated from the sleeve 580 so that the spindle 530 can swivel with respect to the sleeve 580.

Meanwhile, the tightening member 590 includes a tightening unit 591, a tightening lever 592, a bolt 593, and a nut 594.

Here, the second embodiment is different from the first embodiment in that the separate groove 191e (see FIG. 6) is not formed in the tightening unit 591, and the upper part separation preventing unit 586 is formed instead of the tightening member supporting unit 186 (see FIG. 7).

To be more specific, in the gas cylinder 100 according to the first embodiment of the present invention, by coupling the groove 191e of the tightening unit 191 to the protrusion 186a of the tightening member supporting unit 186, the tightening member 190 swivels along with the spindle 130.

On the other hand, in the gas cylinder 500 according to the second embodiment of the present invention, a separate groove or a separate protrusion is not formed in an inner circumferential surface of the tightening unit 591 and an outer circumferential surface of the upper part separation preventing unit 586, but instead, the inner and outer circumferential surfaces are formed to have a ring shape. Also, an external diameter of the upper part separation preventing unit 586 is greater than an internal diameter of the tightening unit 591. Thus, when the ring-shaped tightening unit 591 is inserted into the sleeve 580 and the upper part separation preventing unit 586 is forcibly inserted into an upper part of the tightening unit 591, the tightening unit 591 is not separated in an upward direction.

In this case, since the tightening member 590 is disposed outside the sleeve 580, although the spindle 530 swivels with respect to the sleeve 580, the tightening member 590 and the sleeve 580 do not swivel. That is, an absolute position of the tightening lever 592 is always constant.

An operation of the tightening member 590 will be described below.

First, in a state shown FIG. 18, the tightening lever 592 is loosened. In this state, a short radius of a head of the tightening lever 592 is in contact with the tightening unit 591, and thus, no force is being applied to the tightening unit 591. Accordingly, a distance between both protrusions of the tightening unit 591 is constantly maintained at an initial state (a distance D). That is, since the tightening member 590 is loose, the spindle 530 and the sleeve 580 are slightly separated from each other so that the spindle 530 can swivel with respect to the sleeve 580.

On the other hand, in a state shown in FIG. 19, the tightening lever 592 is tightened. In this state, a long radius of the head of the tightening lever 592 is in contact with the tightening unit 591, and thus, a force is applied to the tightening unit 591 so as to gather the protrusions toward each other. Accordingly, the protrusions of the tightening unit 591 are applied with the force causing them to become close to each other, and are elastically deformed to some extent so that the distance between the protrusions is smaller than the initial state (a distance D'). In this manner, when the tightening unit 591 is tightened, a portion where the groove 581 of the sleeve 580 is formed, wherein the groove 581 is internally coupled to the tightening unit 591, is also elastically deformed to some extent so that the sleeve 580 is very tightly coupled to the spindle 530, and eventually, the ability of the spindle 530 to swivel with respect to the sleeve 580 is disabled.

According to the aforementioned structure, it is possible to allow a user to select a user desired function between a height adjustable swivel chair function and a height adjustable non-swivel chair function.

<Third embodiment>

The third embodiment of the present invention is the same as the first embodiment, except that a structure of a tightening member in the third embodiment is different from that in the first embodiment. Thus, detailed descriptions of components of the third embodiment, which are equal to those of the first embodiment, will be omitted here.

FIG. 20 is a front cross-sectional view of a gas cylinder 600 according to the third embodiment of the present invention.

Referring to FIG. 20, a tightening member 690 of the gas cylinder 600 according to the third embodiment of the present invention includes a tightening unit 691 and a tightening screw 692.

The tightening unit 691 is formed as a hollow cylindrical shape whose inner surface is stepped at the middle of the hollow cylindrical shape. That is, the inner surface of the tightening unit 691 is formed of two steps respectively corresponding to a long diameter unit 691a and a small diameter unit 691b, wherein a diameter of the long diameter unit 691a is relatively greater than a diameter of the small diameter unit 691b. A support 693 is disposed at a lower part of the small diameter unit 691b of the

tightening unit 691, thereby supporting a fixed position of the tightening unit 691. Also, a separation preventing unit 694 is disposed at an upper part of the long diameter unit 691a of the tightening unit 691, thereby preventing the tightening unit 691 from being separated in an upward direction. The tightening unit 691 may be fixedly coupled to a sleeve 680 by undergoing a bonding procedure.

Meanwhile, a through hole 691c may be formed in the long diameter unit 691a so as to allow the tightening screw 692 to be inserted therein. Here, an external screw is formed in the tightening screw 692, and an internal screw corresponding to the external screw of the tightening screw 692 is formed in the through hole 691c. In this regard, according to a tightened state of the tightening screw 692, the ability of a spindle 630 to swivel with respect to the sleeve 680 is enabled or disabled.

When the tightening screw 692 is loosened to some extent, the spindle 630 can freely swivel with respect to the sleeve 680.

On the other hand, when the tightening screw 692 swivels to some extent, the tightening screw 692 applies a force in a direction to press the spindle 630, and also, the tightening unit 691 coupled to the tightening screw 692 is fixedly coupled to the sleeve 680. Thus, the ability of the spindle 630 to swivel with respect to the sleeve 680 is disabled.

According to the aforementioned structure, it is possible for a user to select a height adjustable swivel chair function or a height adjustable non-swivel chair function as desired.

<Fourth embodiment>

FIG. 21 is a front cross-sectional view of a gas cylinder 700 according to the fourth embodiment of the present invention. FIG. 22 is a horizontal cross-sectional view of the gas cylinder 700 of FIG. 21.

The fourth embodiment of the present invention is the same as the first embodiment, except that a structure of a tightening member in the fourth embodiment is different from that in the first embodiment. Thus, detailed descriptions of components of the fourth embodiment, which are equal to those of the first embodiment, will be omitted here.

Referring to FIGS. 21 and 22, a tightening member 790 of the gas cylinder 700 according to the fourth embodiment of the present invention includes a tightening unit 791, a supporting unit 792, and a tightening lever 793.

The tightening unit 791 includes a cylindrical-shaped body 791a having an opening 791b which is formed in a side of the body 791a, and protrusions 791c and 791d which protrude from both ends of the body 791a. A through hole 791e is further formed in the protrusions 791c and 791d, thereby allowing the tightening lever 793 to be inserted therein, and an internal screw is formed in the through hole 791e.

Meanwhile, the supporting unit 792 is inserted into a sleeve 780, and the tightening unit 791 is inserted into an upper part of the supporting unit 792. Here, a support 794 is disposed at a lower part of the supporting unit 792, thereby supporting a fixed position of the supporting unit 792. Also, the support 794 and the supporting unit 792 may be fixedly coupled to the sleeve 780 by undergoing a bonding procedure.

The tightening lever 793 is coupled to the through hole 791e in the protrusions 791c and 791d of the tightening unit 791. To be more specific, the tightening lever 793 includes a body unit 793a and an external screw unit 793b which is formed in the body unit 793a. This external screw unit 793b is coupled to the internal screw of the through hole 791e.

The protrusions 791c and 791d of the tightening unit 791 is close or distant from each other due to swivelling of the tightening lever 793, that is, due to swivelling of the external screw unit 793b that is swivelled by the internal screw.

When a distance between the protrusions 791c and 791d exceeds a threshold distance and is constantly maintained at the threshold distance, the tightening member 790 is loose, and a spindle 730 and the sleeve 780 are slightly separated from each other so that the spindle 730 can swivel with respect to the sleeve 780.

On the other hand, when the tightening lever 793 swivels in a direction to decrease the distance between the protrusions 791c and 791d, a force is applied to the tightening unit 791 in a direction to gather the protrusions 791c and 791d toward each other. Accordingly, the opening 791b and the protrusions 791c and 791d that protrude at both ends of the opening 791b are applied with the force causing them to become close to each other, and are elastically deformed to some extent so that the distance between the protrusion 791c and the protrusion 791d is smaller than an initial state. In this manner, when the tightening unit 791 is tightened, the sleeve 780, which

is internally coupled to the tightening unit 791, is also elastically deformed to some extent so that the sleeve 780 is very tightly coupled to the spindle 730, so that the ability of the spindle 730 to swivel with respect to the sleeve 780 is disabled.

According to the aforementioned structure, it is possible for a user to select a height adjustable swivel chair function or a height adjustable non-swivel chair function as desired.

<Fifth embodiment>

The fifth embodiment of the present invention is the same as the first embodiment, except that a structure of a tightening member in the fifth embodiment is different from that in the first embodiment. Thus, detailed descriptions of components of the fifth embodiment, which are equal to those of the first embodiment, will be omitted here.

FIG. 24 is a front cross-sectional view of a gas cylinder 800 according to the fifth embodiment of the present invention.

Referring to FIG. 24, the gas cylinder 800 according to the fifth embodiment of the present invention includes a base tube 810, a spindle guide 820, a spindle 830, a cylinder (not shown), a piston member (not shown), a valve member (not shown), a sleeve 880 and a tightening member 890.

To be more specific, the base tube 810 acts as a main body of the gas cylinder 800. The spindle 830 is inserted into the base tube 810, thereby performing an up and down reciprocating movement. The spindle guide 820 is interposed between the base tube 810 and the sleeve 880, thereby supporting the spindle 830 and the sleeve 880.

The sleeve 880 is inserted into an outer circumferential surface of the spindle 830 in such a manner that it contacts the spindle 830. At the same time, the sleeve 880 is disposed above the base tube 810 and the spindle guide 820. At this time, a ball bearing 871 may be interposed between the spindle guide 820 and the sleeve 880.

Meanwhile, a sleeve housing 885 may be disposed in outer circumferential surfaces of the base tube 810 and the sleeve 880 which is disposed above the base tube 810. At this time, a hole is formed in the sleeve housing 885, the base tube 810, and the spindle guide 820, wherein a spring pin 872 is inserted through the hole. By

doing so, the sleeve housing 885 may be fixedly coupled with the base tube 810 and the spindle guide 820.

Meanwhile, a through hole 885a may be formed in the sleeve housing 885 and also, a through hole 880a may be formed in the sleeve 880. Then, the screw-shaped tightening member 890 may be inserted through the through hole 885a and also the
5 through hole 880a. Here, according to a tightened state of the tightening member 890, the ability of the spindle 830 to swivel with respect to the sleeve 880 is enabled or disabled.

When the tightening member 890 is loosened to some extent, the spindle 830
10 can freely swivel with respect to the sleeve 880.

On the other hand, when the tightening member 890 swivels to some extent, the tightening member 890 applies a force in a direction to press the sleeve 880. Then, the sleeve 880 is very tightly coupled to the spindle 830 so that the ability of the spindle 830 to swivel with respect to the sleeve 880 is disabled.

According to the aforementioned structure, it is possible to allow a user to select
15 a height adjustable swivel chair function or a height adjustable non-swivel chair function as desired.

<Sixth embodiment>

FIG. 25 is a front view of a gas cylinder 900 according to a sixth embodiment of
20 the present invention.

The sixth embodiment of the present invention is the same as the first embodiment, except that possibility of chair height adjustment in the sixth embodiment is different from that in the first embodiment. Thus, detailed descriptions of
25 components of the sixth embodiment, which are equal to those of the first embodiment, will be omitted here.

Referring to FIG. 25, the gas cylinder 900 according to the sixth embodiment of the present invention includes a base tube 910, a spindle 930, a sleeve 980 and a
tightening member 990.

To be more specific, the base tube 910 acts as a main body of the gas cylinder
30 900. The spindle 930 is inserted into the base tube 910. The sleeve 980 is formed to surround an outer circumferential surface of the spindle 930. A predetermined groove 981 is formed in a portion of an upper part of the sleeve 980. The tightening

member 990 includes a tightening unit 991, a tightening lever 992, a bolt 993, and an adjusting nut 994.

When the tightening member 990 tightens the sleeve 980, the sleeve 980 is tightly coupled to the spindle 930 so that the ability of the spindle 930 to swivel with respect to the sleeve 980 is disabled. On the other hand, when a pressure applied by the tightening member 990 to the sleeve 980 is released, the sleeve 980 and the spindle 930 are slightly separated from each other so that the spindle 930 can swivel with respect to the sleeve 980.

Meanwhile, the sixth embodiment of the present invention does not include the open pin 161 (see FIG. 2) which is included in the first embodiment of the present invention. Thus, the gas cylinder 900 according to the sixth embodiment of the present invention does not perform chair height adjustment, and only performs chair swivel according to whether the spindle 930 is tightly coupled to the sleeve 980 by manipulating the tightening member 990. At this time, the gas cylinder 900 excluding an open pin may include components such as a cylinder (not shown), a piston member (not shown) and a valve member (not shown) which are related to the chair height adjustment, or may exclude all of the aforementioned components such as the cylinder, the piston member and the valve member.

According to the aforementioned structure, the chair height adjustment is not performed, and thus, it is only possible to select whether or not to perform the chair swivel.

While this invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. The exemplary embodiments should be considered in a descriptive sense only and not for purposes of limitation. Therefore, the scope of the invention is defined not by the detailed description of the invention but by the appended claims, and all differences within the scope will be construed as being included in the present invention.

CLAIMS

1. A gas cylinder which is comprised in a chair and is formed in such a manner that a swivel function of a seat of the chair can be enabled or disabled, wherein the seat is coupled to the gas cylinder.

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2. The gas cylinder of claim 1, comprising:

a spindle; and

a sleeve formed to surround at least a portion of an outer circumferential surface of the spindle,

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wherein whether or not to swivel the seat is controlled by whether the spindle is tightly coupled to the sleeve.

3. A gas cylinder comprising:

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a spindle for performing an up and down reciprocating movement according to height adjustment;

a cylinder mounted in the spindle and internally filled with a gas;

a piston member for partitioning the inside of the cylinder into an upper part and a lower part;

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a valve member for sealing the upper part of the cylinder and for controlling an inflow and outflow of the gas internally filling the cylinder;

a sleeve formed to surround at least a portion of an outer circumferential surface of the spindle;

a spindle guide to which at least a portion of the sleeve is inserted; and

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a tightening member for adjusting a separation distance between the sleeve and the spindle.

4. The gas cylinder of claim 3, wherein, when the tightening member is tightened, the sleeve is tightly coupled to the spindle, and when the tightening member is loosened, the sleeve is slightly separated from the spindle.

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5. The gas cylinder of claim 3, wherein a groove is formed in at least a portion of the sleeve, and when the tightening member is tightened, a width of the groove is decreased whereby the sleeve is elastically deformed.

6. The gas cylinder of claim 3, wherein, when the tightening member is tightened, an internal diameter of the sleeve is decreased whereby the sleeve is tightly coupled to the spindle.

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7. The gas cylinder of claim 3, wherein the tightening member comprises a tightening unit having a ring shape in which an opening is formed, and a tightening lever disposed in the tightening unit so as to decrease a gap between the opening and the tightening unit.

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8. The gas cylinder of claim 7, wherein the tightening lever comprises a short radius whose length from a center of the tightening lever is relatively small, and a long radius whose length from the center of the tightening lever is relatively large.

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9. The gas cylinder of claim 8, wherein, when the tightening unit contacts the long radius of the tightening lever, the tightening unit is tightened, and when the tightening unit contacts the short radius of the tightening lever, the tightening unit is loosened.

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10. The gas cylinder of claim 3, wherein a cross-section of the outer circumferential surface of the spindle and a cross-section of an inner circumferential surface of the sleeve have substantially the same circular shapes whereby the spindle is enabled to swivel with respect to the sleeve.

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11. The gas cylinder of claim 3, wherein a cross-section of an outer circumferential surface of the sleeve and a cross-section of an inner circumferential surface of the spindle guide have substantially the same polygonal shapes.

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12. The gas cylinder of claim 3, wherein a protrusion is formed in one of an outer circumferential surface of the sleeve and an inner circumferential surface of the spindle guide, and a groove corresponding to the protrusion is formed in the other one of the outer circumferential surface of the sleeve and the inner circumferential surface of the spindle guide.

13. The gas cylinder of claim 3, wherein a bushing having a hollow cylindrical shape is formed on an upper end of the sleeve, and the tightening member is disposed outside the bushing.

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14. The gas cylinder of claim 3, wherein a tightening member supporter having a ring shape is formed in an upper part of the spindle, and a groove is formed in one of the tightening member and the tightening member supporter and a protrusion corresponding to the groove is formed in the other one, whereby the tightening member is inserted into the tightening member supporter.

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15. The gas cylinder of claim 3, wherein the tightening member comprises:
a tightening unit having a ring shape whose inner surface is stepped; and
a tightening screw inserted into the tightening unit,
wherein the tightening unit is coupled to the sleeve.

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16. The gas cylinder of claim 15, wherein, when the tightening screw is tightened, the spindle is fixed with respect to the sleeve, and when the tightening screw is loosened, the spindle is enabled to swivel with respect to the sleeve.

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17. The gas cylinder of claim 3, wherein the tightening member comprises:
a tightening unit comprising a body unit in which an opening is formed, and protrusions which protrude from both ends of the body unit and which each have an individual through hole; and

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a tightening lever inserted into each through hole,
wherein screw units with shapes corresponding to each other are respectively formed in each through hole and tightening lever.

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18. The gas cylinder of claim 17, wherein, when the tightening lever swivels in one direction, the protrusions of the tightening unit are close to each other, and
wherein, when the tightening lever swivels in a direction opposite to the one direction, the protrusions of the tightening unit are separated from each other.

19. A gas cylinder comprising:

a spindle for performing an up and down reciprocating movement according to height adjustment;

a cylinder mounted in the spindle and internally filled with a gas;

a piston member for partitioning the inside of the cylinder into an upper part and a lower part;

a valve member for sealing the upper part of the cylinder and for controlling an inflow and outflow of the gas internally filling the cylinder;

a sleeve for surrounding the spindle;

a spindle guide for surrounding at least a portion of the sleeve; and

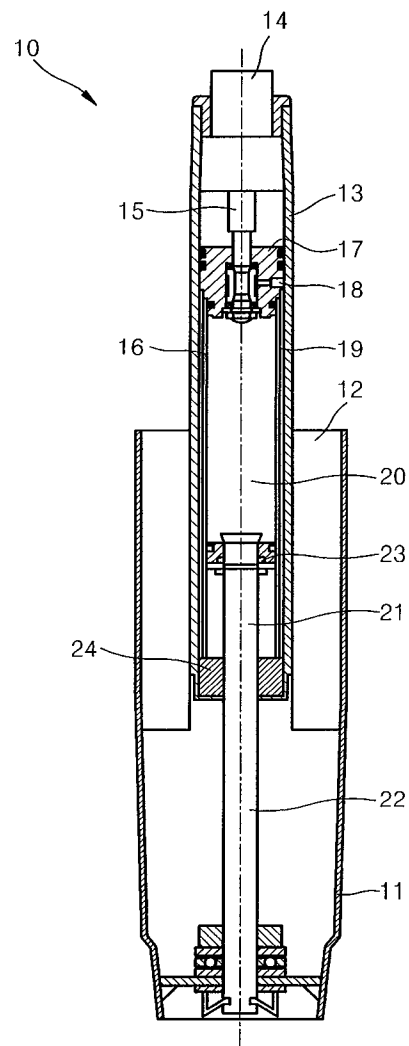
a tightening member inserted into an outside of the sleeve,

wherein the sleeve is coupled to the spindle guide, and the spindle is formed in such a manner that the spindle is enabled to swivel with respect to the sleeve.

20. The gas cylinder of claim 19, wherein, when the tightening member is tightened, the spindle is fixedly coupled to the sleeve, and when the tightening member is loosened, the sleeve and the spindle are enabled to swivel with respect to each other.

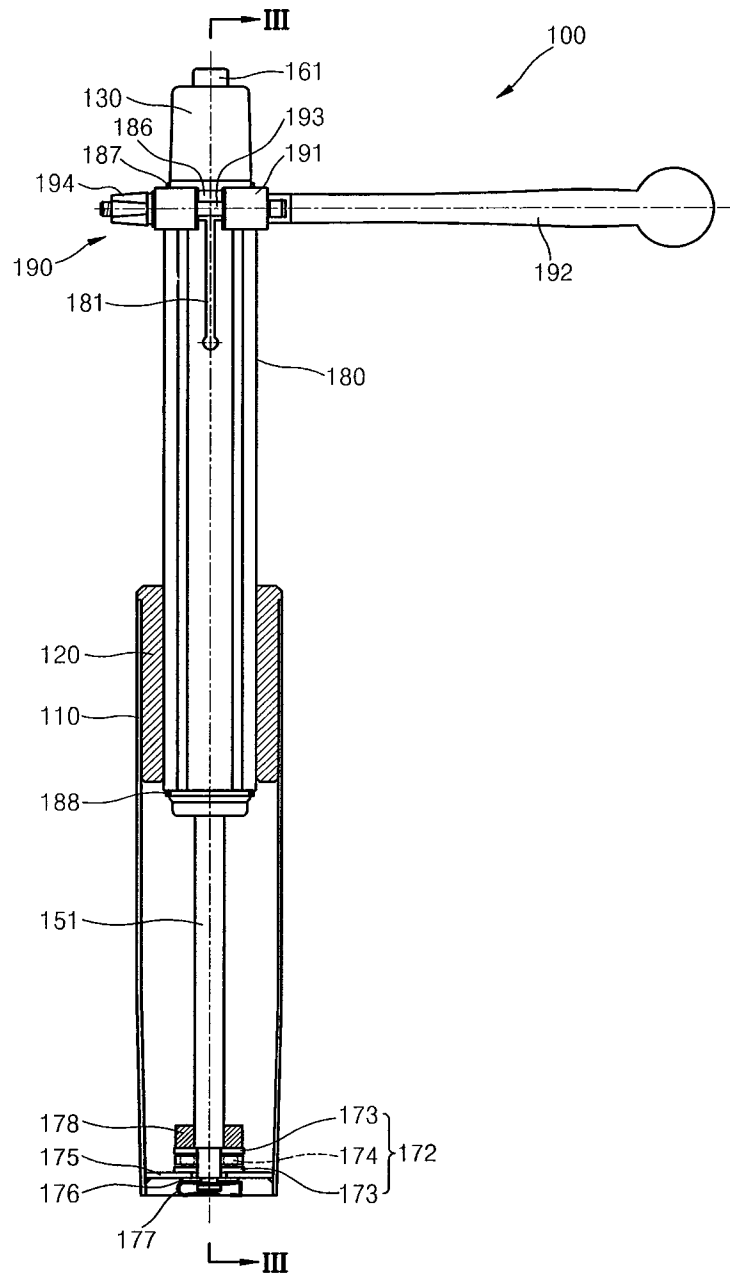
1/20

FIG. 1



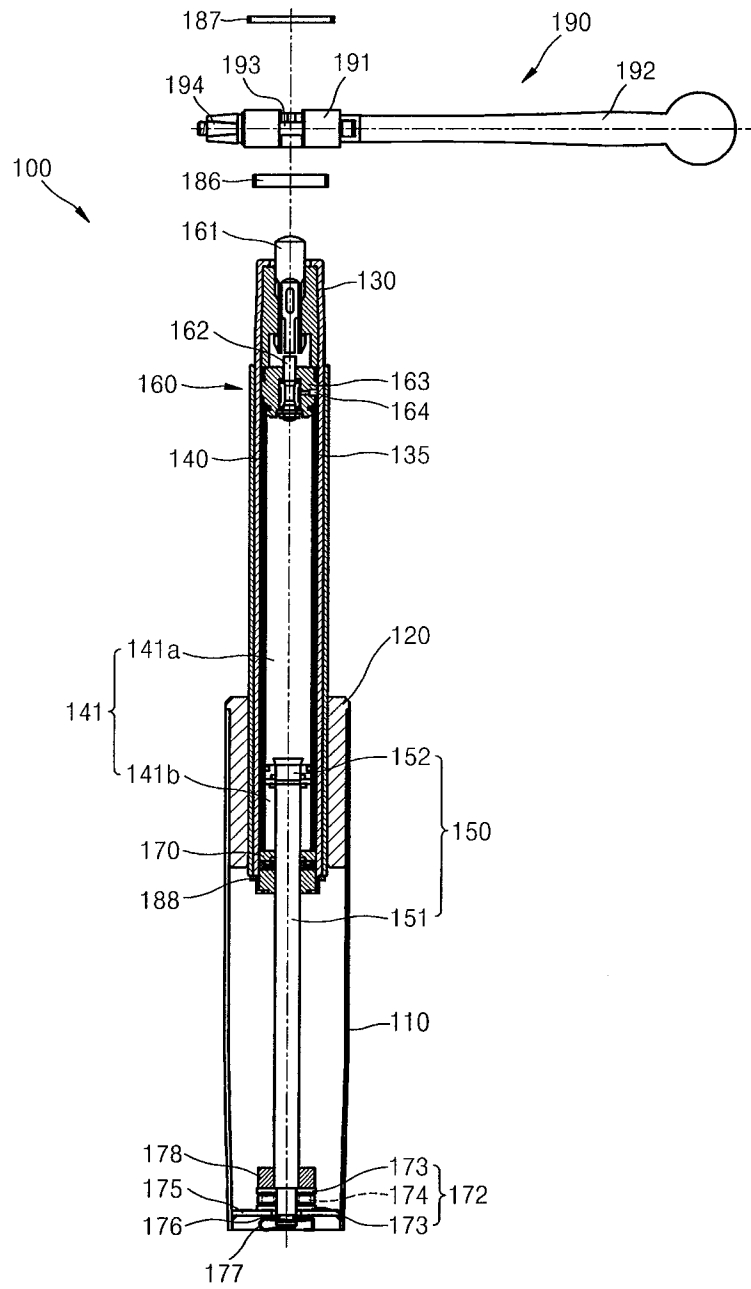
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FIG. 2



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FIG. 3



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FIG. 4

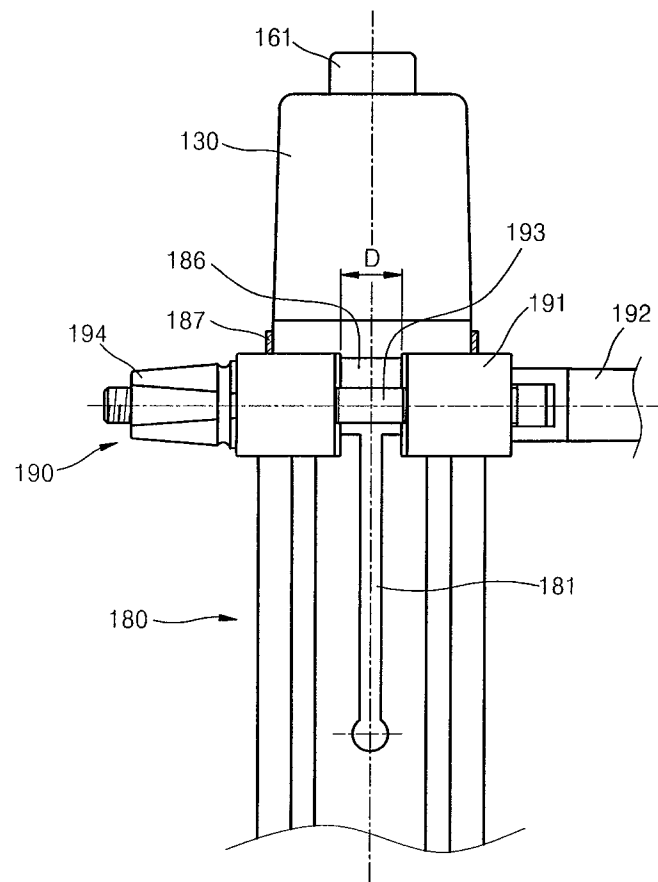
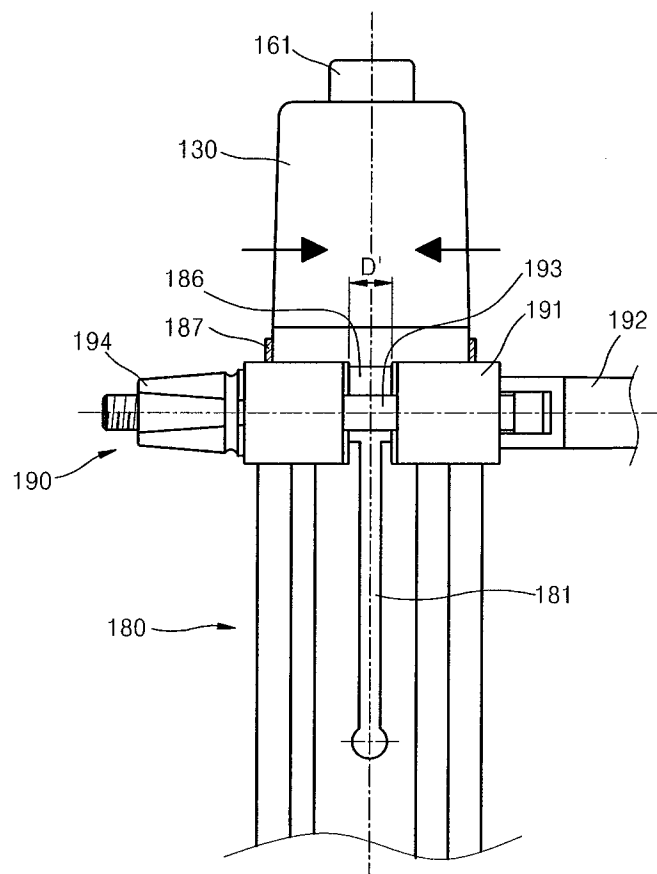


FIG. 5



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FIG. 6

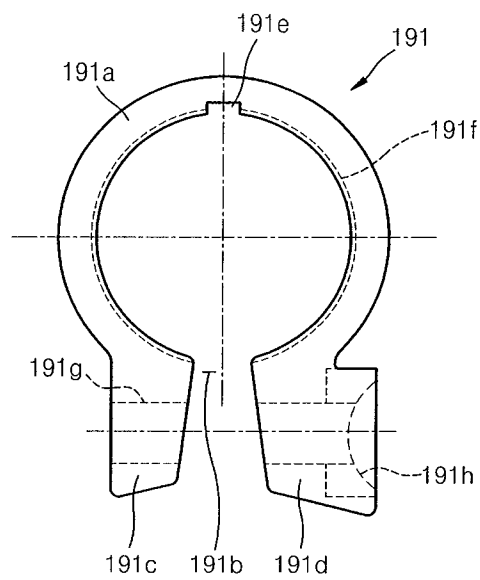
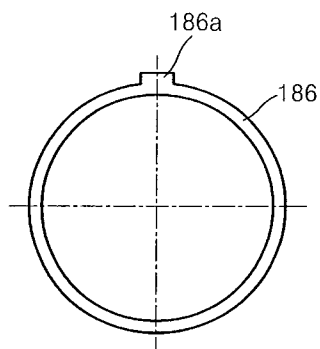


FIG. 7



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FIG. 8

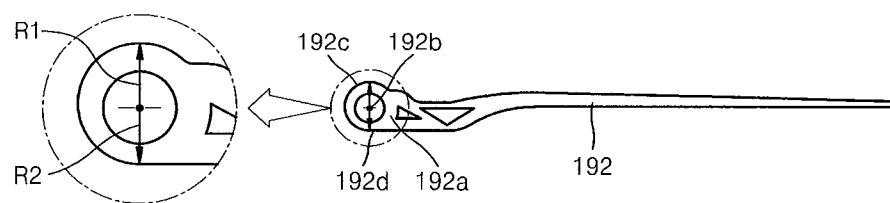
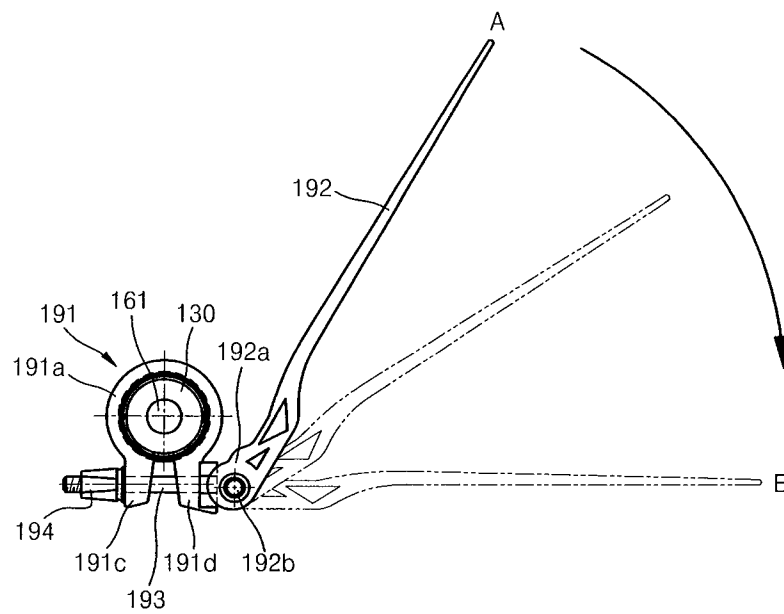


FIG. 9



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FIG. 10

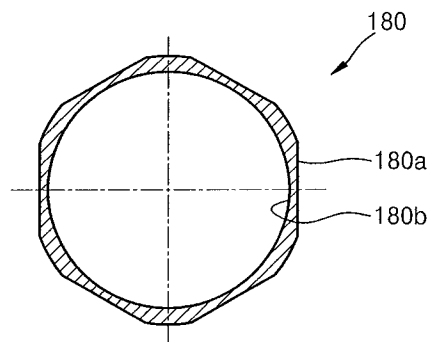
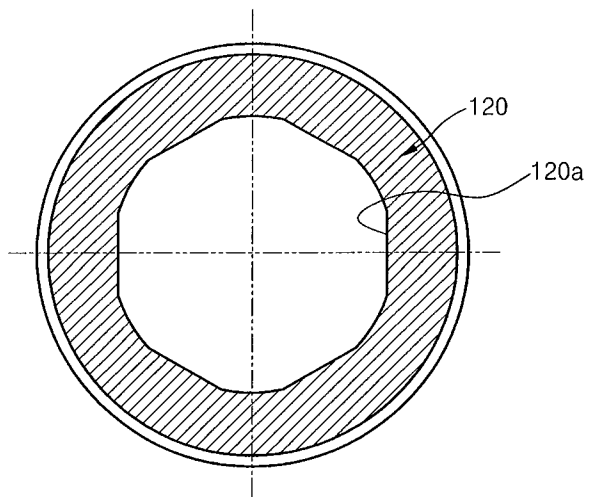


FIG. 11



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FIG. 12

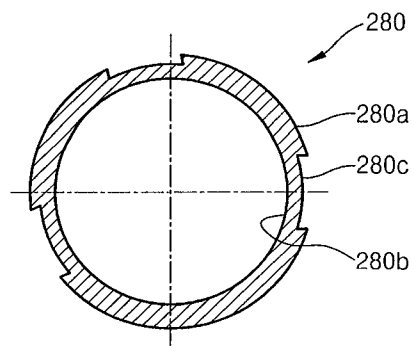
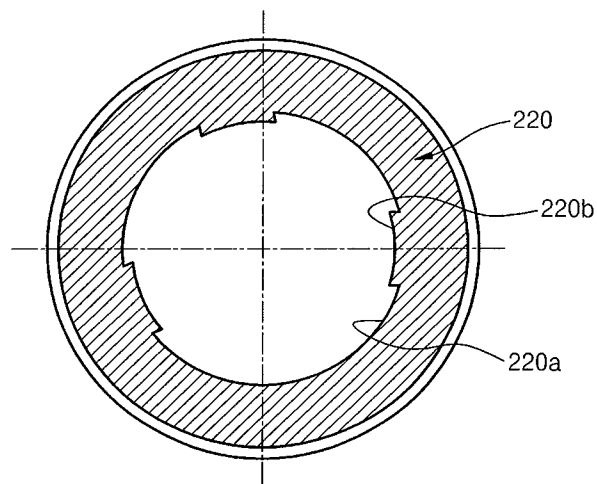


FIG. 13



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FIG. 14

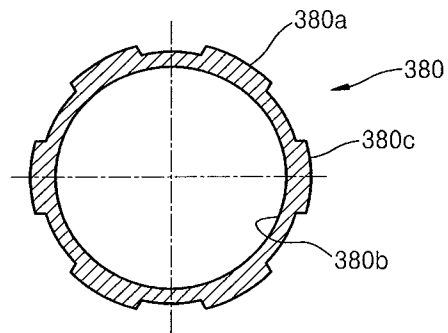
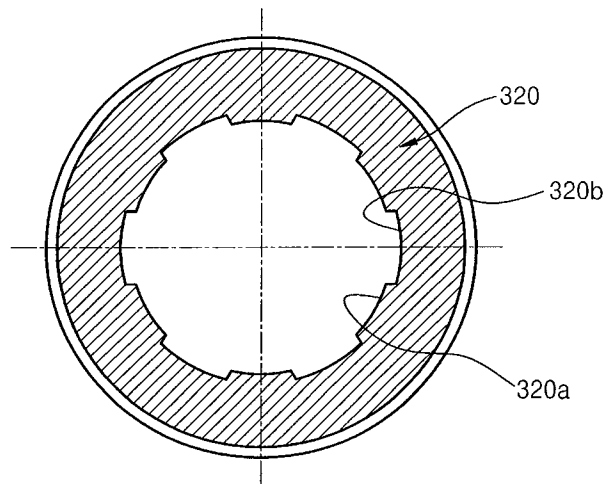
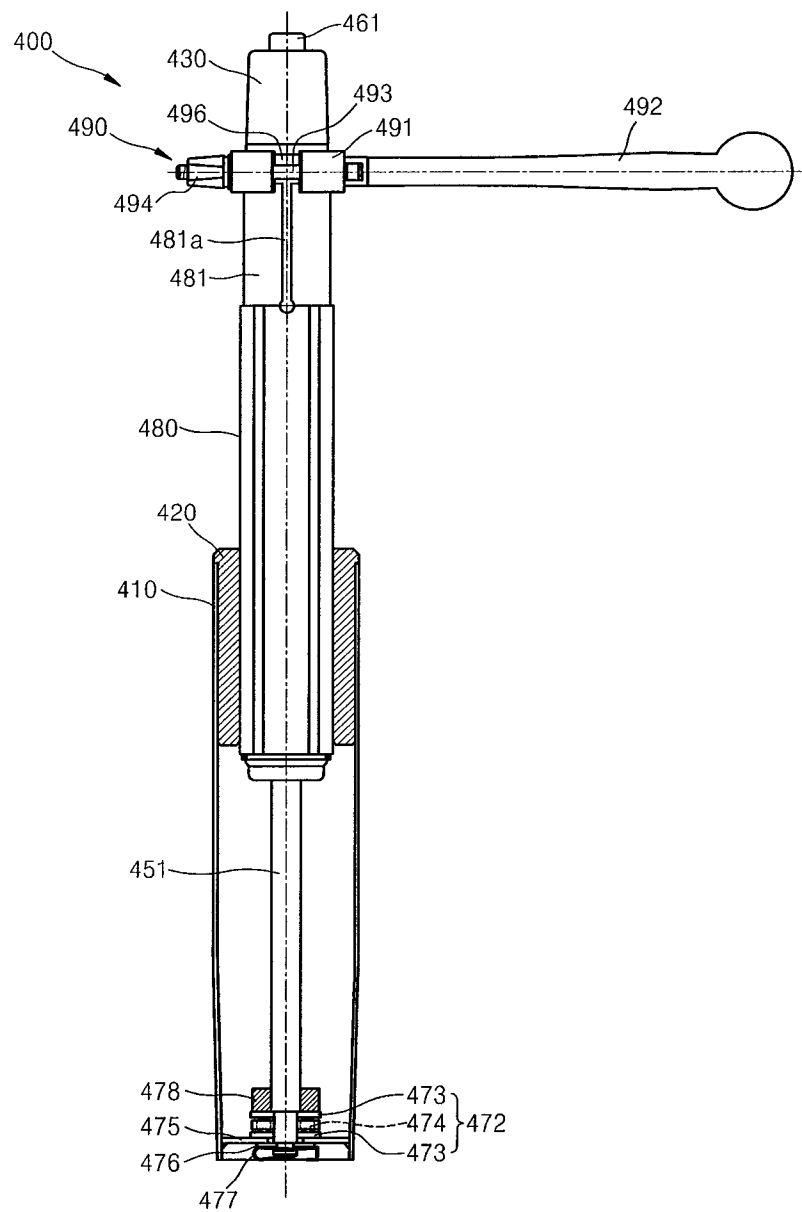


FIG. 15



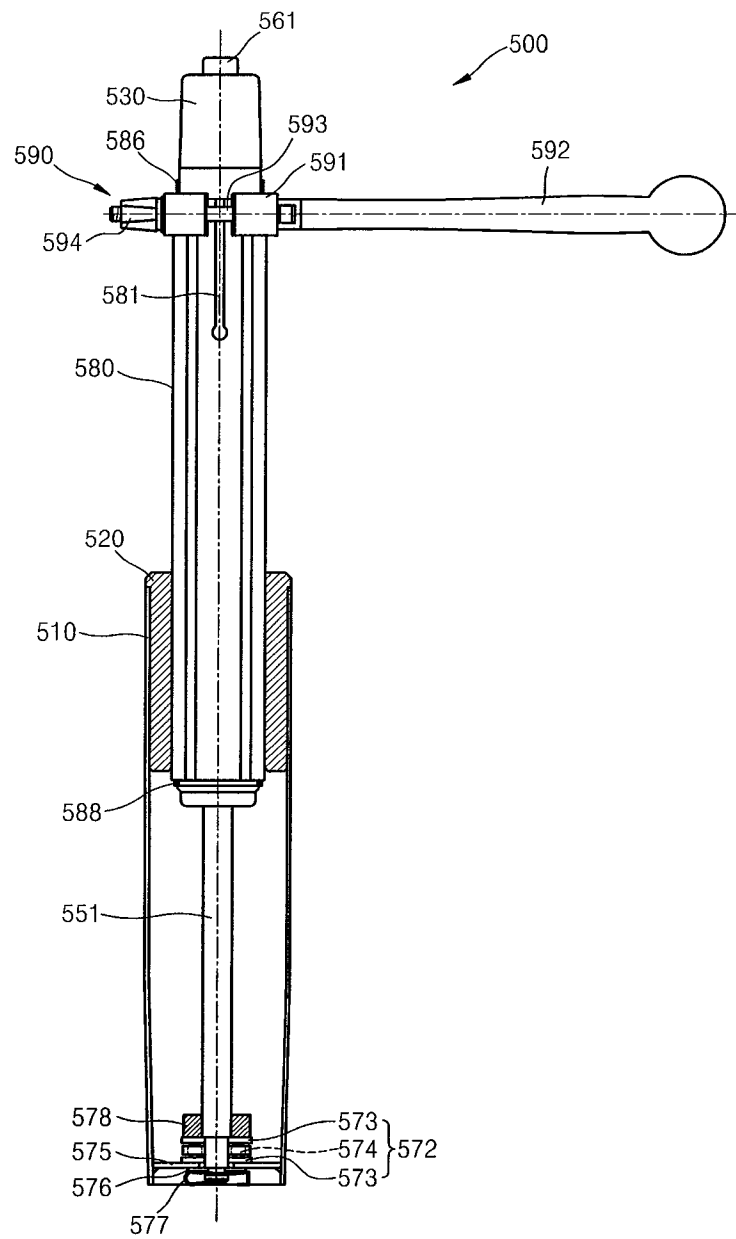
11/20

FIG. 16



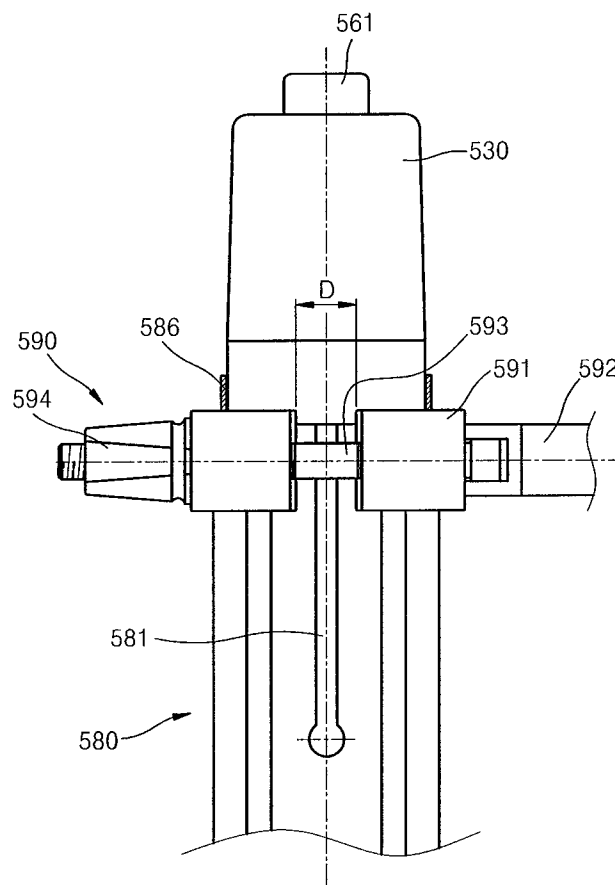
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FIG. 17



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FIG. 18



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FIG. 19

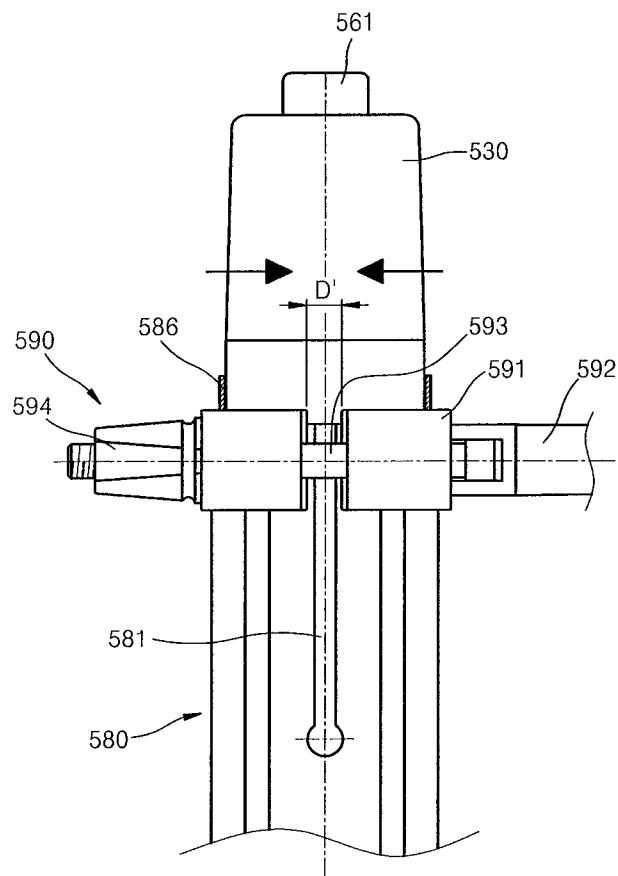


FIG. 20

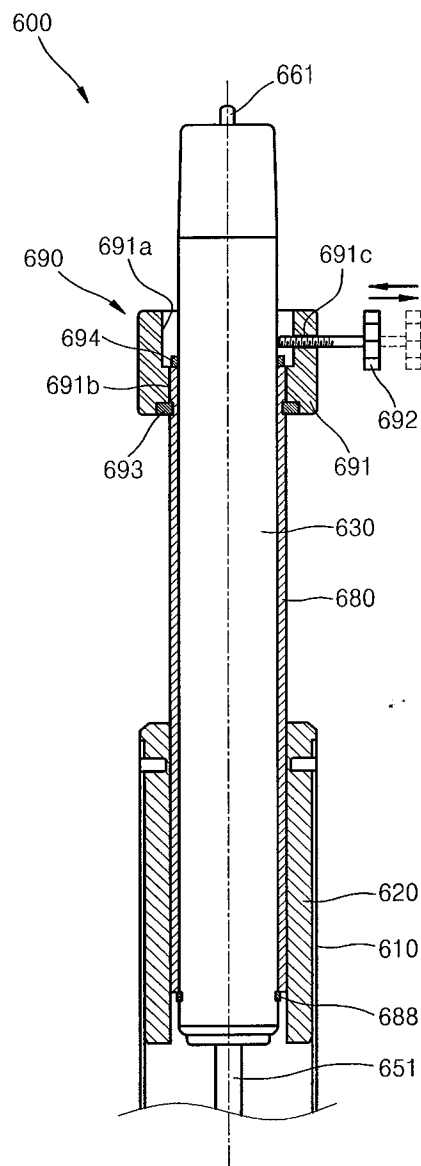


FIG. 21

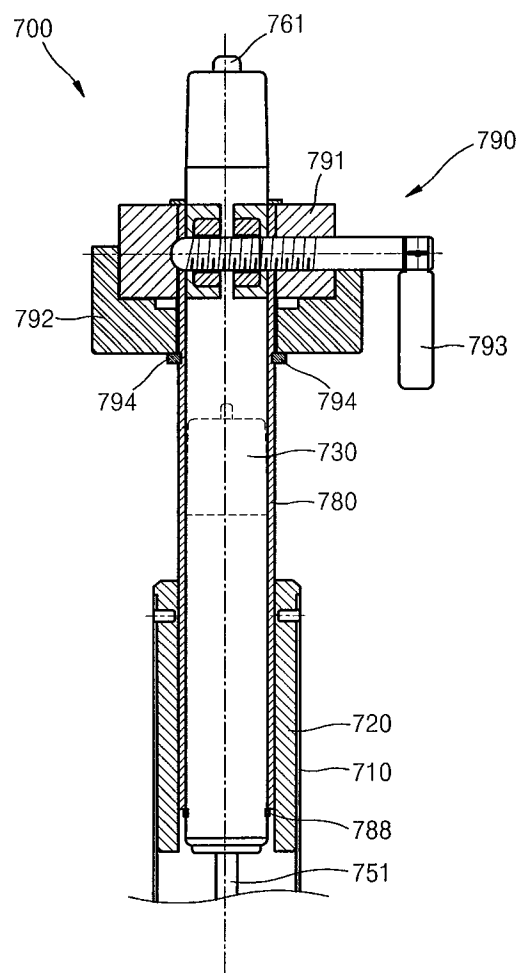


FIG. 22

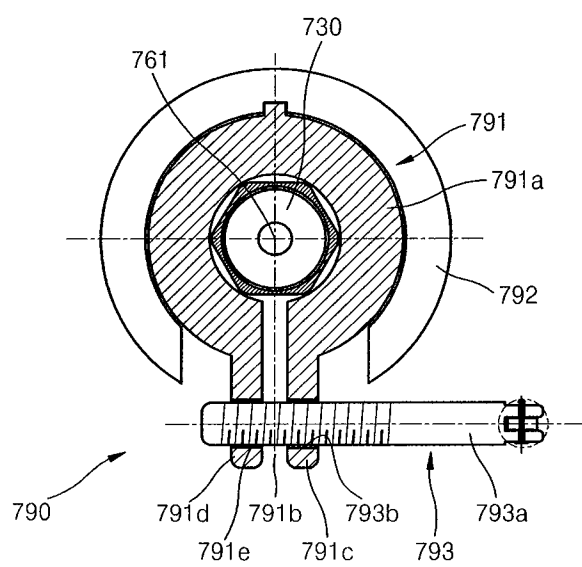
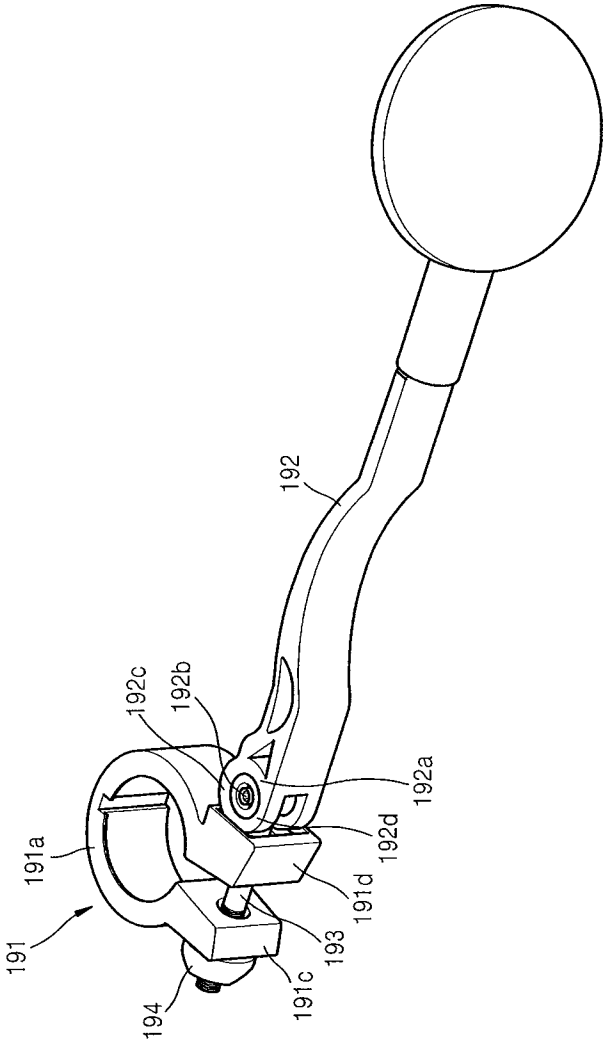
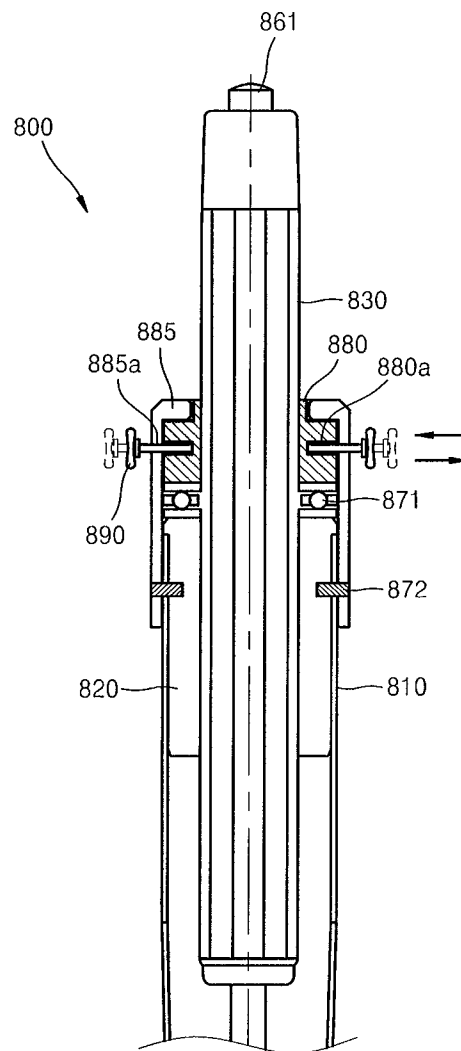


FIG. 23



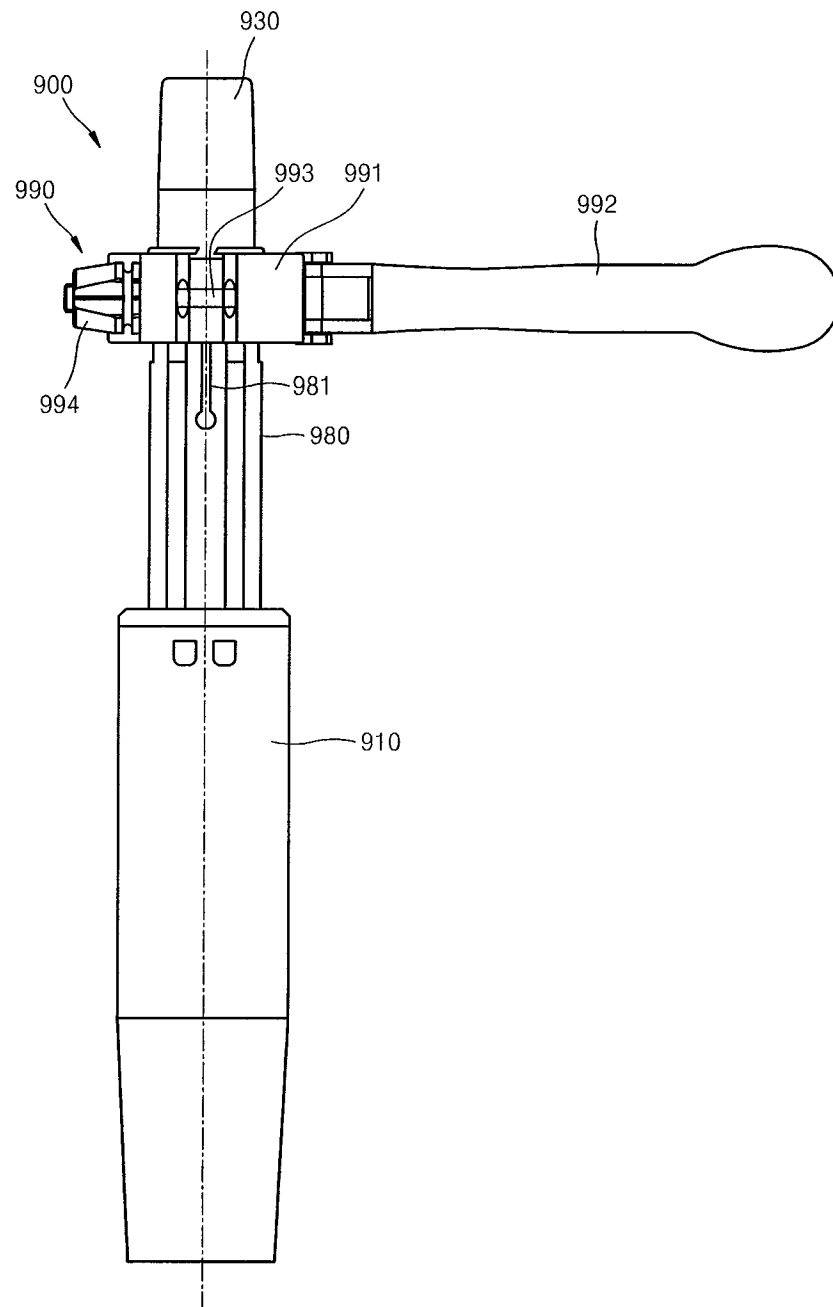
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FIG. 24



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FIG. 25



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2008/007864**A. CLASSIFICATION OF SUBJECT MATTER****A47C 3/30(2006.01)i**

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)

IPC A47C 3/30

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

Korean Utility models and applications for Utility models since 1975
Japanese Utility models and applications for Utility models since 1975

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

eKIPASS (KIPO internal) & keywords: cylinder and swivel

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2006-006755 A (ITOKY CO) 12 January 2006 See page 6, line 30 - page 7, line 33, and Figs. 3-8	1-2
A		3-20
A	US 5188345 A (SIEGNER et al.) 23 February 1993 See the abstract, and Fig. 1	1-20
A	US 5462248 A (JURGEN BAUER) 31 October 1995 See column 3, lines 8 - column 4, line 43, and Figs. 1-6	1-20
A	US 5944290 A (FUHRMANN et al.) 31 August 1999 See column 3, lines 28 - column 3, line 43, and Figs. 1-3	1-20
A	KR 1996-3835 U (YOO, HEE SU) 14 February 1996 See the abstract, and Figs. 1-3	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

04 MARCH 2009 (04.03.2009)

Date of mailing of the international search report

04 MARCH 2009 (04.03.2009)

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Authorized officer

JEONG, Kyu Young

Telephone No. 82-42-481-8124



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/007864

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US 5462248 A	31.10.1995	DE 4329611 A1 DE 59401899 D1 EP 0641532 A1 EP 0641532 B1 ES 2101395 T3 JP 07-148049 A JP 3520116 B2	09.03.1995 10.04.1997 08.03.1995 05.03.1997 01.07.1997 13.06.1995 19.04.2004
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KR 1996-3835 U	14.02.1996	NONE	