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WALL-MOUNTED TOILET FIXING DEVICE

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A wall-mounted toilet fixing device comprises a housing (1), a driven member (2), at least one press block (3) movably fitted on the driven member (2), a driving member (4) for driving the driven member (2) to rotate and for driving the press block (3) to engage with a screw rod (S), and a driver (5) for driving the driving member (4) to rotate. The housing (1) has a first chamber body (13) and a second chamber body (14) which are intersected and communicated with each other. The driver (5) is rotatably fitted in the first chamber body (13). The driving member (4) and the driven member (2) are rotatably fitted in the second chamber body (14). The driving member (4) is movably sleeved on the driven member (2). The driver (5) cooperates with the driving member
- (4)

through an intersecting shaft gear transmission mechanism or an interlaced shaft gear transmission mechanism. The driving member (4) is movably engaged with the driven member (2). A rotation damping mechanism is provided between the driven member (2) and the second chamber body (14). A side wall of the driven member (2) is provided with at least one engaging hole (22) passing through the side wall of the driven member (2). The press block (3) is movably fitted in the engaging hole (22). An inner surface of the press block (3) is formed with an engaging surface (31). The wall-mounted toilet fixing device is used for fixing a wall-mounted toilet (C), having the advantages of a simple operation and a wide adjusting range.

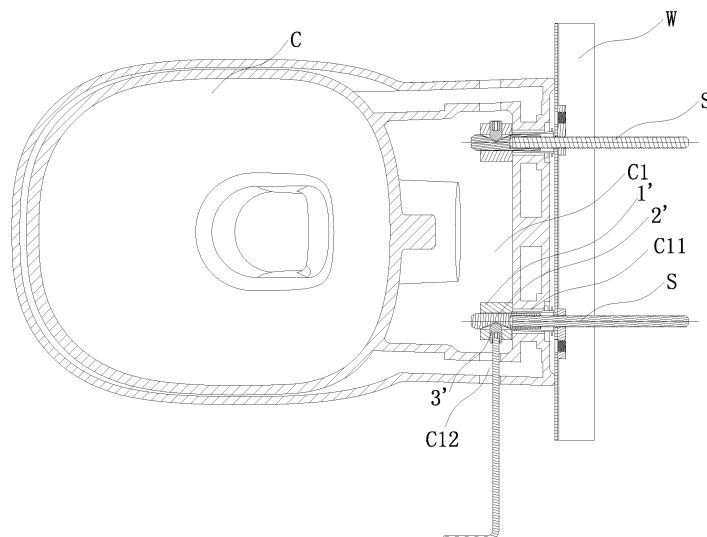


FIG. 2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a wall-mounted toilet, and more particularly to a wall-mounted toilet fixing device.

2. Description of the Prior Art

[0002] Compared to a floor-mounted toilet, a wall-mounted toilet C is a toilet that is directly mounted to a mounting base W (the wall or water tank fixing bracket). The bottom of the toilet does not come into contact with the floor, thus saving the bathroom space. The toilet is fixed to the mounting base through a fixing device.

[0003] As shown in FIG. 1, a conventional wall-mounted toilet fixing device comprises a body 1', a screw sleeve 2' and a screw 3' fitted in the body 1'. The screw sleeve 2' is provided with a concave surface 21'. The tail end of the screw 3' opposite to the head is a conical structure. When the wall-mounted toilet C is fixed by using the wall-mounted toilet fixing device, as shown in FIG. 2, the body 1' is placed in a mounting chamber C1 of the wall-mounted toilet C. The mounting chamber C1 is provided with a fixing hole C11 passing through the back of the wall-mounted toilet C and a mounting hole C12 passing through the top or the side of the wall-mounted toilet C. The screw sleeve 2' is connected to a screw rod S fixed on the mounting base W, and then the screw sleeve 2' is inserted through the fixing hole C11 into the body 1'. Finally, a wrench is inserted in the mounting chamber C1 through the mounting hole C12 to screw the screw 3' into the body 1' so that the tail end of the screw 3' is engaged with the concave surface 21' to achieve locking. However, when the wall-mounted toilet C is fixed by the wall-mounted toilet fixing device, the tail end of the screw 3' is moved within the concave surface 21' of the screw sleeve 2' by turning the screw 3' to achieve the adjustment of the distance between the wall-mounted toilet and the mounting base. However, in order to ensure that the screw 3' is firmly engaged with the concave surface 21', the length of the concave surface 21' cannot be too long. As a result, the adjusting range of the conventional wall-mounted toilet fixing device is small. Therefore, in order to ensure that the distance between the wall-mounted toilet C and the mounting base W is small enough, a locking position can only be found by measuring the thickness of the wall-mounted toilet C. This locking position not only achieves the cooperation of the screw 3' with the concave surface 21' of the screw sleeve 2' but also realizes that the distance between the wall-mounted toilet C and the mounting base W is small enough. Because it is necessary to find the locking position, the operation is troublesome when the conventional wall-mounted toilet fixing device is used to fix the wall-mounted toilet C.

To sum up, the operation for the conventional wall-mounted toilet fixing device used to fix the wall-mounted toilet C is troublesome and the adjusting range is small.

5 SUMMARY OF THE INVENTION

[0004] In view of the shortcomings of the prior art, the primary object of the present invention is to provide a wall-mounted toilet fixing device for fixing a wall-mounted toilet, having the advantages of a simple operation and a wide adjusting range.

[0005] In order to achieve the aforesaid object, the wall-mounted toilet fixing device of the present invention is movably mated with a screw rod fixed on a mounting base. The wall-mounted toilet fixing device comprises a housing, a driven member, at least one press block movably fitted on the driven member, a driving member for driving the driven member to rotate and for driving the press block to engage with the screw rod, and a driver for driving the driving member to rotate. The housing has a first chamber body and a second chamber body which are intersected and communicated with each other. One end of the first chamber body is provided with a through hole passing through the housing. Two ends of the second chamber body are provided with two perforations passing through the housing and facing each other. The driver is a cylindrical structure. The driven member and the driving member are hollow tubular structures. The driver is rotatably fitted in the first chamber body. The driving member and the driven member are rotatably fitted in the second chamber body. The driving member is movably sleeved on the driven member. The driven member is provided with a through passage aligned with the two perforations. The driver cooperates with the driving member through an intersecting shaft gear transmission mechanism or an interlaced shaft gear transmission mechanism. The driving member is movably engaged with the driven member. One end of the driven member extends out of the driving member and is provided with a stop portion for blocking the driving member. A rotation damping mechanism is provided between the stop portion and the second chamber body. The rotation damping mechanism enables the driven member to have a forward rotation damping and a reverse rotation damping. The reverse rotation damping is greater than the forward rotation damping. A side wall of the driven member is provided with at least one engaging hole passing through the side wall of the driven member. The press block is movably fitted in the engaging hole. The number of the press block corresponds to the number of the engaging hole. An inner surface of the press block is formed with an engaging surface corresponding to an external threaded surface of the screw rod. When the driving member is rotated in a forward direction, the press block is pushed by the driving member to engage with the screw rod.

[0006] In an embodiment, the number of the at least one engaging hole is two. Each of the engaging holes is

movably mated with the press block. An inner wall of the driving member is formed with two curved troughs recessed outward and respectively corresponding to the two engaging holes. One side of each of the engaging holes is formed with a limit rib protruding outward and movably fitted in a corresponding one of the curved troughs.

[0007] In an embodiment, the number of the at least one engaging hole is two. Each of the engaging holes is movably mated with the press block. An inner wall of the driving member is formed two eccentric troughs recessed outward and respectively corresponding to the two engaging holes. A distance from the eccentric troughs to a rotating axle of the driven member decreases in a forward rotation direction of the driven member. The at least one press block includes two press blocks each extending outward to form an engaging portion. The engaging portions of the two press blocks are engaged with the two eccentric troughs, respectively.

[0008] In an embodiment, the number of the at least one engaging hole is two. Each of the engaging holes is movably mated with the press block. An inner wall of the driving member is formed an eccentric trough recessed outward. A distance from the eccentric trough to a rotating axle of the driven member decreases in a forward rotation direction of the driven member. The at least one press block includes two press blocks. The two press blocks are connected by a curved plate located between the driving member and the driven member. A middle portion of the curved plate is formed with an engaging portion engaged in the eccentric trough.

[0009] In an embodiment, the intersecting shaft gear transmission mechanism is a bevel gear transmission mechanism. An outer wall of the driving member is provided with a first bevel gear. The driver is provided with a second bevel gear meshing with the first bevel gear.

[0010] In an embodiment, the interlaced shaft gear transmission mechanism is a cylindrical worm shaft transmission mechanism. The driver is a cylindrical worm shaft. An outer wall of the driving member is provided with a gear wheel meshing with the cylindrical worm shaft.

[0011] In an embodiment, the stop portion is provided with two symmetric elastic arms extending in a direction away from a rotating axle of the driven member. A distance from the elastic arms to the rotating axle of the driven member increases in a reverse rotation direction of the driven member. An inner wall of the second chamber body is provided with a plurality of protrusions which are equidistantly distributed and movably mated with the elastic arms. Each of the protrusions is a triangular structure. Two sides of each of the protrusions are a push surface and a stop surface for movably contacting with the elastic arms, respectively. A distance from the push surface to the rotating axle of the driven member increases in a forward rotation direction of the driven member. A distance from the stop surface to the rotating axle of the driven member decreases in the forward rotation direction of the driven member. The elastic arms and the

protrusions constitute the rotation damping mechanism.

[0012] In an embodiment, an inner wall of the second chamber body is provided with two symmetrical elastic arms. A distance from the elastic arms to a rotating axle of the driven member increases in a reverse rotation direction of the driven member. The stop portion is provided with a plurality of protrusions which extend in a direction away from the rotating axle of the driven member and are equidistantly distributed and movably mated with the elastic arms. Each of the protrusions is a triangular structure. Two sides of each of the protrusions are a push surface and a stop surface for movably contacting with the elastic arms, respectively. A distance from the push surface to the rotating axle of the driven member decreases in a forward rotation direction of the driven member. A distance from the stop surface to the rotating axle of the driven member increases in the forward rotation direction of the driven member. The elastic arms and the protrusions constitute the rotation damping mechanism.

[0013] In an embodiment, an end surface of the stop portion is provided with two symmetric elastic arms extending outward. A distance from the elastic arms to an end surface of the driven member increases in a reverse rotation direction of the driven member. An inner end surface of the second chamber body, close to the stop portion, is provided with a plurality of projections which are equidistantly distributed and movably mated with the elastic arms. Each of the protrusions is a triangular structure. Two sides of each of the protrusions are a push surface and a stop surface for movably contacting with the elastic arms, respectively. A distance from the push surface to the end surface of the driven member increases in a forward rotation direction of the driven member. A distance from the stop surface to the end surface of the driven member decreases in the forward rotation direction of the driven member. The elastic arms and the protrusions constitute the rotation damping mechanism.

[0014] Preferably, the end having the through hole of the first chamber body is provided with an upper cover. The upper cover covers the driver. The upper cover is provided with an insertion hole communicating with the first chamber body.

[0015] Preferably, one of the two ends having the perforations of the second chamber body is provided with a hollow sleeve communicating with the second chamber body. The hollow sleeve is mated with an adjusting cylinder.

[0016] Preferably, an inner wall of the hollow sleeve is provided with an inner thread. The adjusting cylinder is a hollow cylinder structure. One end of the adjusting cylinder is formed with at least one elastic press piece. An outer surface of the elastic press piece is formed with an outer thread to mate with the inner thread of the hollow sleeve. An inner surface of the elastic press piece protrudes inward to form a limit rib. Another end of the adjusting cylinder is provided with a plurality of elastic stop pieces extending outward.

[0017] Preferably, the adjusting cylinder is a hollow cyl-

inder structure. The adjusting cylinder is threadedly connected to the hollow sleeve. One end of the adjusting cylinder, away from the housing, is provided with a limit flange.

[0018] Preferably, the adjusting cylinder is provided with a retaining ring fitted on the adjusting cylinder. An inner diameter of the retaining ring is less than an outer diameter of the limit flange. An outer diameter of the retaining ring is greater than the outer diameter of the limit flange.

[0019] Preferably, the engaging surface is a straight tooth surface or a bevel tooth surface or an inner threaded surface.

[0020] When the wall-mounted toilet is fixed to the mounting base by using the wall-mounted toilet fixing device of the present invention, it is not necessary to find the locking position by measuring the thickness of the wall-mounted toilet. The screw rod fixed on the mounting base can be directly inserted in the wall-mounted toilet fixing device of the present invention. By rotating the driver in the forward direction, the press block can be engaged with the screw rod to lock the wall-mounted toilet on the screw rod of the mounting base. The operation is simple and fast. When the press block is engaged with the screw rod, the wall-mounted toilet can be moved toward the mounting base by rotating the driver in the forward direction to adjust the distance between the wall-mounted toilet and the mounting base. The adjusting range is wide. When the wall-mounted toilet needs to be disassembled, the driver is rotated in the reverse direction to disengage the press block from the screw rod so that the wall-mounted toilet can be disassembled. The operation is simple and fast.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 is an exploded view of a conventional wall-mounted toilet fixing device;

FIG. 2 is a schematic view showing that the conventional wall-mounted toilet fixing device is used to fix the wall-mounted toilet;

FIG. 3 is an exploded view of the wall-mounted toilet fixing device according to a first embodiment of the present invention;

FIG. 4 is a perspective view of the wall-mounted toilet fixing device according to the first embodiment of the present invention in cooperation with the screw rod; FIG. 5 is a first sectional view of the wall-mounted toilet fixing device according to the first embodiment of the present invention in cooperation with the screw rod (the press block not engaged with the screw rod); FIG. 6 is a sectional view taken along line A-A of FIG. 5;

FIG. 7 is a second sectional view of the wall-mounted toilet fixing device according to the first embodiment of the present invention in cooperation with the screw

rod (the press block engaged with the screw rod); FIG. 8 is a sectional view taken along line B-B of FIG. 7;

FIG. 9 is a first schematic view of an embodiment of the rotation damping mechanism of the present invention;

FIG. 10 is a second schematic view of an embodiment of the rotation damping mechanism of the present invention;

FIG. 11 is a first schematic view of another embodiment of the rotation damping mechanism of the present invention;

FIG. 12 is a second schematic view of another embodiment of the rotation damping mechanism of the present invention;

FIG. 13 is a schematic view of a further embodiment of the rotation damping mechanism of the present invention;

FIG. 14 is a schematic view of the protrusions of a further embodiment of the rotation damping mechanism of the present invention;

FIG. 15 is a schematic view of the elastic arms of a further embodiment of the rotation damping mechanism of the present invention;

FIG. 16 is a schematic view of the elastic arms in cooperation with the protrusions of a further embodiment of the rotation damping mechanism of the present invention;

FIG. 17 is a first schematic view showing that the wall-mounted toilet fixing device according to the first embodiment of the present invention is used to fix the wall-mounted toilet;

FIG. 18 is a second schematic view showing that the wall-mounted toilet fixing device according to the first embodiment of the present invention is used to fix the wall-mounted toilet;

FIG. 19 is a first sectional view of the wall-mounted toilet fixing device according to a second embodiment of the present invention in cooperation with the screw rod (the press block not engaged with the screw rod);

FIG. 20 is a sectional view taken along line D-D of FIG. 19;

FIG. 21 is a second sectional view of the wall-mounted toilet fixing device according to the second embodiment of the present invention in cooperation with the screw rod (the press block engaged with the screw rod);

FIG. 22 is a sectional view taken along line E-E of FIG. 21;

FIG. 23 is a first sectional view of the wall-mounted toilet fixing device according to a third embodiment of the present invention in cooperation with the screw rod (the press block not engaged with the screw rod); FIG. 24 is a sectional view taken along line F-F of FIG. 23;

FIG. 25 is a second sectional view of the wall-mounted toilet fixing device according to the third embod-

iment of the present invention in cooperation with the screw rod (the press block engaged with the screw rod);

FIG. 26 is a sectional view taken along line G-G of FIG. 25;

FIG. 27 is a first sectional view of the wall-mounted toilet fixing device according to a fourth embodiment of the present invention in cooperation with the screw rod (the press block not engaged with the screw rod); FIG. 28 is a sectional view taken along line H-H of FIG. 27;

FIG. 29 is a second sectional view of the wall-mounted toilet fixing device according to the fourth embodiment of the present invention in cooperation with the screw rod (the press block engaged with the screw rod);

FIG. 30 is a sectional view taken along line I-I of FIG. 29;

FIG. 31 is a perspective view of the adjusting cylinder according to the fourth embodiment of the present invention;

FIG. 32 is a perspective view of the wall-mounted toilet fixing device according to a fifth embodiment of the present invention in cooperation with the screw rod; and

FIG. 33 is a sectional view of the wall-mounted toilet fixing device according to the fifth embodiment of the present invention in cooperation with the screw rod.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings.

[0023] A first embodiment of the present invention is shown in FIG. 3 to FIG. 20. The present invention discloses a wall-mounted toilet fixing device, which is movably mated with a screw rod S fixed on a mounting base W for locking a wall-mounted toilet C on the mounting base W. The wall-mounted toilet fixing device comprises an outer cover 11, an end cap 12, a driven member 2, at least one press block 3 movably fitted on the driven member 2, a driving member 4 for driving the driven member 2 to rotate and for driving the press block 3 to engage with the screw rod S, and a driver 5 for driving the driving member 4 to rotate.

[0024] Specifically, the outer cover 11 and the end cap 12 are detachably assembled by a buckle structure or a screw thread connecting structure to form a housing 1. The housing 1 has a first chamber body 13 and a second chamber body 14 which are intersected and communicated with each other. One end of the first chamber body 13 is provided with a through hole 131 passing through the housing 1. Two ends of the second chamber body 14 are provided with two perforations 141 passing through the housing 1 and facing each other. Both the driven member 2 and the driving member 4 are hollow

tubular structures. The driving member 4 and the driven member 2 are rotatably fitted in the second chamber body 14. The driving member 4 is movably sleeved on the driven member 2. The driven member 2 is provided with a through passage 21 aligned with the two perforations 141. A side wall of the driven member 2 is provided with engaging holes 22 passing through the side wall of the driven member 2. The number of the engaging holes 22 is two. The two engaging holes 22 are opposite to each other. Each engaging hole 22 is movably mated with the press block 3. An inner surface of the press block 3 is formed with an engaging surface 31 corresponding to an external threaded surface of the screw rod S. The engaging surface 31 may be a straight tooth surface or a bevel tooth surface or an inner threaded surface. The straight tooth surface, the bevel tooth surface and the inner threaded surface may achieve the meshing relationship with the screw rod S. The degree of meshing of the straight tooth surface, the bevel tooth surface and the inner threaded surface with the screw rod S sequentially increases. An inner wall of the driving member 4 is formed with two curved troughs 41 recessed outward and respectively corresponding to the two engaging holes 22. Normally, the curved trough 41 aligns with the engaging hole 22 to form a space for the movement of the press block 3. One side of each of the engaging holes 22 is formed with a limit rib 221 protruding outward and movably fitted in a corresponding one of the curved troughs 41. The limit ribs 221 of the two engaging holes 22 are located at the same side. Through the cooperation of the limit ribs 221 and the curved troughs 41, the driving member 4 and the driven member 2 are movably engaged with each other so that the rotation of the driving member 4 can drive the driven member 2 to rotate. One end of the driven member 2 extends out of the driving member 4 and is provided with a stop portion 23 for blocking the driving member 4. A rotation damping mechanism is provided between the stop portion 23 and the second chamber body 14. The rotation damping mechanism enables the driven member 2 to have a forward rotation damping and a reverse rotation damping. The reverse rotation damping is greater than the forward rotation damping. As shown in FIG. 4 to FIG. 8, when the driving member 4 is rotated in the forward direction, due to the forward rotation damping of the driven member 2, the driving member 4 first rotates in the forward direction relative to the driven member 2 so that the limit ribs 221 are engaged with the curved troughs 41, enabling the driving member 4 to drive the driven member 2 to rotate in the forward direction. In this process, the inner wall of the driving member 4 will push the press block 3 to move along the radial direction of the driven member 2 toward the rotating axle of the driven member 2 for the press block 3 to engage with the screw rod S. After the limit ribs 221 are engaged with the curved troughs 41, if more force is applied, the driving member 4 continues to rotate in the forward direction, at this time, the driving member 4 drives the driven member 2 and the press member 3 to rotate

in the forward direction. The press block 3 is engaged with the screw rod. The forward rotation of the press block 3 enables the present invention to generate a linear movement relative to the screw rod S along the axis of the screw rod S. Referring to FIG. 4 to FIG. 8, after the press block 3 is engaged with the screw rod S, if the driving member 4 is rotated in the reverse direction, since the reverse rotation damping of the driven member 2 is greater than the forward rotation damping, the driving member 4 first rotates in the reverse direction relative to the driven member 2, so that the curved troughs 41 are aligned with the engaging holes 22 and the press block 3 can be moved within the space formed by the curved troughs 41 and the engaging holes 22 to be disengaged from the screw rod S. It should be noted that, in this embodiment, the two engaging holes 22 are not limited to be oppositely arranged, and the central axes of the two engaging holes 22 may form an included angle of 0° to 180°. In this way, the press block 3 fitted in the engaging hole 22 can also be engaged with the screw rod S.

[0025] As shown in FIG. 9 and FIG. 10, the stop portion 23 is provided with two symmetric elastic arms 6 extending in a direction away from the rotating axle of the driven member 2. The distance from the elastic arms 6 to the rotating axle of the driven member 2 increases in the reverse rotation direction of the driven member 2. The inner wall of the second chamber body 14 is provided with a plurality of protrusions 7 which are equidistantly distributed and movably mated with the elastic arms 6. Each protrusion 7 is a triangular structure. Two sides of each protrusion 7 are a push surface 71 and a stop surface 72 for movably contacting with the elastic arms 6, respectively. The distance from the push surface 71 to the rotating axle of the driven member 2 increases in the forward rotation direction of the driven member 2. The distance from the stop surface 72 to the rotating axle of the driven member 2 decreases in the forward rotation direction of the driven member 2. The elastic arms 6 and the protrusions 7 constitute the rotation damping mechanism. In this way, when the driven member 2 is rotated in the forward direction, the elastic arm 6 is compressed and deformed by the push surface 71 towards the rotating axle of the driven member 2 to pass the protrusion 7 so that the driven member 2 has the forward rotation damping. When the driven member 2 is rotated in the reverse direction, the elastic arm 6 will be blocked by the stop surface 72 to prevent the driven member 2 from rotating in the reverse direction, so that the driven member 2 has the reverse rotation damping, and the reverse rotation damping is greater than the forward rotation damping of the driven member 2.

[0026] As shown in FIG. 11 and FIG. 12, the elastic arms 6 and the protrusions 7 may be disposed reversely. Specifically, the inner wall of the second chamber body 14 is provided with two symmetrical elastic arms 6. The distance from the elastic arms to the rotating axle of the driven member 2 increases in the reverse rotation direction of the driven member 2. The stop portion 23 is pro-

vided with a plurality of protrusions 7 which extend in a direction away from the rotating axle of the driven member 2 and are equidistantly distributed and movably mated with the elastic arms 6. Each protrusion 7 is a triangular structure. Two sides of each protrusion 7 are a push surface 71 and a stop surface 72 for movably contacting with the elastic arms 6, respectively. The distance from the push surface 71 to the rotating axle of the driven member 2 decreases in the forward rotation direction of the driven member 2. The distance from the stop surface 72 to the rotating axle of the driven member 2 increases in the forward rotation direction of the driven member 2. In this way, when the driven member 2 is rotated in the forward direction, the elastic arm 6 is compressed by the push surface 71 to deform away from the rotating axle of the driven member 2 to pass the protrusion 7 so that the driven member 2 has the forward rotation damping. When the driven member 2 is rotated in the reverse direction, the elastic arm 6 will be blocked by the stop surface 72 to prevent the driven member 2 from rotating in the reverse direction, so that the driven member 2 has the reverse rotation damping, and the reverse rotation damping is greater than the forward rotation damping of the driven member 2.

[0027] As shown in FIG. 13 to FIG. 16, the elastic arms 6 and the protrusions 7 may be disposed on an end surface of the stop portion 23 and an inner end surface of the second chamber body 14, respectively. Specifically, two symmetric elastic arms 6 extend outward from an end surface of the stop portion 23. The distance from the elastic arms 6 to an end surface of the driven member 2 increases in the reverse rotation direction of the driven member 2. An end surface of the second chamber body 14, close to the stop portion 23, is provided with a plurality of projections 7 which are equidistantly distributed and movably mated with the elastic arms 6. Each protrusion 7 is a triangular structure. Two sides of each protrusion 7 are a push surface 71 and a stop surface 72 for movably contacting with the elastic arms 6, respectively. The distance from the push surface 71 to the end surface of the driven member 2 increases in the forward rotation direction of the driven member 2. The distance from the stop surface 72 to the end surface of the driven member 2 decreases in the forward rotation direction of the driven member 2. In this way, when the driven member 2 is rotated in the forward direction, the elastic arm 6 is compressed and deformed by the push surface 71 toward the end surface of the driven member 2 to pass the protrusion 7 so that the driven member 2 has the forward rotation damping. When the driven member 2 is rotated in the reverse direction, the elastic arm 6 will be blocked by the stop surface 72 to prevent the driven member 2 from rotating in the reverse direction, so that the driven member 2 has the reverse rotation damping, and the reverse rotation damping is greater than the forward rotation damping of the driven member 2.

[0028] As shown in FIG. 3 to FIG. 8, the driver 5 is a cylindrical body. The driver 5 is rotatably fitted in the first

chamber body 13. The end having the through hole 131 of the first chamber body 13 is provided with an upper cover 8. The upper cover 8 covers the driver 5. The upper cover 8 is provided with an insertion hole 81 communicating with the first chamber body 13. The driver 5 can be confined by the upper cover 8, preventing the driver 5 from disengaging from the housing 1. The driver 5 is engaged with the driving member 4 through an intersecting shaft gear transmission mechanism, so that the rotation of the driver 5 can drive the driving member 4 to rotate. In order to cooperate with the intersecting shaft gear transmission mechanism, the axis of the first chamber body 13 is perpendicular to the axis of the second chamber body 14. The intersecting shaft gear transmission mechanism may be a bevel gear transmission mechanism, that is, an outer wall of the driving member 4 is provided with a first bevel gear 42, and the driver 5 is provided with a second bevel gear 51 meshing with the first bevel gear 42. Both the first bevel gear 42 and the second bevel gear 51 may be a straight tooth bevel gear structure or an inclined tooth bevel gear structure or a curved tooth bevel gear structure. For driving the driver 5 to rotate, the driver 5 is provided with a groove or a cylindrical body for cooperating with an installation tool. The groove may be a straight groove, a cross groove or a hexagonal groove, such that the installation tool, such as a flat-blade screwdriver, Phillips screwdriver, or hex wrench, can be used to rotate the driver 5. The cylindrical body may be a regular hexagon prism or a regular twelve-sided prism, so that the driver 5 can be rotated by using the installation tool, such as a 6-point socket wrench or a 12-point socket wrench. In order to prevent rotation of the driver 5 because the wall-mounted toilet C is vibrated by an external force, an elastic damper may be disposed between the driver 5 and the inner wall of the first chamber body 13.

[0029] In order to enable the present invention to be fixed on the wall-mounted toilet C, one end having the perforation 141 of the second chamber body 14 is provided with a hollow sleeve 15 communicating with the second chamber body 14. The hollow sleeve 15 is mated with an adjusting cylinder 16. In this embodiment, the adjusting cylinder 16 is a hollow cylinder structure. The adjusting cylinder 16 is threadedly connected to the hollow sleeve 15. One end of the adjusting cylinder 16, away from the housing 1, is provided with a limit flange 161. Specifically, the outer wall of the hollow sleeve 15 is provided with an outer thread. The inner wall of the adjusting cylinder 16 is provided with an inner thread to mate with the outer thread of the hollow sleeve 15. The inner wall of the hollow sleeve 15 may be provided with an inner thread, and the outer wall of the adjusting cylinder 16 may be provided with an outer thread to mate with the inner thread of the hollow sleeve 15. Due to the threaded connection between the hollow sleeve 15 and the adjusting cylinder 16, the distance between the limit flange 161 of the adjusting cylinder 16 and the second chamber body 14 can be adjusted by rotating the adjusting cylinder 16

so that the limit flange 161 and the housing 1 can be engaged with fixing holes C11 of different lengths to meet the requirements for wall-hung toilets C of different thicknesses. In order to enable the adjusting cylinder 16 to be adapted to the fixing holes C11 of different diameters, the adjusting cylinder 16 is provided with a retaining ring 162 fitted on the adjusting cylinder 16. The inner diameter of the retaining ring 162 is less than the outer diameter of the limit flange 161 so as to confine the retaining ring 162. The outer diameter of the retaining ring 162 is greater than the outer diameter of the limit flange 161 so that the retaining ring 162 can be engaged with a larger-diameter fixing hole C11.

[0030] As shown in FIG. 17 and FIG. 18, when the wall-mounted toilet fixing device of the present invention is used to fix the wall-mounted toilet C, the housing 1 containing the driven member 2, the driving member 4, the driver 5 and the press block 3 is first placed in the mounting chamber C1 of the wall-mounted toilet C; next, the adjusting cylinder 16 is screwed to the hollow sleeve 15 through the fixing hole C11 of the wall-mounted toilet C from the back of the wall-mounted toilet C to fix the housing 1 in the mounting chamber C1; and then the screw rod S fixed on the mounting base W directly is inserted through the adjusting cylinder 16, the hollow sleeve 15 and the second chamber body 14 in order; and then the installation tool is inserted through the mounting hole C12 of the wall-mounted toilet C into the mounting chamber C1 for the installation tool to cooperate with the driver 5; then, the driver 5 is rotated in the forward direction by the installation tool, and the driver 5 further drives the driving member 4 to rotate in the forward direction so that the driving member 4 pushes the press block 3 along the radial direction of the driven member 2 to engage with the screw rod S, and the driving member 4 is engaged with the driven member 2, at this time, the wall-mounted toilet C is fixed to the screw rod S fixed on the mounting base W; finally, if the distance between the wall-mounted toilet C and the mounting base W is too large, the driver 5 can be further rotated in the forward direction, the driver 5 drives the driving member 4 to rotate in the forward direction, and the driving member 4 drives the driven member 2 and the press block 3 to rotate in the forward direction, enabling the present invention to generate a linear movement relative to the screw rod S along the axis of the screw rod S so that the wall-mounted toilet C is moved toward the mounting base W to adjust the distance between the wall-mounted toilet C and the mounting base W until the distance between the wall-mounted toilet C and the mounting base W meets the requirement, and then the installation tool is taken out. In the process of fixing the wall-mounted toilet C, there is no need to measure the thickness of the wall-mounted toilet C to find the locking position. The operation is simple and fast. Moreover, the adjusting range of the distance between the wall-mounted toilet C and the mounting base W is wide. After the wall-mounted toilet C is fixed by the wall-mounted toilet fixing device of the present invention, if

the wall-mounted toilet C is to be detached, the driver 5 is driven to rotate in the reverse direction by the installation tool and the driver 5 drives the driving member 4 to rotate in the reverse direction. At this time, due to the action of the rotation damping mechanism, the driven member 2 basically does not move, the driving member 4 is rotated in the reverse direction relative to the driven member 2. The press block 3 gets a space to disengage from the screw rod S so that the wall-mounted toilet C can be detached from the mounting base W. The operation is simple and fast.

[0031] To sum up, when the wall-mounted toilet C is fixed to the mounting base W by using the wall-mounted toilet fixing device of the present invention, it is not necessary to find the locking position by measuring the thickness of the wall-mounted toilet C. The screw rod S fixed on the mounting base W can be directly inserted in the wall-mounted toilet fixing device of the present invention. By rotating the driver 5 in the forward direction, the press block 3 can be engaged with the screw rod S to lock the wall-mounted toilet C on the screw rod. The operation is simple and fast. When the press block 3 is engaged with the screw rod S, the wall-mounted toilet C can be further moved toward the mounting base W by rotating the driver 5 in the forward direction to adjust the distance between the wall-mounted toilet C and the mounting base W. The adjusting range is wide. When the wall-mounted toilet C needs to be disassembled, the driver 5 is rotated in the reverse direction to disengage the press block 3 from the screw rod S so that the wall-mounted toilet C can be disassembled. The operation is simple and fast.

[0032] As shown in FIG. 19 to FIG. 22, a wall-mounted toilet fixing device in accordance with a second embodiment of the present invention comprises an outer cover 11, an end cap 12, a driven member 2, at least one press block 3 movably mated with the driven member 2, a driving member 4 for driving the driven member 2 to rotate and for driving the press block 3 to engage with the screw rod S, and a driver 5 for driving the driving member 4 to rotate.

[0033] The outer cover 11 and the end cap 12 are detachably assembled to form a housing 1. The housing 1 has a first chamber body 13 and a second chamber body 14 which are intersected and communicated with each other. One end of the first chamber body 13 is provided with a through hole 131 passing through the housing 1. Two ends of the second chamber body 14 are provided with two perforations 141 passing through the housing 1 and facing each other.

[0034] Both the driven member 2 and the driving member 4 are hollow tubular structures. The driving member 4 and the driven member 2 are rotatably fitted in the second chamber body 14. The driving member 4 is movably sleeved on the driven member 2. The driven member 2 is provided with a through passage 21 aligned with the two perforations 141. A side wall of the driven member 2 is provided with engaging holes 22 passing through the side wall of the driven member 2. The number of the

engaging holes 22 is two. The two engaging holes 22 are opposite to each other. Each engaging hole 22 is movably mated with the press block 3. An inner surface of the press block 3 is formed with an engaging surface 31 corresponding to an external threaded surface of the screw rod S. An inner wall of the driving member 4 is formed with two eccentric troughs 43 recessed outward and respectively corresponding to the two engaging holes 22. The distance from the eccentric troughs 43 to the rotating axle of the driven member 2 decreases in the forward rotation direction of the driven member 2. The two press blocks 3 each extend outward to form an engaging portion 32. The engaging portions 32 of the two press blocks 3 are engaged with the two eccentric troughs 43, respectively. Normally, the eccentric trough 43 enables the press block 3 to disengage from the screw rod S through the engaging portion 32. One end of the driven member 2 extends out of the driving member 4 and is provided with a stop portion 23 for blocking the driving member 4. A rotation damping mechanism is provided between the stop portion 23 and the second chamber body 14. The rotation damping mechanism enables the driven member 2 to have a forward rotation damping and a reverse rotation damping. The reverse rotation damping is greater than the forward rotation damping. In this embodiment, the specific structure of the rotation damping mechanism refers to the rotation damping mechanism of the first embodiment. In this way, when the driving member 4 rotates in the forward direction, due to the forward rotation damping of the driven member 2, the driving member 4 first rotates in the forward direction relative to the driven member 2, and the driving member 4 through the engaging portion pushes the press block 3 to engage with the screw rod S along the radial direction of the driven member 2. At this time, since the press block 3 is engaged in the engaging hole 22, the driving member 4 is engaged with the driven member 2 so that the driving member 4 is able to drive the driven member 2 to rotate in the forward direction. After the driving member 4 is engaged with the driven member 2, if more force is applied, the driving member 4 continues to rotate in the forward direction, at this time, the driving member 4 drives the driven member 2 and the press member 3 to rotate in the forward direction. Because the press block 3 is engaged with the screw rod, the forward rotation of the press block 3 enables the present invention to generate a linear movement relative to the screw rod S along the axis of the screw rod S. After the press block 3 is engaged with the screw rod S, if the driving member 4 is rotated in the reverse direction, since the reverse rotation damping of the driven member 2 is greater than the forward rotation damping, the driving member 4 first rotates in the reverse direction relative to the driven member 2, so that the driving member 4 through the engaging portion pushes the press block 3 to disengage from the screw rod S along the radial direction of the driven member 2. It should be noted that, in this embodiment, the two engaging holes 22 are not limited to be oppositely arranged, and the central axes of

the two engaging holes 22 may form an included angle of 0° to 180°. In this way, the press block 3 fitted in the engaging hole 22 can also be engaged with the screw rod S.

[0035] The driver 5 is a cylindrical body. The driver 5 is rotatably fitted in the first chamber body 13. The end having the through hole 131 of the first chamber body 13 is provided with an upper cover 8. The upper cover 8 covers the driver 5. The upper cover 8 is provided with an insertion hole 81 communicating with the first chamber body 13. The driver 5 is engaged with the driving member 4 through an intersecting shaft gear transmission mechanism, so that the rotation of the driver 5 can drive the driving member 4 to rotate. The intersecting shaft gear transmission mechanism may be a bevel gear transmission mechanism, that is, an outer wall of the driving member 4 is provided with a first bevel gear 42, and the driver 5 is provided with a second bevel gear 51 meshing with the first bevel gear 42. For driving the driver 5 to rotate, the driver 5 is provided with a groove or a cylindrical body for cooperating with an installation tool.

[0036] One end having the perforation 141 of the second chamber body 14 is provided with a hollow sleeve 15 communicating with the second chamber body 14. The hollow sleeve 15 is mated with an adjusting cylinder 16. In this embodiment, the adjusting cylinder 16 is a hollow cylinder structure. The adjusting cylinder 16 is threadedly connected to the hollow sleeve 15. One end of the adjusting cylinder 16, away from the housing 1, is provided with a limit flange 161. Due to the threaded connection between the hollow sleeve 15 and the adjusting cylinder 16, the distance between the limit flange 161 of the adjusting cylinder 16 and the second chamber body 14 can be adjusted by rotating the adjusting cylinder 16 so that the limit flange 161 and the housing 1 can be engaged with fixing holes C11 of different lengths to meet the requirements for wall-hung toilets C of different thicknesses. In order to enable the adjusting cylinder 16 to be adapted to the fixing holes C11 of different diameters, the adjusting cylinder 16 cooperates with a retaining ring 162 fitted on the adjusting cylinder 16. The inner diameter of the retaining ring 162 is less than the outer diameter of the limit flange 161 so as to confine the retaining ring 162. The outer diameter of the retaining ring 162 is greater than the outer diameter of the limit flange 161.

[0037] As shown in FIG. 23 to FIG. 26, a wall-mounted toilet fixing device in accordance with a third embodiment of the present invention comprises an outer cover 11, an end cap 12, a driven member 2, at least one press block 3 movably mated with the driven member 2, a driving member 4 for driving the driven member 2 to rotate and for driving the press block 3 to engage with the screw rod S, and a driver 5 for driving the driving member 4 to rotate.

[0038] The outer cover 11 and the end cap 12 are detachably assembled to form a housing 1. The housing 1 has a first chamber body 13 and a second chamber body 14 which are intersected and communicated with each other. One end of the first chamber body 13 is provided

with a through hole 131 passing through the housing 1. Two ends of the second chamber body 14 are provided with two perforations 141 passing through the housing 1 and facing each other.

[0039] Both the driven member 2 and the driving member 4 are hollow tubular structures. The driving member 4 and the driven member 2 are rotatably fitted in the second chamber body 14. The driving member 4 is movably sleeved on the driven member 2. The driven member 2 is provided with a through passage 21 aligned with the two perforations 141. A side wall of the driven member 2 is provided with engaging holes 22 passing through the side wall of the driven member 2. The number of the engaging holes 22 is two. The two engaging holes 22 are opposite to each other. Each engaging hole 22 is movably mated with the press block 3. An inner surface of the press block 3 is formed with an engaging surface 31 corresponding to an external threaded surface of the screw rod S. An inner wall of the driving member 4 is formed with one eccentric trough 43 recessed outward. The distance from the eccentric trough 43 to the rotating axle of the driven member 2 decreases in the forward rotation direction of the driven member 2. The two press blocks 3 are connected by a curved plate 33 located between the driving member 4 and the driven member 2. A middle portion of the curved plate 33 is formed with an engaging portion 32 engaged in the eccentric trough 43. Normally, the eccentric trough 43 enables the press block 3 to disengage from the screw rod S through the engaging portion 32. One end of the driven member 2 extends out of the driving member 4 and is provided with a stop portion 23 for blocking the driving member 4. A rotation damping mechanism is provided between the stop portion 23 and the second chamber body 14. The rotation damping mechanism enables the driven member 2 to have a forward rotation damping and a reverse rotation damping. The reverse rotation damping is greater than the forward rotation damping. In this embodiment, the specific structure of the rotation damping mechanism refers to the rotation damping mechanism of the first embodiment. In this way, when the driving member 4 rotates in the forward direction, due to the forward rotation damping of the driven member 2, the driving member 4 first rotates in the forward direction relative to the driven member 2, and the driving member 4 through the engaging portion 32 pushes the two press blocks 3 to engage with the screw rod S along the radial direction of the driven member 2. At this time, since the two press blocks 3 are engaged in the engaging holes 22, the driving member 4 is engaged with the driven member 2 so that the driving member 4 is able to drive the driven member 2 to rotate in the forward direction. After that, if more force is applied, the driving member 4 continues to rotate in the forward direction, at this time, the driving member 4 drives the driven member 2 and the press member 3 to rotate in the forward direction. Because the press block 3 is engaged with the screw rod S, the forward rotation of the press block 3 enables the present invention to generate

a linear movement relative to the screw rod S along the axis of the screw rod S. After the press block 3 is engaged with the screw rod S, if the driving member 4 is rotated in the reverse direction, since the reverse rotation damping of the driven member 2 is greater than the forward rotation damping, the driving member 4 first rotates in the reverse direction relative to the driven member 2, so that the driving member 4 through the engaging portion 32 pushes the press block 3 to disengage from the screw rod S along the radial direction of the driven member 2.

[0040] The driver 5 is a cylindrical body. The driver 5 is rotatably fitted in the first chamber body 13. The end having the through hole 131 of the first chamber body 13 is provided with an upper cover 8. The upper cover 8 covers the driver 5. The upper cover 8 is provided with an insertion hole 81 communicating with the first chamber body 13. The driver 5 is engaged with the driving member 4 through an intersecting shaft gear transmission mechanism, so that the rotation of the driver 5 can drive the driving member 4 to rotate. The intersecting shaft gear transmission mechanism may be a bevel gear transmission mechanism, that is, an outer wall of the driving member 4 is provided with a first bevel gear 42, and the driver 5 is provided with a second bevel gear 51 meshing with the first bevel gear 42. For driving the driver 5 to rotate, the driver 5 is provided with a groove or a cylindrical body for cooperating with an installation tool.

[0041] One end having the perforation 141 of the second chamber body 14 is provided with a hollow sleeve 15 communicating with the second chamber body 14. The hollow sleeve 15 is mated with an adjusting cylinder 16. In this embodiment, the adjusting cylinder 16 is a hollow cylinder structure. The adjusting cylinder 16 is threadedly connected to the hollow sleeve 15. One end of the adjusting cylinder 16, away from the housing 1, is provided with a limit flange 161. Due to the threaded connection between the hollow sleeve 15 and the adjusting cylinder 16, the distance between the limit flange 161 of the adjusting cylinder 16 and the second chamber body 14 can be adjusted by rotating the adjusting cylinder 16 so that the limit flange 161 and the housing 1 can be engaged with fixing holes C11 of different lengths to meet the requirements for wall-hung toilets C of different thicknesses. In order to enable the adjusting cylinder 16 to be adapted to the fixing holes C11 of different diameters, the adjusting cylinder 16 cooperates with a retaining ring 162 fitted on the adjusting cylinder 16. The inner diameter of the retaining ring 162 is less than the outer diameter of the limit flange 161 so as to confine the retaining ring 162. The outer diameter of the retaining ring 162 is greater than the outer diameter of the limit flange 161.

[0042] As shown in FIG. 27 to FIG. 31, a wall-mounted toilet fixing device in accordance with a fourth embodiment of the present invention comprises an outer cover 11, an end cap 12, a driven member 2, at least one press block 3 movably mated with the driven member 2, a driving member 4 for driving the driven member 2 to rotate and for driving the press block 3 to engage with the screw

rod S, and a driver 5 for driving the driving member 4 to rotate.

[0043] The outer cover 11 and the end cap 12 are detachably assembled to form a housing 1. The housing 1 has a first chamber body 13 and a second chamber body 14 which are intersected and communicated with each other. One end of the first chamber body 13 is provided with a through hole 131 passing through the housing 1. Two ends of the second chamber body 14 are provided with two perforations 141 passing through the housing 1 and facing each other.

[0044] Both the driven member 2 and the driving member 4 are hollow tubular structures. The driving member 4 and the driven member 2 are rotatably fitted in the second chamber body 14. The driving member 4 is movably sleeved on the driven member 2. The driven member 2 is provided with a through passage 21 aligned with the two perforations 141. A side wall of the driven member 2 is provided with an engaging hole 22 passing through the side wall of the driven member 2. The number of the engaging hole 22 is one. The number of the press block 3 is also one. The press block 3 is movably mated with the engaging hole 22. An inner surface of the press block 3 is formed with an engaging surface 31 corresponding to an external threaded surface of the screw rod S. An inner wall of the driving member 4 is formed with a curved trough 41 corresponding to the engaging hole 22. Normally, the curved trough 41 aligns with the engaging hole 22 to form a space for the movement of the press block 3. One side of the engaging hole 22 is formed with a limit rib 221 protruding outward and movably fitted in the curved trough 41. Through the cooperation of the limit rib 221 and the curved trough, the driving member 4 and the driven member 2 are movably engaged with each other so that the rotation of the driving member 4 can drive the driven member 2 to rotate. One end of the driven member 2 extends out of the driving member 4 and is provided with a stop portion 23 for blocking the driving member 4. A rotation damping mechanism is provided between the stop portion 23 and the second chamber body 14. The rotation damping mechanism enables the driven member 2 to have a forward rotation damping and a reverse rotation damping. The reverse rotation damping is greater than the forward rotation damping. In this embodiment, the specific structure of the rotation damping mechanism refers to the rotation damping mechanism of the first embodiment. When the driving member 4 is rotated in the forward direction, due to the forward rotation damping of the driven member 2, the driving member 4 first rotates in the forward direction relative to the driven member 2 so that the limit rib 221 is engaged with the curved trough 41, enabling the driving member 4 to drive the driven member 2 to rotate in the forward direction. In this process, the inner wall of the driving member 4 will push the press block 3 to move along the radial direction of the driven member 2 toward the rotating axle of the driven member 2 for the press block 3 to engage with the screw rod S. After the limit rib 221 is en-

gaged with the curved trough 41, if more force is applied, the driving member 4 continues to rotate in the forward direction, at this time, the driving member 4 drives the driven member 2 and the press member 3 to rotate in the forward direction. The press block 3 is engaged with the screw rod. The forward rotation of the press block 3 enables the present invention to generate a linear movement relative to the screw rod S along the axis of the screw rod S. After the press block 3 is engaged with the screw rod S, if the driving member 4 is rotated in the reverse direction, since the reverse rotation damping of the driven member 2 is greater than the forward rotation damping, the driving member 4 first rotates in the reverse direction relative to the driven member 2, so that the curved trough 41 is aligned with the engaging hole 22 and the press block 3 can move within the space formed by the curved trough 41 and the engaging hole 22 to be disengaged from the screw rod S. It should be noted that, in this embodiment, the number of the press block 3 is one. The number of the press blocks 3 in the first embodiment is two. The degree of firmness of the engagement of the press block 3 with the screw rod S in this embodiment is lower than that in the first embodiment. However, the press block 3 of this embodiment can still achieve the engagement with the screw rod S, and the material of the press block 3 is preferably a metal material with high strength in order to improve the use effect of this embodiment. It should also be noted that, the number of the press blocks of the present invention is not limited to one or two. It is only necessary to ensure that the number of the press blocks 3 is at least one so that the present invention is movably engaged with the screw rod S through the press block. Therefore, the number of the press blocks 3 may be three or four, corresponding to the number of the engaging holes 22 provided at the side wall of the driven member 2.

[0045] The driver 5 is a cylindrical body. The driver 5 is rotatably fitted in the first chamber body 13. The end having the through hole 131 of the first chamber body 13 is provided with an upper cover 8. The upper cover 8 covers the driver 5. The upper cover 8 is provided with an insertion hole 81 communicating with the first chamber body 13. The driver 5 is engaged with the driving member 4 through an intersecting shaft gear transmission mechanism, so that the rotation of the driver 5 can drive the driving member 4 to rotate. The intersecting shaft gear transmission mechanism may be a bevel gear transmission mechanism, that is, an outer wall of the driving member 4 is provided with a first bevel gear 42, and the driver 5 is provided with a second bevel gear 51 meshing with the first bevel gear 42. For driving the driver 5 to rotate, the driver 5 is provided with a groove or a cylindrical body for cooperating with an installation tool. In order to prevent the driver 5 from rotating because the wall-mounted toilet C vibrates when subjected to an external force, the driver 5 is provided with a resilient arm leaning against the inner wall of the first chamber body 13.

[0046] One end having the perforation 141 of the sec-

ond chamber body 14 is provided with a hollow sleeve 15 communicating with the second chamber body 14. The hollow sleeve 15 is mated with an adjusting cylinder 16. An inner wall of the hollow sleeve 15 is provided with an inner thread. The adjusting cylinder 16 is a hollow cylinder structure. One end of the adjusting cylinder 16 is formed with at least one elastic press piece 165. An outer surface of the elastic press piece 165 is formed with an outer thread to mate with the inner thread of the hollow sleeve 15. An inner surface of the elastic press piece 165 protrudes inward to form a limit rib 1651. Another end of the adjusting cylinder 16 is provided with a plurality of elastic stop pieces 164 extending outward. When the screw rod S is not inserted in the adjusting cylinder 16, the elastic press piece 165 can be moved in the hollow sleeve 15 to adjust the distance between the adjusting cylinder 16 and the housing 1 by pressing the elastic press piece 165. After the distance between the adjusting cylinder 16 and the housing 1 is adjusted, the elastic press piece 165 is released to return the elastic press piece 165. The inner thread of the elastic press piece 165 is engaged with the inner thread of the hollow sleeve 15, and the adjusting cylinder 16 is fixed on the hollow sleeve 15. After that, it is still possible to adjust the distance between the adjusting cylinder 16 and the housing 1 by rotating the adjusting cylinder 16. When the screw rod S is inserted in the adjusting cylinder 16, the screw rod S will pass through the limit rib 1651 to push the elastic press piece 165 outward so that the inner thread of the elastic press piece 165 is tightly engaged with the inner thread of the hollow sleeve 15. The connection of the adjusting cylinder 16 and the hollow sleeve 15 is more stable.

[0047] The present invention is not limited to the aforesaid embodiments. In the aforesaid embodiments, the driver 5 cooperates with the driving member 4 through the intersecting shaft gear transmission mechanism so that the rotation of the driver 5 can drive the driving member 4 to rotate. In a fifth embodiment, the present invention may adopt another way for the driver 5 to drive the driving member 4 to rotate. Specifically, as shown in FIG. 32 and FIG. 33, in the fifth embodiment, the driver 5 cooperates with the driving member 4 through an interlaced shaft gear transmission mechanism, so that the rotation of the driver 5 can drive the driving member 4 to rotate. As shown in FIG. 32, in order to cooperate with the interlaced shaft gear transmission mechanism, the axis of the first chamber body 13 is perpendicular to the axis of the second chamber body 14. The interlaced shaft gear transmission mechanism may be a cylindrical worm shaft transmission mechanism. That is, the driver 5 is a cylindrical worm shaft, and the outer wall of the driving member 4 is provided with a gear wheel 44 to mesh with the cylindrical worm shaft. The interlaced shaft gear transmission mechanism is not limited to the cylindrical worm shaft transmission mechanism. It may be an annular worm shaft transmission mechanism, that is, the driver 5 is an annular worm shaft, and the outer wall of the

driving member 4 is provided with a gear wheel to mesh with the annular worm shaft.

[0048] Although particular embodiments of the present invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the present invention. Accordingly, the present invention is not to be limited except as by the appended claims.

Claims

1. A wall-mounted toilet fixing device, movably mated with a screw rod (S) fixed on a mounting base (W), comprising a housing (1), a driven member (2), at least one press block (3) movably fitted on the driven member (2), a driving member (4) for driving the driven member (2) to rotate and for driving the press block (3) to engage with the screw rod (S), and a driver (5) for driving the driving member (4) to rotate; the housing (1) having a first chamber body (13) and a second chamber body (14) which are intersected and communicated with each other; one end of the first chamber body (13) being provided with a through hole (131) passing through the housing (1), two ends of the second chamber body (14) being provided with two perforations (141) passing through the housing (1) and facing each other; the driver (5) being a cylindrical structure, the driven member (2) and the driving member (4) being hollow tubular structures, the driver (5) being rotatably fitted in the first chamber body (13), the driving member (4) and the driven member (2) being rotatably fitted in the second chamber body (14), the driving member (4) being movably sleeved on the driven member (2), the driven member (2) being provided with a through passage (21) aligned with the two perforations (141), the driver (5) cooperating with the driving member (4) through an intersecting shaft gear transmission mechanism or an interlaced shaft gear transmission mechanism, the driving member (4) being movably engaged with the driven member (2), one end of the driven member (2) extending out of the driving member (4) and being provided with a stop portion (23) for blocking the driving member (4), a rotation damping mechanism being provided between the stop portion (23) and the second chamber body (14), the rotation damping mechanism enabling the driven member (2) to have a forward rotation damping and a reverse rotation damping, the reverse rotation damping being greater than the forward rotation damping; a side wall of the driven member (2) being provided with at least one engaging hole (22) passing through the side wall of the driven member (2), the press block (3) being movably fitted in the engaging hole (22), the number of the press block (3) corresponding to the number of the engaging hole (22), an inner surface of the press block (3) being

formed with an engaging surface (31) corresponding to an external threaded surface of the screw rod (S); wherein when the driving member (4) is rotated in a forward direction, the press block (3) is pushed by the driving member (4) to engage with the screw rod (S).

2. The wall-mounted toilet fixing device as claimed in claim 1, wherein the number of the at least one engaging hole (22) is two; each of the engaging holes (22) is movably mated with the press block (3), an inner wall of the driving member (4) is formed with two curved troughs (41) recessed outward and respectively corresponding to the two engaging holes (22), and one side of each of the engaging holes (22) is formed with a limit rib (221) protruding outward and movably fitted in a corresponding one of the curved troughs (41).
3. The wall-mounted toilet fixing device as claimed in claim 1, wherein the number of the at least one engaging hole (22) is two; each of the engaging holes (22) is movably mated with the press block (3), an inner wall of the driving member (4) is formed with two eccentric troughs (43) recessed outward and respectively corresponding to the two engaging holes (22), a distance from the eccentric troughs (43) to a rotating axle of the driven member (2) decreases in a forward rotation direction of the driven member (2); the at least one press block (3) includes two press blocks (3) each extending outward to form an engaging portion (32), and the engaging portions (32) of the two press blocks (3) are engaged with the two eccentric troughs (43), respectively.
4. The wall-mounted toilet fixing device as claimed in claim 1, wherein the number of the at least one engaging hole (22) is two; each of the engaging holes (22) is movably mated with the press block (3), an inner wall of the driving member (4) is formed with an eccentric trough (43) recessed outward, a distance from the eccentric trough (43) to a rotating axle of the driven member (2) decreases in a forward rotation direction of the driven member (2); the at least one press block (3) includes two press blocks (3), the two press blocks (3) are connected by a curved plate (33) located between the driving member (4) and the driven member (2), and a middle portion of the curved plate (33) is formed with an engaging portion (32) engaged in the eccentric trough (43).
5. The wall-mounted toilet fixing device as claimed in claim 1, wherein the intersecting shaft gear transmission mechanism is a bevel gear transmission mechanism, an outer wall of the driving member (4) is provided with a first bevel gear (42), and the driver (5) is provided with a second bevel gear (51) meshing with the first bevel gear (42).

6. The wall-mounted toilet fixing device as claimed in claim 1, wherein the interlaced shaft gear transmission mechanism is a cylindrical worm shaft transmission mechanism, the driver (5) is a cylindrical worm shaft, and an outer wall of the driving member (4) is provided with a gear wheel (44) meshing with the cylindrical worm shaft.
7. The wall-mounted toilet fixing device as claimed in claim 1, wherein the stop portion (23) is provided with two symmetric elastic arms (6) extending in a direction away from a rotating axle of the driven member (2), a distance from the elastic arms (6) to the rotating axle of the driven member (2) increases in a reverse rotation direction of the driven member (2); an inner wall of the second chamber body (14) is provided with a plurality of protrusions (7) which are equidistantly distributed and movably mated with the elastic arms (6), each of the protrusions (7) is a triangular structure, two sides of each of the protrusions (7) are a push surface (71) and a stop surface (72) for movably contacting with the elastic arms (6) respectively, a distance from the push surface (71) to the rotating axle of the driven member (2) increases in a forward rotation direction of the driven member (2), a distance from the stop surface (72) to the rotating axle of the driven member (2) decreases in the forward rotation direction of the driven member (2); the elastic arms (6) and the protrusions (7) constitute the rotation damping mechanism.
8. The wall-mounted toilet fixing device as claimed in claim 1, wherein an inner wall of the second chamber body (14) is provided with two symmetrical elastic arms (6), a distance from the elastic arms (6) to a rotating axle of the driven member (2) increases in a reverse rotation direction of the driven member (2); the stop portion (23) is provided with a plurality of protrusions (7) which extend in a direction away from the rotating axle of the driven member (2) and are equidistantly distributed and movably mated with the elastic arms (6), each of the protrusions (7) is a triangular structure, two sides of each of the protrusions (7) are a push surface (71) and a stop surface (72) for movably contacting with the elastic arms (6) respectively, a distance from the push surface (71) to the rotating axle of the driven member (2) decreases in a forward rotation direction of the driven member (2), a distance from the stop surface (72) to the rotating axle of the driven member (2) increases in the forward rotation direction of the driven member (2); the elastic arms (6) and the protrusions (7) constitute the rotation damping mechanism.
9. The wall-mounted toilet fixing device as claimed in claim 1, wherein an end surface of the stop portion (23) is provided with two symmetric elastic arms (6) extending outward, a distance from the elastic arms (6) to an end surface of the driven member (2) increases in a reverse rotation direction of the driven member (2); an inner end surface of the second chamber body (14), close to the stop portion (23), is provided with a plurality of projections (7) which are equidistantly distributed and movably mated with the elastic arms (6), each of the protrusions (7) is a triangular structure, two sides of each of the protrusions (7) are a push surface (71) and a stop surface (72) for movably contacting with the elastic arms (6) respectively, a distance from the push surface (71) to the end surface of the driven member (2) increases in a forward rotation direction of the driven member (2), a distance from the stop surface (72) to the end surface of the driven member (2) decreases in the forward rotation direction of the driven member (2); the elastic arms (6) and the protrusions (7) constitute the rotation damping mechanism.
10. The wall-mounted toilet fixing device as claimed in claim 1, wherein the end having the through hole (131) of the first chamber body (13) is provided with an upper cover (8), the upper cover (8) covers the driver (5), and the upper cover (8) is provided with an insertion hole (81) communicating with the first chamber body (13).
11. The wall-mounted toilet fixing device as claimed in claim 1, wherein one of the two ends having the perforations (141) of the second chamber body (14) is provided with a hollow sleeve (15) communicating with the second chamber body (14), and the hollow sleeve (15) is mated with an adjusting cylinder (16).
12. The wall-mounted toilet fixing device as claimed in claim 11, wherein an inner wall of the hollow sleeve (15) is provided with an inner thread, the adjusting cylinder (16) is a hollow cylinder structure, one end of the adjusting cylinder (16) is formed with at least one elastic press piece (165), an outer surface of the elastic press piece (165) is formed with an outer thread to mate with the inner thread of the hollow sleeve (15), an inner surface of the elastic press piece (165) protrudes inward to form a limit rib (1651), and another end of the adjusting cylinder (16) is provided with a plurality of elastic stop pieces (164) extending outward.
13. The wall-mounted toilet fixing device as claimed in claim 11, wherein the adjusting cylinder (16) is a hollow cylinder structure, the adjusting cylinder (16) is threadedly connected to the hollow sleeve (15), and one end of the adjusting cylinder (16), away from the housing (1), is provided with a limit flange (161).
14. The wall-mounted toilet fixing device as claimed in claim 13, wherein the adjusting cylinder (16) is provided with a retaining ring (162) fitted on the adjusting

cylinder (16), an inner diameter of the retaining ring (162) is less than an outer diameter of the limit flange (161), and an outer diameter of the retaining ring (162) is greater than the outer diameter of the limit flange (161).

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15. The wall-mounted toilet fixing device as claimed in claim 1, wherein the engaging surface (31) is a straight tooth surface or a bevel tooth surface or an inner threaded surface.

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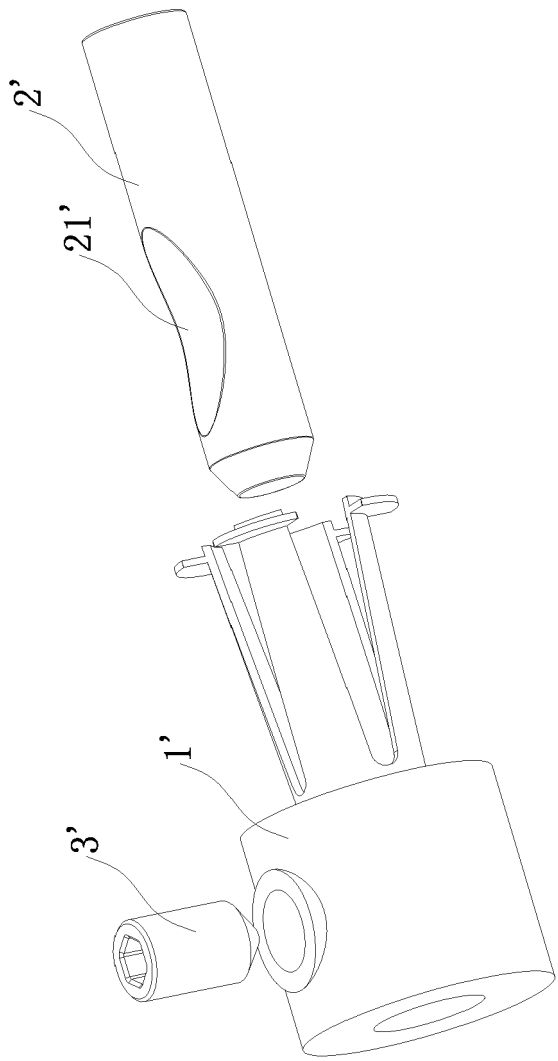


FIG. 1

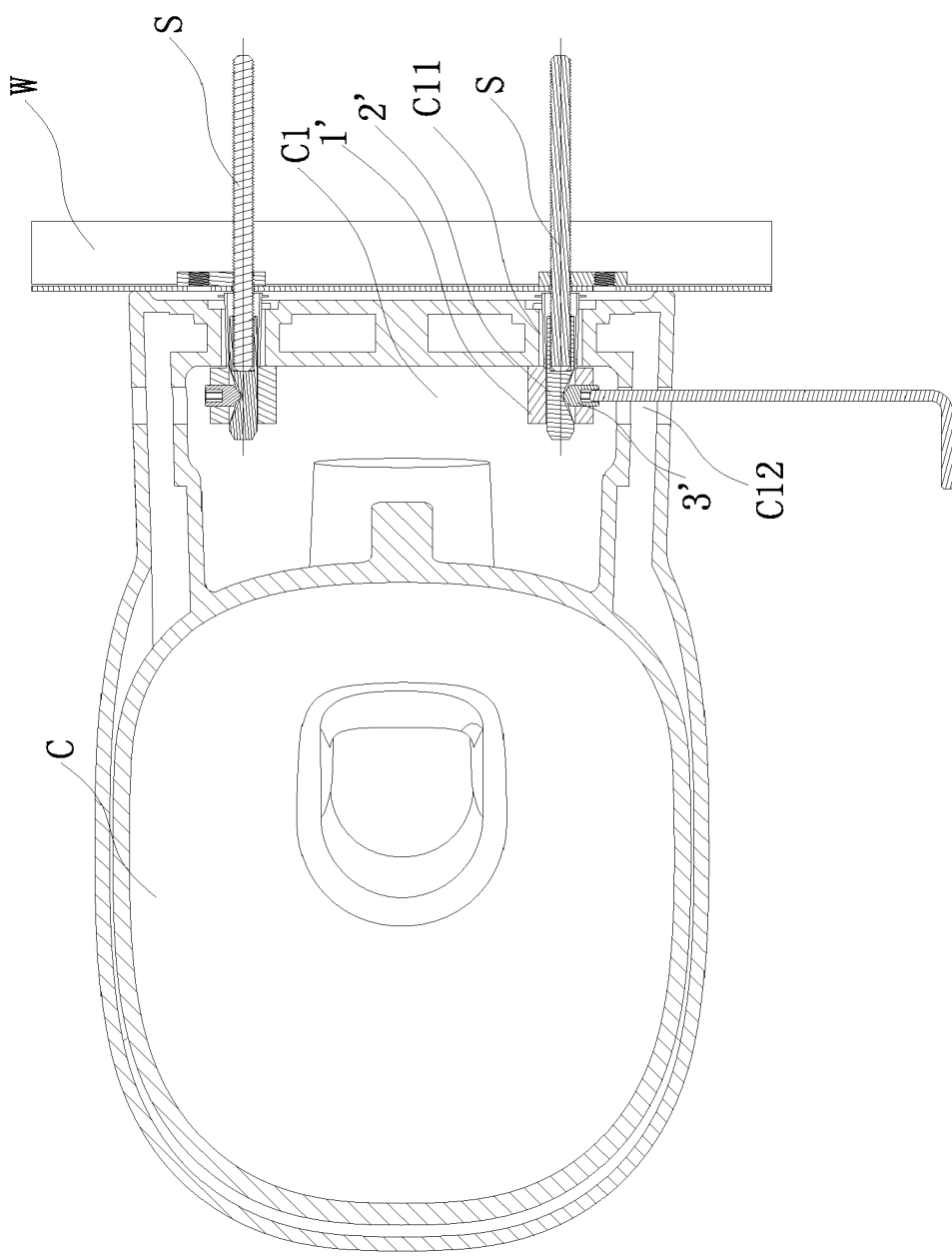


FIG. 2

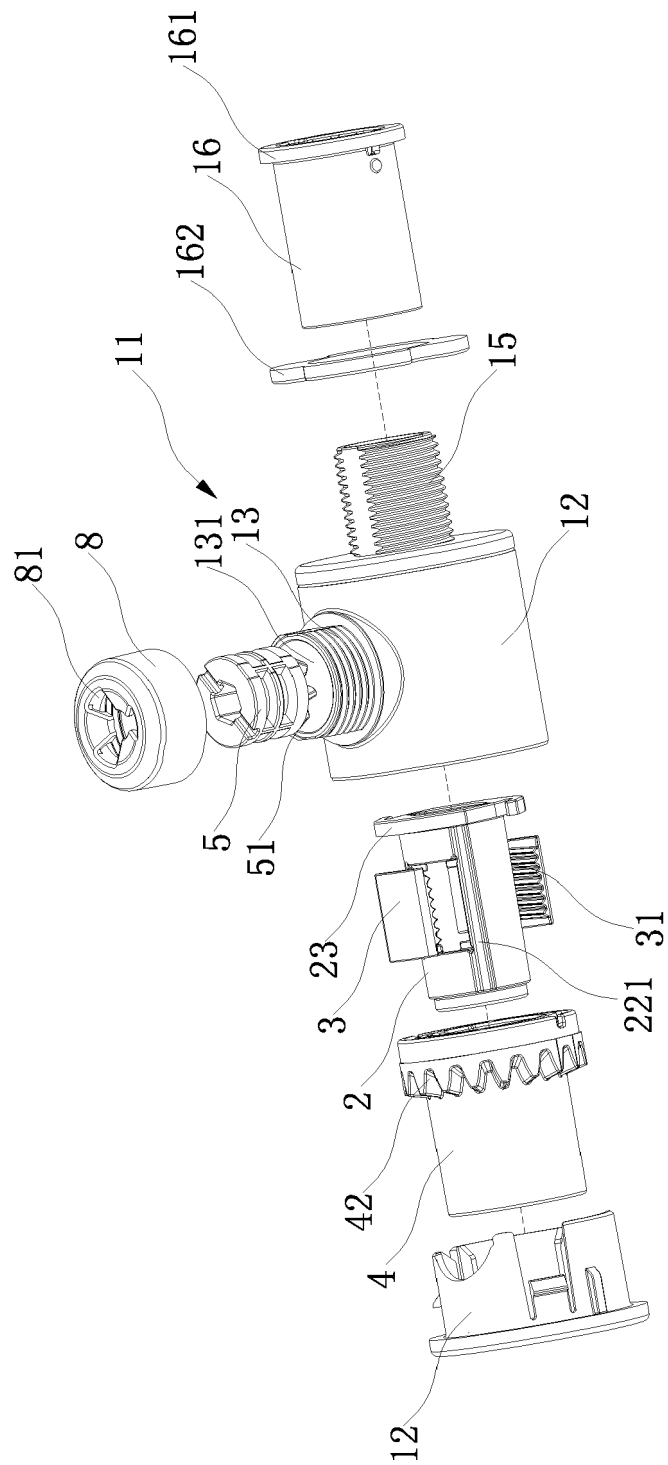


FIG. 3

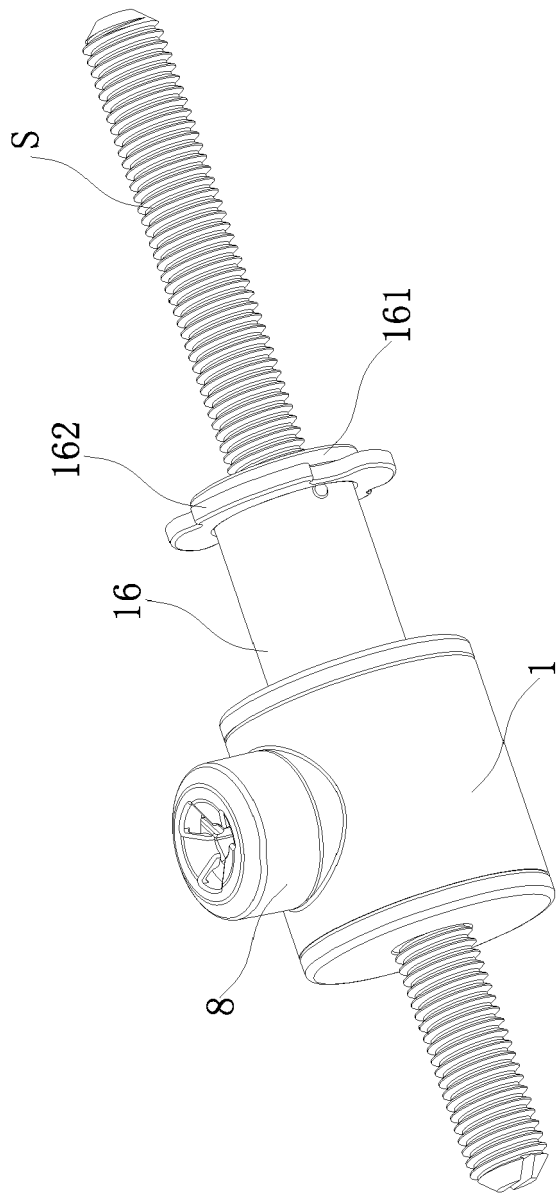


FIG. 4

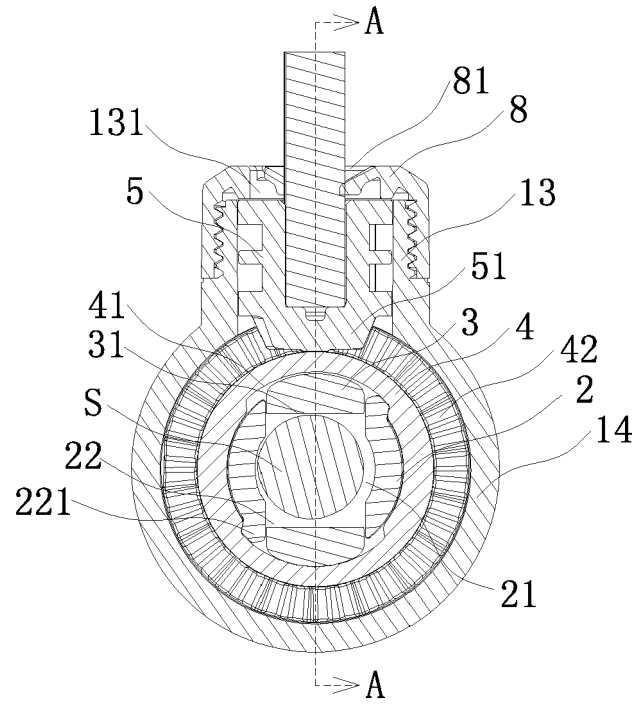


FIG. 5

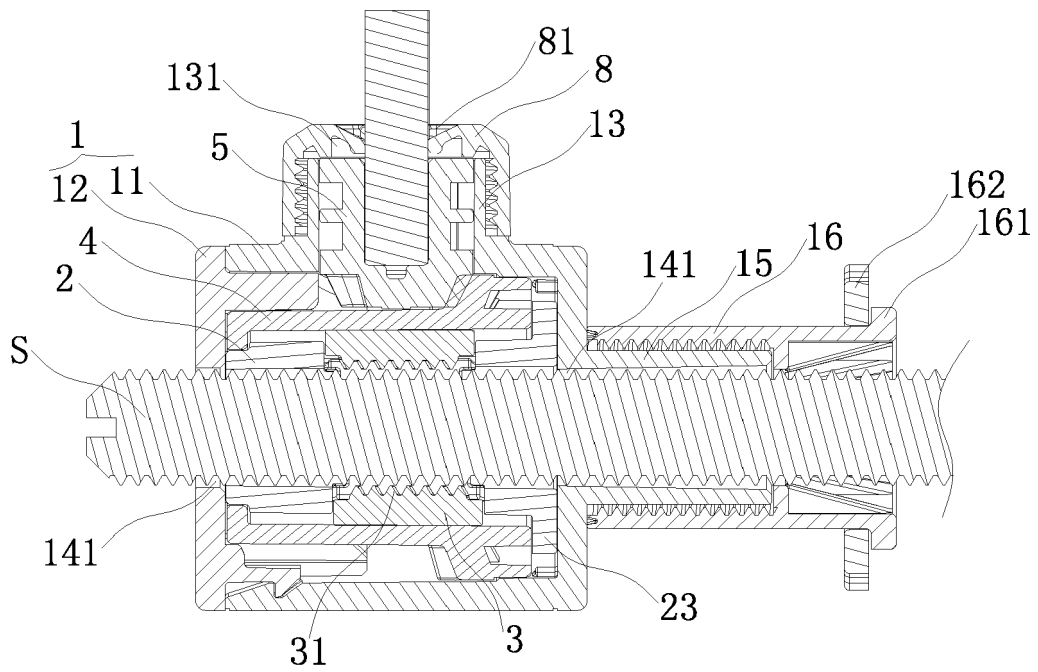


FIG. 6

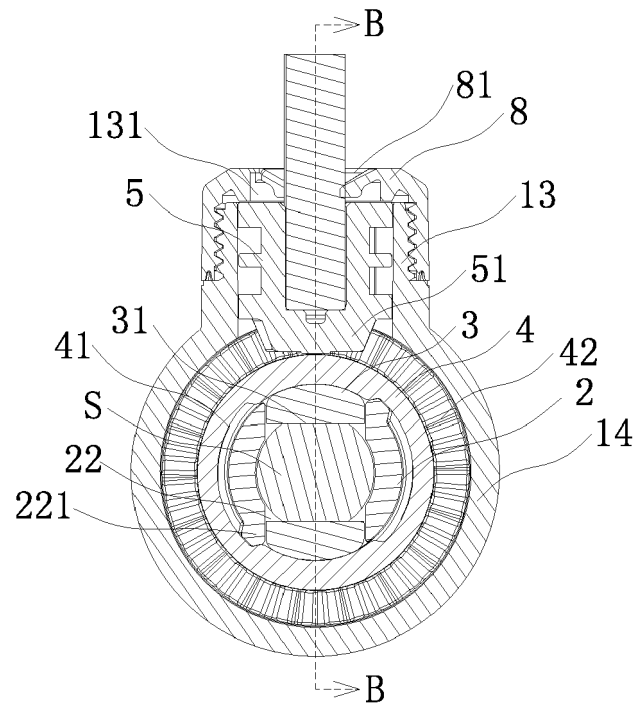


FIG. 7

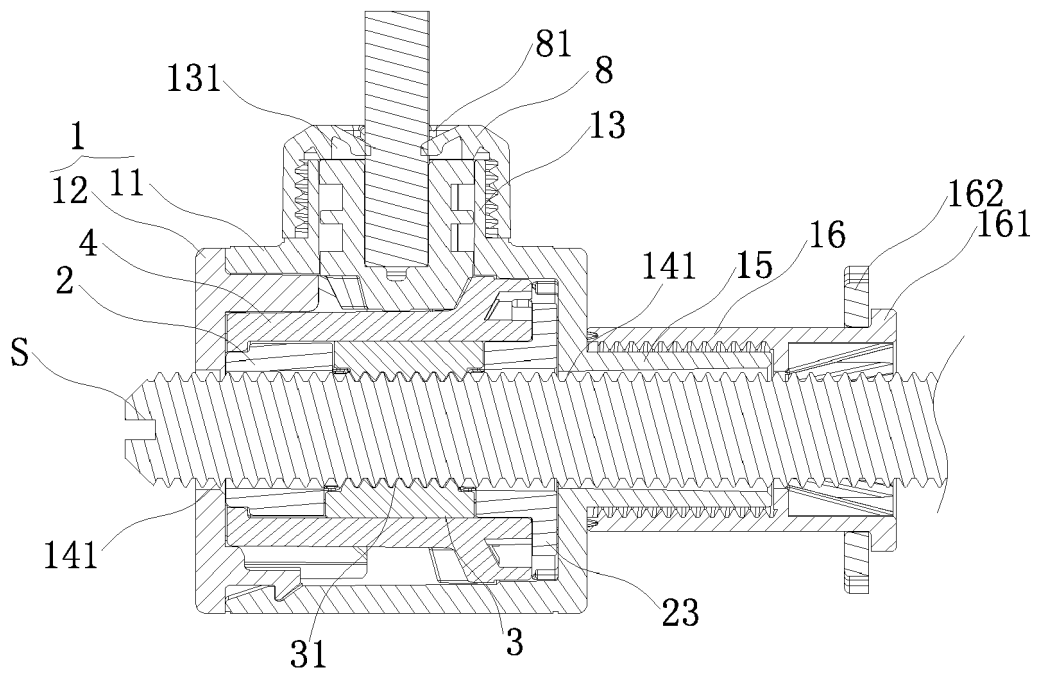


FIG. 8

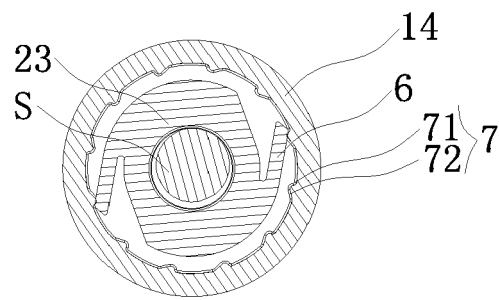


FIG. 9

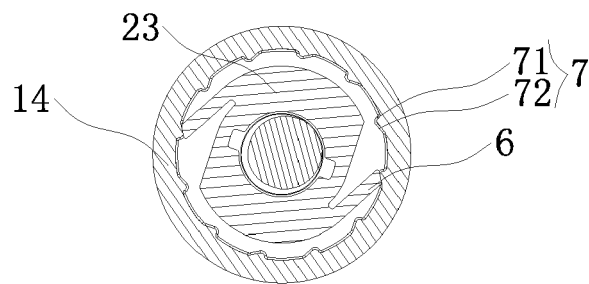


FIG. 10

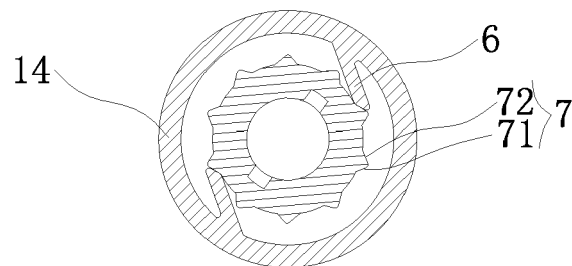


FIG. 11

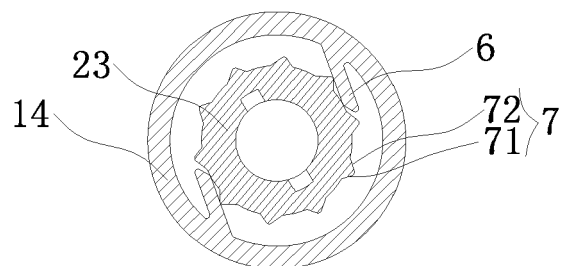


FIG. 12

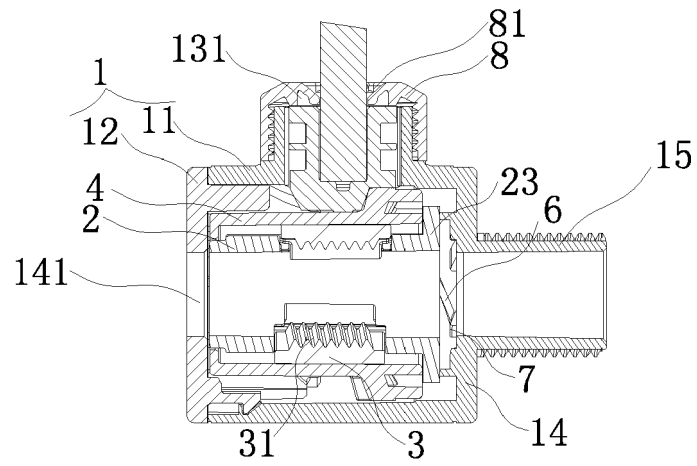


FIG. 13

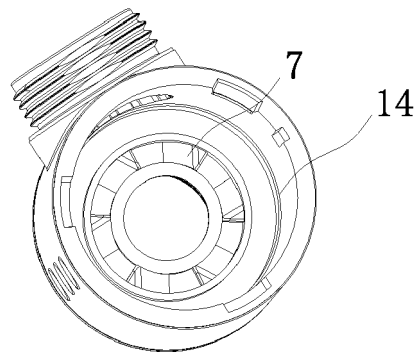


FIG. 14

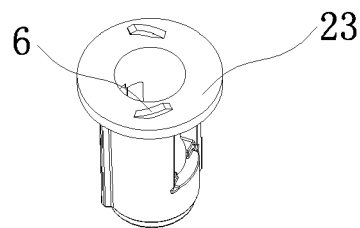


FIG. 15

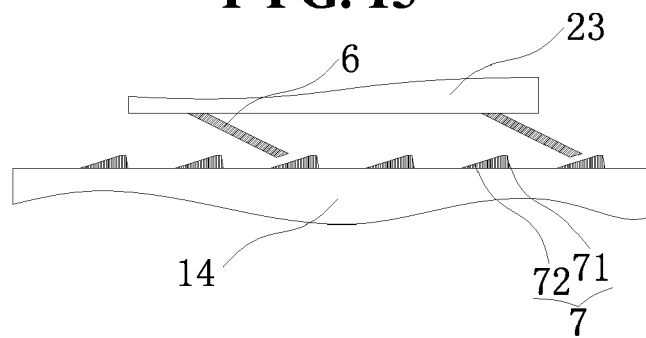


FIG. 16

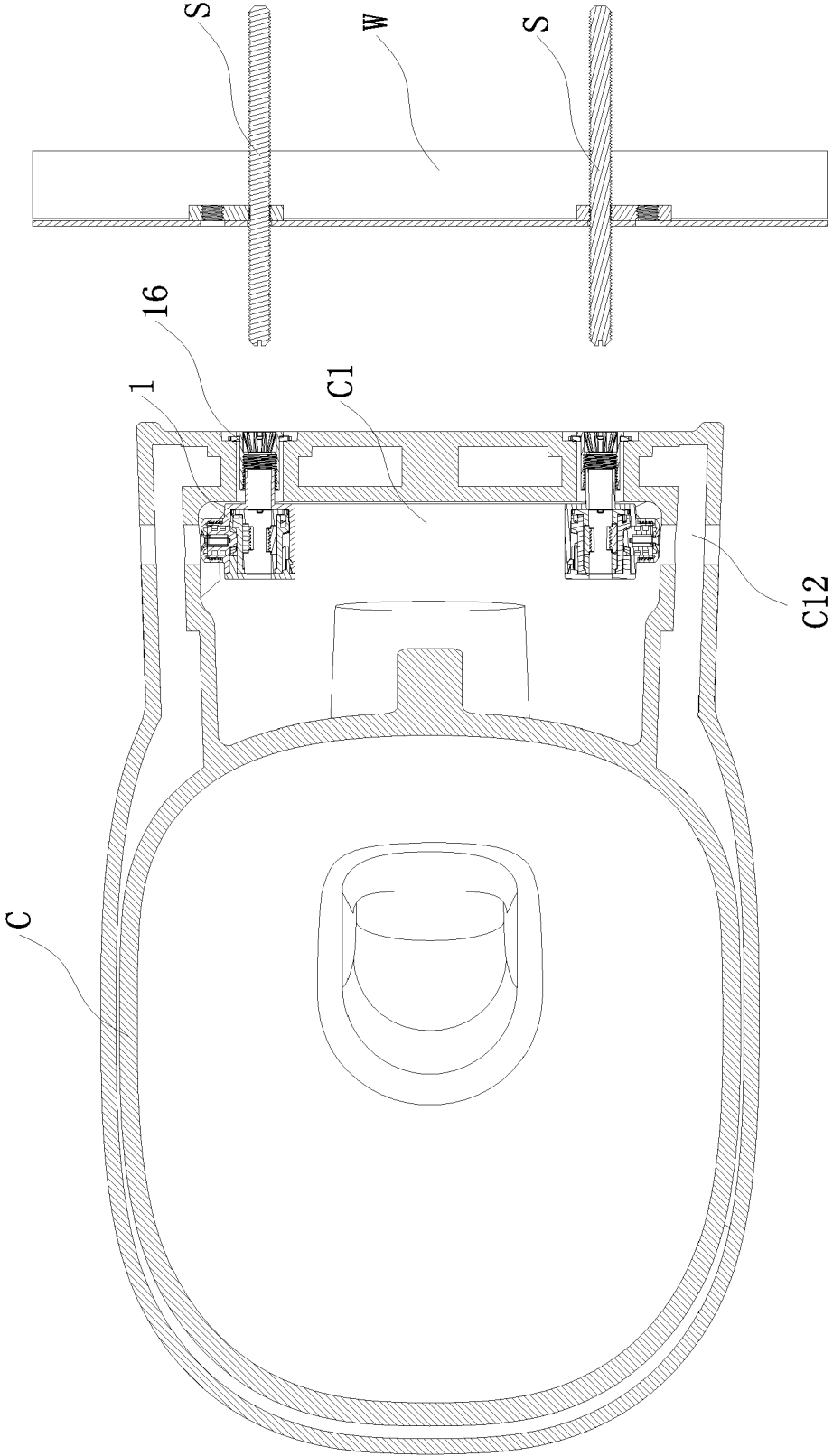


FIG. 17

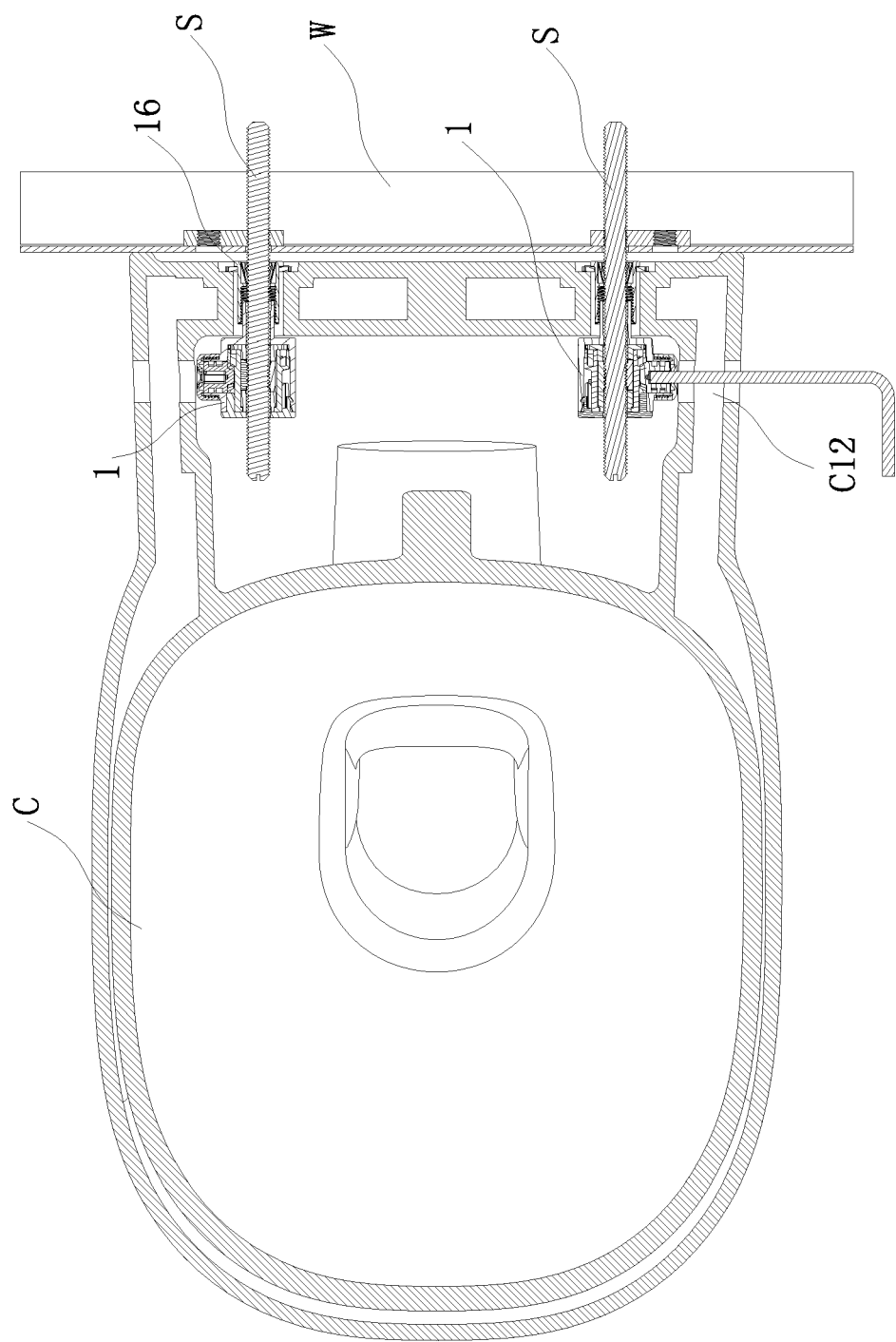


FIG. 18

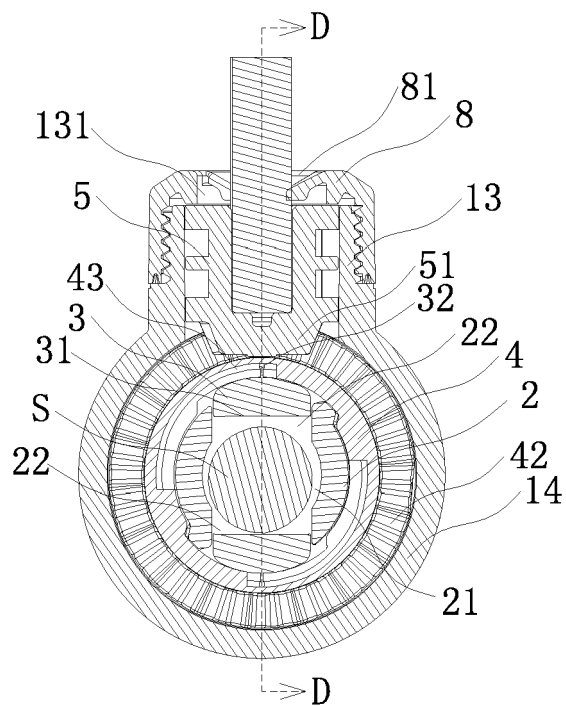


FIG. 19

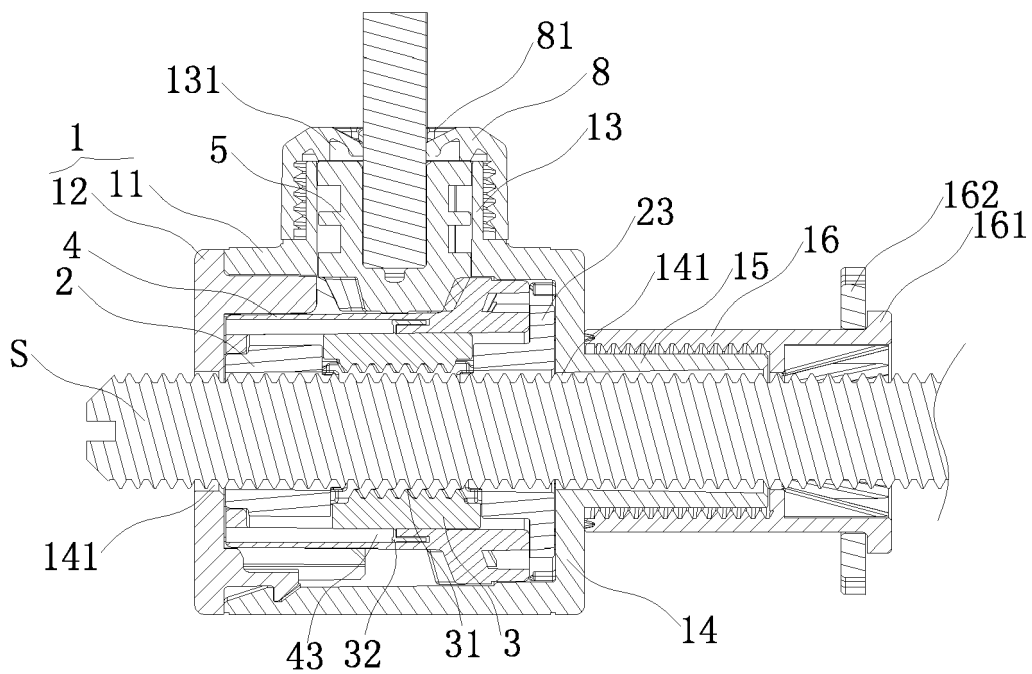


FIG. 20

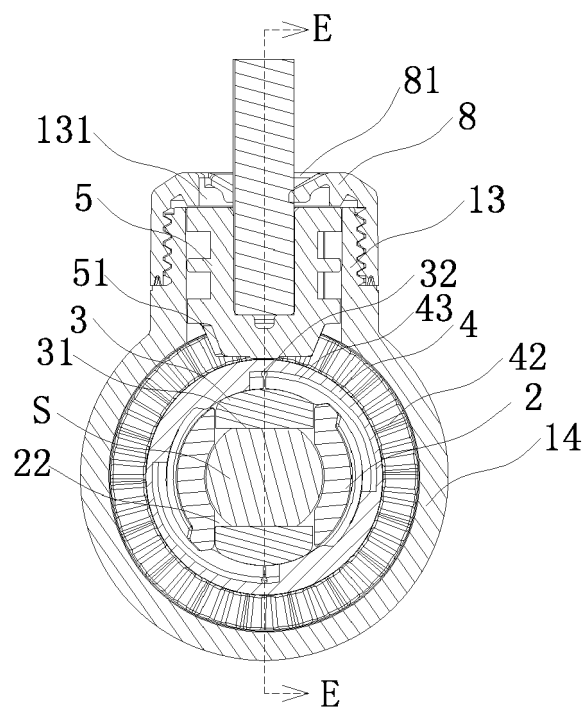


FIG. 21

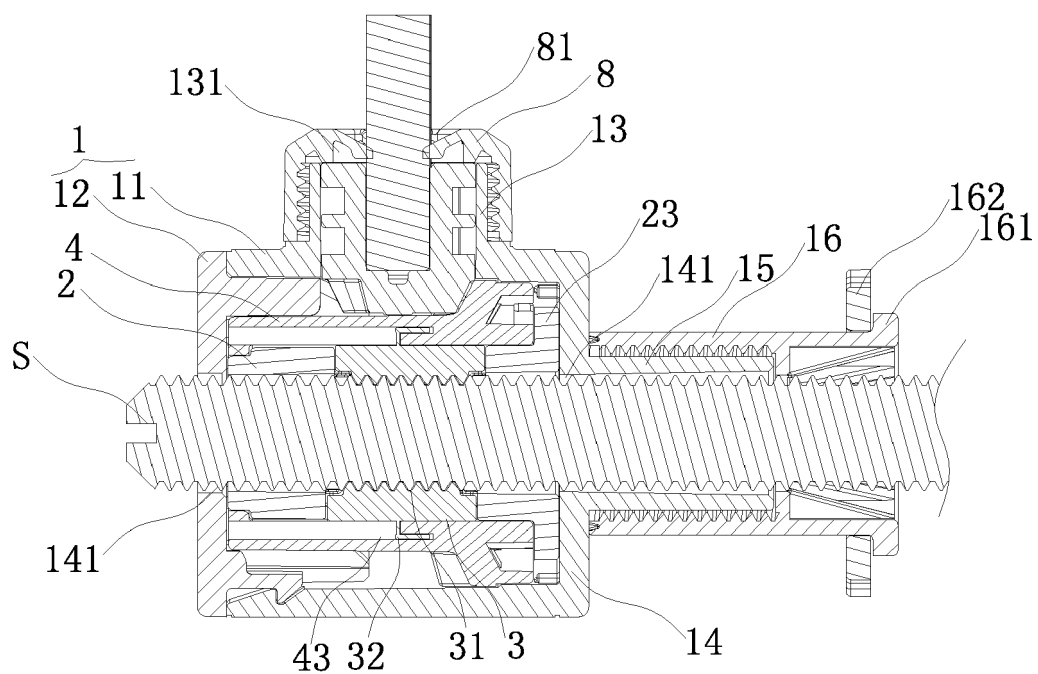


FIG. 22

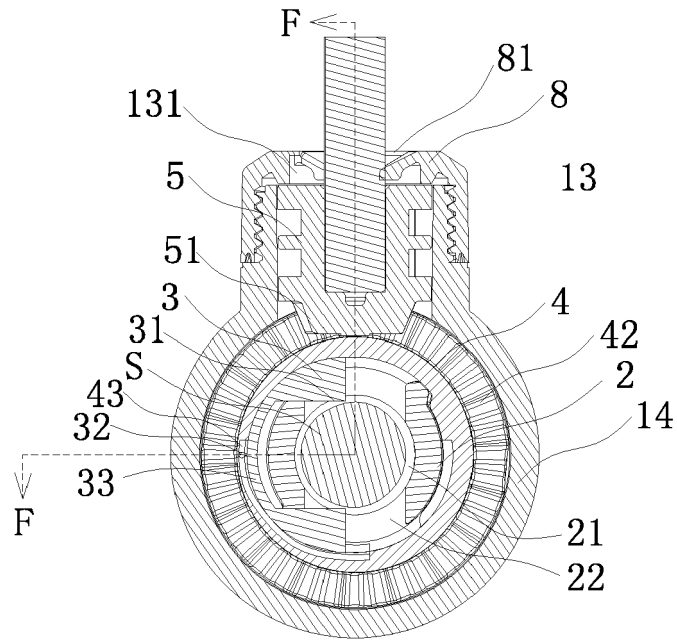


FIG. 23

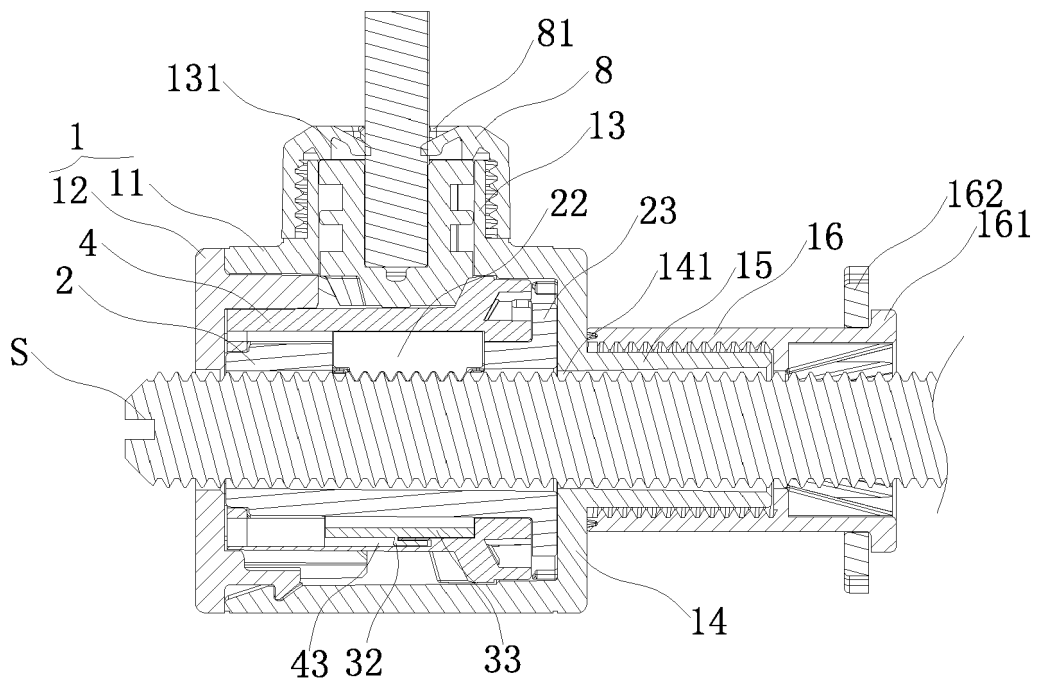


FIG. 24

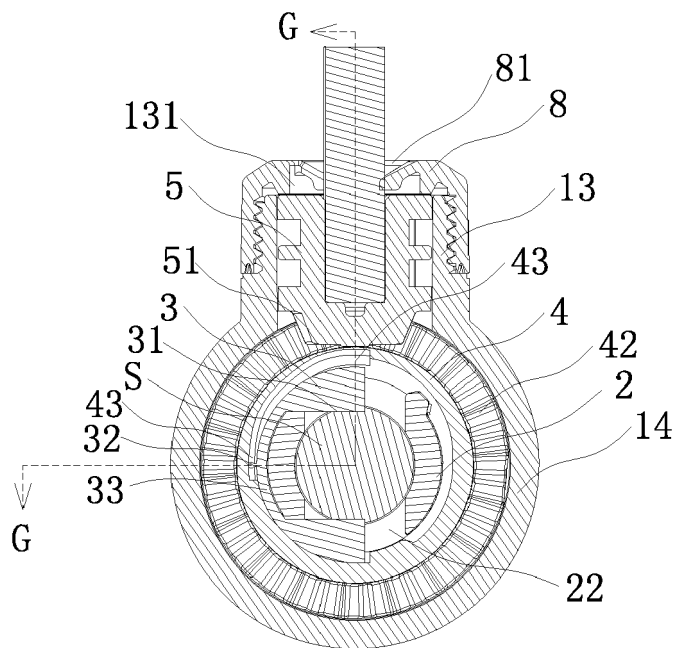


FIG. 25

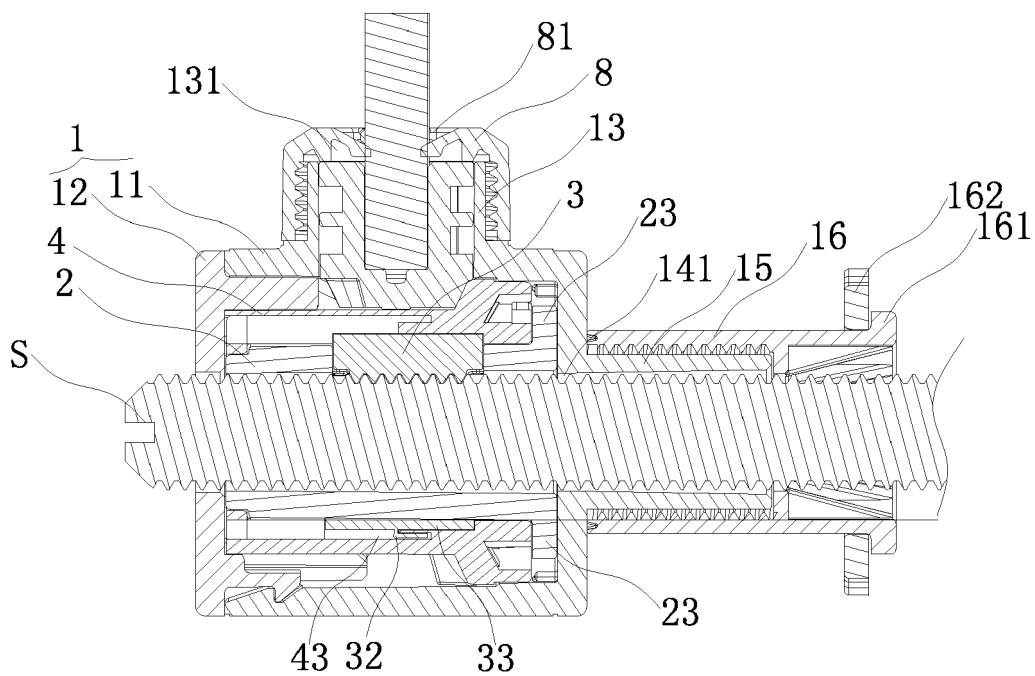


FIG. 26

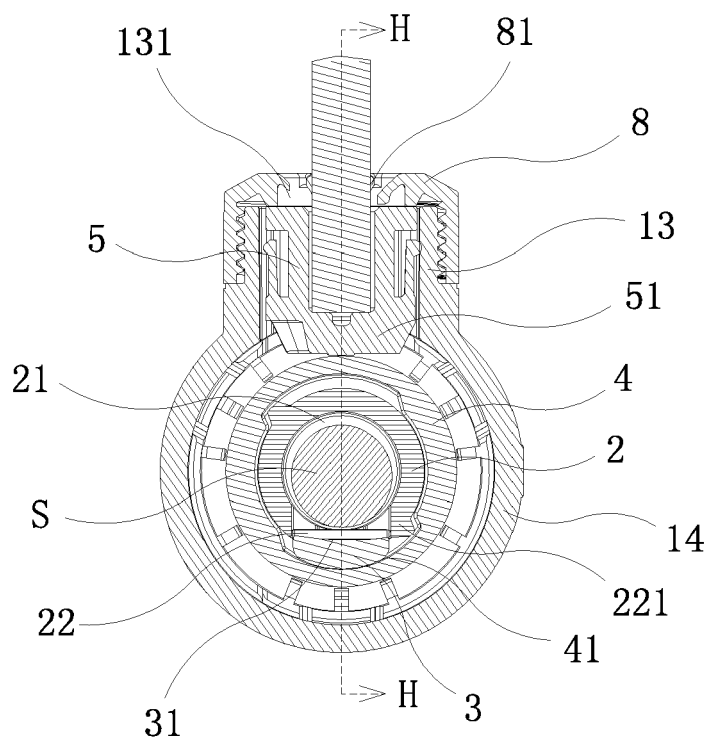


FIG. 27

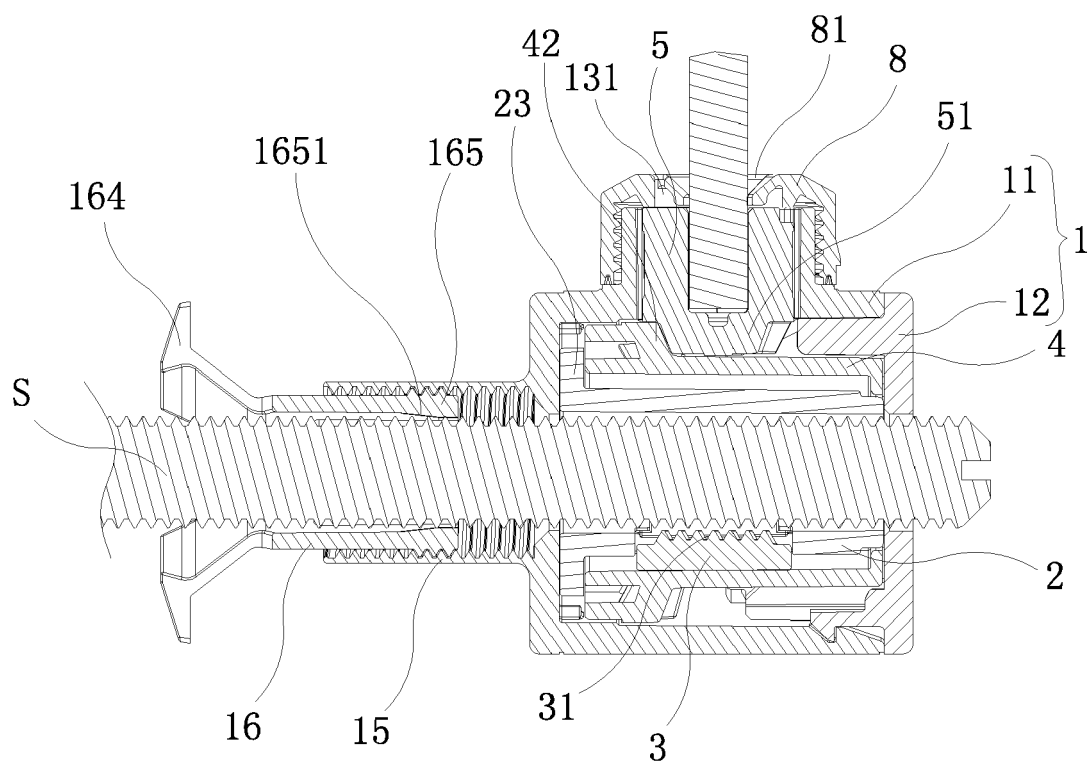


FIG. 28

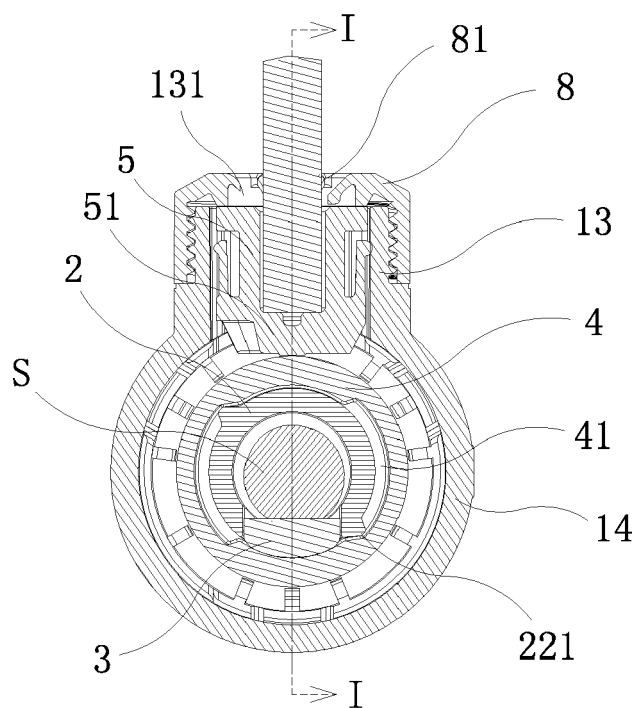


FIG. 29

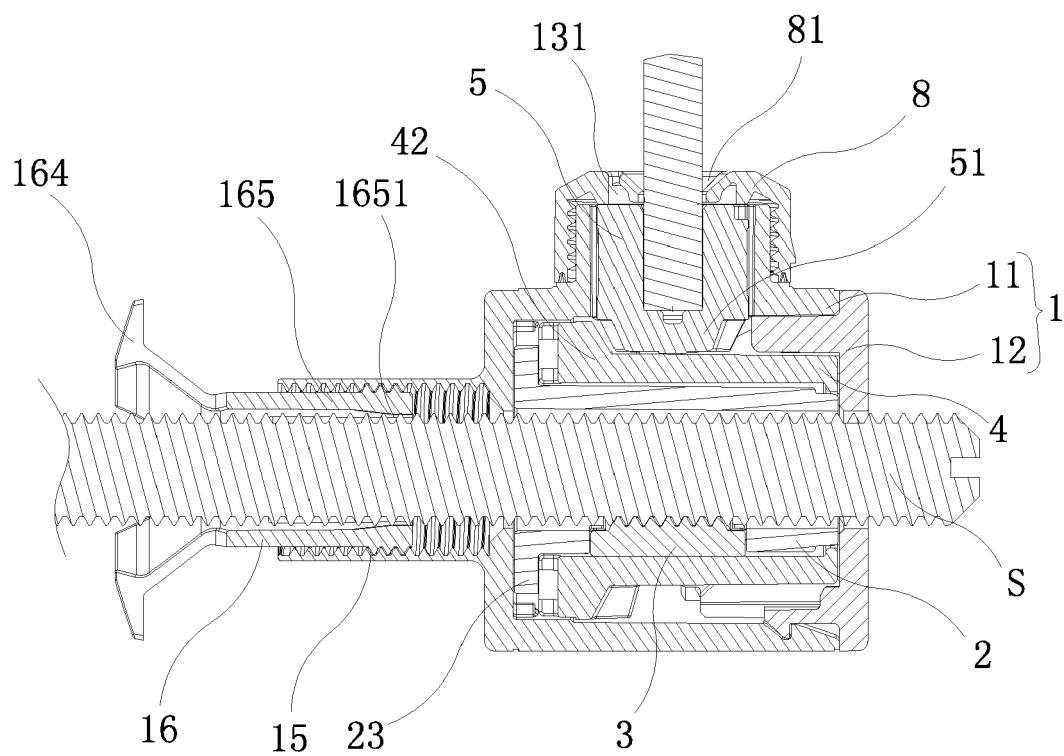


FIG. 30

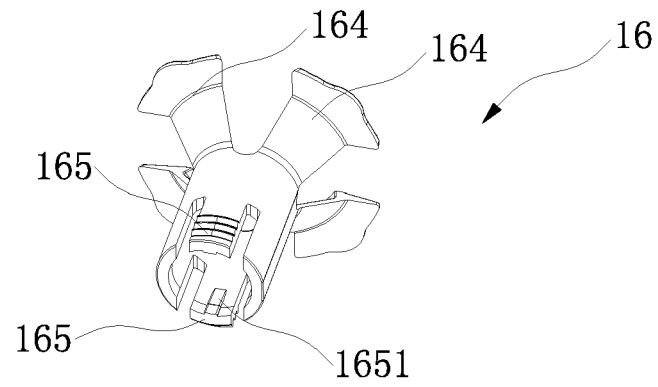


FIG. 31

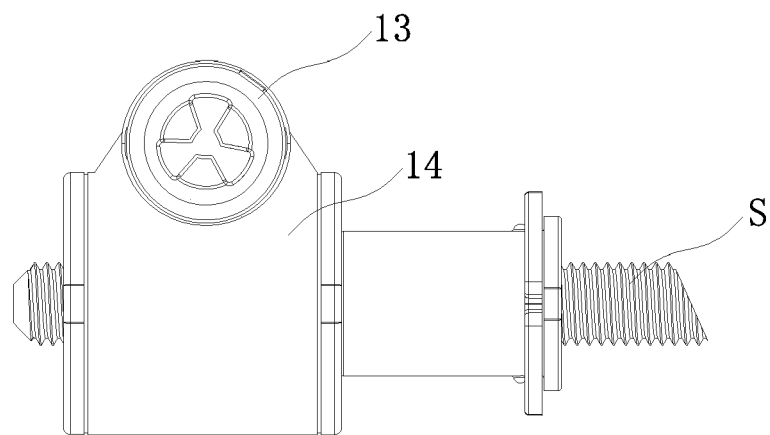


FIG. 32

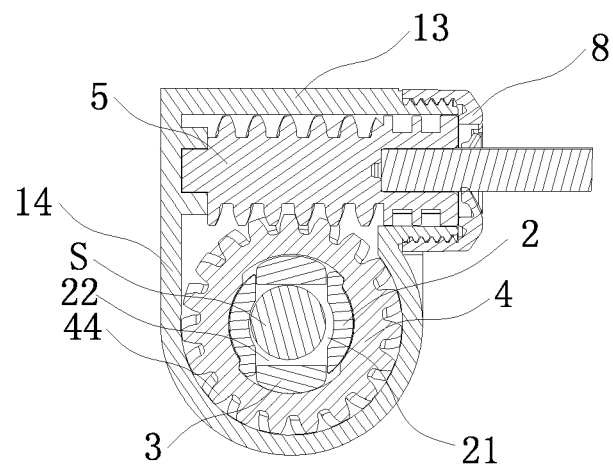


FIG. 33



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 20 8232

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2012 104847 U1 (SANITEC OY [FI]) 22 March 2013 (2013-03-22) * paragraph [0018] - paragraph [0025]; figures 1-4 *	1-15	INV. E03D11/14 E03C1/322
A	DE 20 2010 009280 U1 (FISCHER ITALIA S R L [IT]) 22 December 2011 (2011-12-22) * the whole document *	1-15	
A	WO 2017/203335 A1 (CERAVALLS PUJOL RAMON [ES]; LOPEZ PUCHE NÚRIA [ES]) 30 November 2017 (2017-11-30) * the whole document *	1-15	
A	EP 3 033 979 A1 (FISCHERWERKE GMBH & CO KG [DE]) 22 June 2016 (2016-06-22) * the whole document *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E03D E03C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 June 2018	Examiner Valenta, Ivar
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 1
 EPO FORM 1503 03.82 (P04C01)

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

EP 17 20 8232

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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13-06-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202012104847 U1	22-03-2013	NONE	
DE 202010009280 U1	22-12-2011	NONE	
WO 2017203335 A1	30-11-2017	ES 1159233 U WO 2017203335 A1	21-06-2016 30-11-2017
EP 3033979 A1	22-06-2016	DE 102014018978 A1 EP 3033979 A1 ES 2667735 T3	23-06-2016 22-06-2016 14-05-2018