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(54) **COMBINED STRUCTURE OF ELECTRIC DRIVE WHEEL FOR WHEELCHAIR**

(57) The present invention relates to a combined structure of an electric drive wheel for a wheelchair, which allows a user to easily assemble an electric drive wheel to a wheelchair in a short time, thereby providing excellent assemblability and stability.

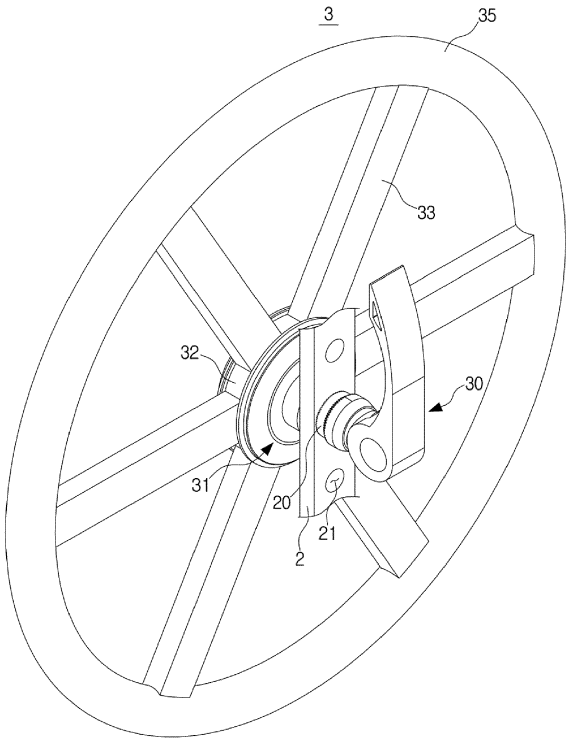

FIG. 1

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a combined structure of an electric drive wheel for a wheelchair, which allows a user to easily assemble an electric drive wheel to a wheelchair in a short time, thereby providing excellent assemblability and stability.

Background Art

[0002] Wheelchairs are wheeled chairs for helping a person who has bad legs or who is disabled, and are medical aids for helping the disabled, patients or the mobility impaired to move conveniently.

[0003] Such wheelchairs are divided into a manual wheelchair of which wheels are driven by manpower and an electric wheelchair of which wheels are driven using an electric drive device.

[0004] The manual wheelchair is foldable, lightweight, portable, and relatively inexpensive, but is inconvenient and is deteriorated in mobility since a user must push a drive wheel by hands to rotate the wheels.

[0005] On the other hand, the electric wheelchair is good at mobility and is convenient in manipulation, but is expensive and is difficult to carry because being heavy.

[0006] In the meantime, Korean Patent No. 10-1715293 (hereinafter, called patent document 0001') and Korean Patent Publication No. 2017-0090371A (hereinafter, called 'patent document 0002') propose a wheelchair structure driving by an electric drive like an electric wheelchair since having an electric module mounted on a conventional manual wheelchair.

[0007] Patent document 0001 relates to a subsidiary driving device of a wheelchair including: a cylindrical friction rotor circumscribed on the outer face of a wheel of the wheelchair and rotating in a state where it meets one side of the wheel; a driving unit connected to a central shaft of the friction rotor to rotate the friction rotor; and a control unit electrically connected with the driving unit to control drive according to a user's manipulation. The subsidiary driving device of a wheelchair is simply mounted on the existing manual wheelchair to provide motor driving efficiency for the existing wheelchair. The existing electric wheelchair is difficult to be loaded on a vehicle due to its size and weight, but the manual wheelchair on which the subsidiary driving device is mounted is easy to carry and load due to its foldable function.

[0008] Patent document 0002 relates to a detachable electric drive device which is detachably mounted on a manual wheelchair that a user drives wheels by hands so as to convert the manual wheelchair into an electric wheelchair of which wheels are driven automatically by electric power. Especially, the detachable electric drive device makes it possible to distribute electric wheelchairs at a low cost since being detachable and converting the manual wheelchair into the electric wheelchair regardless of forms and sizes of wheelchairs. The detachable electric drive device includes: drive modules respectively mounted on mounting frames supporting both wheels of the wheelchair and transmitting rotary power of rollers to the wheels when the rollers meet the wheels; and a control module for controlling driving of the drive modules.

[0009] The subsidiary driving device of a wheelchair disclosed in the patent document 0001 and the detachable electric drive device disclosed in the patent document 0002 are mounted on manual wheelchairs to make the wheelchairs move electrically like electric wheelchairs. However, the patent document 0001 and the patent document 0002 have weak safety, for instance, the rollers and the wheels of the wheelchair may slip or the user is injured since the user's finger gets caught between the roller and the wheelchair.

PATENT LITERATURE

Patent Documents

[0010]

Patent Document 0001: Korean Patent No. 10-1715293 B1 (March 06, 2017)
Patent Document 0002: Korean Patent Publication No. 10-2017-0090371A (August 07, 2017)

SUMMARY OF THE INVENTION

[0011] Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior arts, and it is an object of the present invention to provide a combined structure of an electric drive wheel for a wheelchair, which allows a user to easily assemble an electric drive wheel to a wheelchair in a short time, thereby providing excellent assemblability and stability.

[0012] To accomplish the above object, according to the present invention, there is provided a combined structure of an electric drive wheel for a wheelchair, in which an electric drive wheel having a hub motor is combined with a frame of the wheelchair, the combined structure of the electric drive wheel including: a fixing part fixed on the hub motor; and a fixing lever for closely fixing the fixing part to the frame.

[0013] Here, the combined structure of the electric drive wheel for the wheelchair further includes: a shaft hole formed at the center of the side of a housing of the hub motor of the electric drive wheel; a plurality of screw holes formed around the shaft hole; a fixing flange formed on the fixing part having a plurality of coupling holes screw-coupled with the plurality of screw holes of the hub motor by coupling members passing through the coupling holes; one side fixing shaft extending from the center of the fixing flange in one side and inserted into the shaft hole of the hub motor; the other side fixing shaft extending

from the center of the fixing flange in the other side, passing through the fixing holes formed in the frame, and having a screw hole formed at the center thereof; and fixing rings which receive the other side fixing shaft of the fixing part passing through the fixing hole of the frame, wherein the fixing lever closely fixes the fixing flange of the fixing part and the fixing rings onto both sides of the frame.

[0014] Moreover, a shaft member is formed at the center of the side of the housing of the hub motor of the electric drive wheel, and the shaft member has a screw hole formed therein. The fixing part includes: a fixing body having a shaft hole formed in the middle thereof; and a fixing shaft inserted and fixed into the shaft hole of the fixing body, the fixing shaft receiving the shaft member of the hub motor therein to fix the shaft member and passing through the fixing hole formed in the frame. The fixing lever closely fixes the fixing body of the fixing part onto the side of the frame.

[0015] Furthermore, the fixing lever includes: a shaft screw-coupled with the screw hole of the other side fixing shaft accommodated in the fixing ring; an eccentric lever of which the lower portion is eccentrically coupled with the other side of the shaft; and a moving body disposed at the shaft between the fixing ring and the eccentric lever so as to move right and left from the one side of the shaft to the other side of the shaft, one side of the moving body being closely fixed onto the fixing ring by the eccentric lever and the other side of the moving body having a groove which meets the outer circumferential surface of the lower portion of the eccentric lever.

[0016] Alternatively, the fixing lever includes: a shaft screw-coupled with the screw hole of the shaft member accommodated in the fixing shaft; an eccentric lever of which the lower portion is eccentrically coupled with the other side of the shaft; and a moving body receiving the shaft therein, disposed to move right and left from the one side of the shaft to the other side of the shaft, one side of the moving body being closely fixed onto the fixing shaft by the eccentric lever and the other side of the moving body having a groove which meets the outer circumferential surface of the lower portion of the eccentric lever.

[0017] Here, the fixing lever further includes an elastic member disposed between the fixing ring and the moving body in the state where the fixing lever receives the shaft therein.

[0018] Alternatively, the fixing lever further includes an elastic member disposed between the fixing shaft and the moving body in the state where the fixing lever receives the shaft therein.

[0019] In addition, the combined structure of the electric drive wheel for the wheelchair further includes a fixing ring which receives the fixing shaft passing through the fixing hole of the frame therein, wherein the fixing lever closely fixes the fixing body and the fixing ring onto both sides of the frame.

[0020] Moreover, an uneven part is formed on the other side of the fixing flange.

[0021] Furthermore, uneven parts are respectively formed on one side and the other side of the fixing ring.

[0022] Additionally, an uneven part is formed on one side of the moving body.

[0023] In addition, the combined structure of the electric drive wheel for the wheelchair further includes a packing member in which the other side fixing shaft is accommodated and which is disposed at one side of the other side fixing shaft and is inserted and fixed into the fixing hole of the frame.

[0024] Moreover, there are two fixing rings, and a gap adjustable fixing ring is disposed between the two fixing rings.

[0025] Furthermore, the combined structure of the electric drive wheel for the wheelchair further includes a reinforcing sleeve inserted and fixed into the fixing hole of the frame and receiving the other side fixing shaft therein.

[0026] Additionally, the fixing body includes: a groove formed on an upper portion of the fixing body; and a stopper of which one side is inserted and fixed into the groove of the fixing body and the other side is inserted and fixed into the fixing hole located in the upward direction of the fixing shaft, among the fixing holes of the frame, in order to prevent rotation of the fixing body.

[0027] In addition, the combined structure of the electric drive wheel for the wheelchair further includes an auxiliary stopper including a front side auxiliary stopper coupled to the front side of the other side of the fixing body to be arranged at the front side of the frame and a rear side auxiliary stopper coupled to the rear side of the other side of the fixing body to be arranged at the rear side of the frame in order to prevent rotation of the fixing body.

[0028] As described above, the combined structure of the electric drive wheel for the wheelchair according to the present invention includes: the fixing part having the fixing plate coupled to the side of the housing of the hub motor of the electric drive wheel, and one side fixing shaft and the other side fixing shaft respectively formed at both sides of the fixing plate; the fixing ring which receives the other side fixing shaft of the fixing part therein; and the fixing lever for respectively fixing the fixing plate of the fixing part and the fixing ring onto both sides of the frame of the wheelchair. Therefore, the combined structure of the electric drive wheel for the wheelchair according to the present invention allows a user to easily assemble the electric drive wheel to a wheelchair in a short time, thereby providing excellent assemblability and stability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view schematically il-

lustrating a combined structure of an electric drive wheel for a wheelchair according to a first preferred embodiment of the present invention;

FIG. 2 is an exploded perspective view of FIG. 1;

FIG. 3 is an exploded sectional view taken along the line of A-A of FIG. 2;

FIG. 4 is a sectional view illustrating a combined state of FIG. 3;

FIG. 5 is an exploded lateral view schematically illustrating a state where a drive wheel is separated from a frame of a wheelchair;

FIG. 6 is a side view schematically illustrating a state where the drive wheel is combined with the frame of the wheelchair;

FIGS. 7 and 8 are sectional views schematically illustrating an operational state of a fixing lever;

FIG. 9 is an exploded sectional view schematically illustrating a state where a packing member is separated from a fixing hole of the frame;

FIG. 10 is a sectional view illustrating a combined state of FIG. 9;

FIG. 11 is an exploded perspective view schematically illustrating a fixing ring for adjusting a clearance between two fixing rings;

FIG. 12 is a perspective view showing a combined state of FIG. 11;

FIG. 13 is an exploded sectional view schematically illustrating a gap adjustable fixing ring disposed between two fixing rings;

FIG. 14 is a sectional view showing a combined state of FIG. 13;

FIG. 15 is an exploded perspective view schematically illustrating a combined structure of an electric drive wheel for a wheelchair according to a second preferred embodiment of the present invention;

FIG. 16 is a perspective view showing a combined state of FIG. 15;

FIG. 17 is an exploded sectional view taken along the line of B-B of FIG. 15;

FIG. 18 is a sectional view showing a combined state of FIG. 17;

FIG. 19 is an exploded perspective view schematically illustrating a state where a fixing part of a combined structure of an electric drive wheel for a wheelchair according to a third preferred embodiment of the present invention is separated from a pipe-shaped frame;

FIG. 20 is a perspective view showing a combined state of FIG. 19;

FIG. 21 is an exploded perspective view schematically illustrating a state where a fixing part of a combined structure of an electric drive wheel for a wheelchair according to a third preferred embodiment of the present invention is separated from a plate-shaped frame;

FIG. 22 is a perspective view showing a combined state of FIG. 21;

FIG. 23 is an exploded sectional view taken along the line of C-C of FIG. 21;

FIG. 24 is a sectional view showing a combined state of FIG. 23;

FIG. 25 is an exploded perspective view schematically illustrating fixing rings and a gap adjustable fixing ring of the combined structure of an electric drive wheel for a wheelchair according to the third preferred embodiment of the present invention;

FIG. 26 is a perspective view showing a combined state of FIG. 25;

FIG. 27 is an exploded sectional view taken along the line of D-D of FIG. 25; and

FIG. 28 is a sectional view showing the combined state of FIG. 25.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0030] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. Of course, the protective scope of the present invention is not limited to the following embodiments, and may be variously modified and carried out by those skilled in the art within the scope of the technical spirit of the present invention.

[0031] FIG. 1 is a perspective view schematically illustrating a combined structure of an electric drive wheel for a wheelchair according to a first preferred embodiment of the present invention, and FIG. 2 is an exploded perspective view of FIG. 1.

[0032] The combined structure of the electric drive wheel for the wheelchair according to the first preferred embodiment of the present invention includes a fixing part 10 and a fixing lever 30 as shown in FIGS. 1 and 2.

[0033] First, an electric drive wheel 3 may be replaced with non-electric drive wheels of wheelchairs with various kinds (see FIG. 5 and FIG. 6-1), such as the existing manual wheelchairs.

[0034] As shown in FIGS. 1 and 2, the electric drive wheel 3 includes a hub motor 31, a hub 32, a plurality of spokes 33, a rim (not shown), and a tire 35, and may further include a hand rim (not shown).

[0035] The hub 32 is rotated while surrounding the hub motor 31 to be combined with the hub motor, and is rotated by operation of the hub motor 31.

[0036] The plurality of spokes 33 are arranged between the hub 32 and the rim (not shown), and the tire 35 is fixed and mounted on the rim (not shown).

[0037] Moreover, as shown in FIG. 2, a shaft hole 313 may be formed in the middle of the side of a housing 311 of the hub motor 31.

[0038] A plurality of screw holes 314 are radially formed in the side of the housing 311 at regular intervals around the shaft hole 313 of the hub motor 31.

[0039] FIG. 3 is an exploded sectional view taken along the line of A-A of FIG. 2, and FIG. 4 is a sectional view illustrating a combined state of FIG. 3.

[0040] Next, as shown in FIGS. 2 and 3, the fixing part 10, for instance, includes a fixing flange 110, one side fixing shaft 120, and the other side fixing shaft 130.

[0041] Coupling holes 111, through which coupling members 5 such as bolts pass, are formed around the center of the fixing flange 110 radially at regular intervals.

[0042] The coupling members 5 pass through the coupling holes 111, and are respectively screw-coupled with a plurality of screw holes 314 formed in the side of the housing 311 of the hub motor 31.

[0043] The other side of the fixing flange 110, which is the opposite side, may be closely fixed onto one side of the plate-shaped frame 2 disposed on the one side of the wheelchair 1 as shown in FIG. 4.

[0044] In order to prevent slip between the other side of the fixing flange 110 and the one side of the frame 2 and to reinforce fixation power of the fixing flange 110 closely fixed onto the one side of the frame 2, as shown in FIG. 2, uneven parts 112 are formed around the center of the other side of the fixing flange 110 are formed radially at regular intervals.

[0045] The fixing shaft 120 of one side extends horizontally to a predetermined length from the center of the fixing flange 110 toward the one side of the fixing flange 110, and is inserted into the shaft hole 313 of the hub motor 31.

[0046] The other side fixing shaft 130 extends horizontally to a predetermined length from the center of the fixing flange 110 toward the other side of the fixing flange 110 in a state where the fixing shaft 130 communicates with the fixing shaft 120 of the one side, and passes through the fixing hole 21 formed in the frame 2.

[0047] In order to adjust the height of the electric drive wheel 3, a plurality of the fixing holes 21 of the frame 2 are formed at regular intervals in a vertical direction of the frame 2.

[0048] The other side fixing shaft 130 passes through the fixing hole 21 of the frame 2 and is exposed to a predetermined length in an outward direction of the other side of the frame 2.

[0049] A screw hole 131 is formed at the center of the other side fixing shaft 130 to horizontally extend along the other side fixing shaft 130 to a predetermined length.

[0050] Next, fixing rings 20 are disposed.

[0051] The other side fixing shaft 130 which is exposed to the predetermined length in the outward direction of the other side of the frame after passing through the fixing hole 21 of the frame 2 is accommodated in the inner face of the fixing ring 20.

[0052] As shown in FIG. 4, one side of the fixing ring 20 is closely fixed onto the other side of the plate-shaped frame 2.

[0053] In order to prevent slip between the one side of the fixing ring 20 and the other side of the frame 2 and to reinforce fixation power of the fixing ring 20 closely fixed onto the other side of the frame 2, uneven parts 201 are formed around the center of the one side of the fixing ring 20 are formed radially at regular intervals.

[0054] Next, the fixing lever 30 is disposed.

[0055] As shown in FIG. 4, the fixing lever 30 closely fastens the fixing flange 110 of the fixing part 10 and the fixing ring 20 onto both sides of the plate-shaped frame 2.

[0056] The fixing lever 30 may be one of various kinds, for instance, as shown in FIGS. 2 and 3, is a quick release lever including the shaft 310, an eccentric lever 320, and a moving body 330.

[0057] The shaft 310 is screw-coupled with the screw hole 131 of the other side fixing shaft 130 accommodated in the fixing ring 20.

[0058] A lower portion of the eccentric lever 320 is eccentrically combined with the other side of the shaft 310.

[0059] The shaft 310 disposed between the fixing ring 20 and the eccentric lever 320 horizontally passes through the center of the moving body 330, and the moving body 330 is disposed on the shaft 310 located between the fixing ring 20 and the eccentric lever 320 to move right and left from one side of the shaft 310 to the other side.

[0060] One side of the moving body 330 is closely fixed onto the other side of the fixing ring 20 by the eccentric lever 320.

[0061] In order to prevent slip between the one side of the moving body 330 and the other side of the fixing ring 20 and to reinforce fixation power of the moving body 330 and the fixing ring 20, as shown in FIG. 2, uneven parts 201 are formed around the center of the other side of the fixing ring 20 are formed radially at regular intervals, and uneven parts 332 are formed around the center of the one side of the moving body 330 radially at regular intervals.

[0062] A groove 331 meeting the outer circumferential surface of a lower portion of the eccentric lever 320 is formed on the other side of the moving body 330 in one-sided direction of the moving body 330 to be concave to a predetermined depth.

[0063] FIG. 5 is an exploded lateral view schematically illustrating a state where a drive wheel is separated from a frame of a wheelchair, and FIG. 6 is a side view schematically illustrating a state where the drive wheel is combined with the frame of the wheelchair.

[0064] As described above, the combined structure of the electric drive wheel for the wheelchair according to the present invention can provide excellent assemblability and stability since allowing a user to easily assemble

the electric drive wheel 3 to the frame 2 of the wheelchair 1 in a short time as shown in FIGS. 5 and 6.

[0065] FIGS. 7 and 8 are sectional views schematically illustrating an operational state of a fixing lever.

[0066] As shown in FIG. 7, when a user who uses the wheelchair 1 or a guardian for the user rotates and moves an upper portion of the eccentric lever 320 in the upward direction of the frame 2, the shaft 310 moves in the direction of the other side of the shaft 310 and a right and left gap D1 between the central portion of the shaft 321 of the lower portion of the eccentric lever 320 and the other side of the moving body 330 gets gradually wider, so that the moving body 330 moves in the direction of the one side of the shaft 310 to be closely fixed onto the fixing ring 20 and the fixing flange 110 and the fixing ring 20 are closely fixed onto both sides of the frame 20.

[0067] As shown in FIG. 8, when the upper portion of the eccentric lever 320 is rotated and moved in a downward direction of the frame 2, the shaft 310 moves in the direction of the one side of the shaft 310 and the right and left gap D1 between the central portion of the shaft 321 of the lower portion of the eccentric lever 320 and the other side of the moving body 330 gets gradually narrower, so that the moving body 330 moves in the direction of the other side of the shaft 310 so as to release fixation power between the moving body 330 and the fixing ring 20 and fixation power between the fixing flange 110 and the fixing ring 20 respectively fixed onto both sides of the frame 2.

[0068] In order to allow smooth right and left movement of the moving body 330 and to prevent loosening of the shaft 310, as shown in FIGS. 2, 3, 7 and 8, the fixing lever 30 further includes an elastic member 340.

[0069] The shaft 310 is inserted into the elastic member 340, and the elastic member 340 may be a washer spring or the like disposed between the fixing ring 20 and the moving body 330.

[0070] FIG. 9 is an exploded sectional view schematically illustrating a state where a packing member is separated from a fixing hole of the frame, and FIG. 10 is a sectional view illustrating a combined state of FIG. 9.

[0071] Next, as shown in FIGS. 9 and 10, a packing member 40 is disposed in order to prevent movement of the other side fixing shaft 130, which passes through the fixing hole 21 of the frame 2 and is inserted and fixed into the fixing hole 21, and to enhance fixation power of the other side fixing shaft 130.

[0072] The packing member 40 may be formed in various shapes, for instance, a ring shape, and may be made with elastic materials of various kinds.

[0073] The other side fixing shaft 130 is inserted into the packing member 40, and the packing member 40 is disposed at one side of the other side fixing shaft 130.

[0074] The other side of the packing member 40 is inserted and fixed into one side of the fixing hole 21 of the frame 2 to a predetermined depth.

[0075] In order to easily insert and fix the other side of the packing member 40 into the one side of the fixing hole 21 to the predetermined depth, an inclined surface 401 inwardly inclined from one side to the other side of the packing member 40 is formed on the outer circumferential surface of the packing member 40.

[0076] FIG. 11 is an exploded perspective view schematically illustrating a fixing ring for adjusting a clearance between two fixing rings, FIG. 12 is a perspective view showing a combined state of FIG. 11, FIG. 13 is an exploded sectional view schematically illustrating a gap adjustable fixing ring disposed between two fixing rings, and FIG. 14 is a sectional view showing a combined state of FIG. 13.

[0077] Next, in order to enhance durability of the plate-shaped frame 2 and to adjust a right and left gap D2 between the frame 2 and the moving body 330, as shown in FIGS. 11 to 14, there are two fixing rings 20 and at least one gap adjustable fixing ring 50 disposed between the two fixing rings 20.

[0078] For instance, the combined structure according to the present invention has a plurality of the fixing parts 10, and the right and left lengths from the one side to the other side of the other side fixing shafts 130 of the plural fixing parts 10 may be different from one another.

[0079] The number of the gap adjustable fixing rings 50 may be increased or decreased depending on the right and left length of the other side fixing shaft 130 of the fixing part 10 passing through any one of the fixing holes 21 of the frame 2.

[0080] As the right and left length of the other side fixing shaft 130 of the fixing part 10 gets greater, the number of the gap adjustable fixing rings 50 disposed between the two fixing rings 20 gets increased, so that the right and left gap D2 between the frame 2 and the moving body 330 gets wider.

[0081] As the right and left length of the other side fixing shaft 130 of the fixing part 10 gets shorter, the number of the gap adjustable fixing rings 50 disposed between the two fixing rings 20 gets decreased, so that the right and left gap D2 between the frame 2 and the moving body 330 gets shorter.

[0082] FIG. 15 is an exploded perspective view schematically illustrating a combined structure of an electric drive wheel for a wheelchair according to a second preferred embodiment of the present invention, FIG. 16 is a perspective view showing a combined state of FIG. 15, FIG. 17 is an exploded sectional view taken along the line of B-B of FIG. 15, and FIG. 18 is a sectional view showing a combined state of FIG. 17.

[0083] Next, the combined structure of the electric drive wheel for the wheelchair according to the second preferred embodiment of the present invention is the same as the first preferred embodiment. However, if the frame 2 is formed in a pipe shape as shown in FIGS. 15 to 18, a reinforcing sleeve 60 may be inserted and fixed into any one of the fixing holes 21 formed in one side and the other side of the pipe-shaped frame 2 in a vertical direction of the frame 2 at regular intervals.

[0084] The other side fixing shaft 130 is horizontally

accommodated in the reinforcing sleeve 60.

[0085] Because a contact area between the reinforcing sleeve 60 and the other side fixing shaft 130 can get wider, it is easily prevented that the other side fixing shaft 130 is transformed, and due to the reinforcing sleeve 60, it is also prevented that the fixing holes 21 of the frame 2 are transformed and the fixing holes 21 are reinforced.

[0086] FIG. 19 is an exploded perspective view schematically illustrating a state where a fixing part of a combined structure of an electric drive wheel for a wheelchair according to a third preferred embodiment of the present invention is separated from a pipe-shaped frame, FIG. 20 is a perspective view showing a combined state of FIG. 19, FIG. 21 is an exploded perspective view schematically illustrating a state where a fixing part of a combined structure of an electric drive wheel for a wheelchair according to a third preferred embodiment of the present invention is separated from a plate-shaped frame, FIG. 22 is a perspective view showing a combined state of FIG. 21, FIG. 23 is an exploded sectional view taken along the line of C-C of FIG. 21, and FIG. 24 is a sectional view showing a combined state of FIG. 23.

[0087] Next, the combined structure of the electric drive wheel for the wheelchair according to the third preferred embodiment of the present invention is the same as the first and second embodiments. However, as shown in FIG. 19, a shaft member 315 may be formed at the center of the side of the housing 311 of the hub motor 31 of the electric drive wheel 3.

[0088] The shaft member 315 may horizontally extend to a predetermined length in the direction of the fixing hole 21 of the pipe-shaped frame 2, or may horizontally extend to a predetermined length in the direction of the fixing hole 21 of the plate-shaped frame 2 as shown in FIG. 21.

[0089] A screw hole 316 may be formed inside the shaft member 315.

[0090] A head part 317 may be formed at one side of the shaft member 315 in various shapes, such as a hexagonal shape or a polygonal shape.

[0091] Furthermore, for another example, as shown in FIGS. 19 to 24, the fixing part 10 includes a fixing body 140 and a fixing shaft 150.

[0092] A shaft hole 141 is formed in the middle of the fixing body 140.

[0093] As shown in FIG. 23, first and second insertion holes 142 and 143 communicating with the shaft hole 141 are formed at one side of the fixing body 140.

[0094] The fixing shaft 150 may be inserted and fixed in various ways, for instance, is inserted and fixed after passing through the shaft hole 141 or is inserted and fixed after being screw-coupled with the shaft hole 141.

[0095] A head part 151 may be formed at one side of the fixing shaft 150 in various shapes, such as a hexagonal shape or a polygonal shape.

[0096] The first insertion hole 142 has the shape corresponding to the head part 151 of the fixing shaft 150, and the head part 151 of the fixing shaft 150 is inserted and fixed into the first insertion hole 142 in order to prevent rotation of the fixing shaft 150.

[0097] Additionally, the second insertion hole 143 has the shape corresponding to the head part 317 of the shaft member 315, and the head part 317 of the shaft member 315 is inserted and fixed into the second insertion hole 143 in order to prevent rotation of the fixing body 140.

[0098] The shaft member 315 of the hub motor 31 is accommodated and fixed into the fixing shaft 150.

[0099] The other side of the fixing shaft 150 passes through any one of the fixing holes 21 formed in the frame 2 and is exposed to a predetermined length in the outward direction of the other side of the frame 2.

[0100] The fixing lever 30 closely fixes the fixing body 140 of the fixing part 10 onto the one side of the frame 2.

[0101] The shaft 310 of the fixing lever 30 is screw-coupled with a screw hole 3165 of the shaft member 315 accommodated in the fixing shaft 150.

[0102] The shaft 310 is accommodated in the elastic member 340 of the fixing lever 30, and the elastic member 340 is disposed between the other side of the fixing shaft 150 and the one side of the moving body 330.

[0103] As described above, when the upper portion of the eccentric lever 320 of the fixing lever 30 is rotated and moved in the upward direction of the frame 2, the shaft 310 moves in the direction of the other side of the shaft 310 and the moving body 330 moves in the direction of one side of the shaft 310, so that the fixing body 140 is closely fixed onto the one side of the frame 2 and the elastic member 340 is compressed.

[0104] Moreover, when the upper portion of the eccentric lever 320 of the fixing lever 30 is rotated and moved in the downward direction of the frame 2, the shaft 310 moves in the direction of one side of the shaft 310 and the moving body 330 moves in the direction of the other side of the shaft 310 by elastic force of the expanded elastic member 340 so that fixation power of the fixing body 140 is released.

[0105] FIG. 25 is an exploded perspective view schematically illustrating fixing rings and a gap adjustable fixing ring of the combined structure of an electric drive wheel for a wheelchair according to the third preferred embodiment of the present invention, FIG. 26 is a perspective view showing a combined state of FIG. 25, FIG. 27 is an exploded sectional view taken along the line of D-D of FIG. 25, and FIG. 28 is a sectional view showing the combined state of FIG. 25.

[0106] Next, as shown in FIGS. 25 to 28, the other side of the fixing shaft 150 passing through the fixing hole 21 of the frame 2 may be disposed inside the fixing ring 20.

[0107] As described above, there are two fixing rings 20, and at least one gap adjustable fixing ring 50 is disposed between the two fixing rings 20.

[0108] The other side of the fixing shaft 150 can horizontally pass through the fixing rings 20 and the gap adjustable fixing rings 50 in order.

[0109] When the upper portion of the eccentric lever 320 of the fixing lever 30 is rotated and moved in the

upward direction of the frame 2, the shaft 310 moves in the direction of the other side of the shaft 310 and the moving body 330 moves in the direction of the one side of the shaft 310, so that the fixing body 140 is closely fixed onto the one side of the frame 2, the elastic member 340 is compressed, and the fixing rings 20 and the gap adjustable fixing rings 50 are closed fixed in the direction of the other side of the frame 2.

[0110] Furthermore, when the upper portion of the eccentric lever 320 of the fixing lever 30 is rotated and moved in the downward direction of the frame 2, the shaft 310 moves in the direction of the one side of the shaft 310 and the moving body 330 moves in the direction of the other side of the shaft 310 by elastic force of the expanded elastic member 340 so as to release fixation power among the fixing body 140, the fixing rings 2 and the gap adjustable fixing rings 50.

[0111] Next, as shown in FIGS. 19, 21 and 23, a groove 144 is formed on the upper portion of the fixing body 140.

[0112] The groove 144 may include one side groove 144a and the other side groove 144b.

[0113] The one side groove 144a is formed at the central portion of the upper portion of the fixing body 140 to a predetermined depth.

[0114] The other side groove 144b communicates with the one side groove 144a, and is formed at the upper portion of the other side, which is the opposite side of the one side of the fixing body 140, to a predetermined depth.

[0115] Additionally, a stopper 70 is disposed in order to prevent rotation of the fixing body 140.

[0116] The stopper 70 may include one side plate 710, the other side plate 720, and a connection shaft 730.

[0117] The one side plate 710 is inserted and fixed into the one side groove 144a of the groove 144 of the fixing body 140.

[0118] The other side plate 720 is inserted and fixed into the another fixing hole 21 located in the upward direction of the fixing shaft 150, among the plurality of fixing holes 21 upwardly formed in the frame 2 at regular intervals.

[0119] The one side plate 710 and the other side plate 720 are formed to correspond to the fixing holes 21 of the frame 2.

[0120] The connection shaft 730 is disposed between the one side plate 710 and the other side plate 720 so that the one side plate 710 and the other side plate 720 are connected with each other.

[0121] The connection shaft 730 is inserted and fixed into the other side groove 144b of the groove 144 of the fixing body 140.

[0122] Next, an auxiliary stopper 80 is disposed in order to prevent rotation of the fixing body 140 more easily.

[0123] The auxiliary stopper 80 includes a front side auxiliary stopper 810 and a rear side auxiliary stopper 820.

[0124] The front side auxiliary stopper 810 is coupled to the front side of the other side, which is the opposite side of the one side of the fixing body 140, by coupling members 7 so as to be arranged on the front side of the frame 2.

[0125] The rear side auxiliary stopper 820 is detachably coupled to the rear side of the other side, which is the opposite side of the one side of the fixing body 140, by the coupling members 7 so as to be arranged on the rear side of the frame 2.

[0126] The coupling members 7 may be bolts or the likes, which are screw-coupled with the front side auxiliary stopper 810 and the front side of the other side of the fixing body 140 in order and are screw-coupled with the rear side auxiliary stopper 820 and the rear side of the other side of the fixing body 140 in order.

Claims

1. A combined structure of an electric drive wheel for a wheelchair, in which an electric drive wheel having a hub motor is combined with a frame of the wheelchair, the combined structure of the electric drive wheel comprising:

   a fixing part fixed on the hub motor; and
   a fixing lever for closely fixing the fixing part to the frame.

2. The combined structure of the electric drive wheel according to claim 1, further comprising:

   a shaft hole formed at the center of the side of a housing of the hub motor of the electric drive wheel;
   a plurality of screw holes formed around the shaft hole;
   a fixing flange formed on the fixing part having a plurality of coupling holes screw-coupled with the plurality of screw holes of the hub motor by coupling members passing through the coupling holes;
   one side fixing shaft extending from the center of the fixing flange in one side and inserted into the shaft hole of the hub motor;
   the other side fixing shaft extending from the center of the fixing flange in the other side, passing through the fixing holes formed in the frame, and having a screw hole formed at the center thereof; and
   fixing rings which receive the other side fixing shaft of the fixing part passing through the fixing hole of the frame,
   wherein the fixing lever closely fixes the fixing flange of the fixing part and the fixing rings onto both sides of the frame.

3. The combined structure of the electric drive wheel according to claim 1,
   wherein a shaft member is formed at the center of

the side of the housing of the hub motor of the electric drive wheel, and the shaft member has a screw hole formed therein, wherein the fixing part includes: a fixing body having a shaft hole formed in the middle thereof; and a fixing shaft inserted and fixed into the shaft hole of the fixing body, the fixing shaft receiving the shaft member of the hub motor therein to fix the shaft member and passing through the fixing hole formed in the frame, and
wherein the fixing lever closely fixes the fixing body of the fixing part onto the side of the frame.

4. The combined structure of the electric drive wheel according to claim 2, wherein the fixing lever includes:

a shaft screw-coupled with the screw hole of the other side fixing shaft accommodated in the fixing ring;
an eccentric lever of which the lower portion is eccentrically coupled with the other side of the shaft; and
a moving body disposed at the shaft between the fixing ring and the eccentric lever so as to move right and left from the one side of the shaft to the other side of the shaft, one side of the moving body being closely fixed onto the fixing ring by the eccentric lever and the other side of the moving body having a groove which meets the outer circumferential surface of the lower portion of the eccentric lever.

5. The combined structure of the electric drive wheel according to claim 3, wherein the fixing lever includes:

a shaft screw-coupled with the screw hole of the shaft member accommodated in the fixing shaft;
an eccentric lever of which the lower portion is eccentrically coupled with the other side of the shaft; and
a moving body receiving the shaft therein, disposed to move right and left from the one side of the shaft to the other side of the shaft, one side of the moving body being closely fixed onto the fixing shaft by the eccentric lever and the other side of the moving body having a groove which meets the outer circumferential surface of the lower portion of the eccentric lever.

6. The combined structure of the electric drive wheel according to claim 4, wherein the fixing lever further includes an elastic member disposed between the fixing ring and the moving body in the state where the fixing lever receives the shaft therein.

7. The combined structure of the electric drive wheel according to claim 5, wherein the fixing lever further includes an elastic member disposed between the fixing shaft and the moving body in the state where the fixing lever receives the shaft therein.

8. The combined structure of the electric drive wheel according to claim 3, further comprising:

a fixing ring which receives the fixing shaft passing through the fixing hole of the frame therein, wherein the fixing lever closely fixes the fixing body and the fixing ring onto both sides of the frame.

9. The combined structure of the electric drive wheel according to claim 2, wherein an uneven part is formed on the other side of the fixing flange.

10. The combined structure of the electric drive wheel according to claim 2 or 8, wherein uneven parts are respectively formed on one side and the other side of the fixing ring.

11. The combined structure of the electric drive wheel according to claim 4 or 5, wherein an uneven part is formed on one side of the moving body.

12. The combined structure of the electric drive wheel according to claim 2, further comprising:
a packing member in which the other side fixing shaft is accommodated and which is disposed at one side of the other side fixing shaft and is inserted and fixed into the fixing hole of the frame.

13. The combined structure of the electric drive wheel according to claim 2 or 8, wherein there are two fixing rings, and a gap adjustable fixing ring is disposed between the two fixing rings.

14. The combined structure of the electric drive wheel according to claim 2, further comprising:
a reinforcing sleeve inserted and fixed into the fixing hole of the frame and receiving the other side fixing shaft therein.

15. The combined structure of the electric drive wheel according to claim 3, wherein the fixing body includes:

a groove formed on an upper portion of the fixing body; and
a stopper of which one side is inserted and fixed into the groove of the fixing body and the other side is inserted and fixed into the fixing hole located in the upward direction of the fixing shaft, among the fixing holes of the frame, in order to prevent rotation of the fixing body.

16. The combined structure of the electric drive wheel

according to claim 3, further comprising:
an auxiliary stopper including a front side auxiliary stopper coupled to the front side of the other side of the fixing body to be arranged at the front side of the frame and a rear side auxiliary stopper coupled to the rear side of the other side of the fixing body to be arranged at the rear side of the frame in order to prevent rotation of the fixing body.

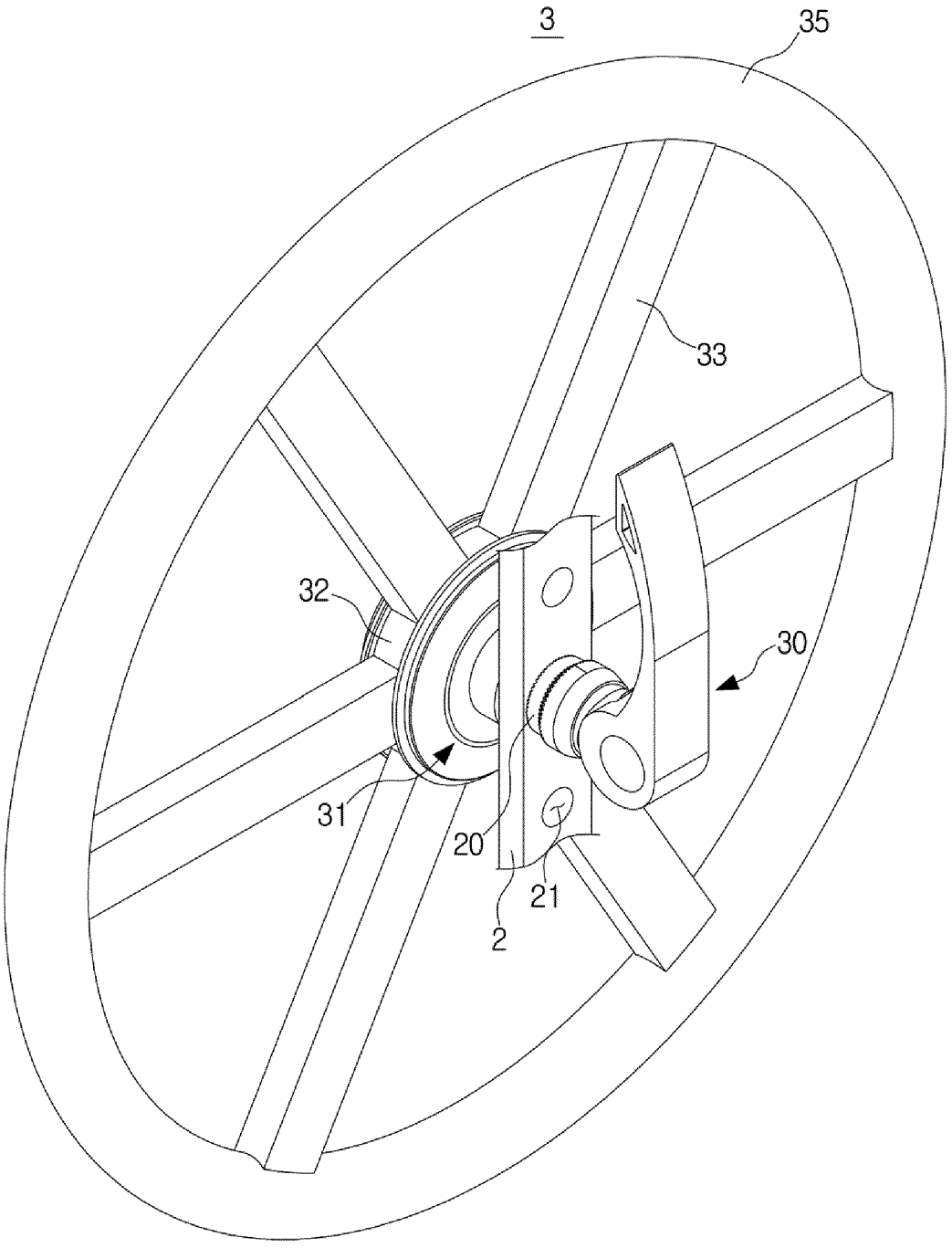

FIG. 1

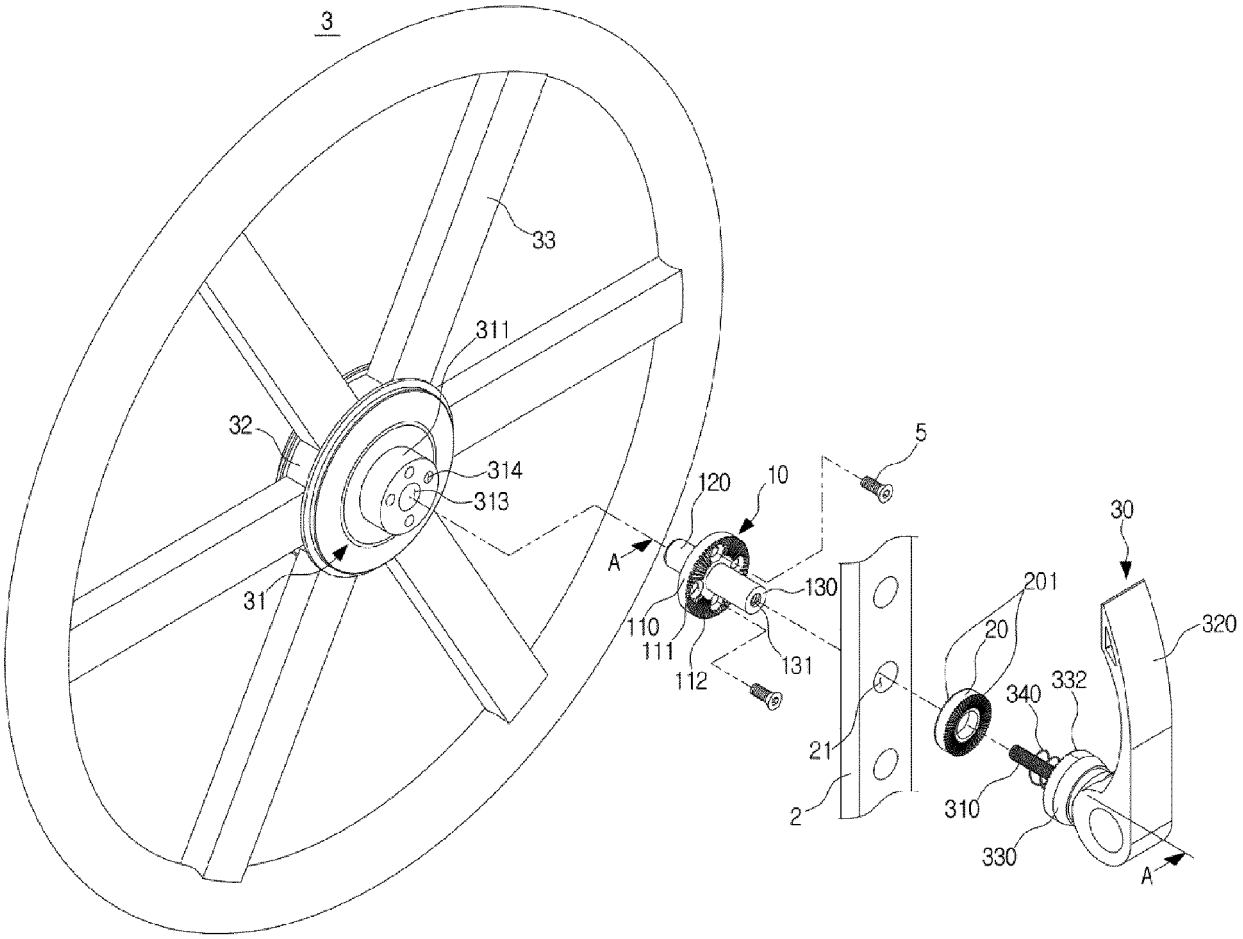
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FIG. 2

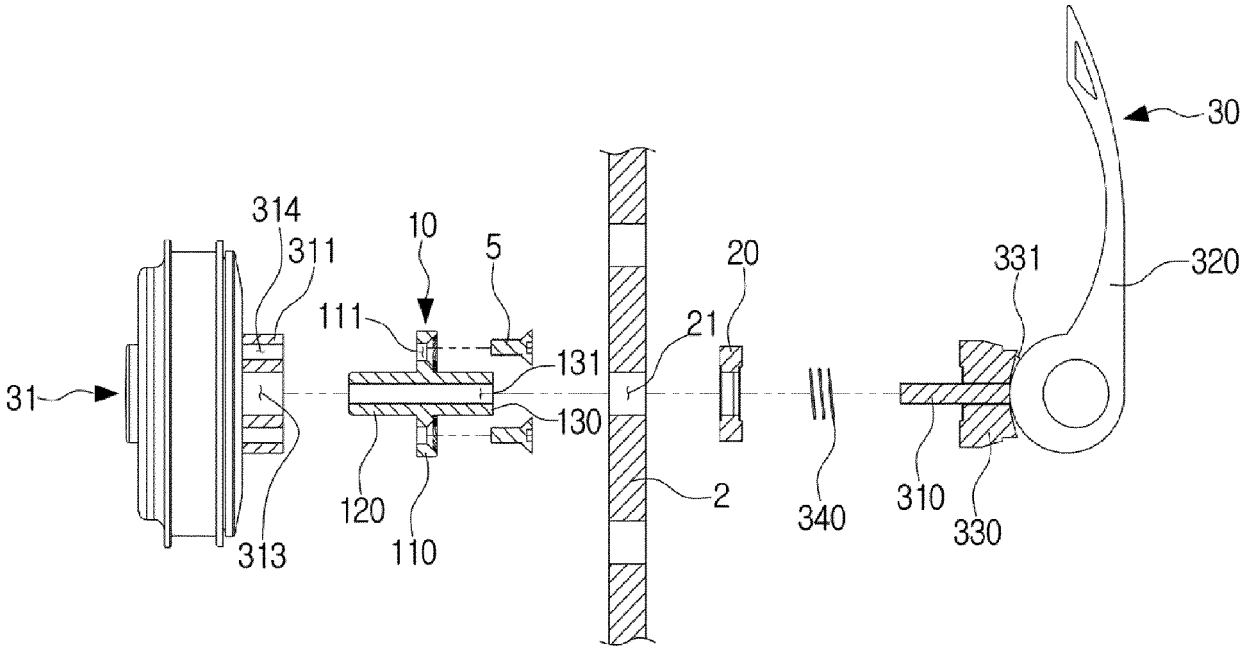
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FIG. 3

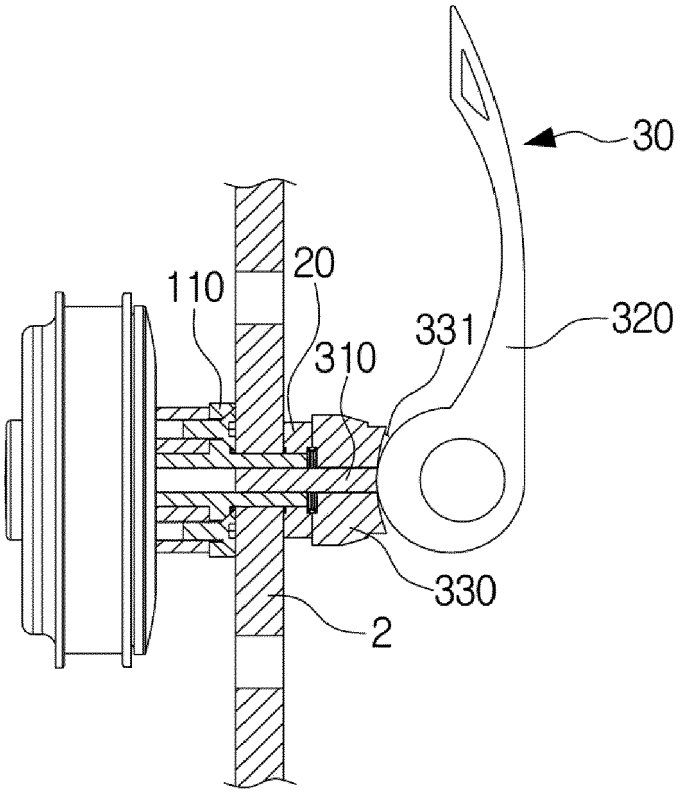


FIG. 4

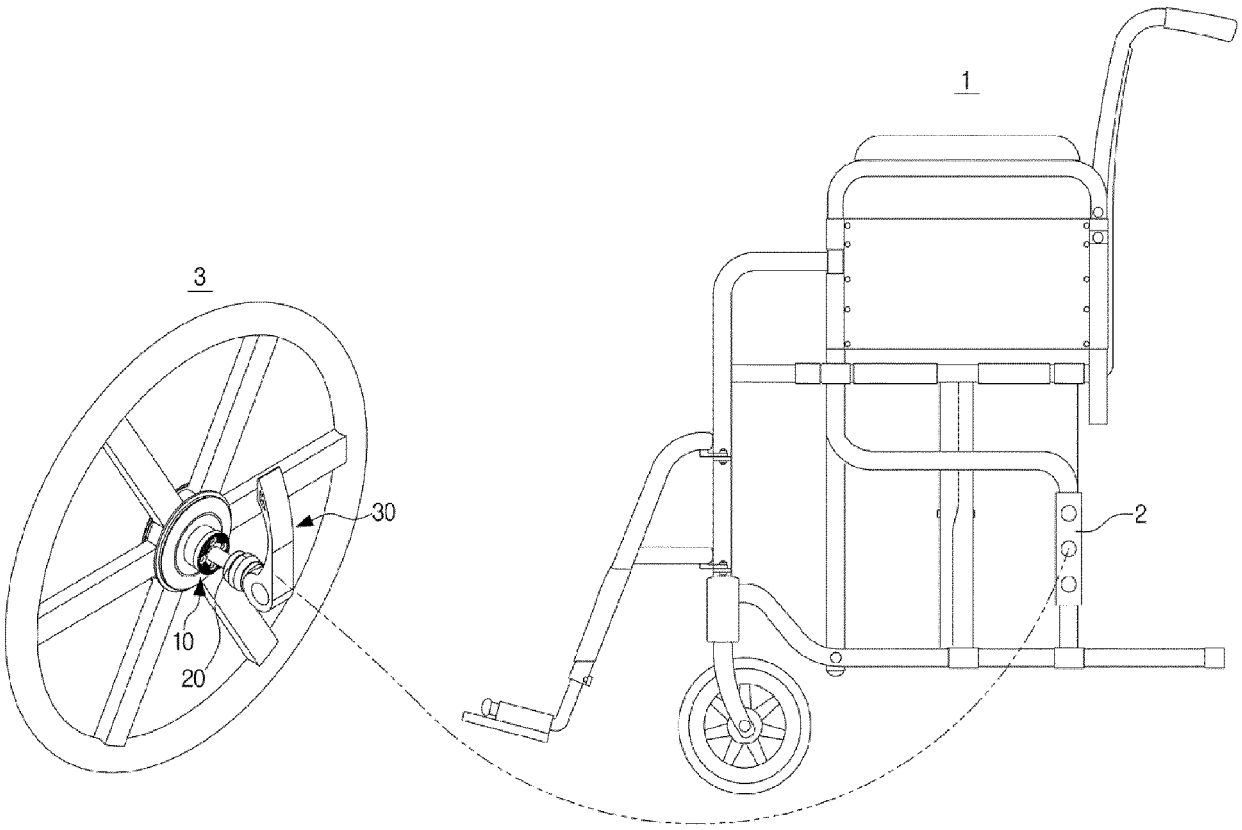


FIG. 5

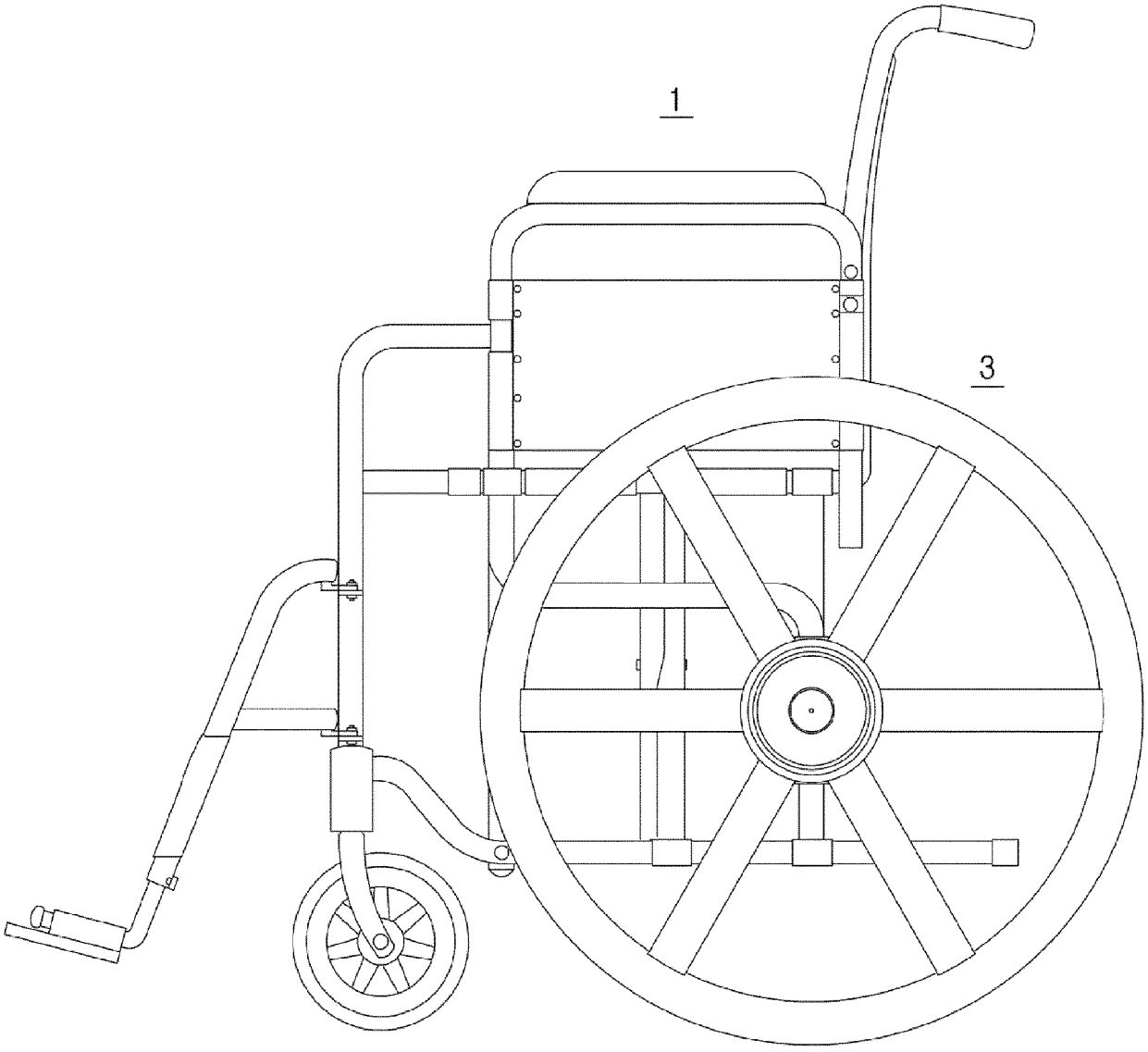


FIG. 6

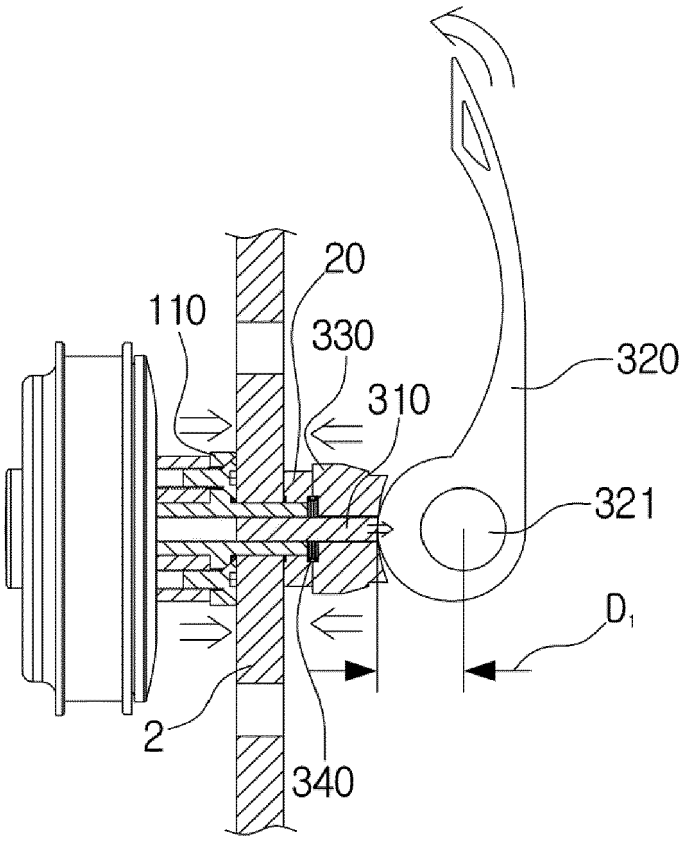


FIG. 7

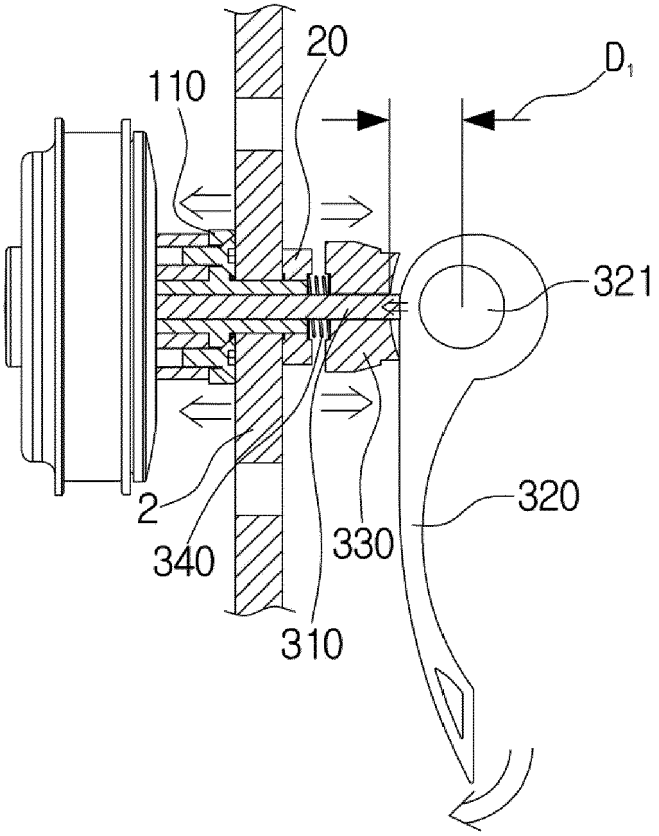


FIG. 8

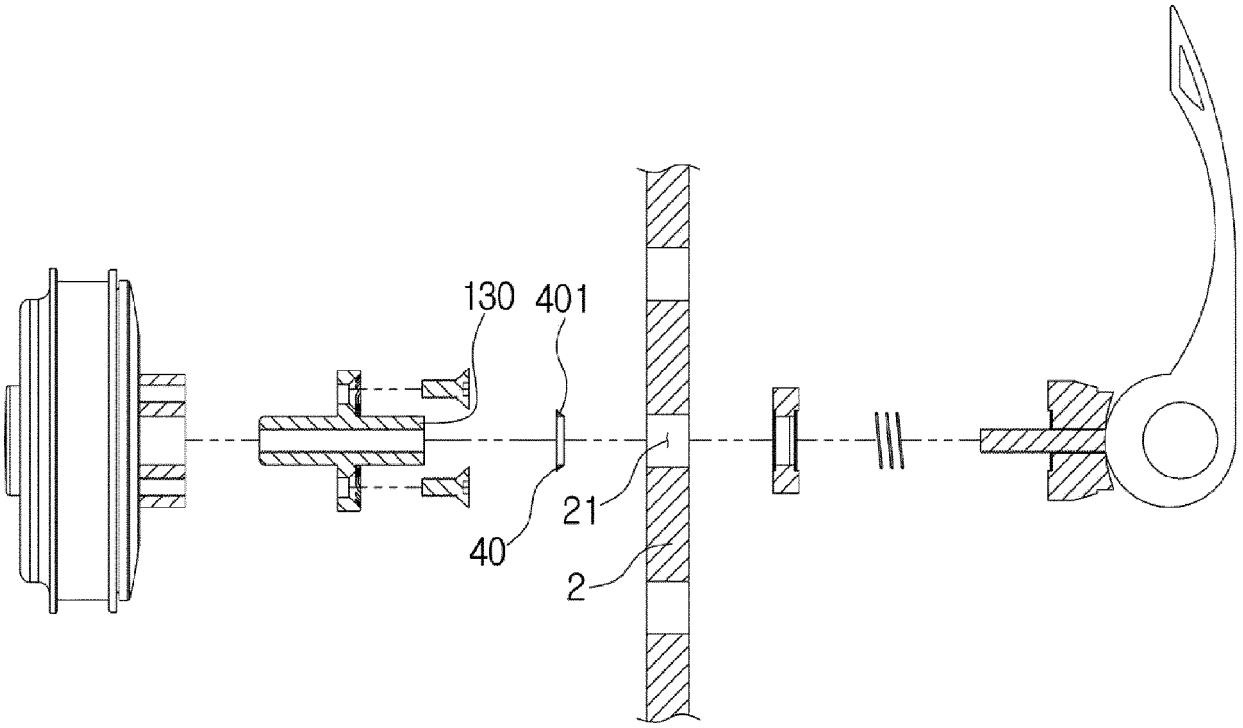


FIG. 9

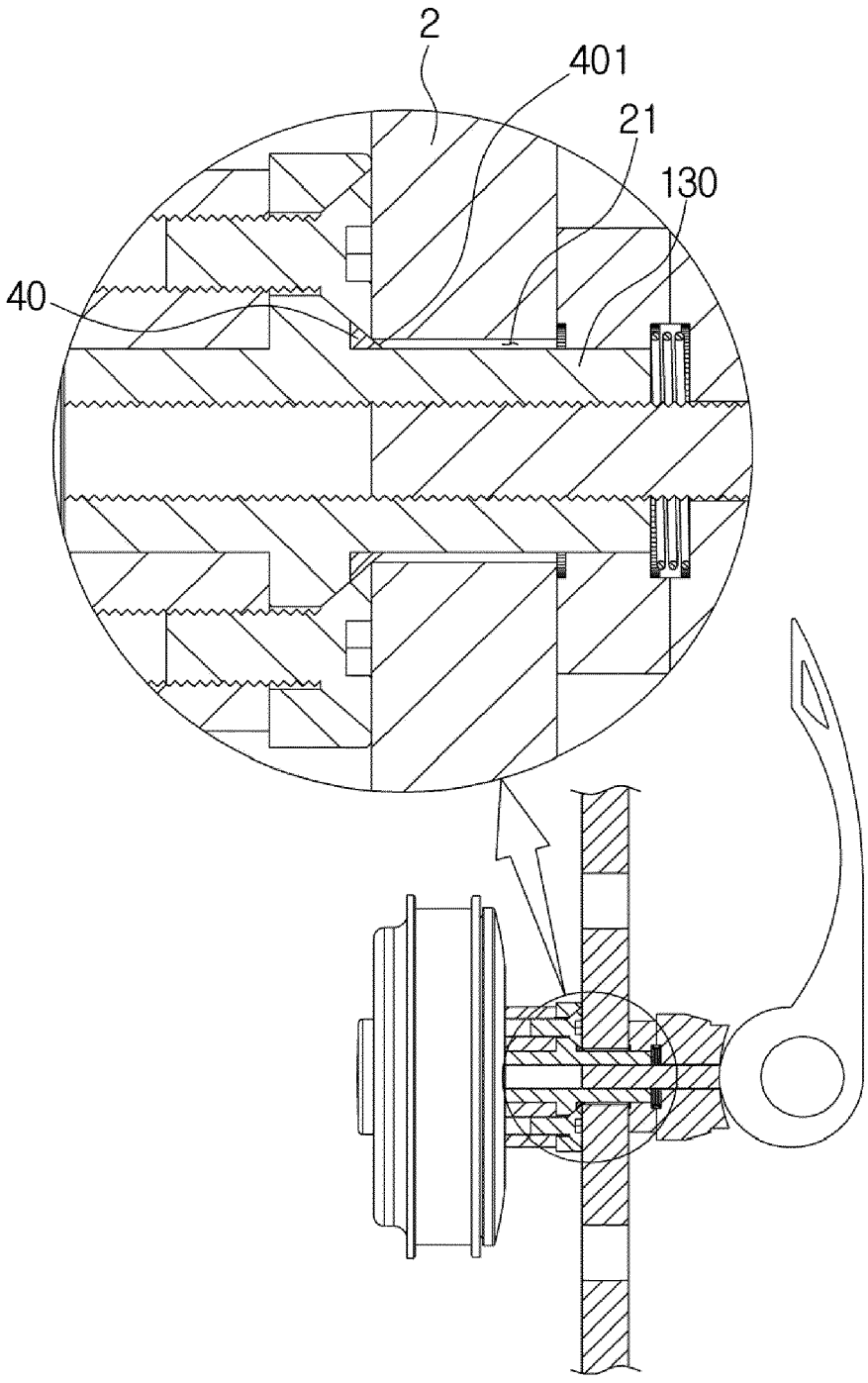
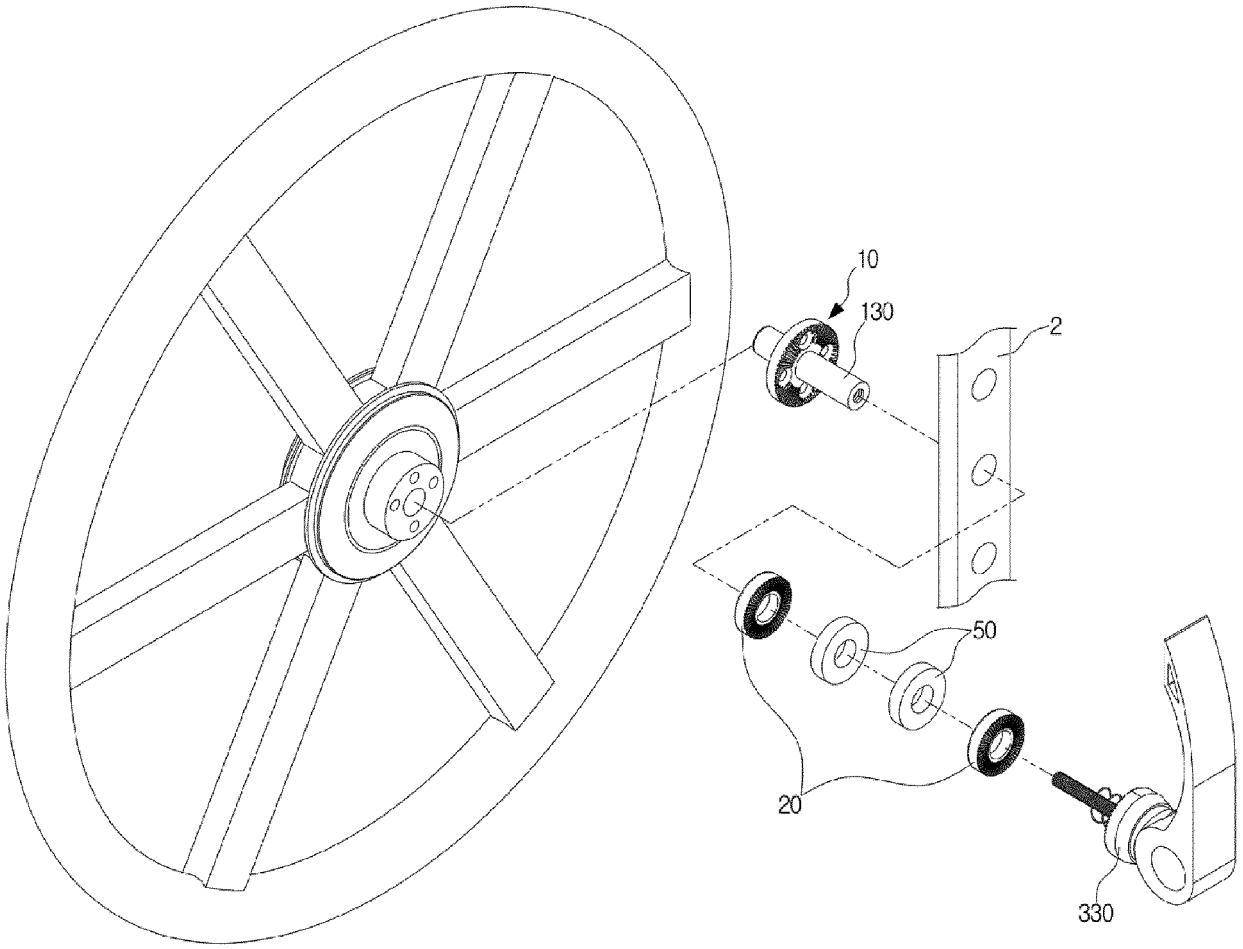


FIG. 10



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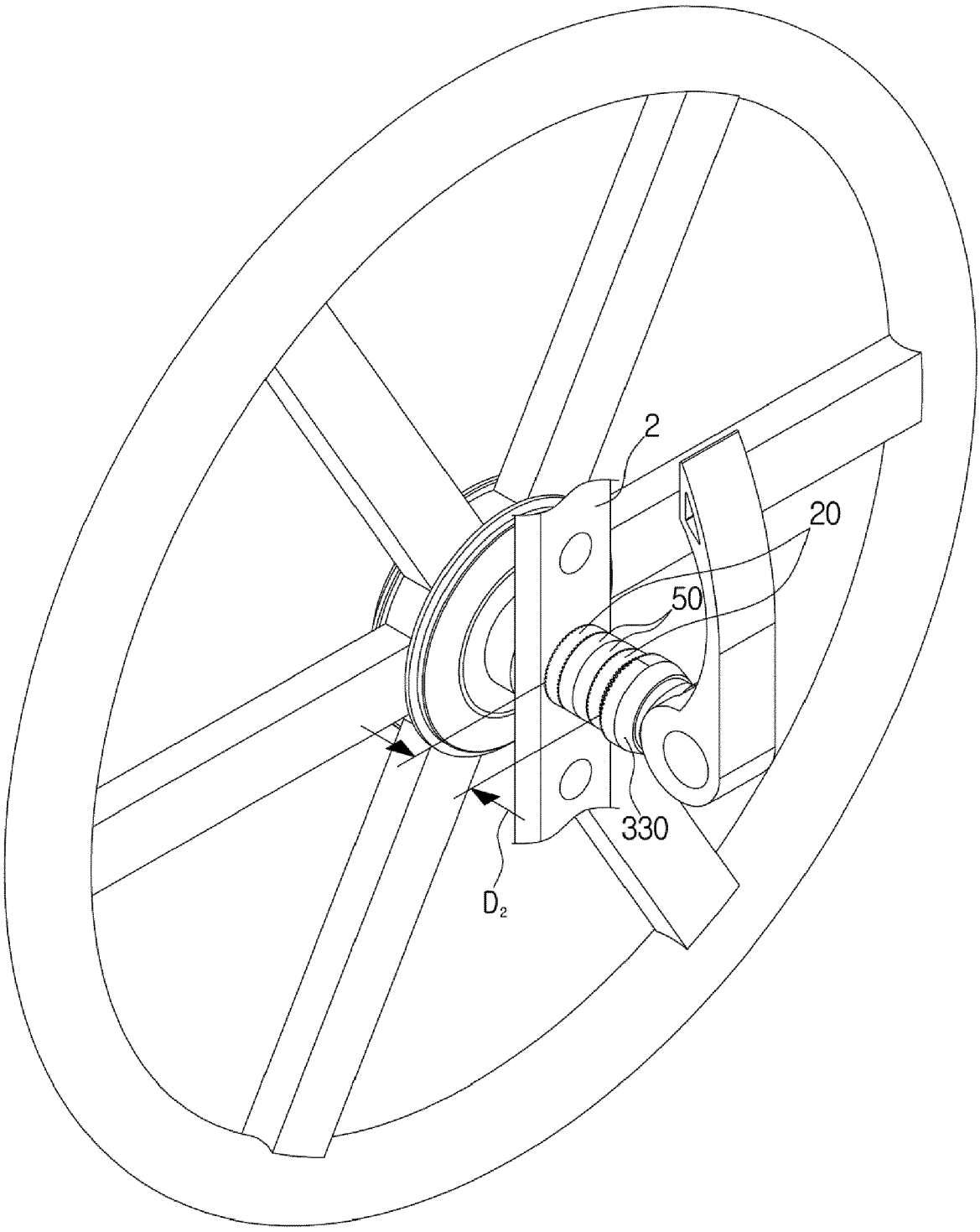

FIG. 12

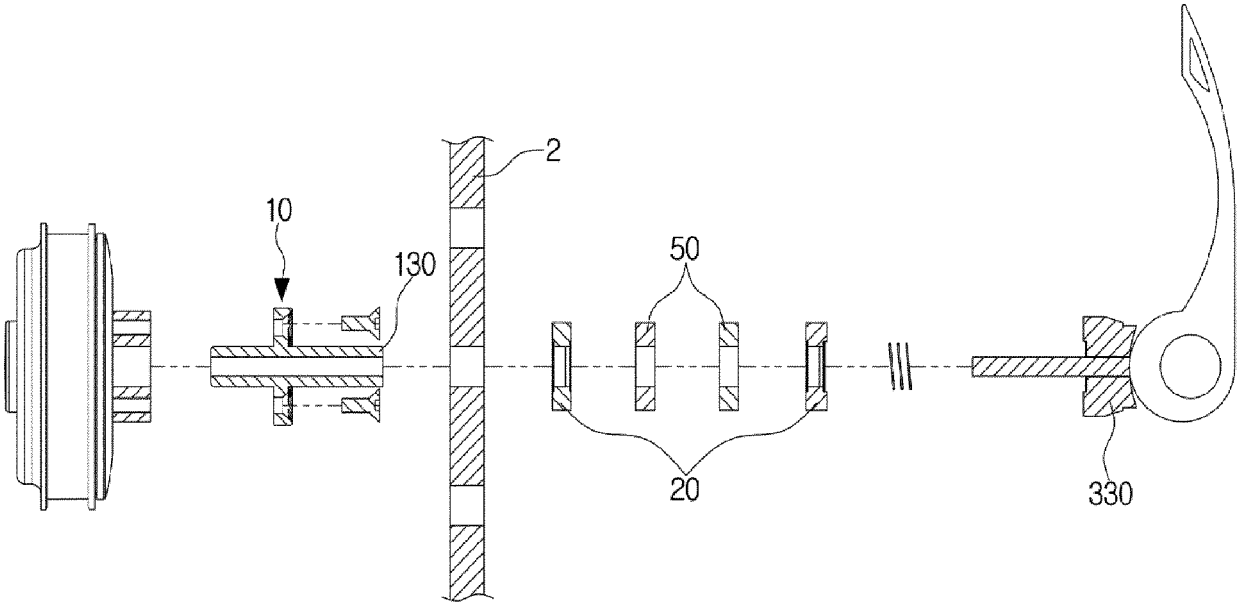

FIG. 13

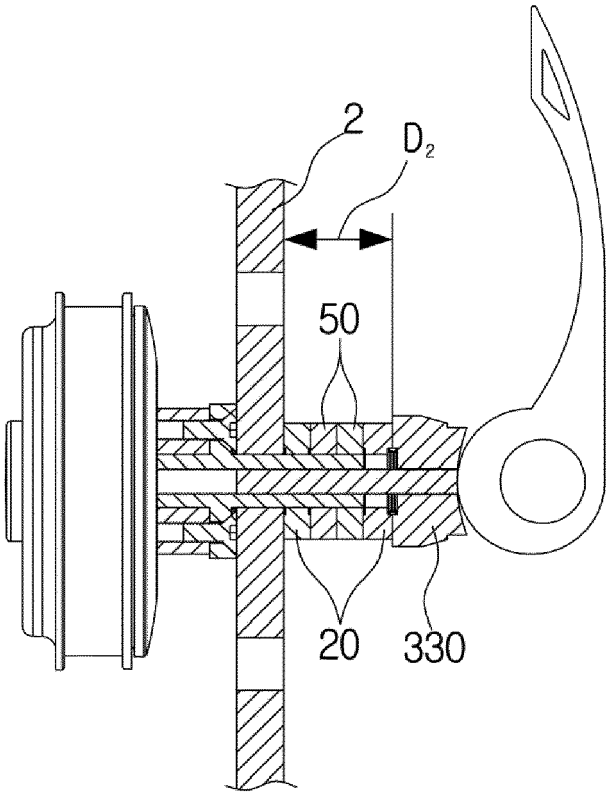

FIG. 14

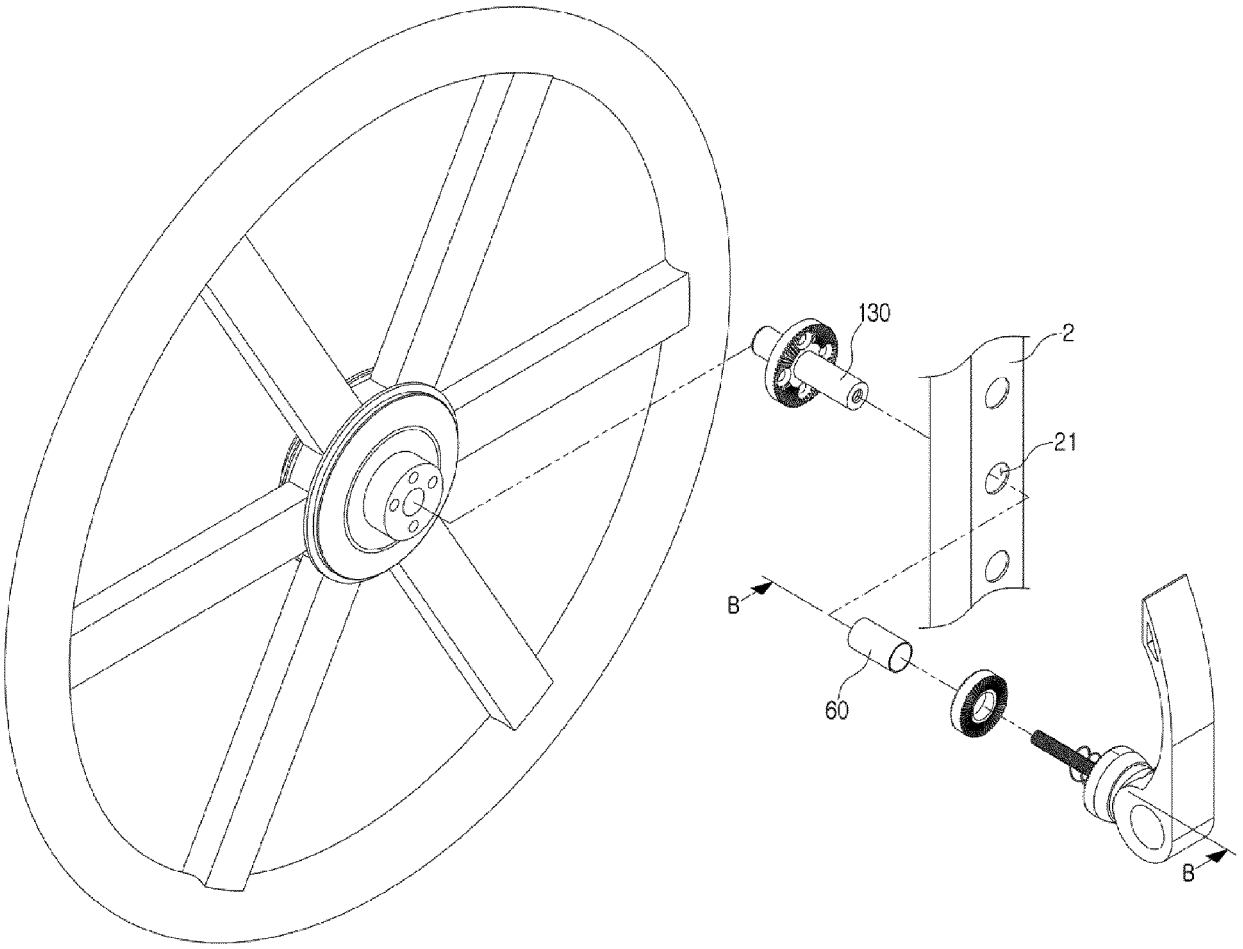

FIG. 15

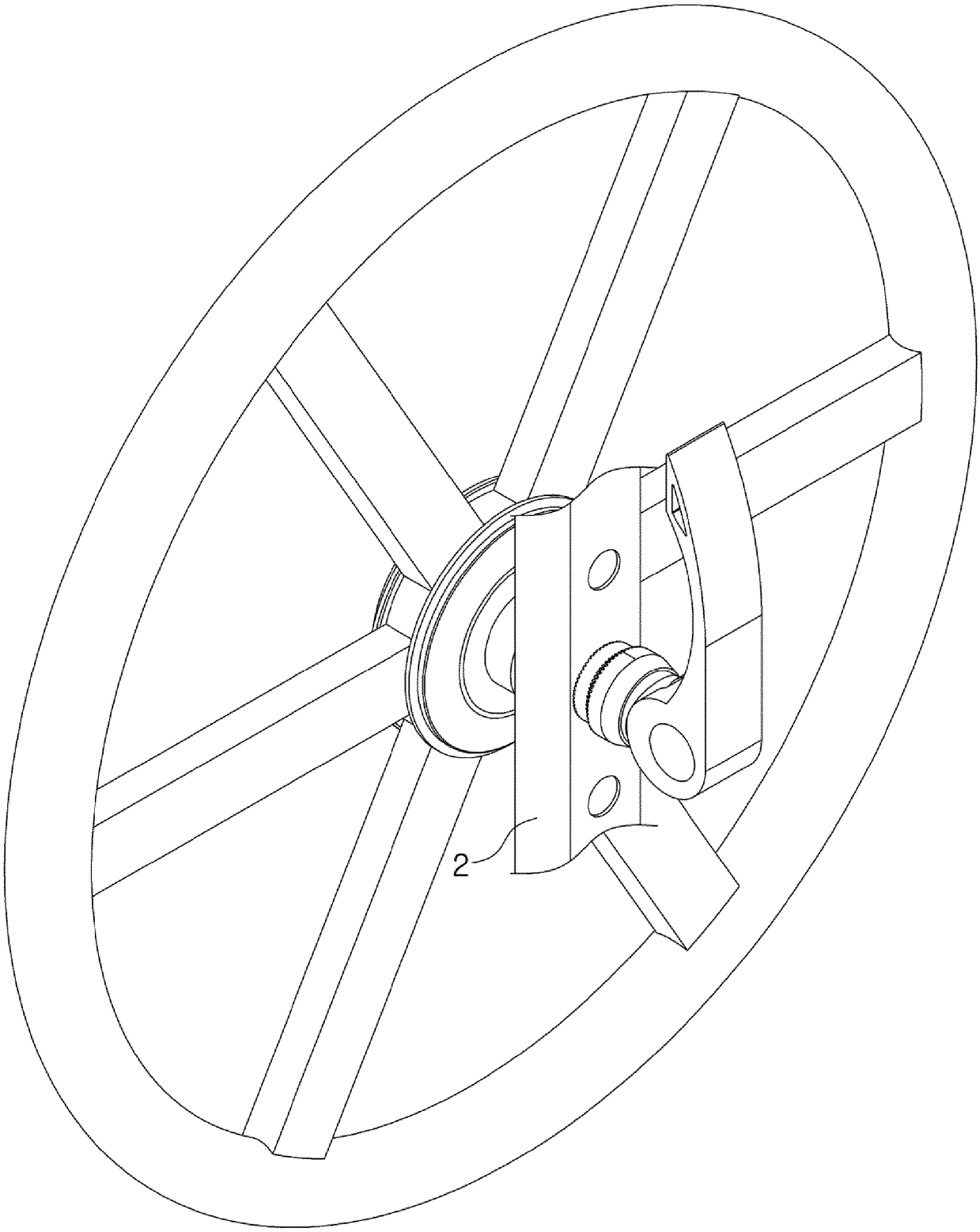

FIG. 16

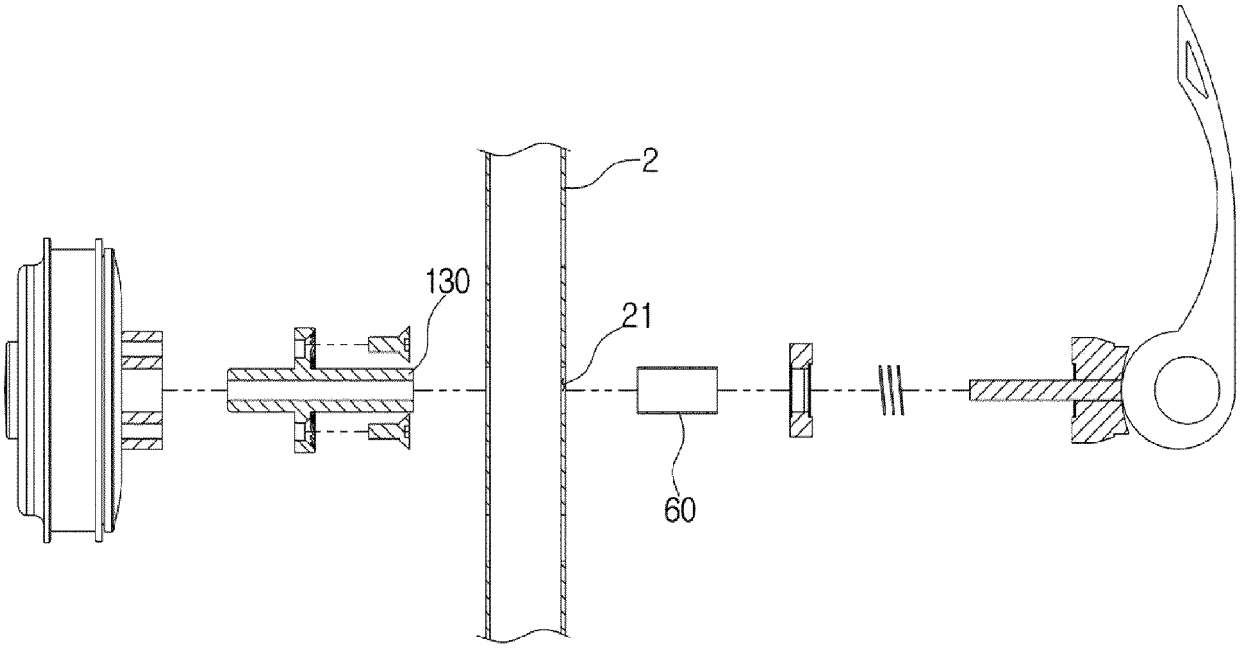

FIG. 17

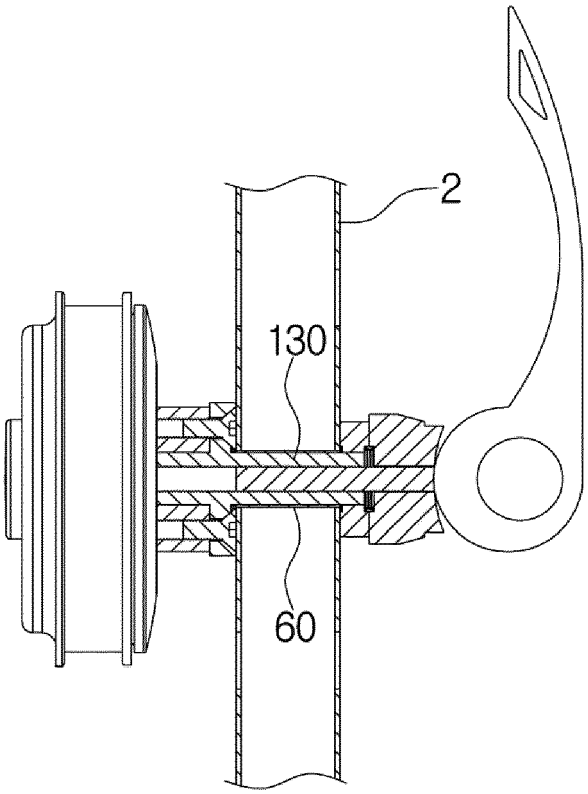

FIG. 18

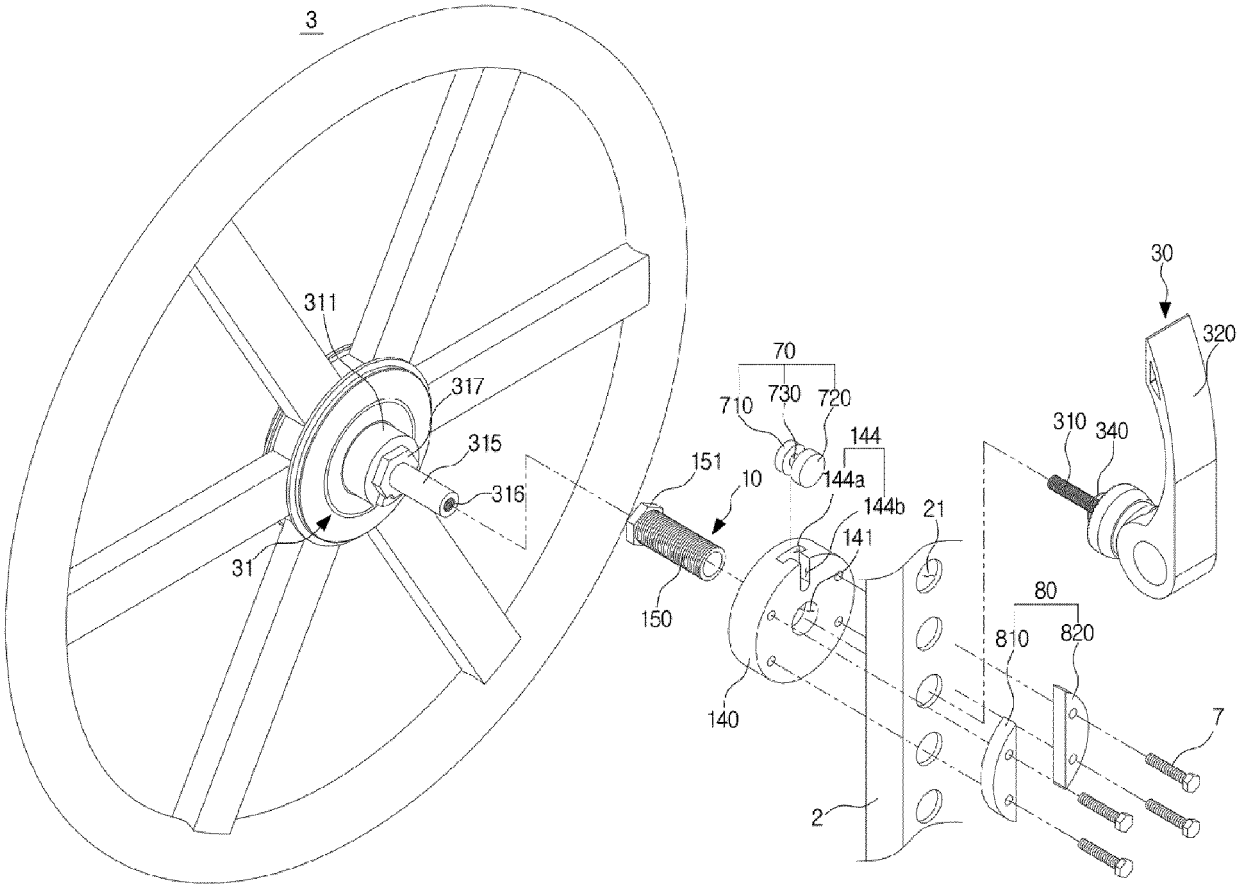
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FIG. 19

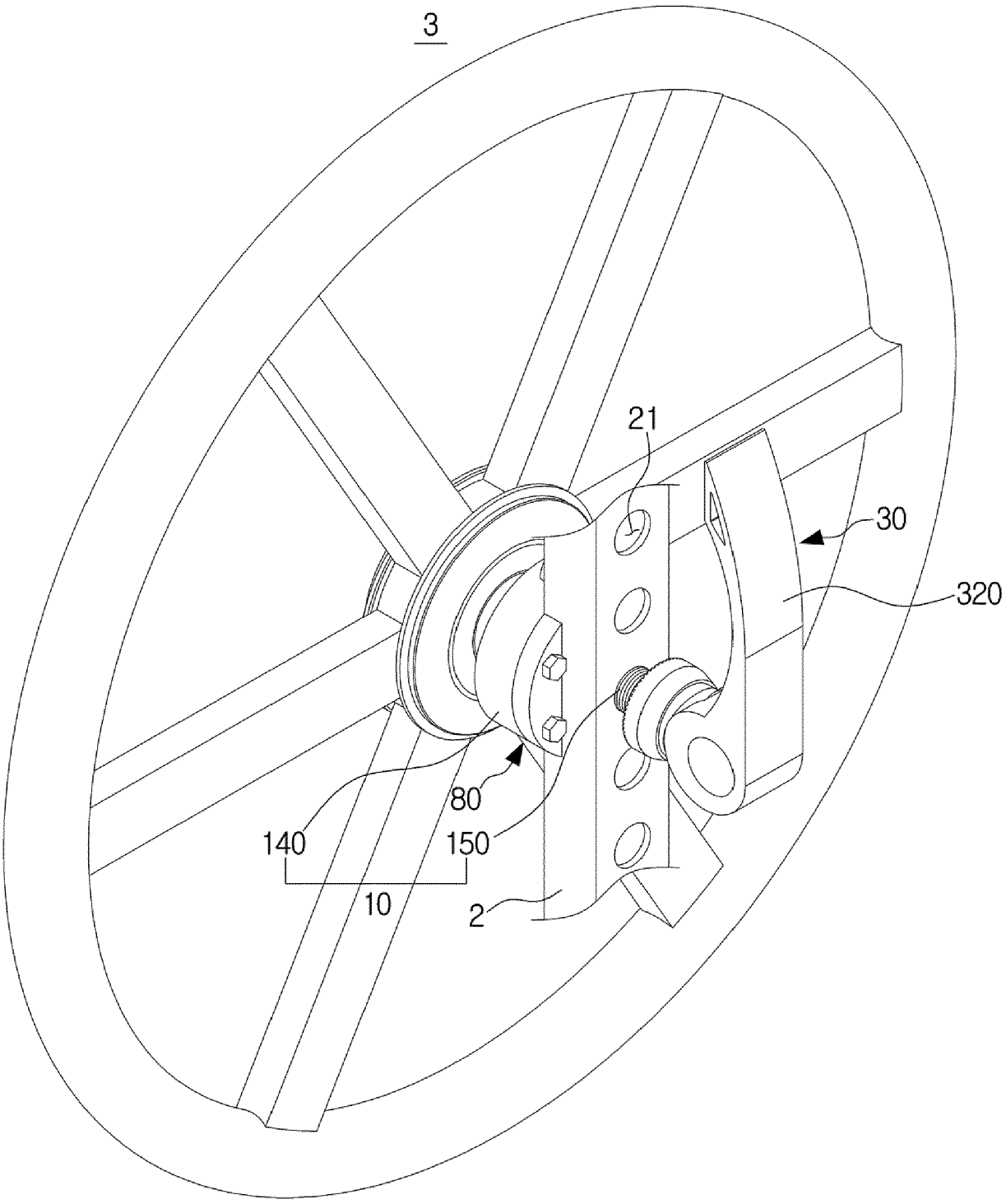

FIG. 20

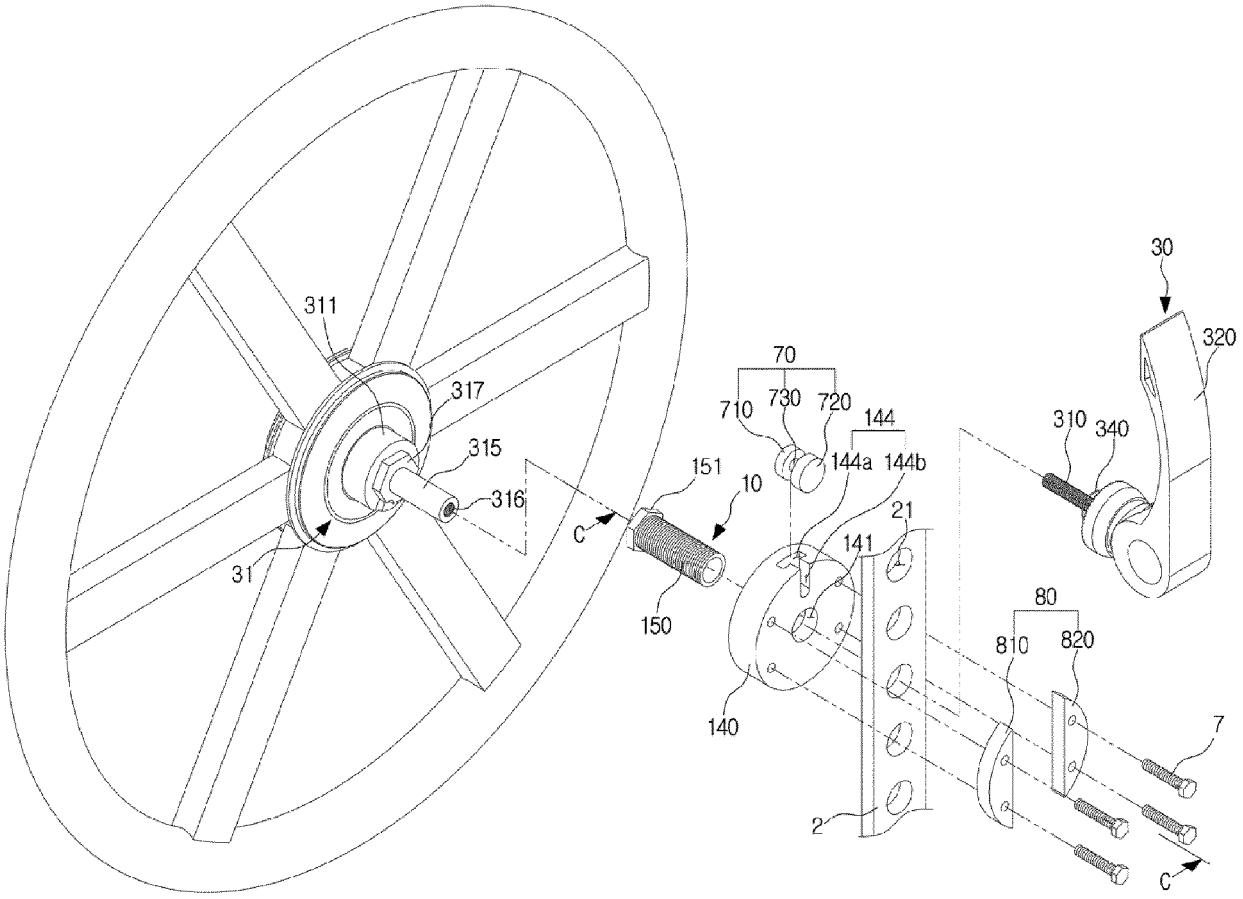
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FIG. 21

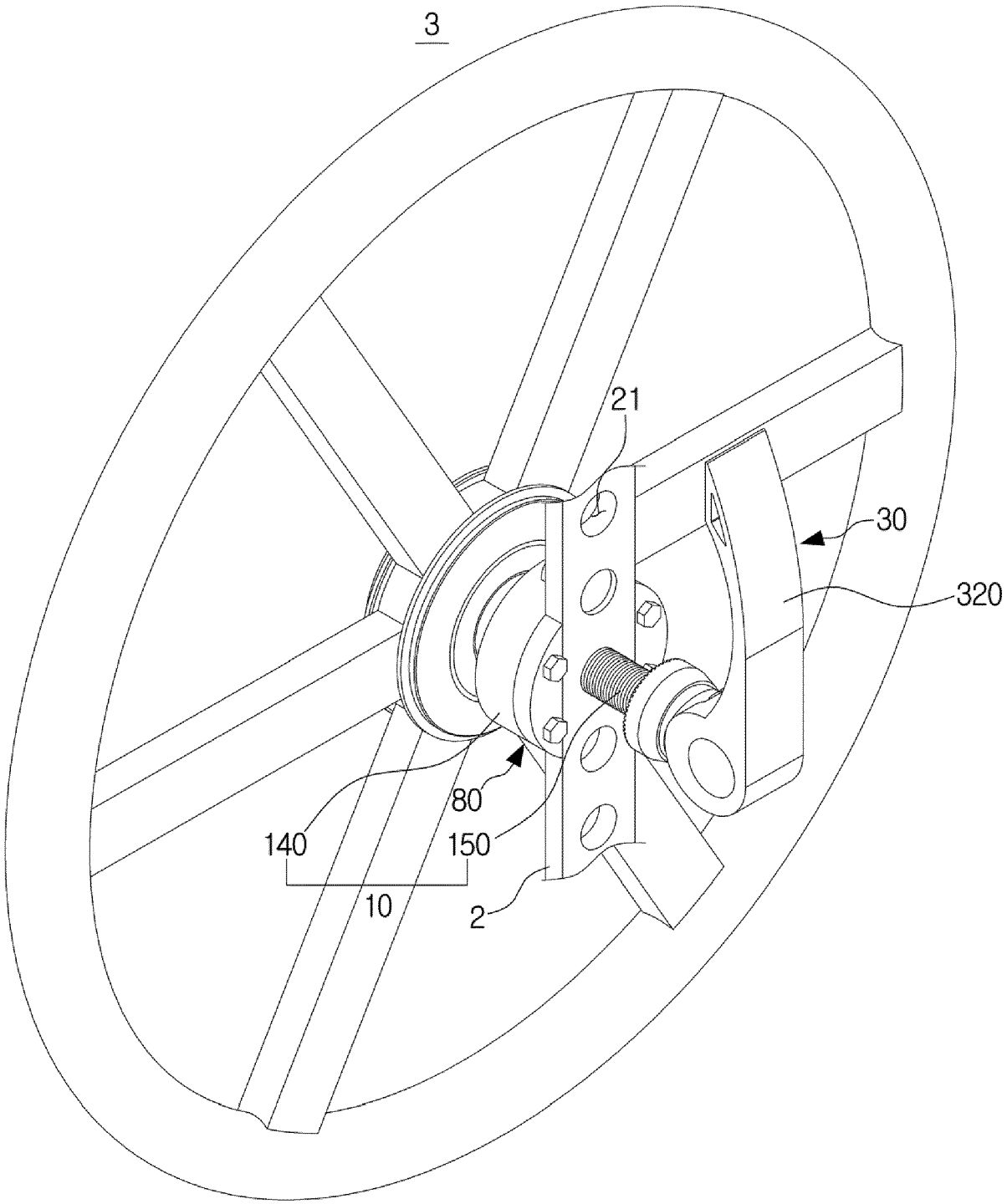

FIG. 22

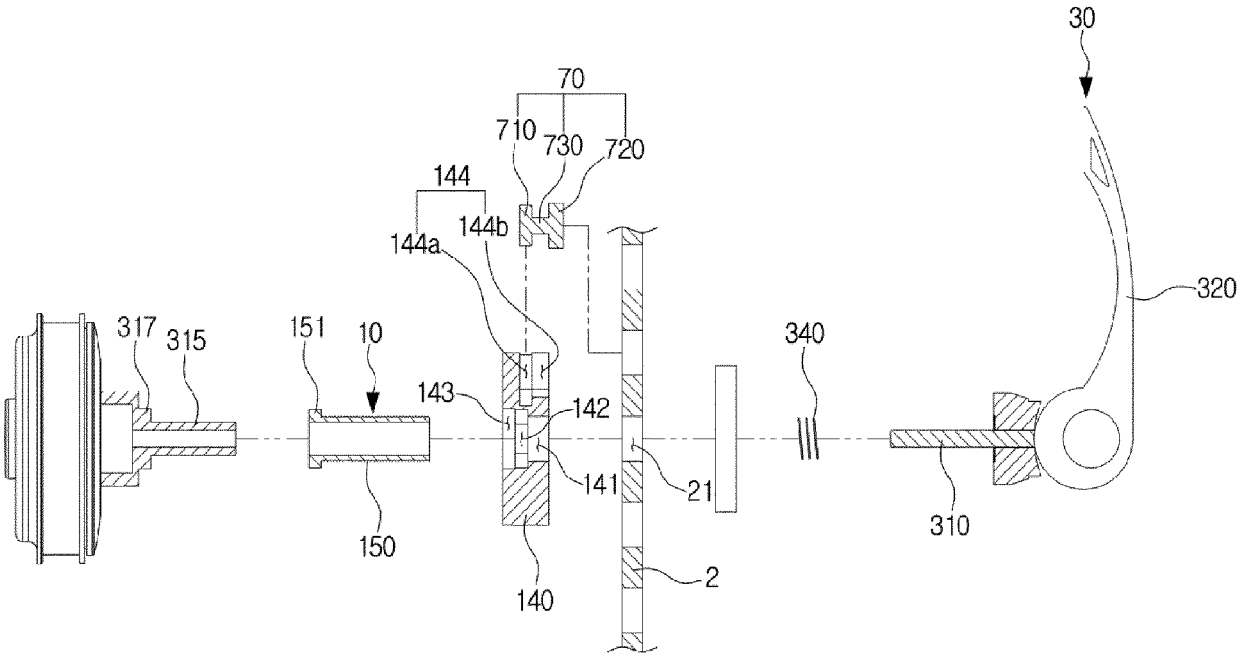
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FIG. 23

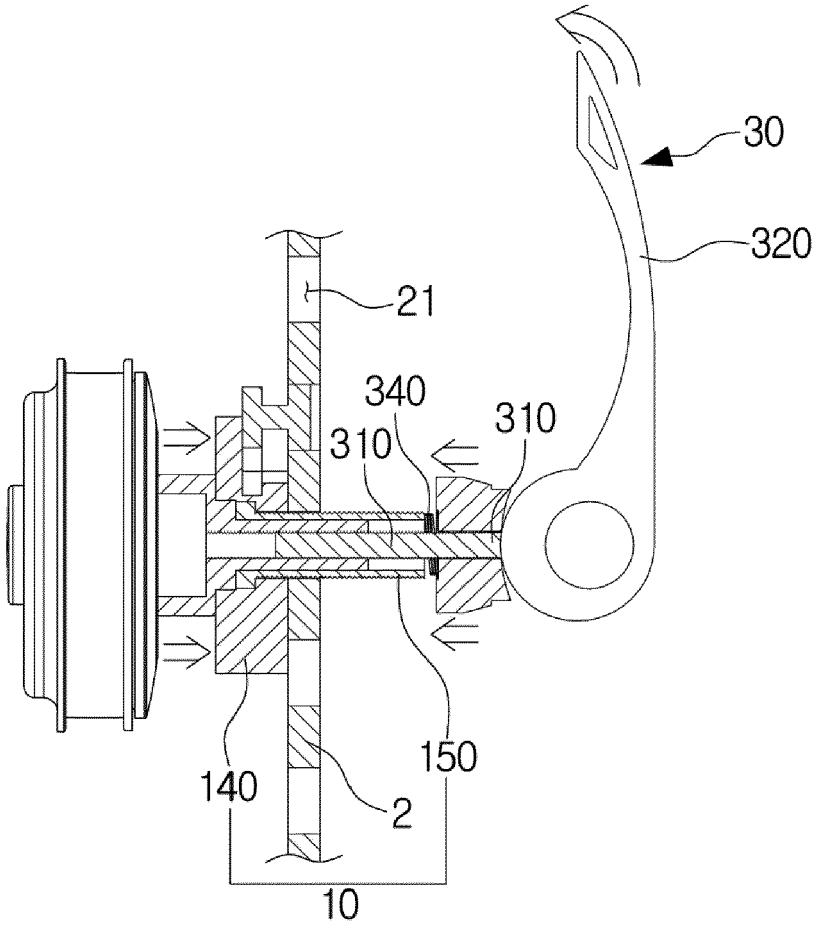

FIG. 24

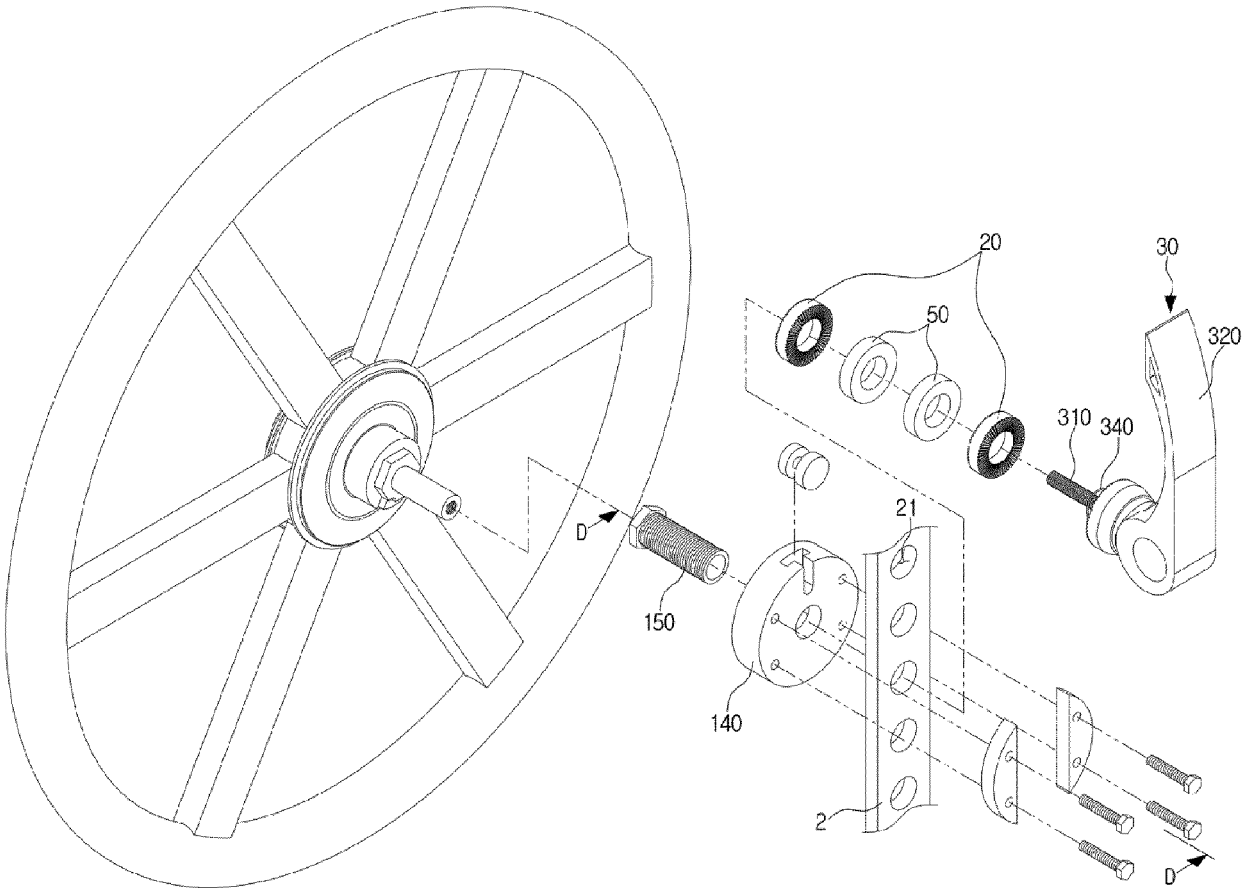

FIG. 25

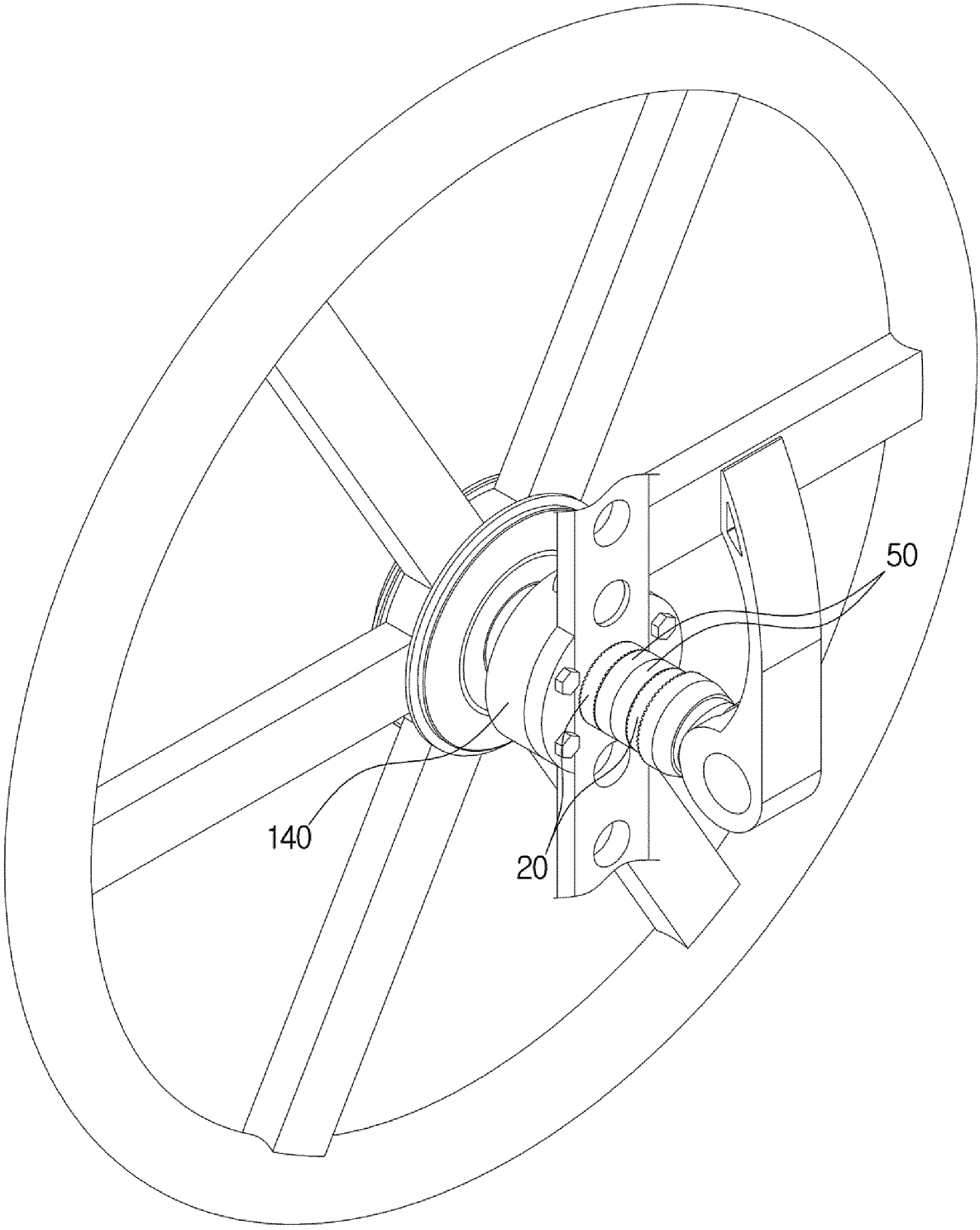

FIG. 26

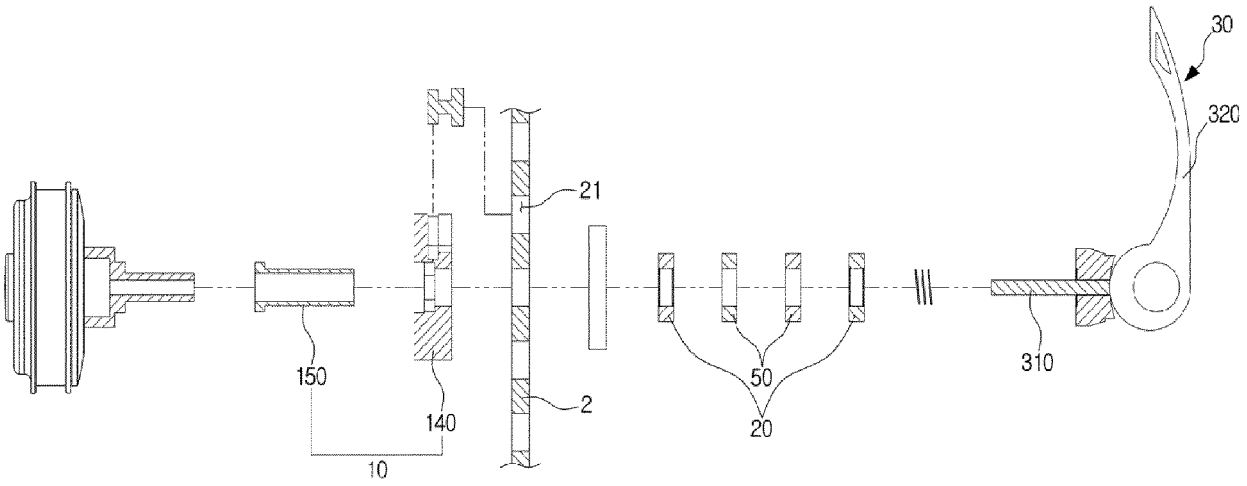

FIG. 27

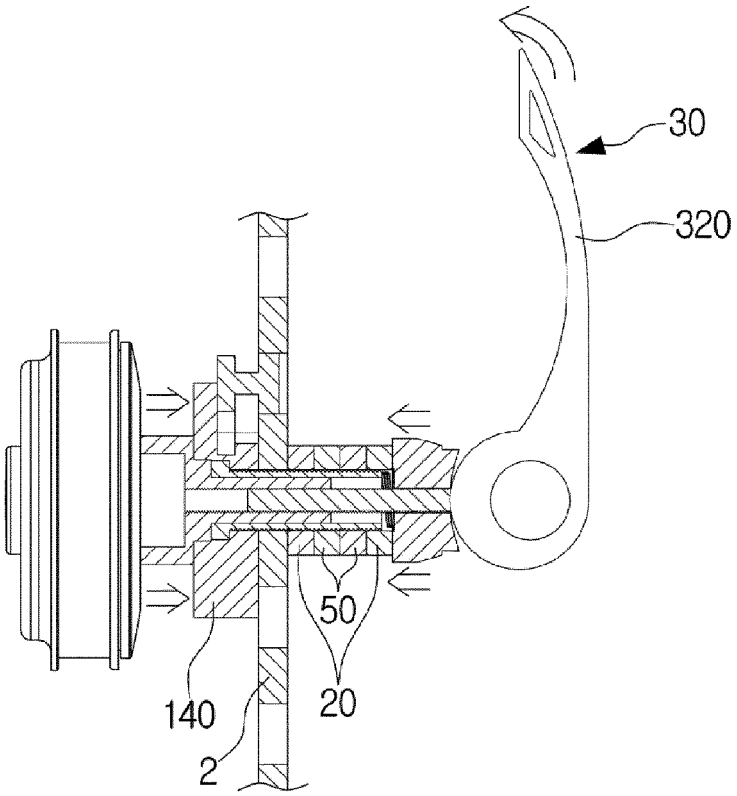

FIG. 28

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EUROPEAN SEARCH REPORT

Application Number
EP 20 18 2806

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	DE 197 46 086 A1 (ORTOPEDIA GMBH [DE]) 22 April 1999 (1999-04-22) * paragraph [0027]; figures 1-3 *	1,3,5,7, 8,10,11 2,4,6,9, 12-16	INV. A61G5/04 A61G5/10
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TECHNICAL FIELDS SEARCHED (IPC)

A61G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 November 2020	Birlanga Pérez, J

CATEGORY OF CITED DOCUMENTS

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09-11-2020

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