



(12) **EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:  
**15.12.2021 Bulletin 2021/50**

(51) Int Cl.:  
**E05D 13/00** <sup>(2006.01)</sup> **E06B 3/42** <sup>(2006.01)</sup>  
**E05D 15/06** <sup>(2006.01)</sup> **A47K 3/34** <sup>(2006.01)</sup>

(21) Application number: **20883671.8**

(86) International application number:  
**PCT/CN2020/086206**

(22) Date of filing: **22.04.2020**

(87) International publication number:  
**WO 2021/212382 (28.10.2021 Gazette 2021/43)**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**  
Designated Validation States:  
**KH MA MD TN**

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(54) **SLIDING WHEEL ASSEMBLY, GUIDE ASSEMBLY AND SHOWER DOOR**

(57) Provided are a pulley assembly (100, 72), a guide assembly (7), and a shower door (8). The pulley assembly (100, 72) includes a pulley (1), a housing (2), cleaning brushes (3), a separator (4), a rotating shaft (5), and a bearing (6). The guide assembly (7) includes a guide rail (71) and a pulley assembly (72). The shower

door (8) includes a movable door plate (81) and a guide assembly (82). The structure of the pulley assembly (100, 72), the guide assembly (7), and the shower door (8) can be configured to clean the guide rail (71) and produce low sliding noise.

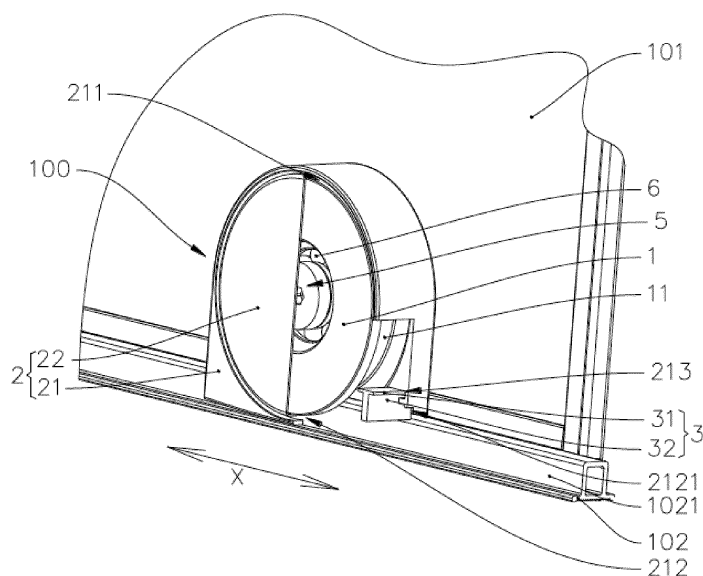


FIG. 1

## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to the field of sanitary wares, and in particular, to a pulley assembly, a guide assembly and a shower door that are provided with the pulley assembly.

### BACKGROUND

**[0002]** At present, there are mainly two ways to open or close a shower door: rotating and sliding. For a shower door that is opened or closed in a sliding way, a guide rail is disposed on a floor, and a pulley assembly fitted with the guide rail is disposed on a movable door plate, so that the pulley assembly can drive the movable door plate to move synchronously when sliding along an extension direction of the guide rail, thereby opening or closing the shower door.

**[0003]** However, the existing shower door that is opened or closed in a sliding way has the following disadvantages: Because the guide rail is disposed on the floor, it is easy to accumulate debris such as dust and hair on the guide rail. When a pulley moves on the guide rail, the dust is easy to be mixed with water and bonded on the pulley, causing a surface of the pulley fitted with the guide rail to be uneven, which affects smooth movement of the movable door plate, and may cause the pulley to jump and produce noise in a moving process. The debris such as hair is easy to entangle itself with and block the pulley and/or a rotating shaft, thereby affecting the smooth movement of the movable door plate.

### TECHNICAL PROBLEM

**[0004]** To resolve the foregoing problems, a first objective of the present invention is to provide a pulley assembly that moves steadily and smoothly without noise.

**[0005]** A second objective of the present invention is to provide a guide assembly that operates steadily and smoothly without noise.

**[0006]** A third objective of the present invention is to provide a shower door of which a movable door plate moves steadily and smoothly without noise.

### TECHNICAL SOLUTION

**[0007]** To implement the first objective of the present invention, the present invention provides a pulley assembly, including a pulley, where the pulley assembly further includes a housing and two cleaning brushes, the housing has an installation position, the pulley is installed in the installation position, the pulley may rotate around a rotation axis of the pulley, a slot communicated with the installation position is disposed on the housing, a portion of the pulley is located in the slot, the slot extends from a first side wall of the housing toward the installation po-

sition along a radial direction of the pulley, the slot penetrates through the housing along a moving direction of the pulley assembly, the two cleaning brushes are installed in the housing, at least a portion of the cleaning brush is located in the slot, and in the moving direction, the pulley is located between the two cleaning brushes.

**[0008]** In a further solution, two installation slots are further disposed on the housing, in the moving direction, the two installation slots are respectively located on two sides of the rotation axis, the installation slot extends from a second side wall of the housing toward an interior of the housing along the rotation axis, and one of the cleaning brushes is detachably installed in one of the installation slots.

**[0009]** In a still further solution, the cleaning brush includes a fixing portion and a cleaning portion, the fixing portion is fitted with and connected to the installation slot, at least a portion of the cleaning portion is located in the slot, and the cleaning portion includes a brush and/or cleaning cotton.

**[0010]** In a still further solution, the housing includes a housing body and a cover body, the installation position and the slot are disposed on the housing body, the cleaning brush is installed on the housing body, the cover body covers an opening of the installation position, and the cover body is fixedly connected to the housing body or the pulley.

**[0011]** In a preferred solution, an arc-shaped wall is disposed in the installation position, the arc-shaped wall is located in a circumferential direction of the pulley, a projection of the arc-shaped wall is disposed as a major arc shape along an axial direction of the pulley, two ends of the arc-shaped wall are located in the slot, and in the moving direction, the two ends of the arc-shaped wall are located between the two cleaning brushes.

**[0012]** In another preferred solution, the pulley assembly further includes a separator, a rotating shaft and a bearing, an installation hole is disposed at the bottom of the installation position along the axial direction of the pulley, a first end of the separator is installed in the installation hole, one end of the rotating shaft penetrates into the installation position along the axial direction, the separator is sleeved on the rotating shaft, the bearing is sleeved between the rotating shaft and the pulley, a first end of the rotating shaft is adjacent to a first end of the bearing, and a second end of the separator is adjacent to a second end of the bearing.

**[0013]** In a further solution, the rotating shaft includes an eccentric fastener and a bolt, where the eccentric fastener includes a first shaft portion, a second shaft portion and a third shaft portion, the second shaft portion is connected between the first shaft portion and the third shaft portion, the first shaft portion and the second shaft portion are eccentrically disposed, the second shaft portion and the third shaft portion are coaxially disposed or eccentrically disposed, the diameter of the first shaft portion is smaller than the diameter of the second shaft portion, the diameter of the second shaft portion is smaller than

the diameter of the third shaft portion, the bearing is sleeved on the first shaft portion, the bolt is threaded to the first shaft portion, the bolt is adjacent to the first end of the bearing, a hole penetrating through the separator along the axial direction is disposed on a middle portion of the separator, the hole includes a first through-hole and a second through-hole that are eccentrically disposed, the diameter of the first through-hole is smaller than the diameter of the second through-hole, the first shaft portion passes through the first through-hole, and the second shaft portion passes through the second through-hole.

**[0014]** In another preferred solution, the slot is located at the bottom of the housing body, and the top of the housing body is disposed as an arc-shaped surface.

**[0015]** To implement the second objective of the present invention, the present invention provides a guide assembly, including a guide rail and a pulley assembly, where the pulley assembly is the foregoing pulley assembly, a pulley is connected to the guide rail, and the pulley may move along an extension direction of the guide rail.

**[0016]** To implement the third objective of the present invention, a shower door is provided, including a movable door plate, where the shower door further includes the foregoing pulley assembly, the pulley assembly is installed at the bottom of the movable door plate, and an opening of a slot is disposed toward the bottom of the movable door plate.

## BENEFICIAL EFFECT

**[0017]** According to the pulley assembly provided in the present invention, a pulley structure is designed, so that the slot can be configured to accommodate the guide rail and a portion of the pulley, thereby preventing the pulley from being exposed from the housing, and producing good contact between the pulley and the guide rail. In such case, limiting may be implemented to a certain extent to further prevent the pulley from separating from the guide rail. The cleaning brush is configured to clean a surface of the guide rail, so as to remove debris such as dust and hair on the surface of the guide rail, so that the pulley moves more steadily and smoothly, and noise is avoided in a sliding process of the pulley assembly. In addition, relative positions of the cleaning brush and the pulley are disposed, so that when the pulley moves back and forth along the guide rail, a contact position between the pulley and the guide rail is always kept clean.

**[0018]** The installation slot configured to fit with and connect to the cleaning brush is disposed on the housing, so that the cleaning brush is replaceable, and replacement is simpler and more convenient. The fixing portion of the cleaning brush is configured to fit with and connect to the installation slot, so that the cleaning brush can be fixedly installed on the housing possibly; the cleaning portion of the cleaning brush is configured to clean the surface of the guide rail, and a type of the cleaning portion

may be selected based on different needs.

**[0019]** The housing is disposed as a separate structure, so that the pulley can be more conveniently installed and maintained, and the arc-shaped wall disposed in the installation position can not only enhance overall strength of the housing, but also block water rolled up by the pulley, so as to prevent external water from affecting rotation of the pulley and/or aggravating water erosion on a metal pulley.

**[0020]** The separator is configured to fit with the rotating shaft to locate and fasten the rotating shaft, and at the same time, the separator can simplify a structure of the housing body and reduce difficulty in processing the housing body. In addition, structures of the rotating shaft and the separator are designed, so that when the second shaft portion and the third shaft portion are eccentrically disposed, the pulley assembly can be fixedly installed on the movable door plate only by using the rotating shaft, thereby simplifying installation steps of the pulley assembly. When the second shaft portion and the third shaft portion are coaxially disposed, the rotating shaft can rotate to adjust relative positions of the pulley assembly and the guide rail, so as to adjust a supporting height of the pulley assembly. However, the housing body and the movable door plate need to be fastened by using another fastener in this case.

**[0021]** The guide assembly provided in the present invention includes the foregoing pulley assembly, so that when the pulley assembly moves along the guide rail, the pulley assembly can move more steadily and smoothly, and noise is avoided in the moving process.

**[0022]** The shower door provided in the present invention includes the foregoing pulley assembly. The pulley assembly is disposed at the bottom of the movable door plate, and is fitted with and connected to the guide rail on the floor. In such case, when the movable door plate of the shower door is moved by using the pulley assembly, the pulley assembly and the movable door plate can move more steadily and smoothly, and noise is avoided in the moving process.

## BRIEF DESCRIPTION OF DRAWINGS

**[0023]**

FIG. 1 is a partial cutaway view of a pulley assembly in use according to a pulley assembly embodiment of the present invention;

FIG. 2 is an exploded view of a pulley assembly embodiment according to the present invention;

FIG. 3 is a structural diagram of assembling a pulley and a bearing according to a pulley assembly embodiment of the present invention;

FIG. 4 is a structural diagram of a first angle of view of a housing body according to a pulley assembly embodiment of the present invention;

FIG. 5 is a structural diagram of a second angle of view of a housing body according to a pulley assembly

bly embodiment of the present invention;

FIG. 6 is an exploded view of a pulley assembly embodiment in which some components are omitted according to the present invention;

FIG. 7 is a structural diagram of a first angle of view of a separator according to a pulley assembly embodiment of the present invention;

FIG. 8 is a structural diagram of a second angle of view of a separator according to a pulley assembly embodiment of the present invention;

FIG. 9 is a structural diagram of an eccentric fastener according to a pulley assembly embodiment of the present invention;

FIG. 10 is a partial structural diagram of a guide assembly embodiment according to the present invention; and

FIG. 11 is a structural diagram of a shower door embodiment according to the present invention.

**[0024]** The following further describes the present invention with reference to the accompanying drawings and embodiments.

## DESCRIPTION OF EMBODIMENTS

Embodiment of a pulley assembly:

**[0025]** Referring to FIG. 1, a pulley assembly 100 is mainly installed at the bottom of a movable door plate 101 of a shower door, and is fitted with a guide rail 102 disposed on a floor, so that the movable door plate 101 can move back and forth along an extension direction of the guide rail 102 by using the pulley assembly 100, thereby opening or closing the shower door. With reference to FIG. 2, the pulley assembly 100 includes a pulley 1, a housing 2, cleaning brushes 3, a separator 4, a rotating shaft 5, and a bearing 6.

**[0026]** With reference to FIG. 3, the pulley 1 is configured to fit with the guide rail 102. In this embodiment, an annular groove 11 is disposed on a peripheral wall of the pulley 1. When the pulley 1 fits with the guide rail 102, a protrusion 1021 of the guide rail 102 is clamped in the annular groove 11 of the pulley 1, so as to prevent the pulley 1 from separating from the guide rail 102 when moving along the guide rail 102. An installation hole 12 is disposed on a middle portion of the pulley 1, the bearing 6 is disposed in the installation hole 12, and an outer ring of the bearing 6 and a hole wall of the installation hole 12 are in interference fit.

**[0027]** With reference to FIG. 4 to FIG. 6, the housing 2 includes a housing body 21 and a cover body 22. The housing body 21 has an installation position 211, the pulley 1 is installed in the installation position 211, and the pulley 1 may rotate relative to the housing body 21 around a rotation axis of the pulley 1. A slot 212 and installation slots 213 are disposed on the housing body 21, and the slot 212 extends from a first side wall of the housing body 21 toward the installation position 211 along a radial di-

rection of the pulley 1 and is communicated with the installation position 211, so that a portion of the pulley 1 is located in the slot 212. The slot 212 is located at the bottom of the housing body 21 and forms an opening on a bottom wall (i.e., the first side wall) of the housing body 21, that is, when the housing body 21 is installed on the movable door plate 101, the opening of the slot 212 is disposed toward the guide rail 102. In addition, the slot 212 penetrates through the housing body 21 along a moving direction X of the pulley assembly 100 (i.e., the extension direction of the guide rail 102), and respectively forms a notch 2121 on each of two opposite third side walls of the housing body 21. When the pulley assembly 100 fits with the guide rail 102, the guide rail 102 penetrates into the slot 212 by using the opening and the two notches 2121 of the slot 212, so that the annular groove 11 of the pulley 1 is fitted with and connected to the guide rail 102. When accommodating the guide rail 102 and a portion of the pulley 1, the slot 212 can further prevent the pulley 1 from being exposed from the housing 2, so that the pulley 1 and the guide rail 102 have good contact, and limiting is implemented to a certain extent to further prevent the pulley 1 from separating from the guide rail 102.

**[0028]** There are two installation slots 213 and two cleaning brushes 3, and one of the cleaning brushes 3 is detachably installed in one of the installation slots 213. Along the moving direction X of the pulley assembly 100, the two installation slots 213 are respectively located on two sides of a rotation axis of the pulley 1, that is, in the moving direction X of the pulley assembly 100, the pulley 1 is located between the two cleaning brushes 3. The installation slot 213 extends from a second side wall of the housing body 21 toward an interior of the housing body 21 along the rotation axis of the pulley 1. When the housing body 21 is installed on the movable door plate 101, the second side wall is disposed facing the movable door plate 101. In such case, the movable door plate 101 can further limit the cleaning brush 3 to prevent the cleaning brush 3 from separating from the installation slot 213.

**[0029]** As shown in FIG. 4, an arc-shaped wall 2111 is disposed in the installation position 211, the arc-shaped wall 2111 is located in a circumferential direction of the pulley 1, and a projection of the arc-shaped wall 2111 is disposed as a major arc shape along an axial direction of the pulley 1. Two ends of the arc-shaped wall 2111 are located at a communication position between the slot 212 and the installation position 211. In the moving direction X of the pulley assembly 100, the two ends of the arc-shaped wall 2111 are located between the two cleaning brushes 3. The arc-shaped wall 2111 may increase overall strength of the housing body 21. In addition, the arc-shaped wall 2111 may further block water rolled up by the pulley 1, so as to prevent external water from entering the installation position 211 and causing erosion to the bearing 6, thereby ensuring rotation reliability of the pulley 1. In addition, because the housing 2 is enclosed for a long time, when there is accumulated water

in the installation position 211, it is difficult to evaporate and drain the accumulated water. As a result, the installation position 211 is wet for a long time. The arc-shaped wall 2111 can effectively resolve the above problem, prevent the bearing 6 and the metal pulley 1 from being eroded, and slow down aging of the bearing 6 and the metal pulley 1.

**[0030]** The cleaning brush 3 is configured to clean a surface of the guide rail 102 (that is, an upper surface of the protrusion 1021 of the guide rail 102), so as to prevent debris such as dust and hair on the surface of the guide rail 102 from affecting the rotation of the pulley 1, so that the rotation of the pulley 1 is more steady and smooth, and noise is avoided when the pulley 1 moves relative to the guide rail 102. In addition, a position of the cleaning brush 3 is disposed, so that when the pulley 1 moves back and forth along the guide rail 102, a contact position between the pulley 1 and the guide rail 102 is always kept clean.

**[0031]** As shown in FIG. 6, the cleaning brush 3 includes a fixing portion 31 and a cleaning portion 32, and the fixing portion 31 is configured to fit with and connect to the installation slot 213, so that the cleaning brush 3 is fastened onto the housing body 21. The cleaning portion 32 is fastened onto the fixing portion 31, and at least a portion of the cleaning portion 32 is located in the slot 212. When the pulley assembly 100 is in use, in a vertical direction, an end of the cleaning portion 32 is flush with the lowest portion of the annular groove 11 on the pulley 1, or an end of the cleaning portion 32 is located between the opening of the slot 212 and the lowest portion of the annular groove 11 on the pulley 1, thereby ensuring that the cleaning portion 32 of the cleaning brush 3 can reliably clean the surface of the guide rail 102. In this embodiment, a brush is used as the cleaning portion 32, so that when the cleaning portion 32 passes the guide rail 102, the debris such as dust and hair on the surface of the guide rail 102 can be cleaned, and in particular, hair cleaning capability of the cleaning brush 3 can be improved. Certainly, in an optional solution, cleaning cotton may be used as the cleaning portion 32. Using the cleaning cotton as the cleaning portion 32 can improve the capability of removing the accumulated water on the surface of the guide rail 102, so that when the cleaning portion 32 passes the guide rail 102, the accumulated water on the surface of the guide rail 102 can be better removed, thereby further reducing probability of the accumulated water being drawn into the installation position 211. In another optional solution, the brush and the cleaning cotton can both be disposed on the cleaning portion 32.

**[0032]** As shown in FIG. 1, the cover body 22 covers an opening of the installation position 211, and the cover body 22 seals the installation position 211, so as to prevent the debris such as external dust and hair and the accumulated water from entering the installation position 211, thereby preventing components such as the pulley 1 and the bearing 6 from being contaminated, and ensuring reliability of the pulley assembly 100. The cover

body 22 is fixedly connected to the housing body 21. In an optional solution, the cover body 22 may further be fixedly connected to the pulley 1, so that the cover body 22 can follow the pulley 1 to rotate relative to the housing body 21. In addition, the housing 2 is disposed as a separate structure, so that the pulley 1 can be more conveniently installed and maintained.

**[0033]** The top of the housing body 21 is disposed as an arc-shaped surface, so that after the pulley assembly 100 is installed on the movable door plate 101, when water drops on the top of the housing body 21, the water can slide down along the arc-shaped surface at the top of the housing body 21.

**[0034]** With reference to FIG. 4, FIG. 7, and FIG. 8, the separator 4 is disposed between the housing body 21 and the pulley 1. Specifically, an installation hole 2112 is disposed at the bottom of the installation position 211 along the axial direction of the pulley 1, and the installation hole 2112 penetrates through the housing body 21 along the axial direction of the pulley 1. A first protrusion 41 is disposed on a first end of the separator 4, and the first protrusion 41 is installed in the installation hole 2112 of the housing body 21. A second protrusion 42 is disposed on a second end of the separator 4, and the second protrusion 42 is respectively adjacent to the pulley 1 and a second end of the bearing 6, so as to limit the pulley 1 and the bearing 6. In addition, a hole 43 is disposed on a middle portion of the separator 4, the hole 43 penetrates through the separator 4 along the axial direction of the pulley 1, the hole 43 includes a first through-hole 431 and a second through-hole 432, and the first through-hole 431 and the second through-hole 432 are eccentrically disposed, that is, an axis of the first through-hole 431 and an axis of the second through-hole 432 are parallel to each other and staggered from each other. The first through-hole 431 and the pulley 1 are coaxially disposed, and the diameter of the first through-hole 431 is smaller than the diameter of the second through-hole 432.

**[0035]** As shown in FIG. 1, one end of the rotating shaft 5 penetrates into the installation position 211 of the housing body 21 along the axial direction of the pulley 1, an inner ring of the separator 4 and an inner ring of the bearing 6 are respectively sleeved on the rotating shaft 5, and another end of the rotating shaft 5 is fixedly connected to the movable door plate 101 to install the pulley assembly 100 on the movable door plate 101. Specifically, as shown in FIG. 2, the rotating shaft 5 includes an eccentric fastener 51 and a bolt 52.

**[0036]** With reference to FIG. 9, the eccentric fastener 51 includes a first shaft portion 511, a second shaft portion 512, and a third shaft portion 513, the second shaft portion 512 is connected between the first shaft portion 511 and the third shaft portion 513, and the first shaft portion 511 and the second shaft portion 512 are eccentrically disposed, that is, an axis of the first shaft portion 511 and an axis of the second shaft portion 512 are parallel to each other and staggered from each other. The second shaft portion 512 and the third shaft portion 513

are eccentrically disposed, that is, the axis of the second shaft portion 512 and an axis of the third shaft portion 513 are parallel to each other and staggered from each other. The diameter of the first shaft portion 511 is smaller than the diameter of the second shaft portion 512, the diameter of the second shaft portion 512 is smaller than the diameter of the third shaft portion 513, the diameter of the first through-hole 431 is equal to or slightly larger than the diameter of the first shaft portion 511, and the diameter of the second through-hole 432 is equal to or slightly larger than the diameter of the second shaft portion 512. When the separator 4 is installed on the eccentric fastener 51, the first shaft portion 511 is located in the first through-hole 431, and the second shaft portion 512 is located in the second through-hole 432. The second shaft portion 512 is further configured to fit with the third shaft portion 513 to connect to the movable door plate 101, so as to install the pulley assembly 100 on the movable door plate 101.

**[0037]** A threaded hole 5111 is disposed on the first shaft portion 511, the bolt 52 is threaded to the first shaft portion 511 by using the threaded hole 5111, and a nut of the bolt 52 is adjacent to a first end of the bearing 6, so as to fit with the eccentric fastener 51 to fasten the bearing 6 and the separator 4.

**[0038]** It should be noted that, in an optional solution, the second shaft portion 512 and the third shaft portion 513 may further be coaxially disposed as required. For example, when the second shaft portion 512 and the third shaft portion 513 are eccentrically disposed, only one second hole may be disposed on the movable door plate 101, the second hole penetrates through the movable door plate 101 along the axial direction of the pulley 1, and the second hole includes a third through-hole and a fourth through-hole. The third through-hole is located between the fourth through-hole and the housing body 21, the diameter of the third through-hole is smaller than the diameter of the fourth through-hole, the third through-hole is configured to fit with and connect to the second shaft portion 512 of the eccentric fastener 51, and the fourth through-hole is configured to fit with and connect to the third shaft portion 513 of the eccentric fastener 51. In such case, the pulley assembly 100 may be fixedly installed on the movable door plate 101 only by using the rotating shaft 5. When the second shaft portion 512 and the third shaft portion 513 are coaxially disposed, a countersunk hole is disposed on the movable door plate 101, a through-hole portion of the countersunk hole is located between a countersunk portion and the housing body 21. The countersunk portion is configured to fit with and connect to the third shaft portion 513 of the eccentric fastener 51, and the through-hole portion is configured to fit with and connect to the second shaft portion 512 of the eccentric fastener 51. The second shaft portion 512 and the third shaft portion 513 are coaxially disposed, so that the rotating shaft 5 can rotate to adjust relative positions of the pulley assembly 100 and the guide rail 102, so as to adjust supporting height of the pulley assembly 100,

that is, in the vertical direction, relative positions (heights) of the pulley 1 and the surface of the guide rail 102 are adjusted. However, another fastener needs to be disposed to fasten the housing body 21 and the movable door plate 101 in this case.

**[0039]** In conclusion, according to the present invention, a structure of the pulley assembly is designed, so that when the pulley of a pulley assembly moves on the guide rail, the cleaning brush can clean the surface of the guide rail in the moving direction of the pulley assembly, so as to prevent the debris such as dust and hair and the accumulated water from affecting the rotation of the pulley, and produce good contact between the pulley and the guide rail, thereby ensuring that the pulley assembly and the movable door plate can move steadily and smoothly, and avoiding noise when the pulley assembly moves.

Embodiment of a guide assembly:

**[0040]** The guide assembly is mainly applied to a shower door that is opened or closed in a sliding way. As shown in FIG. 10, a guide assembly 7 includes a guide rail 71 and a pulley assembly 72, the guide rail 71 is installed on a floor of a shower room when in use, and the pulley assembly 72 is installed on a movable door plate of a shower door and located at the bottom of the movable door plate. The pulley assembly 72 is the pulley assembly described in the foregoing embodiment of the pulley assembly, and a pulley of the pulley assembly 72 is fitted with and connected to the guide rail 71, so that the pulley assembly 72 can drive the movable door plate to move along an extension direction of the guide rail 71 to open or close the shower door.

Embodiment of a shower door:

**[0041]** As shown in FIG. 11, a shower door 8 includes a movable door plate 81 and a guide assembly 82, the guide assembly 82 is the guide assembly described in the foregoing embodiment of the guide assembly. A guide rail 821 of the guide assembly 82 is installed on a floor of a shower room, a pulley assembly 822 of the guide assembly 82 is installed at the bottom of the movable door plate 81, and an opening of a slot of a housing body of the pulley assembly 822 is disposed toward the guide rail 821, so that the guide rail 821 is located in the slot and is fitted with and connected to an annular groove of a pulley. Therefore, when the pulley assembly 822 moves along an extension direction of the guide rail 821 by using the pulley, the pulley assembly 822 can drive the movable door plate 81 to move along the extension direction of the guide rail 821, so as to open or close the shower door 8.

## INDUSTRIAL APPLICABILITY

**[0042]** According to the present invention, the structure

of the pulley assembly is designed, so that when the pulley assembly slides along the guide rail, the cleaning brush on the pulley assembly can always clean the surface of the guide rail at an upstream end of the moving direction of the pulley. Therefore, the pulley can pass the guide rail steadily and smoothly, so as to prevent the pulley from jumping during movement. In addition, noise can further be avoided during the movement of the pulley. The guide assembly is connected between the floor of the shower room and the movable door plate of the shower door, and the guide rail of the guide assembly is installed on the floor. The pulley assembly of the guide assembly is installed at the bottom of the movable door plate of the shower door, and fits with the guide rail to open or close the shower door. For the guide assembly provided with the pulley assembly, the pulley assembly can move steadily and smoothly when sliding along the guide rail, thereby avoiding noise during movement of the pulley assembly. The shower door is installed in the shower room, and the pulley assembly is disposed on the movable door plate, so that the pulley assembly can drive the movable door plate to move synchronously along the guide rail on the floor, thereby opening or closing the shower door. After the pulley assembly is disposed, the pulley assembly and the movable door plate can move more steadily and smoothly during the opening or closing of the shower door, and noise is avoided when the pulley assembly and the movable door plate move along the guide rail.

## Claims

1. A pulley assembly, comprising a pulley, wherein the pulley assembly further comprises:

a housing, wherein the housing has an installation position, the pulley is installed in the installation position, the pulley may rotate around a rotation axis of the pulley, a slot communicated with the installation position is disposed on the housing, a portion of the pulley is located in the slot, the slot extends from a first side wall of the housing toward the installation position along a radial direction of the pulley, and the slot penetrates through the housing along a moving direction of the pulley assembly; and  
two cleaning brushes, wherein the two cleaning brushes are installed in the housing, at least a portion of the cleaning brush is located in the slot, and in the moving direction, the pulley is located between the two cleaning brushes.

2. The pulley assembly according to claim 1, wherein

two installation slots are further disposed on the housing, and in the moving direction, the two installation slots are respectively located on two

sides of the rotation axis; and  
the installation slot extends from a second side wall of the housing toward an interior of the housing along the rotation axis, and one of the cleaning brushes is detachably installed in one of the installation slots.

3. The pulley assembly according to claim 2, wherein

the cleaning brush comprises a fixing portion and a cleaning portion, the fixing portion fits with and is connected to the installation slot, and at least a portion of the cleaning portion is located in the slot; and  
the cleaning portion comprises a brush and/or cleaning cotton.

4. The pulley assembly according to claim 1, wherein the housing comprises:

a housing body, wherein both the installation position and the slot are disposed on the housing body, and the cleaning brush is installed on the housing body; and

a cover body, wherein the cover body covers an opening of the installation position, and the cover body is fixedly connected to the housing body or the pulley.

5. The pulley assembly according to claim 4, wherein

an arc-shaped wall is disposed in the installation position, the arc-shaped wall is located in a circumferential direction of the pulley, and a projection of the arc-shaped wall is disposed as a major arc shape along an axial direction of the pulley; and  
two ends of the arc-shaped wall are located in the slot, and in the moving direction, the two ends of the arc-shaped wall are located between the two cleaning brushes.

6. The pulley assembly according to claim 4, wherein the pulley assembly further comprises:

a separator, wherein an installation hole is disposed at the bottom of the installation position along the axial direction of the pulley, and a first end of the separator is installed in the installation hole;

a rotating shaft, wherein one end of the rotating shaft penetrates into the installation position along the axial direction, and the separator is sleeved on the rotating shaft; and

a bearing, wherein the bearing is sleeved between the rotating shaft and the pulley, a first end of the rotating shaft is adjacent to a first end of the bearing, and a second end of the separator

is adjacent to a second end of the bearing.

7. The pulley assembly according to claim 6, wherein

the rotating shaft comprises an eccentric fastener and a bolt, the eccentric fastener comprises a first shaft portion, a second shaft portion, and a third shaft portion, the second shaft portion is connected between the first shaft portion and the third shaft portion, the first shaft portion and the second shaft portion are eccentrically disposed, the second shaft portion and the third shaft portion are coaxially disposed or eccentrically disposed, the diameter of the first shaft portion is smaller than the diameter of the second shaft portion, the diameter of the second shaft portion is smaller than the diameter of the third shaft portion, the bearing is sleeved on the first shaft portion, the bolt is threaded to the first shaft portion, and the bolt is adjacent to the first end of the bearing; and  
a hole penetrating through the separator along the axial direction is disposed on a middle portion of the separator, the hole comprises a first through-hole and a second through-hole that are eccentrically disposed, the diameter of the first through-hole is smaller than the diameter of the second through-hole, the first shaft portion passes through the first through-hole, and the second shaft portion passes through the second through-hole.

8. The pulley assembly according to claim 4, wherein the slot is located at the bottom of the housing body, and the top of the housing body is disposed as an arc-shaped surface.

9. A guide assembly, comprising a guide rail, wherein the guide assembly further comprises the pulley assembly according to claim 1, the pulley is connected to the guide rail, and the pulley may move along an extension direction of the guide rail.

10. A shower door, comprising a movable door plate, wherein the shower door further comprises the pulley assembly according to claim 1, the pulley assembly is installed at the bottom of the movable door plate, and an opening of the slot is disposed toward the bottom of the movable door plate.

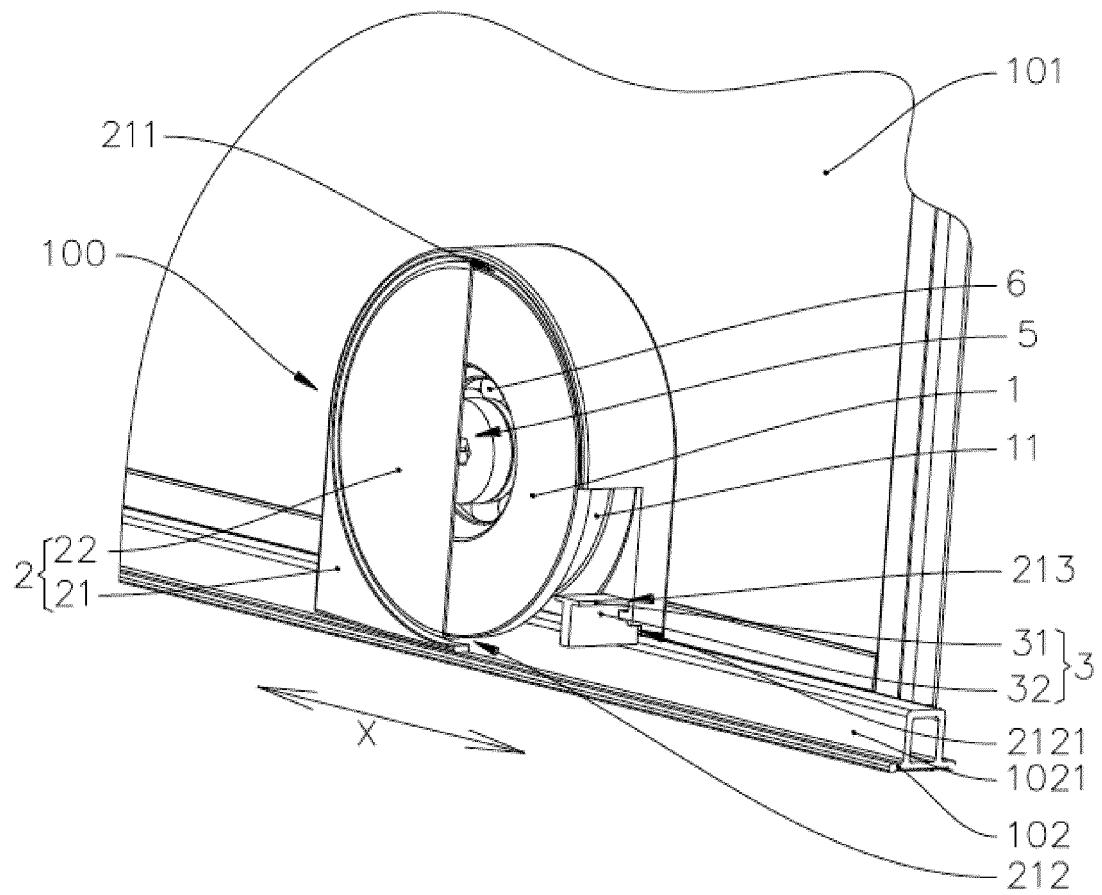


FIG. 1

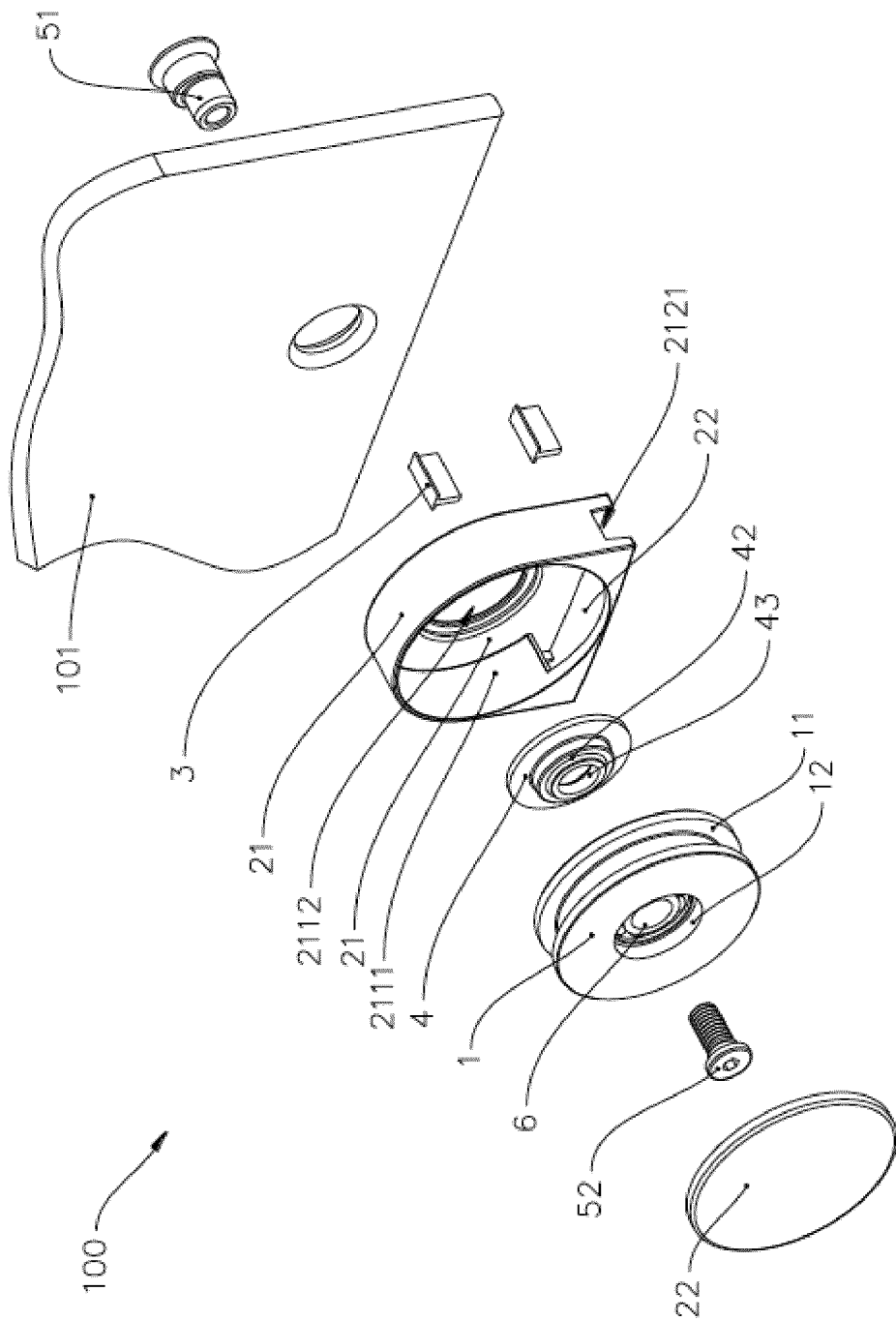


FIG. 2

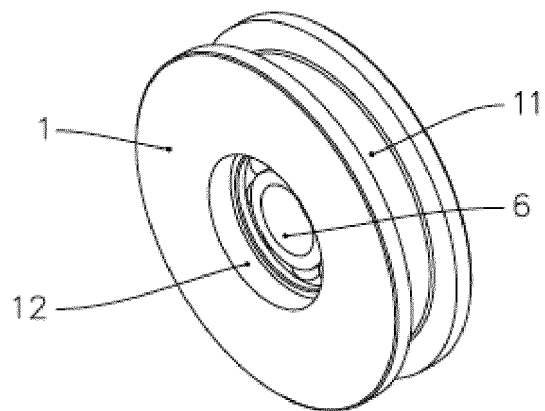


FIG. 3

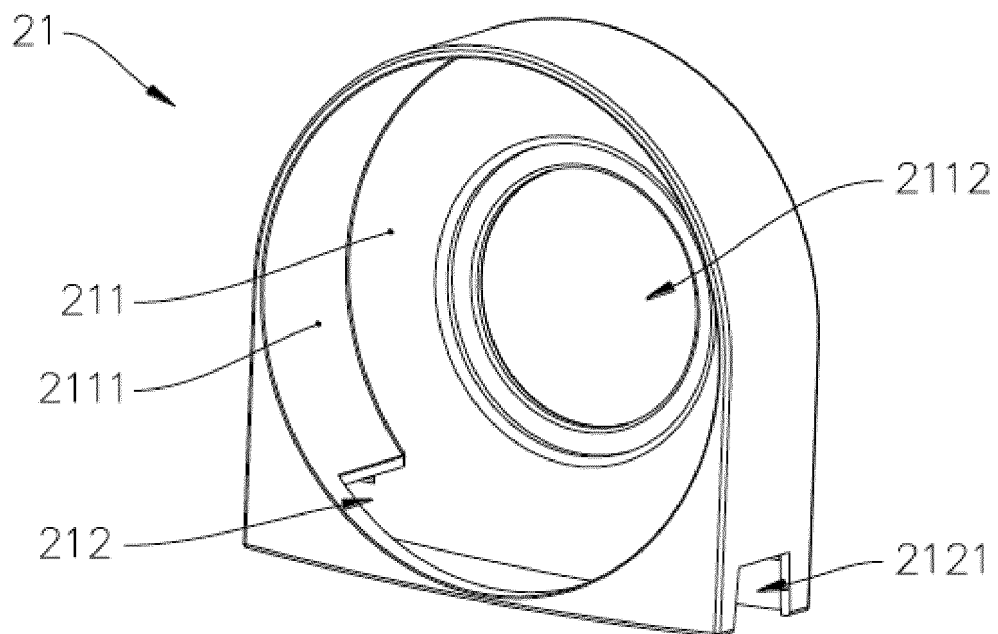


FIG. 4

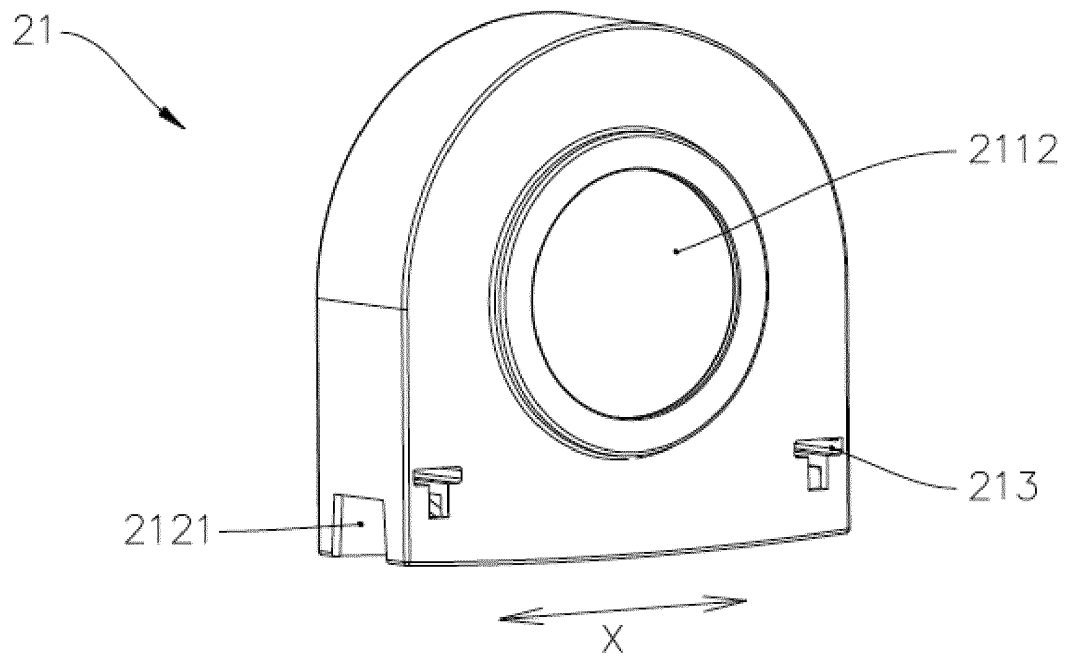


FIG. 5

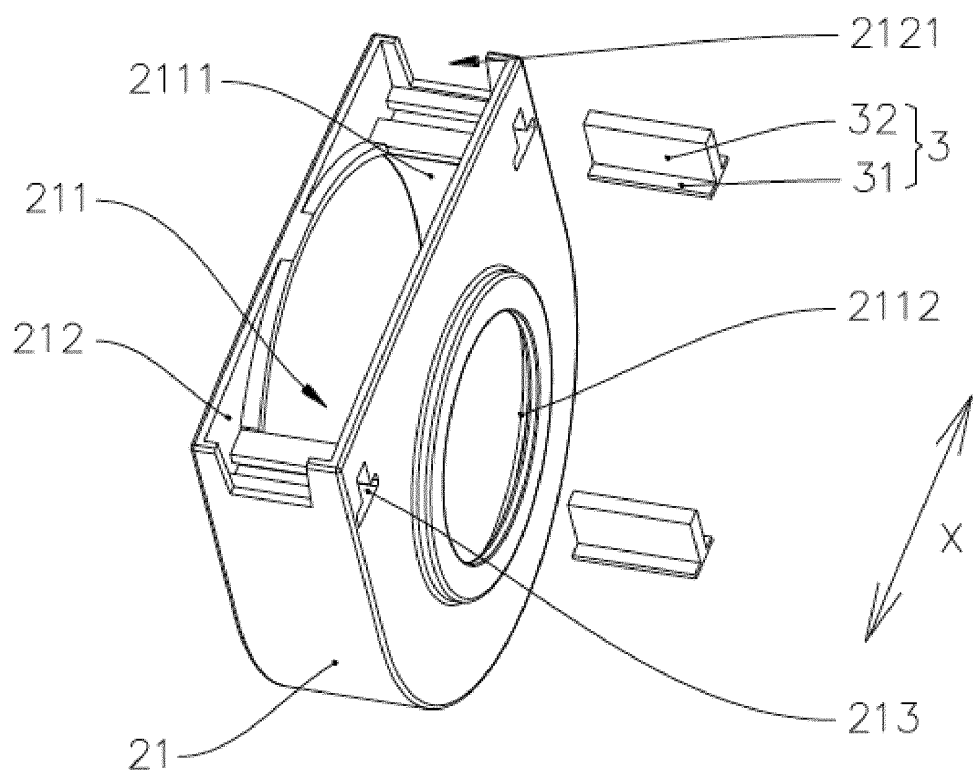


FIG. 6

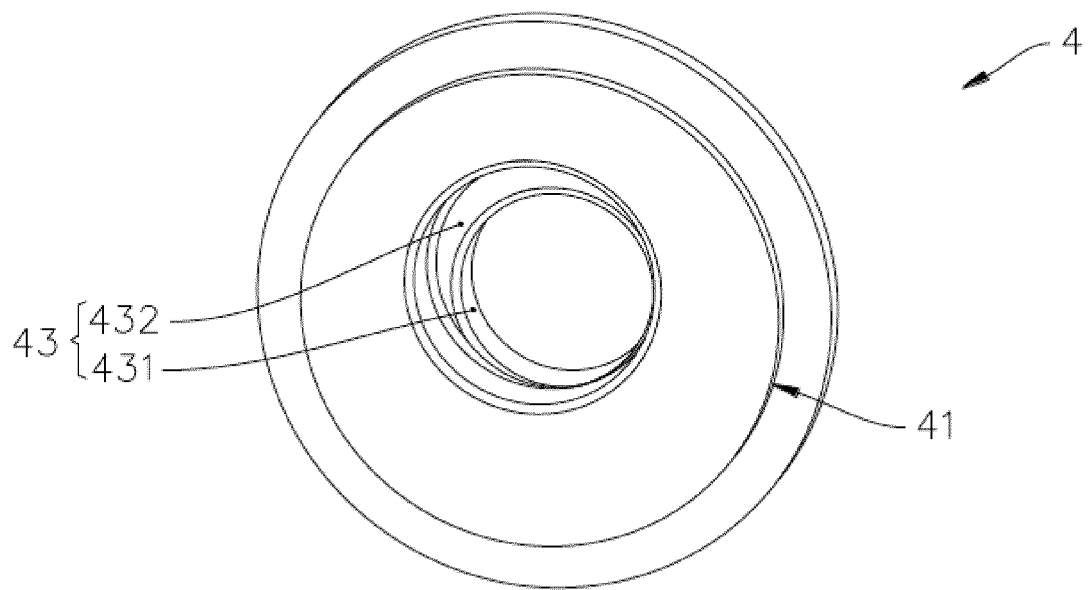


FIG. 7

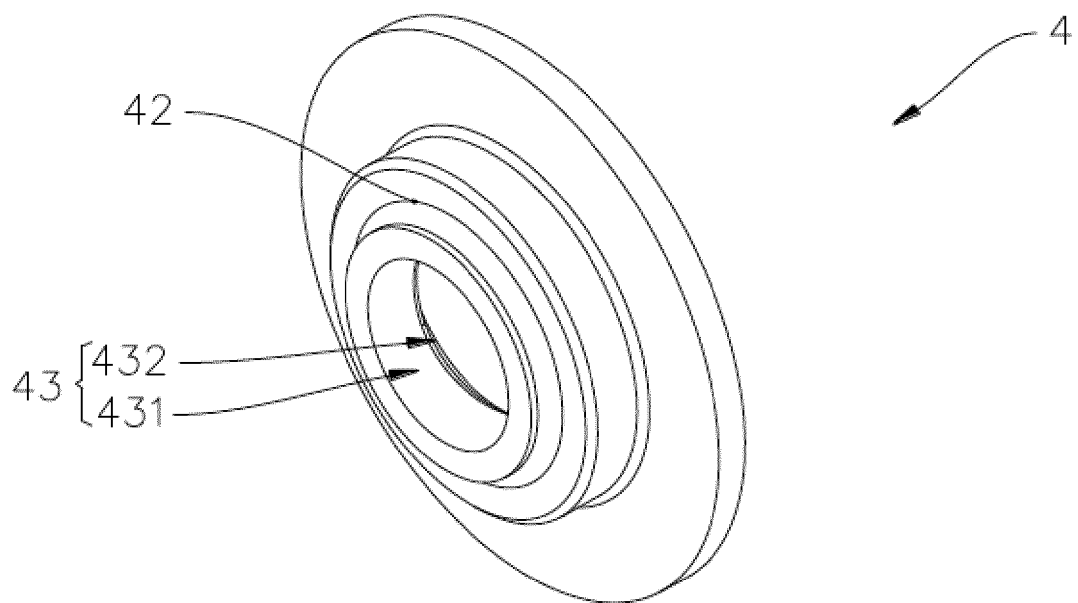


FIG. 8

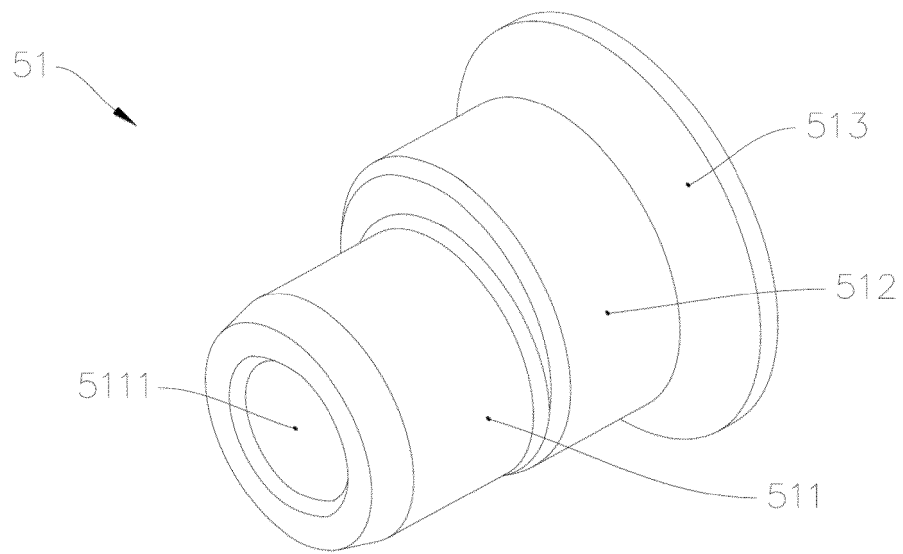


FIG. 9

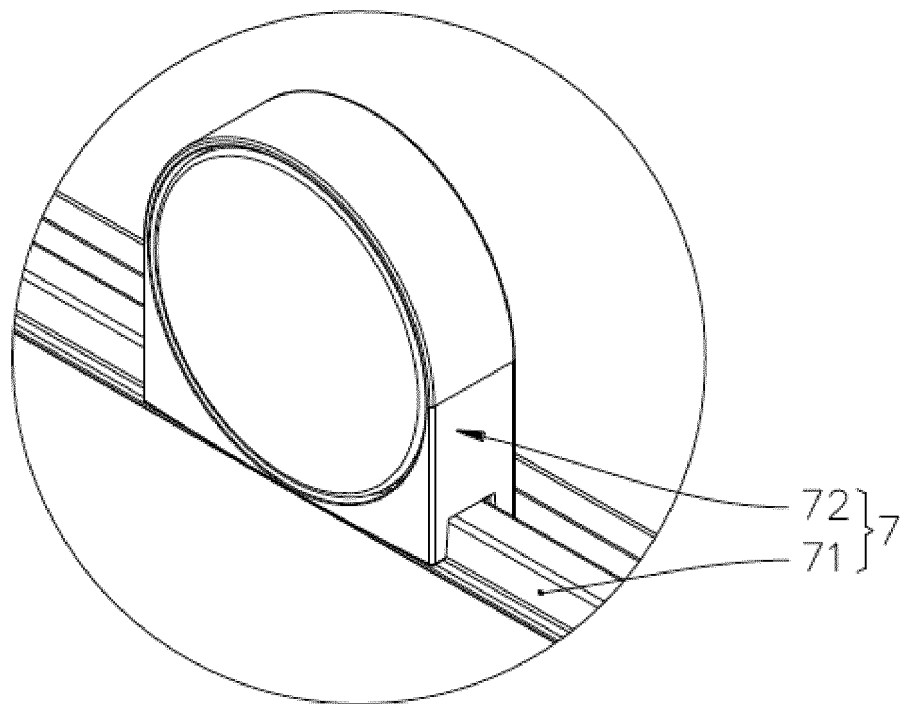


FIG. 10

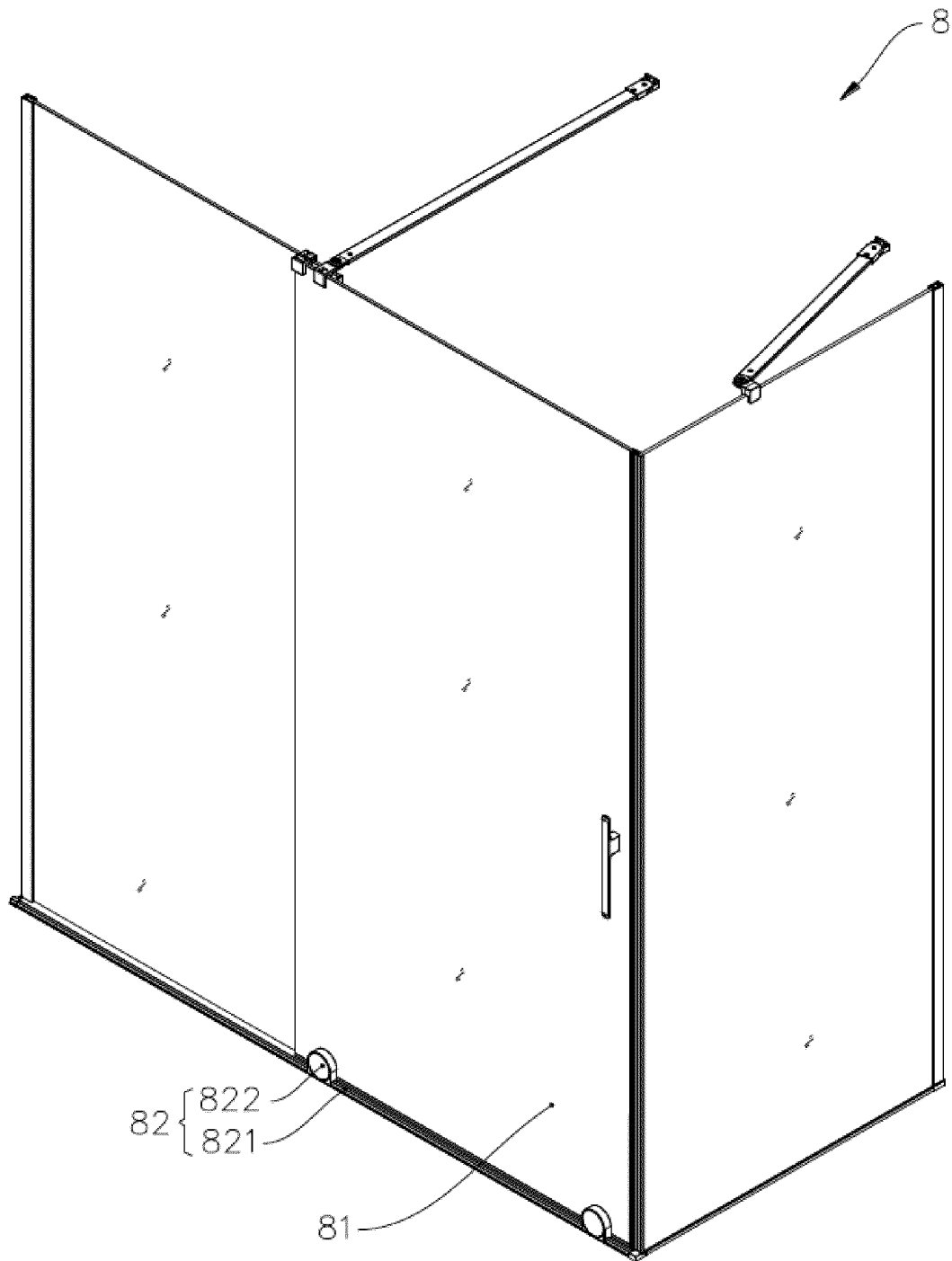


FIG. 11

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/086206

**A. CLASSIFICATION OF SUBJECT MATTER**

E05D 13/00(2006.01)i; E06B 3/42(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

E05D 13, E06B 3

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

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

CNABS, CNKI, VEN: 滑轮, 滚轮, 滚动轮, 滑动轮, 轮, 偏心轮, 清洁, 清扫, 推板, 擦拭, 刷, 粉尘, 灰尘, 杂物, 毛发, 头发, 偏心, wheel?, roller?, trolley, pulley?, clean+, sweep+, wip+, dust?, dirt, ash, hair, eccentric+, offset, bias

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                           | Relevant to claim No. |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X         | CN 2718173 Y (YANG, Shengyu) 17 August 2005 (2005-08-17) description, embodiment 11, and figures 22, 28 and 29                               | 1-5, 8                |
| Y         | CN 2718173 Y (YANG, Shengyu) 17 August 2005 (2005-08-17) description, embodiment 11, and figures 22, 28 and 29                               | 6, 7, 9, 10           |
| Y         | BR MU9002517 U2 (ANA TEREZA BORGUI DE MELO) 12 March 2013 (2013-03-12) description, page 4, line 3 to page 6, the last line, and figures 1-5 | 6, 7                  |
| Y         | CN 110219541 A (FOSHAN IDEAL SANITARY WARE CO., LTD.) 10 September 2019 (2019-09-10) description, paragraphs [0035]-[0051], and figures 1-5  | 9, 10                 |
| A         | CN 209539089 U (SHANGHAI SUNCARE DOOR & WINDOWS CO., LTD.) 25 October 2019 (2019-10-25) entire document                                      | 1-10                  |
| A         | DE 102007059624 A1 (RAUMPLUS GMBH & CO. KG) 18 June 2009 (2009-06-18) entire document                                                        | 1-10                  |
| A         | JP 1162407 A (TAIWAN KOSHOTOKU DENKI YUGENKO) 05 March 1999 (1999-03-05) entire document                                                     | 1-10                  |

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

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Date of the actual completion of the international search

28 December 2020

Date of mailing of the international search report

20 January 2021

Name and mailing address of the ISA/CN

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Telephone No.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/086206

| C. DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                      |                       |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Category*                              | Citation of document, with indication, where appropriate, of the relevant passages                                                   | Relevant to claim No. |
| A                                      | CN 205117096 U (GUANGDONG OCEAN SANITARY WARE CO., LTD.) 30 March 2016 (2016-03-30)<br>entire document                               | 1-10                  |
| A                                      | CN 201679360 U (XU, Jiangde) 22 December 2010 (2010-12-22)<br>entire document                                                        | 1-10                  |
| A                                      | TW 487133 U (HUANG, Guofeng) 01 October 2014 (2014-10-01)<br>entire document                                                         | 1-10                  |
| A                                      | DE 29812074 U1 (MARANTEC ANTRIEBS- UND STEUERUNGSTECHNIK GMBH & CO. PRODUKTIONS-KG) 03 December 1998 (1998-12-03)<br>entire document | 1-10                  |
| A                                      | CN 106460428 A (FOSHAN IDEAL SANITARY WARE CO., LTD.) 22 February 2017 (2017-02-22)<br>entire document                               | 1-10                  |
| A                                      | US 4134178 A (AMEROCK CORPORATION) 16 January 1979 (1979-01-16)<br>entire document                                                   | 1-10                  |
| A                                      | CN 205349055 U (SUZHOU SHENGDE PRECISION ELECTRIC CO., LTD.) 29 June 2016 (2016-06-29)<br>entire document                            | 1-10                  |
| A                                      | CN 208310520 U (FOSHAN IDEAL SANITARY WARE CO., LTD.) 01 January 2019 (2019-01-01)<br>entire document                                | 1-10                  |

**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.

**PCT/CN2020/086206**

| Patent document<br>cited in search report | Publication date<br>(day/month/year) | Patent family member(s) | Publication date<br>(day/month/year) |
|-------------------------------------------|--------------------------------------|-------------------------|--------------------------------------|
| CN 2718173 Y                              | 17 August 2005                       | None                    |                                      |
| BR MU9002517 U2                           | 12 March 2013                        | None                    |                                      |
| CN 110219541 A                            | 10 September 2019                    | None                    |                                      |
| CN 209539089 U                            | 25 October 2019                      | None                    |                                      |
| DE 102007059624 A1                        | 18 June 2009                         | WO 2009074251 A1        | 18 June 2009                         |
| JP 1162407 A                              | 05 March 1999                        | TW 342021 U             | 01 October 1998                      |
| CN 205117096 U                            | 30 March 2016                        | None                    |                                      |
| CN 201679360 U                            | 22 December 2010                     | None                    |                                      |
| TW 487133 U                               | 01 October 2014                      | None                    |                                      |
| DE 29812074 U1                            | 03 December 1998                     | None                    |                                      |
| CN 106460428 A                            | 22 February 2017                     | WO 2018045527 A1        | 15 March 2018                        |
|                                           |                                      | EP 3312373 A4           | 25 April 2018                        |
|                                           |                                      | EP 3312373 B1           | 08 May 2019                          |
|                                           |                                      | CN 106460428 B          | 30 April 2019                        |
|                                           |                                      | EP 3312373 A1           | 25 April 2018                        |
| US 4134178 A                              | 16 January 1979                      | CA 1070174 A            | 22 January 1980                      |
| CN 205349055 U                            | 29 June 2016                         | None                    |                                      |
| CN 208310520 U                            | 01 January 2019                      | None                    |                                      |

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