



(11) EP 3 135 167 A1

(12)

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

(43) Date of publication:  
**01.03.2017 Bulletin 2017/09**

(51) Int Cl.:  
**A47K 13/26 (2006.01)** **A47K 13/12 (2006.01)**

(21) Application number: **15782657.9**(86) International application number:  
**PCT/JP2015/058615**(22) Date of filing: **20.03.2015**(87) International publication number:  
**WO 2015/163065 (29.10.2015 Gazette 2015/43)**

(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:

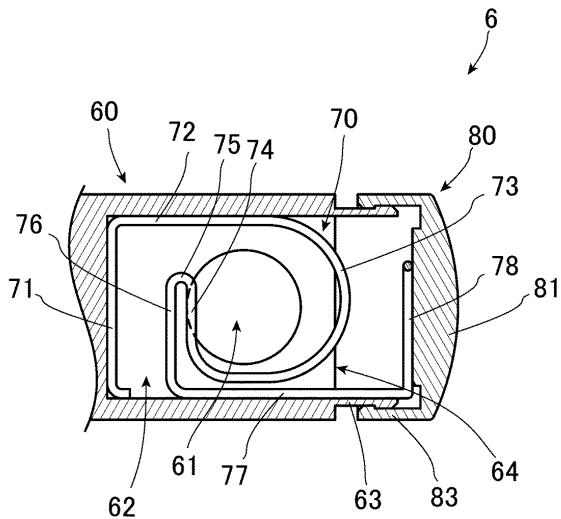
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(54) **DETACHABLE DEVICE, AND HINGE DEVICE EMPLOYING SAME**

(57) To provide an attaching/detaching device of which the configuration can be simplified, and a hinge device using the same, an attaching/detaching device 6 in the invention includes a case 60 in which an insertion hole 61 for insertion of a pin 3, and a housing space 62 that is connected to the insertion hole 61 and extends in a direction perpendicular to a longitudinal direction of the insertion hole 61 are formed; a button 80 that is depressible into the case 60 in the direction perpendicular to the

longitudinal direction of the insertion hole 61; and a spring 70 that biases the button 80 in a direction opposite to a depression direction of the button 80 with respect to the case 60. The spring 70 has a locking part 74 for locking the pin 3. The locking part 74 is positioned within the insertion hole 61 in a state where the button 80 is not depressed, and is moved from the inside of the insertion hole 61 to the inside of the housing space 62 by the button 80 being depressed.

FIG.4



**Description****Technical Field**

**[0001]** The present invention relates to an attaching/detaching device of which the configuration can be simplified.

**Background Art**

**[0002]** Among hinge devices that pivotally support an apparatus body and a lid, there are some hinge devices that make the body and the lid attachable or detachable. The following PTL 1 describes an attaching/detaching mechanism that makes a toilet seat and a toilet lid attachable to or detachable from a toilet bowl of a toilet. This attaching/detaching mechanism consists of a fixing part to be attached to the toilet bowl, and an attachment/detachment part provided in a hinge device to be attached to the toilet seat and the toilet lid. The fixing part is provided with a pin in which a groove is formed along a circumferential direction. Meanwhile, the attachment/detachment part has a case, a shaft that is disposed within the case and is slidable with respect to the case, a spring that biases the shaft in a predetermined direction, and a button that depresses the shaft against a biasing force of the spring. An insertion hole into which the pin inserted is formed in the case.

**[0003]** When the toilet seat and the toilet lid are attached to the toilet bowl, the pin of the fixing part is inserted into the insertion hole of the case. At this time, the shaft slides against the biasing force of the spring due to a force that depresses the pin. Then, if the pin and the shaft have a predetermined positional relationship, the shaft is pushed back into its original direction by the biasing force of the spring, and a portion of the shaft enters the groove formed in the pin. In this way, the pin inserted into the insertion hole is locked and the fixing part and the attachment/detachment part are locked to each other. **[0004]** Meanwhile, when the fixing part and the attachment/detachment part are removed in order to detach the toilet seat and the toilet lid from the toilet bowl, the above button is depressed against the biasing force of the spring. Then, a portion of the shaft that has entered the groove of the pin comes off from the groove. For this reason, the locked state of the pin is released, and it is possible to extract the pin from the insertion hole. In this way, the attachment/detachment part can be detached from the fixing part.

**Citation List****Patent Literature**

**[0005]** [PTL 1] Specification of European Patent Application Laid-Open No. 2324745

**Summary of Invention****Technical Problem**

5 **[0006]** However, the above attachment/detachment part is configured such that the shaft within the case that fixes the pin is biased by the spring, and requires the shaft and the spring. However, there is demand for further reducing the number of parts and simplifying the configuration.

10 **[0007]** Thus, an object of the invention is to provide an attaching/detaching device of which the configuration can be simplified, and a hinge device using the same. **Solution to Problem**

15 **[0008]** In order to solve the above problems, an attaching/detaching device of the invention includes a case in which an insertion hole for insertion of a pin, and a housing space that is connected to the insertion hole and extends in a direction perpendicular to a longer direction i. e. a longitudinal direction of the insertion hole are formed; a button that is depressible into the case in the direction perpendicular to the longitudinal direction of the insertion hole; and a spring that biases the button in a direction opposite to a depression direction of the button with respect to the case. The spring includes a locking part for locking the pin. Also, the locking part is positioned within the insertion hole in a state where the button is not depressed, and is moved from the inside of the insertion hole to the inside of the housing space by the button being depressed.

**Advantageous Effects of Invention**

35 **[0009]** According to such an attaching/detaching device, if a pin in which a groove which is engageable with the locking part of the spring is provided is inserted into the insertion hole in a state where the button is not depressed, the groove or the like and the locking part engage with each other within the insertion hole. For this reason, the attaching/detaching device and the pin are fixed to each other. Additionally, if the button is depressed, the locking part moves into the housing space. Therefore, the fixed state between the attaching/detaching device and the pin is released. In this way, in the 40 attaching/detaching device of the invention, a portion of the spring that biases the button is the locking part that fixes the pin as described above. Therefore, compared to the attachment/detachment part of the hinge device described in the above PTL, the configuration can be simplified to the extent of being made the shaft unnecessary.

**Brief Description of Drawings**

55 **[0010]**

FIG. 1 is a view illustrating a toilet seat and a toilet lid using an attaching/detaching device related to an

embodiment of the invention.

FIG. 2 is a sectional view of a rotary damper of FIG. 1. FIG. 3 is an exploded perspective view of the attaching/detaching device of FIG. 1.

FIG. 4 is a sectional view in a direction perpendicular to a pin of the attaching/detaching device of FIG. 1. FIG. 5 is a sectional view in a direction parallel to the pin of the attaching/detaching device of FIG. 1.

FIG. 6 is a sectional view illustrating an aspect in which the pin is fixed to the attaching/detaching device, from the same viewpoint as FIG. 5.

FIG. 7 is a sectional view illustrating an aspect in which the button of the attaching/detaching device is depressed, from the same viewpoint as FIG. 4.

### Description of Embodiments

**[0011]** Hereinafter, a preferred embodiment of an attaching/detaching device and a hinge device using the same related to the invention will be described in detail, referring to the drawings.

**[0012]** A toilet seat 1 and a toilet lid 2 that are illustrated in FIG. 1 are pivotally supported to a toilet bowl (not illustrated) by a pair of hinge devices 4a and 4b. The hinge device 4a includes a rotary damper 5a and an attaching/detaching device 6. Meanwhile, the hinge device 4b includes a rotary damper 5b having a configuration different from the rotary damper 5a of the hinge device 4a, and an attaching/detaching device 6 having the same configuration as the attaching/detaching device 6 of the hinge device 4a. Additionally, the toilet bowl is provided with a pair of fixing pins 3. By the pins 3 being locked to the attaching/detaching devices 6, respectively, the toilet seat 1 and the toilet lid 2 are pivotally supported to the toilet bowl by the respective hinge device 4a and 4b as described above.

**[0013]** The respective rotary dampers 5a and 5b pivotally support the toilet seat 1 and the toilet lid 2. Although the rotary damper 5a and the rotary damper 5b respectively include torque generating parts 51 having the same configuration as each other, a rotating shaft 52a of the rotary damper 5a and a rotating shaft 52b of the rotary damper 5b have mutually different configurations.

**[0014]** As illustrated in FIG. 2, the rotating shaft 52a is inserted into a case 56 of the torque generating part 51 of the rotary damper 5a. A space between the case 56 and the rotating shaft 52a is filled with a viscous liquid. For this reason, if the rotating shaft 52a rotates with respect to the case 56, shear resistance of the liquid occurs. In this way, the torque generating part 51 pivotally supports the rotating shaft 52a, and applies a predetermined rotation resistance to the rotating shaft 52a when the rotating shaft 52a rotates. Additionally, the rotating shaft 52a is fixed to the toilet lid 2. For this reason, the rotating shaft 52a rotates together with the toilet lid 2 in a case where the toilet lid 2 turns around a central axis of the rotating shaft 52a as a reference. Meanwhile, the torque generating part 51 is fixed to the toilet lid 2 via the rotating

shaft 52a. Therefore, even if the toilet lid 2 turns with respect to the toilet bowl as described above in a state where the torque generating part 51 is fixed to the toilet bowl via the attaching/detaching device 6, the torque generating part 51 does not rotate but the rotating shaft 52a rotates with respect to the torque generating part 51. At this time, since the torque generating part 51 applies rotation resistance to the rotating shaft 52a, the toilet lid 2 to which the rotating shaft 52a is fixed receives the rotation resistance. In this way, the toilet lid 2 is opened and closed with respect to the toilet bowl, receiving a predetermined resistance. In addition, although the toilet seat 1 is also pivotally supported to the rotating shaft 52a as described above, the rotating shaft 52a idles with respect to the toilet seat 1, and does not apply rotation resistance to the turning of the toilet seat 1.

**[0015]** The torque generating part 51 of the rotary damper 5b pivotally supports the rotating shaft 52b, similar to the configuration in which the torque generating part 51 of the rotary damper 5a pivotally supports the rotating shaft 52a. Therefore, when the rotating shaft 52b rotates with respect to the torque generating part 51, a predetermined rotation resistance is applied. Additionally, the rotating shaft 52b is fixed to the toilet seat 1. For this reason, the rotating shaft 52b rotates together with the toilet seat 1 in a case where the toilet seat 1 turns around a central axis of the rotating shaft 52b as a reference. Meanwhile, the torque generating part 51 is fixed to the toilet seat 1 via the rotating shaft 52b. Therefore, even if the toilet seat 1 turns with respect to the toilet bowl as described above in a state where the torque generating part 51 is fixed to the toilet bowl via the attaching/detaching device 6, the torque generating part 51 does not rotate but the rotating shaft 52b rotates with respect to the torque generating part 51. At this time, since the torque generating part 51 applies rotation resistance to the rotating shaft 52b, the toilet seat 1 to which the rotating shaft 52b is fixed receives the rotation resistance. In this way, the toilet seat 1 is opened and closed with respect to the toilet bowl, receiving a predetermined resistance. In addition, although the toilet lid 2 is also pivotally supported to the rotating shaft 52b as described above, the rotating shaft 52b idles with respect to the toilet lid 2, and does not apply rotation resistance to the turning of the toilet lid 2.

**[0016]** Additionally, the attaching/detaching device 6 of the hinge device 4a is integrated with the torque generating part 51 of the rotary damper 5a, and the attaching/detaching device 6 of the hinge device 4b is integrated with the torque generating part 51 of the rotary damper 5b. As illustrated in FIGS. 3 to 5, each attaching/detaching device 6 includes a case 60, a spring 70, and a button 80. In addition, these drawings are views illustrating a state where the pin 3 is not fixed to the attaching/detaching device 6. Additionally, since FIG. 3 illustrates the case 60 and the button 80 in a state where a section can be seen for facilitation of understanding, and the rotary damper is omitted. Additionally, the pin 3 to be inserted

is described in FIG. 5.

**[0017]** The case 60 of the attaching/detaching device 6 in the hinge device 4a is integrated with the rotary damper 5a, and the case 60 of the attaching/detaching device 6 in the hinge device 4b is integrated with the rotary damper 5b. Specifically, the case 56 of the rotary damper 5a or 5b and the case 60 of the attaching/detaching device 6 are integrally formed. An insertion hole 61 for insertion of the pin 3 fixed to the toilet bowl is formed in the case 60. The insertion hole 61 is a hole of which the shape perpendicular to a longitudinal direction is made circular. Additionally, a housing space 62 that extends in a direction perpendicular to the longitudinal direction of the insertion hole 61 is formed in the case 60. Specifically, an opening 64 is formed in a portion of a side surface of the case 60 opposite to the rotary damper 5 side, and the housing space 62 extends from the opening 64. Additionally, in a case where the housing space 62 is seen along a plane perpendicular to the longitudinal direction of the insertion hole 61, the housing space 62, as illustrated in FIG. 4, has a substantially rectangular outer peripheral shape that surrounds the insertion hole 61. The housing space 62 is spatially connected to the insertion hole 61. Meanwhile, in a case where the housing space 62 is seen from the direction perpendicular to the longitudinal direction of the insertion hole 61, the housing space 62 is formed such that the width thereof in the longitudinal direction of the insertion hole 61 has a size slightly greater than a wire rod that constitutes a spring 70 to be described below. Additionally, a cylindrical inside fitting part 63 for fitting to the button 80 to be described below is provided in the case 60 so as to surround the above opening 64. A protrusion that protrudes to an outer peripheral side is formed at an end part of the inside fitting part 63.

**[0018]** The button 80 has a cylindrical outside fitting part 83 and a pressing part 81 that blocks one opening of the outside fitting part 83. A protrusion that protrudes to an inner peripheral side is formed at an end part of the outside fitting part 83 opposite to the pressing part 81 side. The outside fitting part 83 is fitted to the inside fitting part 63 of the case 60. That is, the button 80 is disposed such that the outside fitting part 83 surrounds an outer peripheral surface of the inside fitting part 63 of the case 60, and is made to be slidable with respect to the case 60. Additionally, the button 80 is configured so as not to slip out of the case 60 in normal use by the above protrusion of the inside fitting part 63 and the above protrusion of the outside fitting part 83 abutting against each other.

**[0019]** The spring 70 is constituted of a wire rod with a circular sectional shape, and is configured to include a case butting part 71, a case butting connecting part 72, a larger bent part 73, a locking part 74, a smaller bent part 75, a parallel extending part 76, a button butting connecting part 77, and a button butting part 78.

**[0020]** One end part of the spring 70 is slightly bent, and the case butting part 71 is a substantially linear part

connected to this one end part. The case butting part 71 is disposed so as to extend in a direction perpendicular to a sliding direction of the button 80, in a corner of the housing space 62 opposite to the opening 64 side, and

5 abuts against an inner wall of the case 60 that forms the housing space 62. Therefore, the inner wall against which the case butting part 71 abuts also extends in the direction perpendicular to the sliding direction of the button 80.

**[0021]** The case butting connecting part 72 is a part 10 that is connected to the case butting part 71, and linearly extends in a direction perpendicular to the case butting part 71, that is, the sliding direction of the button 80. Additionally, the case butting connecting part 72 is disposed along an inner wall that extends in a direction perpendicular 15 to the inner wall against which the case butting part 71 abuts. Although the inner wall along which the case butting connecting part 72 is disposed is connected to the opening 64, the case butting connecting part 72 extends up to the middle of the inner wall but does not extend 20 up to the opening 64.

**[0022]** The larger bent part 73 is a part that is connected to the case butting connecting part 72, is bent with a larger diameter than the diameter of the insertion hole 61, and is bent with a largest diameter in the spring 70. 25 Additionally, the larger bent part 73 is disposed so as to surround a portion of an outer periphery of the insertion hole 61, both end parts of the larger bent part 73 are located within the housing space 62, and a portion part between both the end parts protrudes from the opening 30 64 to the outside of the housing space 62. In addition, in the present embodiment, the larger bent part 73 is bent at approximately 180 degrees, and surrounds almost half of the outer periphery of the insertion hole 61.

**[0023]** The locking part 74 is connected to the larger 35 bent part 73 via a part that is bent with a predetermined diameter. The locking part 74 is a linear part, and extends in a direction in which a line perpendicular to the sliding direction of the button 80 and a portion from one end of the locking part 74 to the other end thereof overlap each 40 other. For example, an extending direction of the locking part 74 is the direction perpendicular to the sliding direction of the button 80. Additionally, the locking part 74 is located in a place biased from a center of the insertion hole 61 in an across direction of the insertion hole 61 in 45 a state where the button 80 is located in a place farthest from the case 60 (a state where the button 80 to be described below is not depressed). In the present embodiment, the place biased from the center of the insertion hole 61 is a place to which the button 80 is further depressed than the center of the insertion hole 61, and is 50 almost an end of the insertion hole 61.

**[0024]** The smaller bent part 75 is connected to the locking part 74. That is, the locking part 74 is connected to the smaller bent part 75 on one side thereof, and is 55 connected to the larger bent part 73 on the other side thereof. Except for the part to which the smaller bent part 75 is connected to the locking part 74, most of the smaller bent part 75 is located in a place to which the button 80

is further depressed than the insertion hole 61 within the housing space 62. The smaller bent part 75 is a part that is bent in a direction away from the insertion hole 61 with a smaller diameter than the diameter of the insertion hole 61. In the present embodiment, the smaller bent part 75 is substantially bent at 180 degrees with a larger diameter than the diameter of the wire rod.

**[0025]** The parallel extending part 76 is a linear part that is connected to the portion of the smaller bent part 75 opposite to the locking part 74 side and extended parallel to the locking part 74. Additionally, the parallel extending part 76 is located in a side to which the button 80 is depressed with the locking part 74 as a reference, within the housing space 62, and extends up to an inner wall that faces the inner wall along which the case butting connecting part 72 is disposed.

**[0026]** The button butting connecting part 77 is a linear part, is perpendicular to the parallel extending part 76, and extends in the sliding direction of the button 80. The button butting connecting part 77 is disposed along the inner wall that faces the inner wall along which the case butting connecting part 72 is disposed, and the inner wall of the inside fitting part 63, and extends up to the pressing part 81 of the button 80.

**[0027]** The button butting part 78 is connected to the button butting connecting part 77. The button butting part 78 consists of three parts that are bent at 90 degrees to each other, two of these parts are made parallel to each other, and the other one part connects respective one ends of these parallel parts in the direction of 90 degrees with respect to the parallel parts. As a result, the button butting part 78 has a U shape. The three parts of the button butting part 78 abuts against the pressing part 81 so as to be surrounded by the outside fitting part 83 of the button 80.

**[0028]** In a state where the spring 70 having such a shape is disposed within a case 60 as described above and the button 80 is slidably disposed with respect to the case 60 as described above, the spring 70 biases the button 80 in the direction (the direction opposite to the depression direction of the button 80) in which the button 80 is separated from the case 60. In this way, the button 80 is made depressible into the case 60.

**[0029]** Next, an operation in which the pin 3 is fixed to the attaching/detaching device 6 will be described.

**[0030]** As illustrated in FIG. 5, the pin 3 has a taper part 31 formed at a tip thereof, and is formed in a substantially columnar shape that has a circumferential groove 32 formed in a portion of an outer periphery thereof. The diameter of the pin 3 is made slightly smaller than the diameter of the insertion hole 61. Additionally, the groove 32 has a width and a depth such that the wire rod that forms the spring 70 can enter.

**[0031]** In a state where the pin 3 is not inserted into the insertion hole 61, as illustrated in FIGS. 4 and 5, the locking part 74 is located within the insertion hole 61. In this state, if the pin 3 is inserted into the insertion hole 61, the taper part 31 of the pin 3 abuts against the locking

part 74. Then, if the pin 3 is further depressed, a portion of the spring 70 bends due to a force that depresses the pin 3, and the locking part 74 moves into the housing space 62 from the inside of the insertion hole 61, sliding on the taper part 31. At this time, resistance resulting from friction may occur in at least a portion of the spring 70 and the inner wall of the case 60. However, since the spring 70 of the present embodiment is made to have a circular sectional shape, the spring 70 and the inner wall

5 are in linear contact with each other and the contact area therebetween is small. Therefore, even in a case where resistance resulting from friction occurs, the resistance can be made small. Then, if the pin 3 is further depressed and the pin 3 and the case 60 satisfies a predetermined 10 positional relationship, the groove 32 of the pin 3 is lined up with the housing space 62. In the present embodiment, the groove 32 and the housing space 62 are lined up in a state where the tip of the pin 3 abuts against an inner wall that forms the bottom of the insertion hole 61. At this 15 time, as illustrated in FIG. 6, due to an elastic force of the spring 70, the locking part 74 returns to the inside of the insertion hole 61 and the locking part 74 is located within a groove 32. In this way, the locking part 74 locks the pin 3 and fixes the attaching/detaching device 6 and 20 the pin 3. Therefore, the toilet seat 1 and the toilet lid 2 are fixed to the toilet bowl in which the pin 3 is provided via the attaching/detaching device 6.

**[0032]** Next, the operation of extracting the pin 3 from the attaching/detaching device 6 will be described.

**[0033]** In a case where the pin 3 is extracted from the insertion hole 61, first, the pressing part 81 of the button 80 is pressed and depresses the button 80 with respect to the case 60. At this time, a pressing force is transmitted to the button butting part 78 of the spring 70, and the pressing force is transmitted from the button butting part 78 to the larger bent part 73. Since the larger bent part 73 is bent with a larger diameter than the other parts of the spring 70, the spring 70 mainly bends due to the elastic deformation of the larger bent part 73. Due to the elastic deformation of the larger bent part 73, as illustrated in FIG. 7, the parallel extending part 76 moves as a whole in the direction away from the insertion hole 61 in the depression direction of the button 80 within the housing space 62. The smaller bent part 75 is also moved in the 35 direction away from the insertion hole 61 in the depression direction of the button 80 within the housing space 62 by the movement of the parallel extending part 76. Then, the smaller bent part 75 pulls the locking part 74 within the housing space 62. As described above, the 40 locking part 74 extends in the direction in which the line perpendicular to the sliding direction of the button 80 and the portion from one end of the locking part 74 to the other end thereof overlap each other. Therefore, the smaller bent part 75 pulls the locking part 74 in the direction 45 perpendicular to the line that overlaps the portion from the one end of the locking part 74 to the other end thereof. The locking part 74 pulled by the smaller bent part 75 slips out of the groove 32 of the pin 3, and moves 50 55

into the housing space 62 from the inside of the insertion hole 61. In this way, a state where the attaching/detaching device 6 and the pin 3 are fixed is released. In this state, the pin 3 is extracted from the insertion hole 61. Therefore, the toilet seat 1 and the toilet lid 2 are removed from the toilet bowl in which the pin 3 is provided.

**[0034]** As described above, the attaching/detaching device 6 of the present embodiment includes the case 60 in which the insertion hole 61 for insertion of the pin 3, and the housing space 62 that is connected to the insertion hole 61 and extends in the direction perpendicular to the longitudinal direction of the insertion hole 61 are formed; the button 80 that is depressible into the case 60 in the direction perpendicular to the longitudinal direction of the insertion hole 61; and the spring 70 that biases the button 80 in the direction opposite to the depression direction of the button 80 with respect to the case 60. The spring 70 has the locking part 74 that locks the pin 3. Also, the locking part 74 is positioned within the insertion hole 61 in a state where the button 80 is not depressed, and is moved from the inside of the insertion hole 61 to the inside of the housing space 62 by the button 80 being depressed.

**[0035]** In this way, in the attaching/detaching device 6, the pin 3 is fixed by a portion of the spring 70 that bias the button 80. Therefore, the configuration of the attaching/detaching device 6 can be made simpler than a case where a member that biases the button 80 and a member that locks the pin 3 are separate from each other.

**[0036]** Additionally, in the attaching/detaching device 6 of the present embodiment, the spring 70 is made of the wire rod. Also, the width of the housing space 62 in the longitudinal direction of the insertion hole 61 is made to have a size that is slightly greater as a whole than the wire rod that constitutes the spring 70. Therefore, a configuration in which the width of the housing space 62 in the longitudinal direction of the insertion hole 61 in a region where at least the locking part 74 moves is smaller than a thickness equivalent to two wire rods is provided.

**[0037]** When the thickness of the wire rod that forms the locking part 74 and the above width of the housing space 62 in the region where the locking part 74 moves satisfies such a relationship, the spring 70 can be prevented from intersecting due to the movement of the locking part 74 within the housing space 62. Therefore, when the button 80 is depressed, the locking part 74 and other parts of the spring 70 can be prevented from intersecting, and the locking part 74 can be appropriately moved within the housing space 62 from the inside of the insertion hole 61. In this way, it is preferable that the configuration in which the width of the housing space 62 in the longitudinal direction of the insertion hole 61 in the region where at least the locking part 74 moves is smaller than a thickness equivalent to two wire rods is provided, and as in the above embodiment, it is preferable that the width of the housing space 62 in the longitudinal direction of the insertion hole 61 is smaller as a whole than a thickness equivalent to two wire rods. However, a configuration in

which the above width in a partial region of the housing space 62 is smaller than the thickness equivalent to two wire rods may be provided, and a configuration in which the above width in the other regions is smaller than the thickness equivalent to two wire rods may not be provided.

**[0038]** Additionally, a configuration in which the smaller bent part 75 connected to one side of the locking part 74, of which at least a portion is located within the housing space 62, moves to a position separated from the insertion hole 61 within the housing space 62 by the button 80 being depressed, and pulls the locking part 74 within the housing space 62 is provided. Moreover, a configuration in which the locking part 74 is made to be straight and the smaller bent part 75 connected to the one side of the locking part 74 pulls the locking part 74 in a direction perpendicular to a line that overlaps the portion from one end of the locking part 74 to the other end thereof is provided.

**[0039]** In this way, the part disposed within the housing space 62 is connected to the locking part 74 and the locking part 74 is pulled into the housing space 62. Therefore, when the locking part 74 moves into the housing space 62, the above width of the housing space 62 is small as described above, and the locking part 74 can be further inhibited from being caught in the inner wall of the case 60 irrespective of the locking part 74 moves substantially perpendicularly to the extending direction thereof. Therefore, an operational sensation can be made excellent in a case where the button 80 is pushed for unlocking. In addition, the part connected to the locking part 74 may be made to have other shapes without being formed as the smaller bent part. Additionally, the locking part 74 may not made to be straight as described above.

**[0040]** Additionally, the part connected to the one side of the locking part 74 is the smaller bent part 75 that is bent with a smaller diameter than the diameter of the insertion hole 61, the spring 70 has the parallel extending part 76 that is connected to the side of the smaller bent part 75 opposite to the locking part 74 side and extends parallel to the locking part 74, the parallel extending part 76 is disposed on the side to which the locking part 74 moves away from the insertion hole 61 within the housing space 62, and the side of the parallel extending part 76 opposite to the smaller bent part 75 side moves in the direction perpendicular to the extending direction of the locking part 74 so as to be separated from the insertion hole 61 within the housing space 62 due to a pressing force when the button 80 is depressed.

**[0041]** A portion consisting of the locking part 74, the parallel extending part 76, and the smaller bent part 75 is formed in a substantially cantilevered shape by the parallel extending part 76 being formed parallel to the locking part 74 via the smaller bent part 75 in this way. The side of the parallel extending part 76 opposite to the smaller bent part 75 side serve as a cantilevered end part. As a result, when the end part moves, the overall

cantilevered portion including the locking part 74 is moved. Since moving such a cantilevered end part is easier than moving a double-supported spring, the locking part 74 can be more simply moved.

**[0042]** Additionally, the spring 70 has the larger bent part 73 that is bent with a larger diameter than the diameter of the insertion hole 61 and is connected to the other side of the locking part 74, and the side of the larger bent part 73 opposite to the locking part 74 is fixed to the case 60. Moreover, the spring 70 has the case butting part 71 that is struck against the case 60 within the housing space 62, and the side of the larger bent part 73 opposite to the locking part 74 is fixed to the case 60 by the case butting part 71 being fixed to the case 60.

**[0043]** Such a larger bent part 73 can be deformed more elastically than other parts and can exert a spring force. Meanwhile, if such a larger bent part 73 is provided closer to the button 80 side than the locking part 74, the locking part 74 is not easily moved by the larger bent part 73 that is elastically deformed as described above. Therefore, the locking part 74 can be more appropriately moved by the larger bent part 73 being disposed in this way and being fixed to the case 60 as described above.

**[0044]** Additionally, the larger bent part 73 is disposed so as to surround at least a portion of the outer periphery of the insertion hole 61. In a case where the larger bent part 73 is disposed in this way, the overall attaching/detaching device 6 can be made smaller than that in a case where the larger bent part 73 is disposed in other places.

**[0045]** Additionally, the shape of the section of the wire rod that forms the spring 70 is circular. For this reason, even in a case where the spring 70 abuts with the inner wall of the case 60, the contact area between the spring 70 and the case 60 can be made small. Therefore, the frictional resistance between the spring 70 and the case 60 can be made small.

**[0046]** Additionally, the hinge device 4a or 4b of the present embodiment includes the attaching/detaching device 6, and the rotary damper 5a (5b) that has the case 56 integrated with the case 60 of the attaching/detaching device 6, has the rotating shaft 52a (52b) inserted into the case 56, and is filled with a viscous liquid. Therefore, attachment and detachment to a housing, a lid, or the like to be pivotally supported by the hinge devices 5a and 5b can be performed with a simple configuration. For example, the attachment and detachment of the hinge devices 5a and 5b of the above embodiment to the toilet bowl are made easy, and the toilet seat 1 and the toilet lid 2 can be fixed via the hinge devices 5a and 5b.

**[0047]** Although the invention has been described above taking the above embodiment as an example, the invention is not limited to this.

**[0048]** For example, in the above embodiment, the shape of the section of the spring 70 may not be circular and the spring 70 may not be made of the wire rod. For example, the spring may be formed from a plate spring as long as the spring 70 has the locking part 74 that is positioned within the insertion hole 61 in a state where

the button 80 is not depressed and is moved from the inside of the insertion hole 61 to the inside of the housing space 62 by the button 80 being depressed. Therefore, the shape of the spring 70 does not need to have the same shape as the above embodiment even in a case where the spring is made of the wire rod as in the above embodiment.

#### Industrial Applicability

**[0049]** As described above, according to the invention, the attaching/detaching device of which the configuration can be simplified, and the hinge device using the same, are provided, and these attaching/detaching device and hinge device can be used for apparatuses that performs attachment and detachment or the like between a body and a lid.

#### Reference Signs List

	<b>[0050]</b>
1:	TOILET SEAT
2:	TOILET LID
25	3: PIN
	4a, 4b: HINGE DEVICE
	5a, 5b: ROTARY DAMPER
	6: ATTACHING/DETACHING DEVICE
	51: TORQUE GENERATING PART
30	52a, 52b: ROTATING SHAFT
	60: CASE
	61: INSERTION HOLE
	62: HOUSING SPACE
	70: SPRING
35	74: LOCKING PART
	80: BUTTON

#### Claims

**1.** An attaching/detaching device (6) comprising:  
 a case (60) in which an insertion hole (61) for insertion of a pin (3), and a housing space (62) that is connected to the insertion hole (61) and extends in a direction perpendicular to a longitudinal direction of the insertion hole (61) are formed;  
 a button (80) that is depressible into the case (60) in the direction perpendicular to the longitudinal direction of the insertion hole (61); and  
 a spring (70) that biases the button (80) in a direction opposite to a depression direction of the button (80) with respect to the case (60),

#### characterized in that:

the spring (70) includes a locking part (74) for locking the pin (3), and

the locking part (74) is positioned within the insertion hole (61) in a state where the button (80) is not depressed, and is moved from the inside of the insertion hole (61) to the inside of the housing space (62) by the button (80) being depressed. 5

2. The attaching/detaching device (6) according to Claim 1,  
**characterized in that;**  
 the spring (70) is made of a wire rod, and  
 the width of the housing space (62) in the longitudinal direction of the insertion hole (61) in a region where at least the locking part (74) moves is smaller than a thickness equivalent to two wire rods. 10

3. The attaching/detaching device (6) according to Claim 2,  
**characterized in that;**  
 a part connected to one side of the locking part (74), of which at least a portion is located within the housing space (62), moves to a position separated from the insertion hole (61) within the housing space (62) by the button (80) being depressed, and pulls the locking part (74) into the housing space (62). 20

4. The attaching/detaching device (6) according to Claim 3,  
**characterized in that;**  
 the locking part (74) is made to be straight, and the part connected to the one side of the locking part (74) pulls the locking part (74) in a direction perpendicular to a line that overlaps a portion from one end of the locking part (74) to the other end thereof. 30

5. The attaching/detaching device (6) according to Claim 4,  
**characterized in that;**  
 the part connected to the one side of the locking part (74) is a smaller bent part (75) that is bent with a smaller diameter than the diameter of the insertion hole (61),  
 the spring (70) includes a parallel extending part (76) that is connected to a side of the smaller bent part (75) opposite to the locking part (74) side and extends parallel to the locking part (74),  
 the parallel extending part (76) is disposed on a side to which the locking part (74) moves away from the insertion hole (61) within the housing space (62), and a side of the parallel extending part (76) opposite to the smaller bent part (75) side moves in the direction perpendicular to an extending direction of the locking part (74) so as to be separated from the insertion hole (61) within the housing space (62) due to a pressing force when the button (80) is depressed. 40

6. The attaching/detaching device (6) according to Claim 4 or 5,  
**characterized in that;** 45

the spring (70) includes a larger bent part (73) that is bent with a larger diameter than the diameter of the insertion hole (61) and is connected to the other side of the locking part (74), and a side of the larger bent part (73) opposite to the locking part (74) is fixed to the case (60). 50

7. The attaching/detaching device (6) according to Claim 6,  
**characterized in that;**  
 the larger bent part (73) is disposed so as to surround at least a portion of an outer periphery of the insertion hole (61). 55

8. The attaching/detaching device (6) according to Claim 6 or 7,  
**characterized in that;**  
 the spring (70) includes a case butting part (71) that is struck against the case (60) within the housing space (62), and a side of the larger bent part (73) opposite to the locking part (74) is fixed to the case (60) by the case butting part (71) being fixed to the case (60). 60

9. The attaching/detaching device (6) according to any one of Claims 2 to 8,  
**characterized in that;**  
 the shape of a section of the wire rod is circular. 65

10. A hinge device (4a, 4b) comprising,  
 the attaching/detaching device (6) according to any one of Claims 1 to 9; and  
 a rotary damper (5a, 5b) that has a case (56) integrated with the case (60) of the attaching/detaching device (6), has a rotating shaft (52a, 52b) inserted into the case (56), and is filled with a viscous liquid. 70

FIG.1

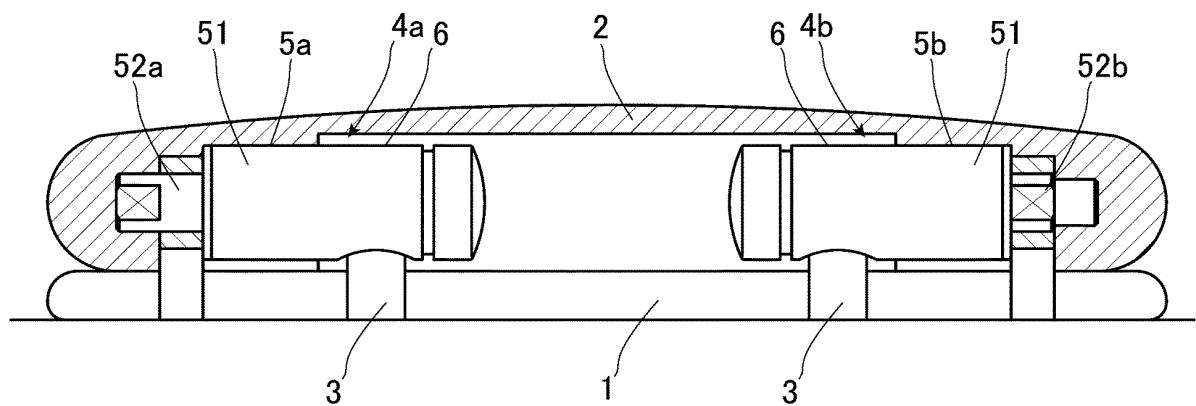


FIG.2

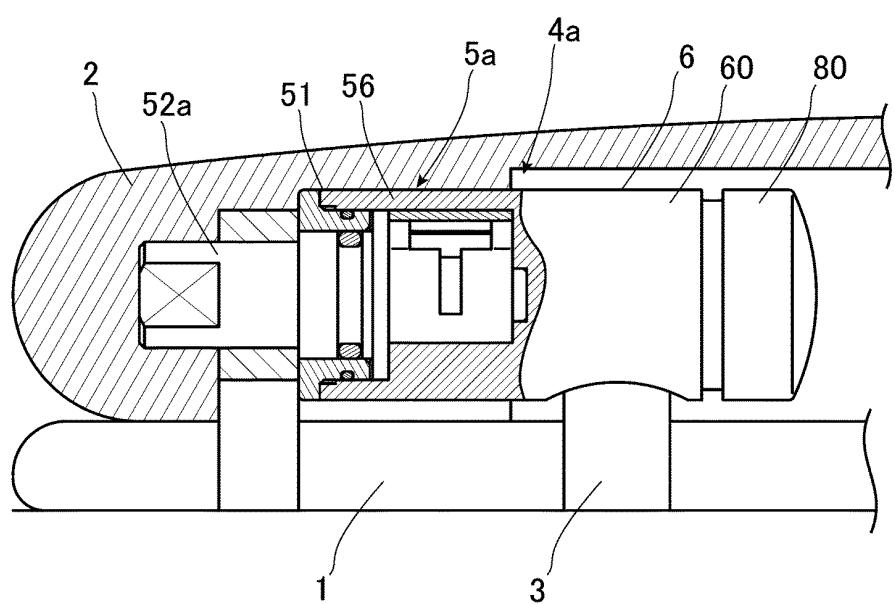


FIG.3

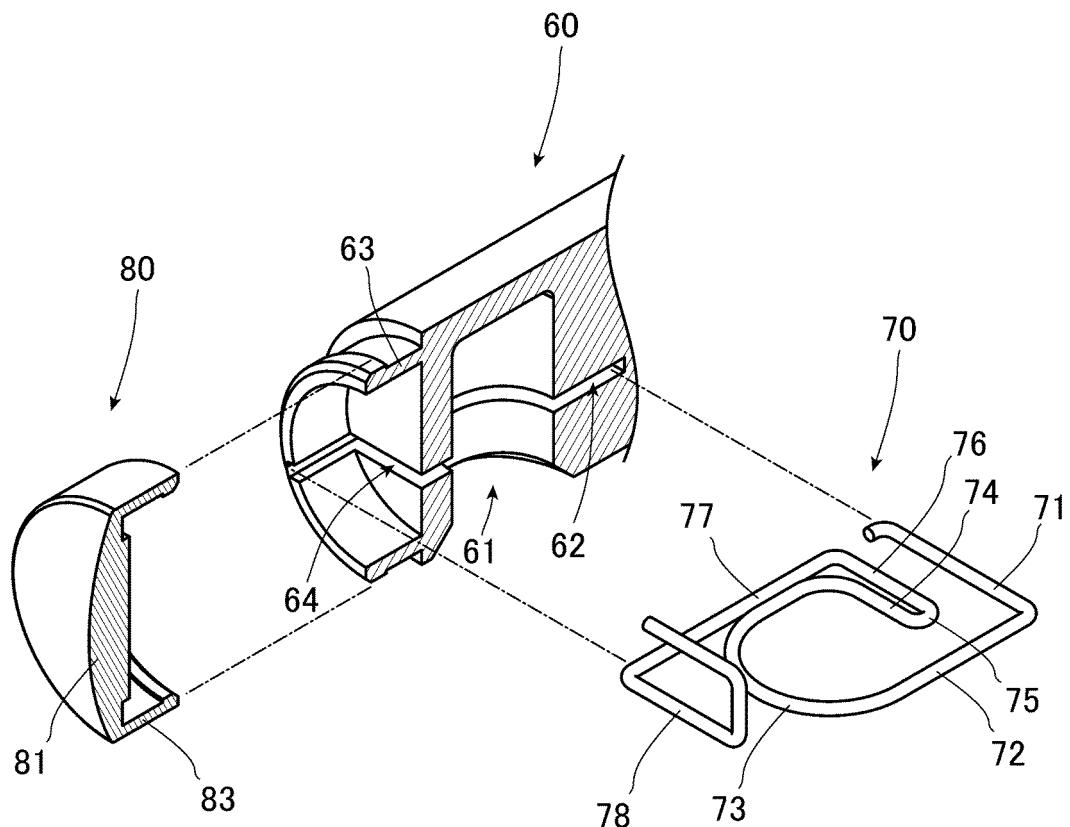


FIG.4

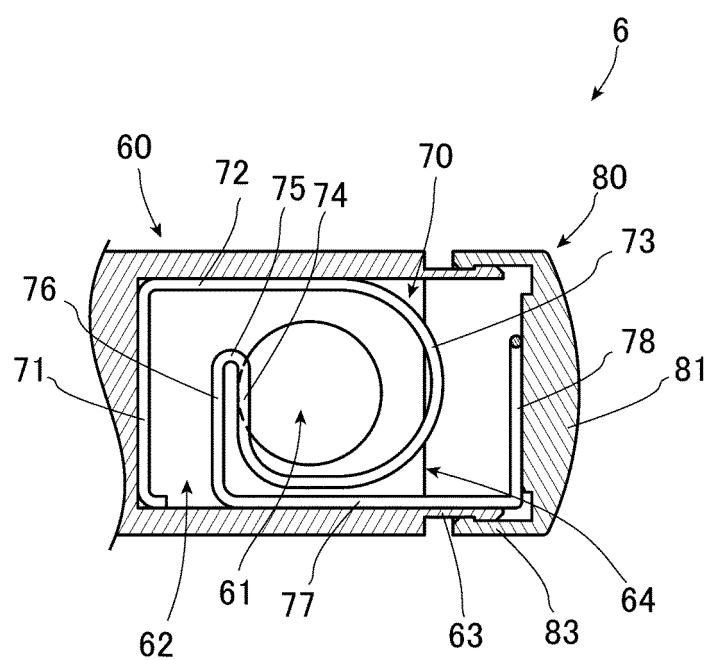


FIG.5

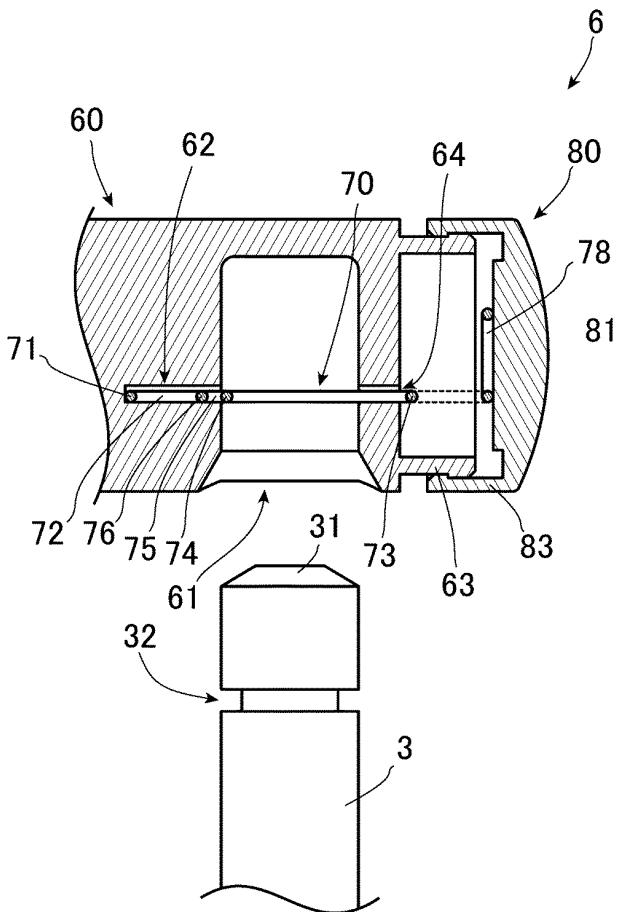


FIG.6

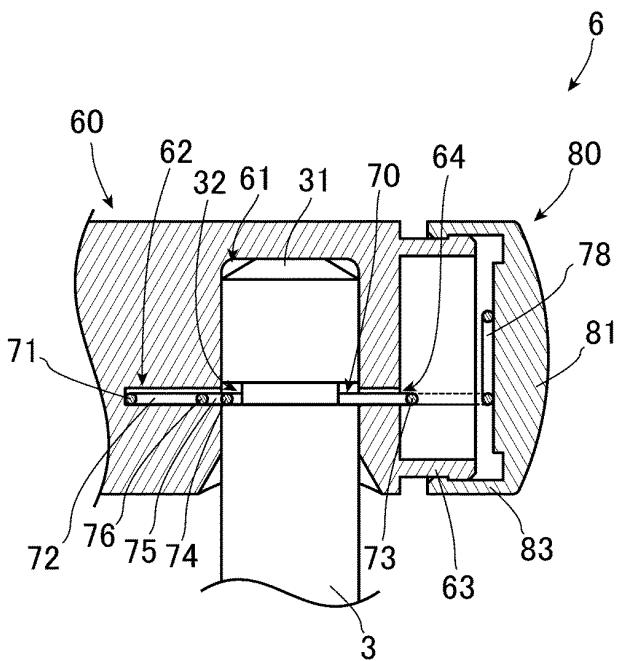
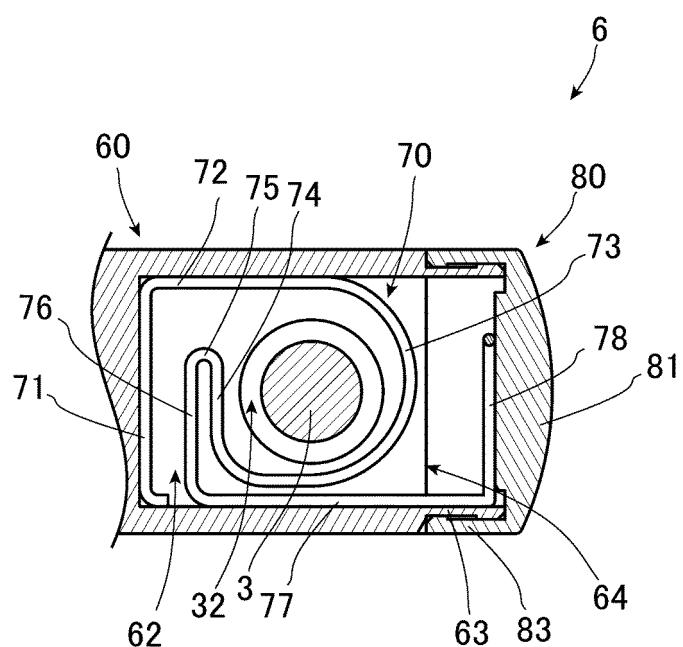


FIG.7



<b>INTERNATIONAL SEARCH REPORT</b>		International application No. PCT/JP2015/058615												
5	A. CLASSIFICATION OF SUBJECT MATTER A47K13/26(2006.01)i, A47K13/12(2006.01)i													
10	According to International Patent Classification (IPC) or to both national classification and IPC													
15	B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A47K13/26, A47K13/12													
20	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015 Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015													
25	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)													
30	C. DOCUMENTS CONSIDERED TO BE RELEVANT													
35	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Category*</th> <th style="text-align: left; padding: 2px;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="text-align: left; padding: 2px;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">EP 2356930 A2 (Zhongshan City Cumei Electric Appliance Co., Ltd.), 17 August 2011 (17.08.2011), entire text; all drawings &amp; CN 101766459 A</td> <td style="text-align: center; padding: 2px;">1-10</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">US 2012/0284909 A1 (Chen Guo-Bin), 15 November 2012 (15.11.2012), entire text; all drawings &amp; WO 2010/022615 A1 &amp; CN 201271201 Y</td> <td style="text-align: center; padding: 2px;">1-10</td> </tr> <tr> <td style="text-align: center; padding: 2px;">A</td> <td style="padding: 2px;">CN 202636818 U (XIAMEN RT PLUMBING TECHNOLOGY CO., LTD.), 02 January 2013 (02.01.2013), entire text; all drawings (Family: none)</td> <td style="text-align: center; padding: 2px;">1-10</td> </tr> </tbody> </table>		Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	EP 2356930 A2 (Zhongshan City Cumei Electric Appliance Co., Ltd.), 17 August 2011 (17.08.2011), entire text; all drawings & CN 101766459 A	1-10	A	US 2012/0284909 A1 (Chen Guo-Bin), 15 November 2012 (15.11.2012), entire text; all drawings & WO 2010/022615 A1 & CN 201271201 Y	1-10	A	CN 202636818 U (XIAMEN RT PLUMBING TECHNOLOGY CO., LTD.), 02 January 2013 (02.01.2013), entire text; all drawings (Family: none)	1-10
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A	CN 202636818 U (XIAMEN RT PLUMBING TECHNOLOGY CO., LTD.), 02 January 2013 (02.01.2013), entire text; all drawings (Family: none)	1-10												
40	<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.													
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50	Date of the actual completion of the international search 18 May 2015 (18.05.15)	Date of mailing of the international search report 02 June 2015 (02.06.15)												
55	Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer  Telephone No.												

INTERNATIONAL SEARCH REPORT		International application No. PCT/JP2015/058615	
5	C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
10	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
15	A	CN 203252575 U (XU XIAOFENG), 30 October 2013 (30.10.2013), entire text; all drawings & EP 2803308 A1	1-10
20	A	JP 2010-246773 A (TOTO Ltd.), 04 November 2010 (04.11.2010), entire text; all drawings (Family: none)	1-10
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**Patent documents cited in the description**

- EP 2324745 A [0005]