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(54) **ROTARY LAUNDRY DEVICE ADAPTED FOR A LAUNDRY MACHINE**

(57) A rotary laundry device(1) adapted for a laundry machine(2) includes a driving main body(11) located inside an inner tub(21) of the laundry machine(2), a supporting component(12) detachably installed on the inner tub(21) of the laundry machine(2), and a connecting component(13) rotatably passing through the supporting component(12). A plurality of protruding portions(111) protrude from the driving main body(11). A blocking surface is formed on each protruding portion(111). A plurality of mounting lugs(123) protrude from the supporting component(12) for passing through and engaging with a plurality of mounting holes(211) formed on the inner tub(21) of the laundry machine(2). The supporting component(12) is installed on the inner tub(21) of the laundry machine(2) by engagement of the plurality of mounting lugs(123) and the plurality of mounting holes(211). The driving main body(11) drives the connecting component(13) to rotate relative to the inner tub(21) of the laundry machine(2) when the blocking surface is forced.

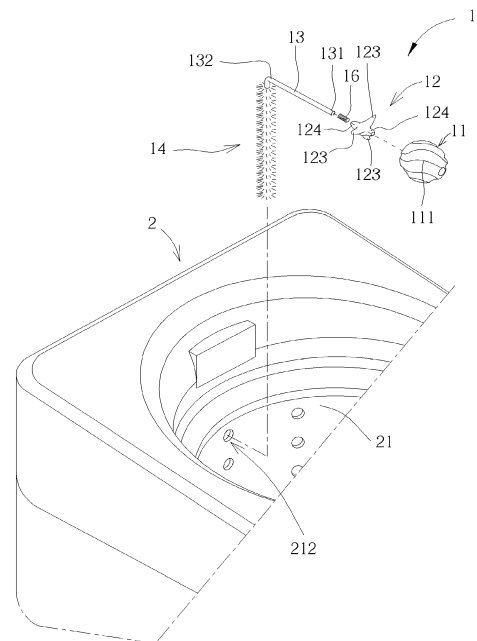


FIG. 1

Description

Field of the Invention

[0001] The present invention relates to a rotary laundry device adapted for a laundry machine according to the pre-characterizing clause of claim 1.

Background of the Invention

[0002] It is an important task to clean clothing since people have learned to make clothing with cloth, silk or modern man-made fibers. With advancement automation equipment technology, a washing machine becomes one of essential electrical appliances in every home. The laundry machine removes dirt from clothing by stirring and lashing clothing with water and laundry detergent. The stronger turbulence of flow of the water during washing is, the better the cleanliness of the washed clothing. Therefore, it becomes an important topic to provide an easy-to-use and user-friendly solution to increase the turbulence of the flow of the water during washing to improve the cleanliness of the washed clothing.

Summary of the Invention

[0003] This is mind, the present invention aims at providing a rotary laundry device adapted for a laundry machine which can be installed or detached easily.

[0004] This is achieved by a rotary laundry device adapted for a laundry machine according to claim 1. The dependent claims pertain to corresponding further developments and improvements.

[0005] As will be seen more clearly from the detail description following below, the claimed rotary laundry device adapted for a laundry machine includes a driving main body, a supporting component and a connecting component. The driving main body is located inside an inner tub of the laundry machine. A plurality of protruding portions protrude from the driving main body. A blocking surface is formed on each of the plurality of protruding portions. The supporting component is detachably installed on the inner tub of the laundry machine. A plurality of mounting lugs protrude from the supporting component for passing through and engaging with a plurality of mounting holes formed on the inner tub of the laundry machine. The supporting component is installed on the inner tub of the laundry machine by engagement of the plurality of mounting lugs and the plurality of mounting holes. The connecting component rotatably passes through the supporting component. The driving main body drives the connecting component to rotate relative to the inner tub of the laundry machine when the blocking surface is forced.

[0006] According to an embodiment of the present invention, the plurality of mounting lugs are made of resilient material.

[0007] According to an embodiment of the present in-

vention, the supporting component includes a first portion and a second portion connected to the first portion. A distance between an outer periphery of the first portion and a rotating axis of the connecting component gradually increases along a first direction parallel to the rotating axis of the connecting component. A distance between an outer periphery of the second portion and the rotating axis of the connecting component gradually decreases along the first direction parallel to the rotating axis of the connecting component, and the plurality of mounting lugs are located at a connection of the first portion and the second portion of the supporting component and extend away from the rotating axis of the connecting component.

[0008] According to an embodiment of the present invention, the rotary laundry device further includes a detaching assembly. The detaching assembly includes an abutting component and a prying component. The abutting component includes an abutting operating portion and a plurality of abutting portions movably connected to the abutting operating portion and for abutting against the plurality of mounting lugs. Each of the plurality of abutting portions includes a first abutting member, a second abutting member and a third abutting member. Two ends of the first abutting member are respectively connected to the abutting operating portion and the second abutting member. The second abutting member is further connected to the third abutting member. A first included angle is formed between the first abutting member and the abutting operating portion. The first abutting member is bendable relative to the abutting operating portion to adjust the first included angle. A second included angle is formed between the first abutting member and the second abutting member. The second abutting member is bendable relative to the first abutting member to adjust the second included angle. A third included angle is formed between the second abutting member and the third abutting member. The third abutting member is bendable relative to the second abutting member to adjust the third included angle. The abutting operating portion includes a first operating member and a second operating member, and the first operating member is connected to the second operating member and bendable relative to the second operating member. The prying component includes a prying operating portion and a prying portion connected to the prying operating portion and for abutting against the driving main body. The prying portion is a U-shaped structure, and the prying operating portion is connected to a middle portion of the U-shaped structure.

[0009] According to an embodiment of the present invention, the rotary laundry device further includes a cleaning component connected to the connecting component and perpendicular to the connecting component, and the cleaning component is located between the inner tub and an outer tub of the laundry machine.

[0010] According to an embodiment of the present invention, the supporting component further includes at least one restraining structure for abutting against the

driving main body to restrain an axial displacement of the connecting component relative to the supporting component and parallel to a rotating axis of the connecting component.

[0011] According to an embodiment of the present invention, the connecting component includes a shaft body and at least one restraining portion. The shaft body rotatably passes through the supporting component and is connected to the driving main body. The at least one restraining portion protrudes from the shaft body and located adjacent to the supporting component, and the at least one restraining portion is for abutting against the supporting component to restrain an axial displacement of the connecting component relative to the supporting component and parallel to a rotating axis of the connecting component.

[0012] According to an embodiment of the present invention, a slit and a through hole are formed on the supporting component. The connecting component rotatably passes through the through hole. The slit is communicated with the through hole and extends to an outer periphery (P3, P4) of the supporting component.

[0013] According to an embodiment of the present invention, the connecting component is detachably connected to the driving main body. The connecting component includes a middle abutting portion and two resilient engaging portions. A middle recess and two engaging slots are formed on the driving main body. The middle recess is for accommodating the middle abutting portion, and the two resilient engaging portions are for engaging with the two engaging slots.

[0014] According to an embodiment of the present invention, the connecting component is detachably connected to the driving main body. An accommodating chamber and an opening communicated with the accommodating chamber are formed on the driving main body. An end of the connecting component for connecting the driving main body is a T-shaped structure. The T-shaped structure includes two lateral portions extending toward two opposite directions. A sum of lengths of the two lateral portions is greater than a length of the opening, and the accommodating chamber is for accommodating the two lateral portions.

[0015] According to an embodiment of the present invention, the rotary laundry device further includes a resilient component and a covering component. The resilient component is disposed between the supporting component and the inner tub of the laundry machine, and the resilient component is forced to resiliently deform when the supporting component is detachably installed on the inner tub of the laundry machine. The covering component is for at least partially covering the driving main body.

[0016] According to an embodiment of the present invention, the rotary laundry device further includes a driven component disposed on the connecting component. A plurality of driving abutting portions protrude from the driven component, and the driving main body pushes the plurality of driving abutting portions to drive the connect-

ing component to rotate relative to the inner tub of the laundry machine when the blocking surface is forced.

[0017] According to an embodiment of the present invention, a weight of the driving main body is distributed unevenly.

[0018] According to an embodiment of the present invention, the supporting component includes a first half portion and a second half portion detachably connected to the first half portion. A through hole is formed between the first half portion and the second half portion for allowing the connecting component to pass through when the first half portion and the second half portion are combined with each other. The rotary laundry device further includes a locking assembly. The locking assembly includes a first locking member disposed on the first half portion and a second locking member disposed on the second half portion. The first half portion and the second half portion are prevented from being separated from each other when the first locking member engages with the second locking member, and the first half portion and the second half portion are allowed to be separated from each other for withdrawal of the connecting component when the first locking member disengages from the second locking member.

[0019] According to an embodiment of the present invention, the supporting component is made of resilient material. The supporting component includes at least one sucking structure and a through slot structure. The at least one sucking structure is for attaching to a wall of an installing notch of the inner tub of the laundry machine. The through slot structure extends along a rotating axis of the connecting component for allowing the connecting component to pass through. The supporting component further includes at least one outer extending portion. The at least one outer extending portion is exposed out of the installing notch when the supporting component is installed on the inner tub of the laundry machine, and the through slot structure includes a corrugated segment for allowing a length of the through slot structure to resiliently retract and extend.

[0020] In summary, the present invention utilizes engagement of the mounting lugs and the mounting holes to install the supporting component on the inner tub of the laundry machine for reliably supporting the supporting component. Therefore, it is convenient for a user to install the rotary laundry device on the inner tub of the laundry machine by the engagement of the mounting lugs and the mounting holes or detach the rotary laundry device from the inner tub of the laundry machine by disengagement of the mounting lugs and the mounting holes. Furthermore, the supporting component can abut against the connecting component, the driving main body or the cleaning component along the direction parallel to the rotating axis of the connecting component for restraining the axial displacement of the connecting component relative to the supporting component. Therefore, the connecting component can be prevented from disengaging from the supporting component along the direction par-

allel to the rotating axis of the connecting component even if the connecting component is forced by an external force along the direction parallel to the rotating axis of the connecting component. Besides, the configuration of the connecting component detachable from the driving main body or the configuration of the connecting component detachable from the supporting component also facilitates maintenance.

[0021] These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

Brief Description of the Drawings

[0022] In the following, the invention is further illustrated by way of example, taking reference to the accompanying drawings. Thereof

FIG. 1 is a diagram of a rotary laundry device according to a first embodiment of the present invention,

FIG. 2 is an installation diagram of the rotary laundry device according to the first embodiment of the present invention,

FIG. 3 is a diagram of a supporting component of the rotary laundry device according to the first embodiment of the present invention,

FIG. 4 is a partial diagram of the rotary laundry device according to the first embodiment of the present invention,

FIG. 5 is a diagram of a detaching assembly according to the first embodiment of the present invention,

FIG. 6 and FIG. 7 are diagrams of a rotary laundry device at different views according to a second embodiment of the present invention,

FIG. 8 is a partial diagram of the rotary laundry device according to the second embodiment of the present invention,

FIG. 9 is a diagram of a rotary laundry device according to a third embodiment of the present invention,

FIG. 10 is a partial diagram of the rotary laundry device according to the third embodiment of the present invention,

FIG. 11 is an installation diagram of a rotary laundry device according to a fourth embodiment of the present invention,

FIG. 12 is an installation diagram of a rotary laundry device according to a fifth embodiment of the present invention,

FIG. 13 is an installation diagram of a rotary laundry device according to a sixth embodiment of the present invention, and

FIG. 14 is a diagram of a supporting component of the rotary laundry device according to the sixth embodiment of the present invention.

Detailed Description

[0023] In the following detailed description of the preferred embodiments, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. In this regard, directional terminology, such as "top," "bottom," "front," "back," etc., is used with reference to the orientation of the Figure(s) being described. The components of the present invention can be positioned in a number of different orientations. As such, the directional terminology is used for purposes of illustration and is in no way limiting. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive.

[0024] Please refer to FIG. 1 to FIG. 4. FIG. 1 is a diagram of a rotary laundry device 1 according to a first embodiment of the present invention. FIG. 2 is an installation diagram of the rotary laundry device 1 according to the first embodiment of the present invention. FIG. 3 is a diagram of a supporting component 12 of the rotary laundry device 1 according to the first embodiment of the present invention. FIG. 4 is a partial diagram of the rotary laundry device 1 according to the first embodiment of the present invention. As shown in FIG. 1 to FIG. 4, the rotary laundry device 1 includes a driving main body 11, the supporting component 12, a connecting component 13 and a cleaning component 14. The driving main body 11 is located inside an inner tub 21 of a laundry machine 2. A plurality of protruding portions 111 protrude from the driving main body 11. A blocking surface is formed on each protruding portion 111 for providing resistance for water or clothing inside the inner tub 21. The supporting component 12 is detachably installed on the inner tub 21 of the laundry machine 2. Three mounting lugs 123 protrude from the supporting component 12 and disposed in a circular arrangement. Preferably, in this embodiment, an included angle between the two adjacent mounting lugs 123 can be 120 degrees, i.e., the three mounting lugs 123 can be spaced apart at equal intervals. However, the present invention is not limited to this embodiment. Three mounting holes 211 are formed on the inner tub 21 of the laundry machine 2 and located at positions corresponding to the three mounting lugs 123. The three mounting lugs 123 can pass through and engage with the three mounting holes 211 on the inner tub 21 of the laundry machine 2. The supporting component 12 is installed on the inner tub 21 of the laundry machine 2 by engagement of the three mounting lugs 123 and the three mounting holes 211.

[0025] The connecting component 13 rotatably passes through the supporting component 12. A first end 131 of the connecting component 13 is connected to the driving main body 11. The cleaning component 14 is connected to a second end 132 of the connecting component 13 opposite to the first end 131 of the connecting component 13 and substantially perpendicular to the connecting component 13. The cleaning component 14 is located

between the inner tub 21 and an outer tub 22 of the laundry machine 2. Preferably, in this embodiment, the cleaning component 14 can be a brush or a soft spatula. However, the present invention is not limited thereto. In such a way, when the blocking surface is forced by the water or the washed clothing, the driving main body 11 can be driven to drive the connecting component 13 to rotate together with the driving main body 11 relative to the inner tub 21 of the laundry machine 2 and further can increase turbulence of flow of the water by the blocking surface for improving cleanliness of the washed clothing. Furthermore, when the driving main body 11 is lashed by the water or the clothing to drive the connecting component 13 to rotate together with the driving main body 11 relative to the inner tub 21 of the laundry machine 2, the connecting component 13 can drive the cleaning component 4 to rotate relative to the inner tub 21 and the outer tub 22 of the laundry machine 2 to clean the inner tub 21 and the outer tub 22.

[0026] When beginning to operate the laundry machine 2, the inner tub 21 can be filled with water, and the driving main body 11 can be sunk into the water. The water inside the inner tub 21 can be driven by the laundry machine 2 to form a whirly flow. Since the blocking surface is formed on each protruding portion 111 of the driving main body 11, the water lashes the blocking surface to drive the driving main body 11 to rotate when the water flows through the driving main body 11. Besides, when the clothing inside the inner tub 21 passes by the driving main body 11, the clothing also lashes the blocking surface to drive the driving main body 11 to rotate. Furthermore, the driving main body 11 can further swipe the water by the blocking surface to increase turbulence of the flow of the water when the driving main body 11 rotates. By the turbulence, it can increase the friction between the clothing and the water, so that the cleanliness of the washed clothing is improved. In other words, in the present invention, since the driving main body 11 can be driven by the water inside the inner tub 21 to rotate, the rotation of the driving main body 11 can change a flow field of the water and increase the turbulence of the flow of the water accordingly, which causes a coupling effect. Therefore, the flow field of the water inside the inner tub 21 gradually changes with time and can be regarded as an unstable flow field. Since the unstable flow field has the stronger turbulence, which facilitates transmission of momentum of the water, the present invention can improve the cleanliness of the washed clothing.

[0027] It should be noticed that the structure of the rotary laundry device is not limited to this embodiment. For example, in another embodiment, the rotary laundry device can include the driving main body, the supporting component and the connecting component only, i.e., the cleaning component can be omitted. Furthermore, the number and the arrangement of the mounting lug are not limited to this embodiment. For example, in another embodiment, there can be only two mounting lugs protruding from the supporting component and arranged diagonally

and oppositely, i.e., an included angle between the two mounting lugs is 180 degrees.

[0028] Specifically, the supporting component 12 includes a first portion 121 and a second portion 122 connected to the first portion 121 and adjacent to the cleaning component 14. A distance between an outer periphery P1 of the first portion 121 and a rotating axis S of the connecting component 13 gradually increases along a first direction R1 parallel to the rotating axis S of the connecting component 13. A distance between an outer periphery P2 of the second portion 122 and the rotating axis S of the connecting component 13 gradually decreases along the first direction R1 parallel to the rotating axis S of the connecting component 13. The three mounting lugs 123 are located at a connection of the first portion 121 and the second portion 122 of the supporting component 12 and extend away from the rotating axis S of the connecting component 13 for engaging with the three mounting holes 211. Furthermore, the supporting component 12 further includes two restraining structures 124. The two restraining structures 124 respectively extend from the first portion 121 and the second portion 122 toward the driving main body 11 and the cleaning component 14 for respectively abutting against the driving main body 11 and the cleaning component 14 to restrain an axial displacement of the connecting component 13 relative to the supporting component 12 and parallel to the rotating axis S of the connecting component 13. Therefore, the axial displacement of the connecting component 13 along the first direction R1 or a second direction R2 opposite to the first direction R1 can be restrained by the two restraining structures 124 for preventing disengagement of the connecting component 13 from the supporting component 12 along the first direction R1 or the second direction R2 even if the connecting component 13 is forced by an external force along the first direction R1 or the second direction R2. Besides, preferably, in this embodiment, the supporting component can be a symmetrical gyro-shaped structure. However, the present invention is not limited to thereto. It depends on practical demands. For example, in another embodiment, the supporting component can only include the first portion and the restraining structure extending from the first portion toward the driving main body.

[0029] In addition, in this embodiment, an installing notch 212 is formed on the inner tub 21. The three mounting holes 211 are formed on a wall 2121 of the installing notch 212 of the inner tub 21 and disposed in a circular arrangement. When the rotary laundry device 1 is installed on the inner tub 21, the rotary laundry device 1 can be preferably partially accommodated inside the installing notch 212, i.e., only the driving main body 11 of the rotary laundry device 1 is partially exposed out of the installing notch 212, for preventing the clothing from wrapping the driving main body 11, the supporting component 12 or the connecting component 13 due to excessive protrusion of the rotary laundry device 1. However, in another embodiment, the driving main body can

be configured to be fully exposed out of the installing notch. It depends on practical demands.

[0030] Furthermore, in order to bring convenience in installation and detachment of the rotary laundry device 1, the three mounting lugs 123 can be preferably be made of resilient material. When it is desired to install or detach the supporting component 12, it only has to press the mounting lugs 123 to resiliently deform to engage with or disengage from the mounting holes 211 for achieving installation or detachment of the supporting component 12. Besides, please refer to FIG. 3 to FIG. 5. FIG. 5 is a diagram of a detaching assembly 15 according to the first embodiment of the present invention. As shown in FIG. 3 to FIG. 5, the rotary laundry device 1 further includes the detaching assembly 15. The detaching assembly 15 includes an abutting component 151 and a prying component 152. The abutting component 151 includes an abutting operating portion 1511 and three abutting portions 1512 connected to the abutting operating portion 1511 and for abutting against the three mounting lugs 123. The prying component 152 includes a prying operating portion 1521 and a prying portion 1522 connected to the prying operating portion 1521 and for abutting against the driving main body 11. When it is desired to detach the rotary laundry device 1 from the inner tub 21, the abutting operating portion 1511 can be operated to insert the abutting portions 1512 into the installing notch 212 to press the mounting lugs 123 to resiliently deform. Afterwards, the prying operating portion 1521 can be operated to drive the prying portion 1522 to abut against a side of the driving main body 11 adjacent to the supporting component 12 to pry the driving main body 11 along the second direction R2, so that the supporting component 12 can be detached easily. Preferably, in this embodiment, the prying portion 1522 can be a U-shaped structure, and the prying operating portion 1521 can be connected to a middle portion of the U-shaped structure. Furthermore, preferably, the abutting operating portion 1511 can be a regular triangular structure. However, the present invention is not limited to this embodiment. It depends on practical demands. For example, in another embodiment, the abutting operating portion can be a polygon-shaped structure or a circular structure. Besides, the number and the arrangement of the abutting portion are not limited to this embodiment. It depends on practical demands, e.g., it can depend on the number and the arrangement of the mounting lug.

[0031] In order to enhance using convenience of the abutting component 151, the three abutting portions 1512 are movably connected to the regular triangular structure, i.e., the abutting operating portion 1511. The three abutting portions 1512 can be moved to three peaks of the regular triangular structure to correspond to the three mounting lugs 123. The regular triangular structure includes a first operating member 1511A and a second operating member 1511B at each side. The first operating member 1511A is connected to the second operating member 1511B and bendable relative to the second op-

erating member 1511B. Each abutting portion 1512 includes a first abutting member 1512A, a second abutting member 1512B and a third abutting member 1512C. Two ends of the first abutting member 1512A are respectively connected to the abutting operating portion 1511 and the second abutting member 1512B. The second abutting member 1512B is further connected to the third abutting member 1512C. A first included angle A1 is formed between the first abutting member 1512A and the abutting operating portion 1511. The first abutting member 1512A is bendable relative to the abutting operating portion 1511 to adjust the first included angle A1. A second included angle A2 is formed between the first abutting member 1512A and the second abutting member 1512B. The second abutting member 1512B is bendable relative to the first abutting member 1512A to adjust the second included angle A2. A third included angle A3 is formed between the second abutting member 1512B and the third abutting member 1512C. The third abutting member 1512C is bendable relative to the second abutting member 1512B to adjust the third included angle A3. In such a way, the user can bend the first abutting member 1512A relative to the abutting operating portion 1511, bend the second abutting member 1512B relative to the first abutting member 1512A, and bend the third abutting member 1512C relative to the second abutting member 1512B to fold or unfold the abutting component 151. The folded abutting component 151 has compact occupied space, which facilitates storage or portability.

[0032] Moreover, as shown in FIG. 1 and FIG. 2, in this embodiment, the rotary laundry device 1 can further include a resilient component 16 abutting between the supporting component 12 and the inner tub 21. Preferably, the resilient component 16 can be a compression spring that is forced to resiliently be compressed when the supporting component 12 is installed on the inner tub 21. When the mounting lugs 123 are forced to resiliently deform, the resiliently compressed resilient component 16 can drive the supporting component 12 to disengage the mounting lugs 123 from the mounting holes 211 along the second direction R2 by a resilient recovering force, which makes the detachment of the supporting component 12 more convenient and labor-saving.

[0033] Please further refer to FIG. 6 to FIG. 8. FIG. 6 and FIG. 7 are diagrams of a rotary laundry device 1' at different views according to a second embodiment of the present invention. FIG. 8 is a partial diagram of the rotary laundry device 1' according to the second embodiment of the present invention. As shown in FIG. 6 to FIG. 8, different from the first embodiment, the rotary laundry device 1' of the second embodiment includes a driving main body 11', a supporting component 12', a connecting component 13' and a cleaning component 14'. For simplicity, protruding portions of the driving main body 11' are not illustrated in FIG. 6 to FIG. 8. The supporting component 12' includes a supporting plate 121' and a hollow pipe 122'. Two restraining structures 124' are respectively formed on two ends of the hollow pipe 122' for

respectively abutting against the driving main body 11' and the cleaning component 14'. Two mounting lugs 123' protrude from the supporting plate 121' and arranged oppositely. Understandably, in this embodiment, there can be two mounting holes formed on the inner tub. A through hole 125' is formed on the supporting plate 121'. The hollow pipe 122' passes through the through hole 125'. The connecting component 13' passes through the hollow pipe 122'. A slit 126' is further formed on the supporting plate 121'. The slit 126' is communicated with the through hole 125' and extends to an outer periphery P3 of the supporting plate 121' through one of the two mounting lugs 123'. By the configuration of the slit 126', the user can operate the supporting plate 121' to allow disengagement of the hollow pipe 122' through the through the slit 126', which facilitates detachment of the hollow pipe 122' and/or the connecting component 13'.

[0034] Furthermore, a first end 131' of the connecting component 13' is detachably connected to the driving main body 11'. Specifically, an accommodating chamber 112' and an opening 113' communicated with the accommodating chamber 112' are formed on the driving main body 11'. The first end 131' of the connecting component 13' for connecting the driving main body 11' can be a T-shaped structure. The T-shaped structure includes two lateral portions 1311' respectively extending toward two opposite directions. A sum of lengths of the two lateral portions 1311' is greater than a length of the opening 113', and the accommodating chamber 112' is for accommodating the two lateral portions 1311'. The user can move the two lateral portions 1311' to pass through the opening 113' into the accommodating chamber 112' by movement of the T-shaped structure relative to the driving main body 11' for achieving connection of the first end 131' of the connecting component 13' and the driving main body 11'. On the other hand, the user also can move the two lateral portions 1311' out of the accommodating chamber 112' via the opening 113' for achieving disconnection of the first end 131' of the connecting component 13' and the driving main body 11'.

[0035] Please further refer to FIG. 9 and FIG. 10. FIG. 9 is a diagram of a rotary laundry device 1" according to a third embodiment of the present invention. FIG. 10 is a partial diagram of the rotary laundry device 1" according to the third embodiment of the present invention. As shown in FIG. 9 and FIG. 10, different from the aforementioned embodiments, the rotary laundry device 1" of the third embodiment includes a driving main body 11", a supporting component 12", a connecting component 13" and a cleaning component 14". For simplicity, protruding portions of the driving main body 11" are not illustrated in FIG. 9 and FIG. 10. The supporting component 12" includes a supporting plate 121". Three mounting lugs 123" protrude from the supporting plate 121" and disposed in a circular arrangement. A through hole 125" is formed on the supporting plate 121". The connecting component 13" passes through the through hole 125". A slit 126" is further formed on the supporting plate

121". The slit 126" is communicated with the through hole 125" and extends to an outer periphery P4 of the supporting plate 121". By the configuration of the slit 126", the user can operate the supporting plate 121" to allow disengagement of the connecting component 13" through the slit 126', which facilitates detachment of the connecting component 13".

[0036] Besides, the connecting component 13" includes a shaft body 133" and two restraining portions 134". The shaft body 133" rotatably passes through the supporting plate 121". Two ends of the shaft body 133" are respectively connected to the driving main body 11" and the cleaning component 14". The two restraining portions 134" protrude from the shaft body 133" and located adjacent to two opposite sides of the supporting plate 121". The two restraining portions 134" are for abutting against the supporting plate 121" to restrain an axial displacement of the connecting component 13" relative to the supporting plate 121" and parallel to a rotating axis of the connecting component 13". Preferably, in this embodiment, the restraining portion 134" can be a protruding ring-shaped structure whose outer diameter can be greater than an inner diameter of the through hole 125". However, the number and the structure of the restraining portion are not limited to this embodiment. For example, the connecting component can include only one restraining portion located at one side of the supporting plate.

[0037] Furthermore, the shaft body 133" is detachably connected to the driving main body 11". The shaft body 133" includes a middle abutting portion 1331" and two resilient engaging portions 1333" located at two sides of the middle abutting portion 1331" and extending toward two opposite directions. A middle recess 114" and two engaging wings 117" are formed on the driving main body 11". The two engaging wings 117" are located at two sides of the middle recess 114". Each engaging wing 117" can be switched between an engaging position and a releasing position pivotally, and an engaging slot 116" is formed on each engaging wing 117". When it is desired to connect the shaft body 133" to the driving main body 11", the middle abutting portion 1331" can be accommodated inside the middle recess 114". Afterwards, the two engaging wings 117" can be operated to pivot to the engaging positions to engage the two resilient engaging portions 1333" with the two engaging slots 116" for achieving connection of the shaft body 133" and the driving main body 11". When it is desired to disconnect the shaft body 133" from the driving main body 11", the two engaging wings 117" can be operated to pivot to the disengaging positions to disengage the two resilient engaging portions 1333" from the two engaging slots 116" for allowing disconnection of the shaft body 133" from the driving main body 11".

[0038] Please refer to FIG. 11. FIG. 11 is an installation diagram of a rotary laundry device 1" according to a fourth embodiment of the present invention. As shown in FIG. 11, different from the aforementioned embodiments, the rotary laundry device 1" includes a driving main body

11^{'''}, a supporting component 12^{'''}, a connecting component 13^{'''}, a cleaning component 14^{'''}, a resilient component 16^{'''} and a driven component 17^{'''}. The driving main body 11^{'''} does not contact with the connecting component 13^{'''}, i.e., the connecting component 13^{'''} is not connected to the driving main body 11^{'''} directly. The driving main body 11^{'''} includes a plurality of protruding portions 111^{'''}. Each protruding portion 111^{'''} can be a blade-shaped structure. The blocking surface is formed on each protruding portion 111^{'''}. The driven component 17^{'''} is disposed on the connecting component 13^{'''}. A plurality of driving abutting portions 171^{'''} protrude from the driven component 17^{'''} and for rotatably abutting against the blade-shaped protruding portions 111^{'''}. A rotating axis of the driven component 17^{'''} is perpendicular to a rotating axis of the driving main body 11^{'''}. When the blocking surface is forced, the driving main body 11^{'''} is forced to rotate to push the plurality of driving abutting portions 171^{'''} to drive the connecting component 13^{'''} to rotate relative to the inner tub 21 of the laundry machine 2 for driving the cleaning component 14^{'''} to rotate relative to the inner tub 21 and the outer tub 22, so as to clean the inner tub 21 and the outer tub 22. Structures and operational principles of other structures of this embodiment are similar to the ones of the first embodiment. Detailed description is omitted herein for simplicity.

[0039] Please refer to FIG. 12. FIG. 12 is an installation diagram of a rotary laundry device 1^{'''} according to a fifth embodiment of the present invention. As shown in FIG. 12, different from the aforementioned embodiments, the rotary laundry device 1^{'''} of this embodiment includes a driving main body 11^{'''}, a supporting component 12^{'''}, a connecting component 13^{'''}, a cleaning component 14^{'''}, a resilient component 16^{'''}, a covering component 18^{'''} and a locking assembly 19^{'''}. The covering component 18^{'''} covers a portion of the driving main body 11^{'''} protruding from the inner tub 21 and is fixed on the inner tub 21. A plurality of apertures 181^{'''} are formed on the covering component 18^{'''} for allowing the water to flow therethrough. In other words, the covering component 18^{'''} allows the water to flow therethrough and prevents direct contact of the clothing and the driving main body 11^{'''} for preventing the clothing from wrapping the driving main body 11^{'''}. However, the structure of the covering component is not limited to this embodiment. For example, in another embodiment, the covering component can be combined with the driving main body and rotate together with the driving main body instead of being fixed on the inner tub. Besides, a weight of the driving main body 11^{'''} can preferably be distributed unevenly for achieving a purpose of self-rotating by gravity. Furthermore, the supporting component 12^{'''} includes a first half portion 121^{'''} and a second half portion 122^{'''}. The first half portion 121^{'''} and the second half portion 122^{'''} are combined with each other in a detachable manner. When the supporting component 12^{'''} is in a closed state, the first half portion 121^{'''} and the second half portion 122^{'''} are combined with each other, and a through hole is formed be-

tween the first half portion 121^{'''} and the second half portion 122^{'''} for allowing the connecting component 13^{'''} to pass therethrough. When the supporting component 12^{'''} is in an open state, the first half portion 121^{'''} and the second half portion 122^{'''} are separated from each other for withdrawal of the connecting component 13^{'''} relative to the supporting component 12^{'''}. The locking assembly 19^{'''} includes a first locking member 191^{'''} disposed on the first half portion 121^{'''}, e.g., a rotatable locking lug, and a second locking member 192^{'''} disposed on the second half portion 122^{'''}, e.g., an engaging hook. The first half portion 121^{'''} and the second half portion 122^{'''} are prevented from being separated from each other when the first locking member 191^{'''} is pivoted to engage with the second locking member 192^{'''}, and the first half portion 121^{'''} and the second half portion 122^{'''} are allowed to be separated from each other for withdrawal of the connecting component 13^{'''} when the first locking member 191^{'''} disengages from the second locking member 192^{'''}. Structures and operational principles of other structures of this embodiment are similar to the ones of the first embodiment. Detailed description is omitted herein for simplicity.

[0040] Please refer to FIG. 13 and FIG. 14. FIG. 13 is an installation diagram of a rotary laundry device 1^{'''} according to a sixth embodiment of the present invention. FIG. 14 is a diagram of a supporting component 12^{'''} of the rotary laundry device 1^{'''} according to the sixth embodiment of the present invention. As shown in FIG. 13 and FIG. 14, different from the aforementioned embodiments, the rotary laundry device 1^{'''} of this embodiment includes a driving main body 11^{'''}, the supporting component 12^{'''}, a connecting component 13^{'''} and a cleaning component 14^{'''}. The supporting component 12^{'''} is made of resilient material. The supporting component 12^{'''} includes a plurality of mounting lugs 123^{'''}, two restraining structures 124^{'''}, a plurality of sucking structures 127^{'''}, a through slot structure 128^{'''} and a plurality of outer extending portions 129^{'''}. The mounting lugs 123^{'''} are for engaging with the mounting holes 211 formed on the wall 2121 of the installing notch 212 of the inner tub 21 of the laundry machine 2 for fixing the supporting component 12^{'''}. The sucking structures are for attaching to the wall 2121 of the installing notch 212 of the inner tub 21 of the laundry machine 2 for improving fixing stability of the supporting component 12^{'''}. In order to achieve a better sucking effect, the wall 2121 of this embodiment can be arc-shaped. However, the present invention is not limited to this embodiment. The outer extending portions 129^{'''} are exposed out of the installing notch 212 for allowing the user to operate to detach the supporting component 12^{'''} when the supporting component 12^{'''} is installed on the inner tub 21 of the laundry machine 2. The through slot structure 128^{'''} extends along a rotating axis of the connecting component 13^{'''} for allowing the connecting component 13^{'''} to pass through. Two restraining structures 124^{'''} are located at two ends of the through slot structure 128^{'''} and for re-

spectively abutting against the driving main body 11'''' and the cleaning component 14'''' to restrain an axial displacement of the connecting component 13'''' relative to the supporting component 12'''' and parallel to a rotating axis of the connecting component 13''''.

The through slot structure 128'''' includes a corrugated segment 1281'''' located between the two restraining structures 124'''' for allowing a length of the through slot structure to resiliently retract and extend. Therefore, the user can install the rotary laundry device 1'''' by pressing the driving main body 11'''' easily. However, the present invention is not limited to his embodiment. For example, in another embodiment, the supporting component can include only one sucking structure and one outer extending portion.

[0041] In contrast to the prior art, the present invention utilizes engagement of the mounting lugs and the mounting holes to install the supporting component on the inner tub of the laundry machine for reliably supporting the supporting component. Therefore, it is convenient for a user to install the rotary laundry device on the inner tub of the laundry machine by the engagement of the mounting lugs and the mounting holes or detach the rotary laundry device from the inner tub of the laundry machine by disengagement of the mounting lugs and the mounting holes. Furthermore, the supporting component can abut against the connecting component, the driving main body or the cleaning component along the direction parallel to the rotating axis of the connecting component for restraining the axial displacement of the connecting component relative to the supporting component. Therefore, the connecting component can be prevented from disengaging from the supporting component along the direction parallel to the rotating axis of the connecting component even if the connecting component is forced by an external force along the direction parallel to the rotating axis of the connecting component. Besides, the configuration of the connecting component detachable from the driving main body or the configuration of the connecting component detachable from the supporting component also facilitates maintenance.

[0042] Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

Claims

1. A rotary laundry device (1, 1', 1'', 1''', 1''''', 1''''') adapted for a laundry machine (2), **characterized in that** the rotary laundry device (1, 1', 1'', 1''', 1''''', 1''''') comprising:

a driving main body (11, 11', 11'', 11''', 11''''', 11''''') located inside an inner tub (21) of the laundry

machine (2), a plurality of protruding portions (111, 111'') protruding from the driving main body (11, 11', 11'', 11''', 11''''', 11'''''), a blocking surface being formed on each of the plurality of protruding portions (111, 111'');
a supporting component (12, 12', 12'', 12''', 12''''', 12''''') detachably installed on the inner tub (21) of the laundry machine (2), a plurality of mounting lugs (123, 123', 123'', 123''', 123''''', 123''''') protruding from the supporting component (12, 12', 12'', 12''', 12''''', 12''''') for passing through and engaging with a plurality of mounting holes (211) formed on the inner tub (21) of the laundry machine (2), the supporting component (12, 12', 12'', 12''', 12''''', 12''''') being installed on the inner tub (21) of the laundry machine (2) by engagement of the plurality of mounting lugs (123, 123', 123'', 123''', 123''''', 123''''') and the plurality of mounting holes (211); and
a connecting component (13, 13', 13'', 13''', 13''''', 13''''') rotatably passing through the supporting component (12, 12', 12'', 12''', 12''''', 12'''''), the driving main body (11, 11', 11'', 11''', 11''''', 11''''') driving the connecting component (13, 13', 13'', 13''', 13''''', 13''''') to rotate relative to the inner tub (21) of the laundry machine (2) when the blocking surface is forced.

2. The rotary laundry device (1, 1', 1'', 1''', 1''''', 1''''') of claim 1, **characterized in that** the plurality of mounting lugs (123, 123', 123'', 123''', 123''''', 123''''') are made of resilient material.
3. The rotary laundry device (1) of claim 1, **characterized in that** the supporting component (12) comprises a first portion (121) and a second portion (122) connected to the first portion (121), a distance between an outer periphery (P1) of the first portion (121) and a rotating axis (S) of the connecting component (13) gradually increases along a first direction (R1) parallel to the rotating axis (S) of the connecting component (13), a distance between an outer periphery (P2) of the second portion (122) and the rotating axis (S) of the connecting component (13) gradually decreases along the first direction (R1) parallel to the rotating axis (S) of the connecting component (13), and the plurality of mounting lugs (123) are located at a connection of the first portion (121) and the second portion (122) of the supporting component (12) and extend away from the rotating axis (S) of the connecting component (13).
4. The rotary laundry device (1) of claim 1, **characterized by** a detaching assembly (15), the detaching assembly (15) comprises an abutting component (151) and a prying component (152), the abutting component (151) comprises an abutting operating portion (1511) and a plurality of abutting portions

- (1512) movably connected to the abutting operating portion (1511) and for abutting against the plurality of mounting lugs (123), each of the plurality of abutting portions (1512) comprises a first abutting member (1512A), a second abutting member (1512B) and a third abutting member (1512C), two ends of the first abutting member (1512A) are respectively connected to the abutting operating portion (1511) and the second abutting member (1512B), the second abutting member (1512B) is further connected to the third abutting member (1512C), a first included angle (A1) is formed between the first abutting member (1512A) and the abutting operating portion (1511), the first abutting member (1512A) is bendable relative to the abutting operating portion (1511) to adjust the first included angle (A1), a second included angle (A2) is formed between the first abutting member (1512A) and the second abutting member (1512B), the second abutting member (1512B) is bendable relative to the first abutting member (1512A) to adjust the second included angle (A2), a third included angle (A3) is formed between the second abutting member (1512B) and the third abutting member (1512C), the third abutting member (1512C) is bendable relative to the second abutting member (1512B) to adjust the third included angle (A3), the abutting operating portion (1511) comprises a first operating member (1511A) and a second operating member (1511B), the first operating member (1511A) is connected to the second operating member (1511B) and bendable relative to the second operating member (1511B), the prying component (152) comprises a prying operating portion (1521) and a prying portion (1522) connected to the prying operating portion (1521) and for abutting against the driving main body (11, 11', 11'', 11''', 11''''), the prying portion (1522) is a U-shaped structure, and the prying operating portion (1521) is connected to a middle portion of the U-shaped structure.
5. The rotary laundry device (1, 1', 1'', 1''', 1'''') of claim 1, **characterized by** a cleaning component (14, 14', 14'', 14''', 14'''') connected to the connecting component (13, 13', 13'', 13''', 13'''') and perpendicular to the connecting component (13, 13', 13'', 13''', 13'''') and the cleaning component (14, 14', 14'', 14''', 14'''') being located between the inner tub (21) and an outer tub (22) of the laundry machine (2).
6. The rotary laundry device (1, 1', 1'', 1''', 1'''') of claim 1, **characterized in that** the supporting component (12, 12', 12'', 12''', 12'''') further comprises at least one restraining structure (124, 124', 124'', 124''', 124'''') for abutting against the driving main body (11, 11', 11'', 11''', 11'''') to restrain an axial displacement of the connecting component (13, 13', 13'', 13''', 13'''') relative to the supporting component (12, 12', 12'', 12''', 12'''') and parallel to a rotating axis (S) of the connecting component (13, 13', 13'', 13''', 13'''').
7. The rotary laundry device (1'') of claim 1, **characterized in that** the connecting component (13'') comprises a shaft body (133'') and at least one restraining portion (134''), the shaft body (133'') rotatably passes through the supporting component (12'') and is connected to the driving main body (11''), the at least one restraining portion (134'') protrudes from the shaft body (133'') and located adjacent to the supporting component (12''), and the at least one restraining portion (134'') is for abutting against the supporting component (12'') to restrain an axial displacement of the connecting component (13'') relative to the supporting component (12'') and parallel to a rotating axis (S) of the connecting component (13'').
8. The rotary laundry device (1', 1'') of claim 1, **characterized in that** a slit (126', 126'') and a through hole (125', 125'') are formed on the supporting component (12', 12''), the connecting component (13', 13'') rotatably passes through the through hole (125', 125''), the slit (126', 126'') is communicated with the through hole (125', 125'') and extends to an outer periphery (P3, P4) of the supporting component (12', 12'').
9. The rotary laundry device (1'') of claim 1, **characterized in that** the connecting component (13'') is detachably connected to the driving main body (11''), the connecting component (13'') comprises a middle abutting portion (133'') and two resilient engaging portions (1333''), a middle recess (114'') and two engaging slots (116'') are formed on the driving main body (11, 11', 11'', 11''', 11''''), the middle recess (114'') is for accommodating the middle abutting portion (133''), and the two resilient engaging portions (1333'') are for engaging with the two engaging slots (116'').
10. The rotary laundry device (1') of claim 1, **characterized in that** the connecting component (13') is detachably connected to the driving main body (11'), an accommodating chamber (112') and an opening (113') communicated with the accommodating chamber (112') are formed on the driving main body (11'), an end (131') of the connecting component (13') for connecting the driving main body (11') is a T-shaped structure, the T-shaped structure comprises two lateral portions (1311') extending toward two opposite directions, a sum of lengths of the two lateral portions (1311') is greater than a length of the opening (113'), and the accommodating chamber (112') is for accommodating the two lateral portions (1311').
11. The rotary laundry device (1, 1'', 1''') of claim 1,

characterized by a resilient component (16, 16'", 16''') and a covering component (18'''), the resilient component (16, 16'", 16''') being disposed between the supporting component (12, 12'", 12''') and the inner tub (21) of the laundry machine (2), the resilient component (16, 16'", 16''') being forced to resiliently deform when the supporting component (12, 12'", 12''') is detachably installed on the inner tub (21) of the laundry machine (2), and the covering component (18''') being for at least partially covering the driving main body (11, 11'", 11''').

12. The rotary laundry device (1'') of claim 1, **characterized by** a driven component (17'') disposed on the connecting component (13''), a plurality of driving abutting portions (171'') protruding from the driven component (17''), and the driving main body (11, 11', 11'', 11''', 11''') pushing the plurality of driving abutting portions (171'') to drive the connecting component (13'') to rotate relative to the inner tub (21) of the laundry machine (2) when the blocking surface is forced.
13. The rotary laundry device (1''') of claim 1, **characterized in that** a weight of the driving main body (11''') is distributed unevenly.
14. The rotary laundry device (1, 1', 1'', 1''', 1''') of claim 1, **characterized in that** the supporting component (12, 12', 12'', 12''', 12''') comprises a first half portion (121''') and a second half portion (122''') detachably connected to the first half portion (121'''), a through hole is formed between the first half portion (121''') and the second half portion (122''') for allowing the connecting component (13, 13', 13'', 13''', 13''') to pass through when the first half portion (121''') and the second half portion (122''') are combined with each other, the rotary laundry device (1, 1', 1'', 1''', 1''') further comprises a locking assembly (19'''), the locking assembly (19''') comprises a first locking member (191''') disposed on the first half portion (121''') and a second locking member (192''') disposed on the second half portion (122'''), the first half portion (121''') and the second half portion (122''') are prevented from being separated from each other when the first locking member (191''') engages with the second locking member (192'''), and the first half portion (121''') and the second half portion (122''') are allowed to be separated from each other for withdrawal of the connecting component (13'') when the first locking member (191''') disengages from the second locking member (192''').
15. The rotary laundry device (1''') of claim 1, **characterized in that** the supporting component (12''') is made of resilient material, the supporting component (12''') comprises at least one sucking structure

(127''') and a through slot structure (128'''), the at least one sucking structure (127''') is for attaching to a wall (2121) of an installing notch (212) of the inner tub (21) of the laundry machine (2), the through slot structure (128''') extends along a rotating axis (S) of the connecting component (13'') for allowing the connecting component (13'') to pass through, the supporting component (12'') further comprises at least one outer extending portion (129'''), the at least one outer extending portion (129''') is exposed out of the installing notch (212) when the supporting component (12'') is installed on the inner tub (21) of the laundry machine (2), and the through slot structure (128''') comprises a corrugated segment (1281''') for allowing a length of the through slot structure (128'') to resiliently retract and extend.

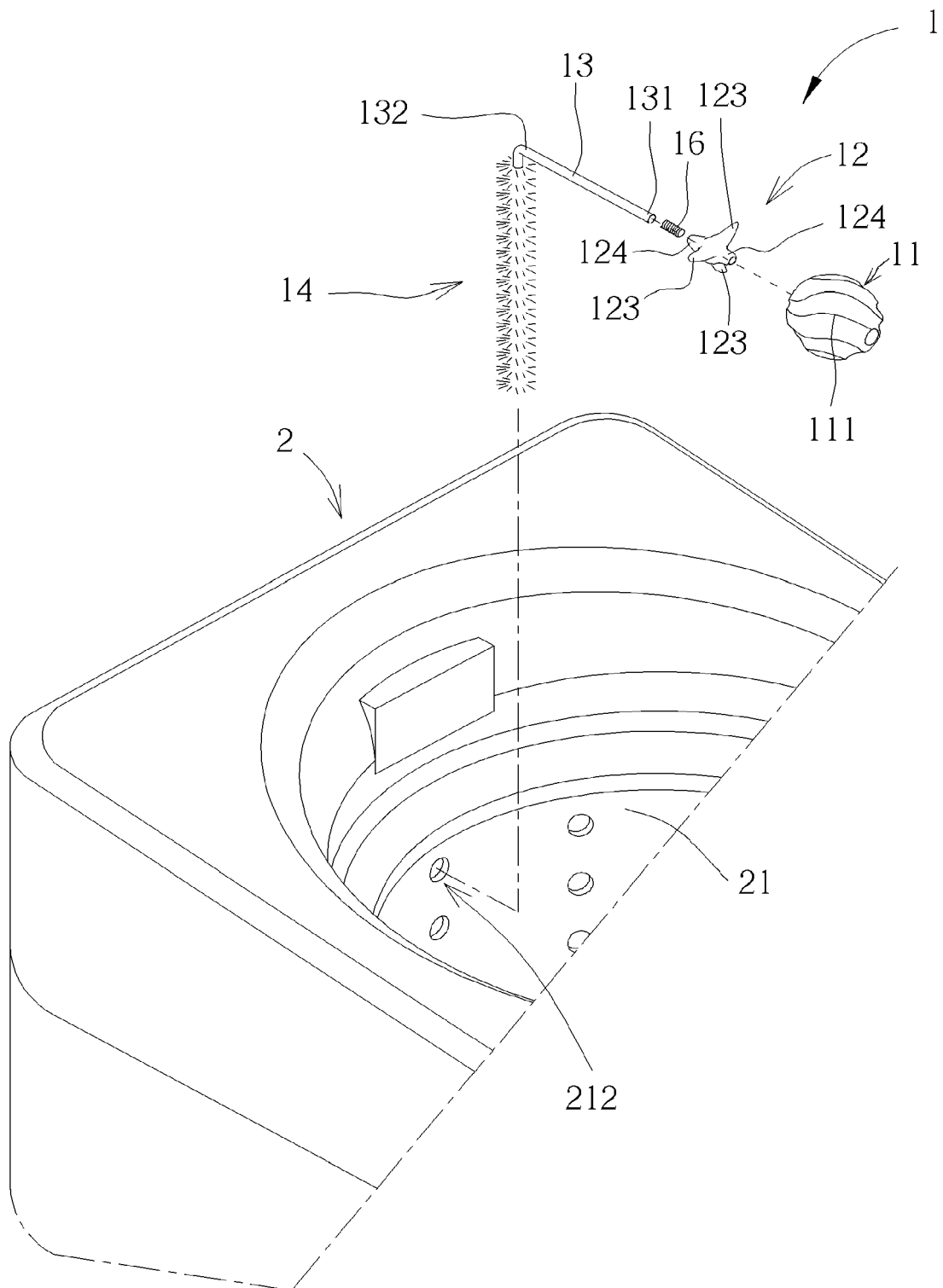


FIG. 1

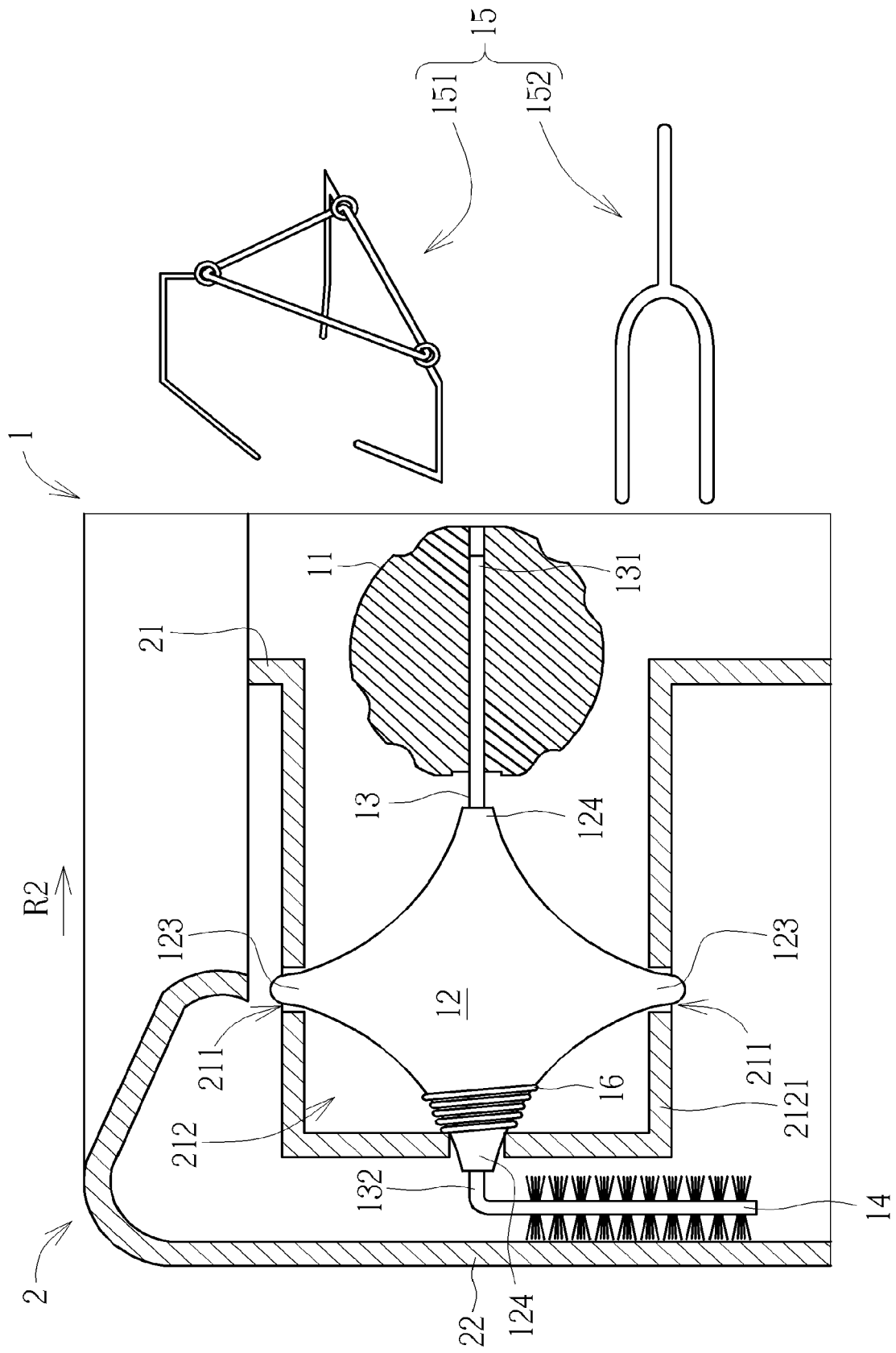


FIG. 2

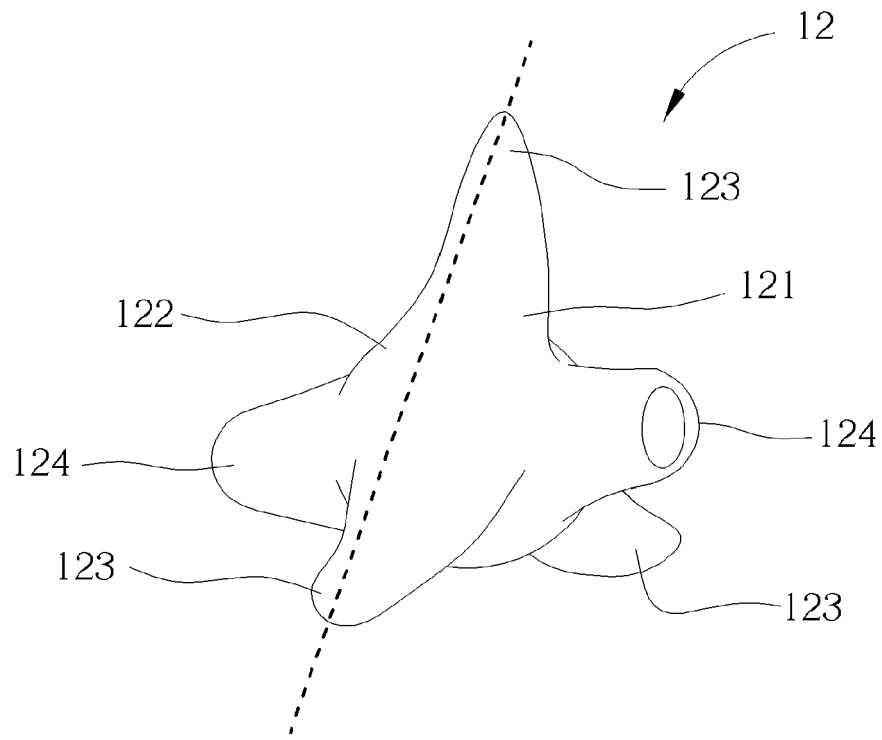


FIG. 3

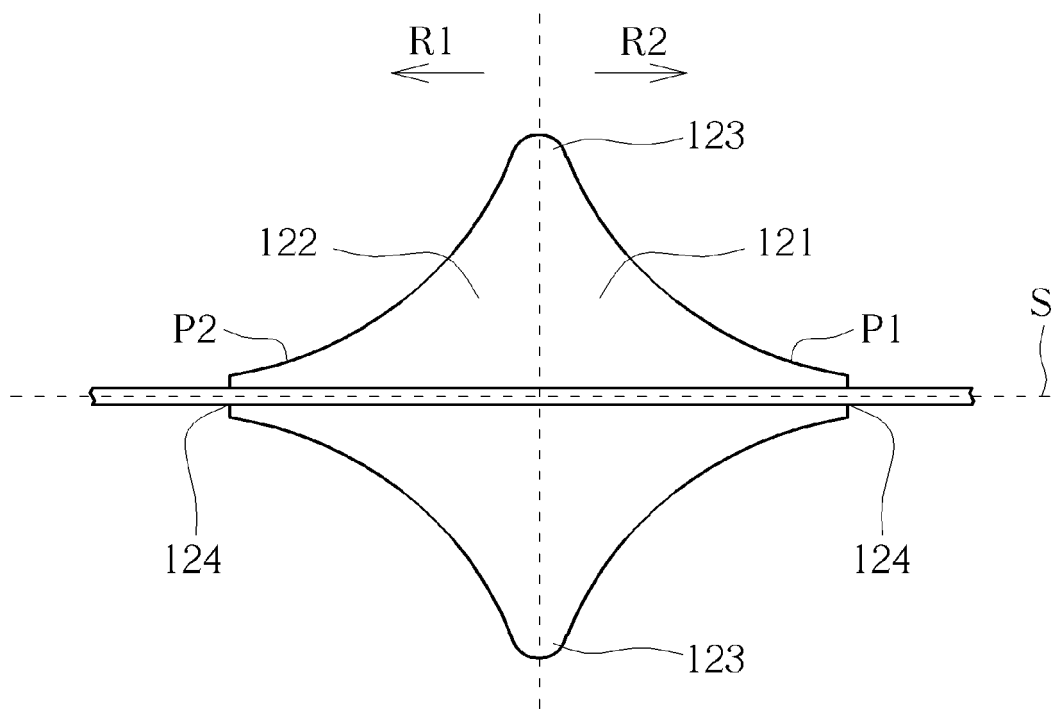


FIG. 4

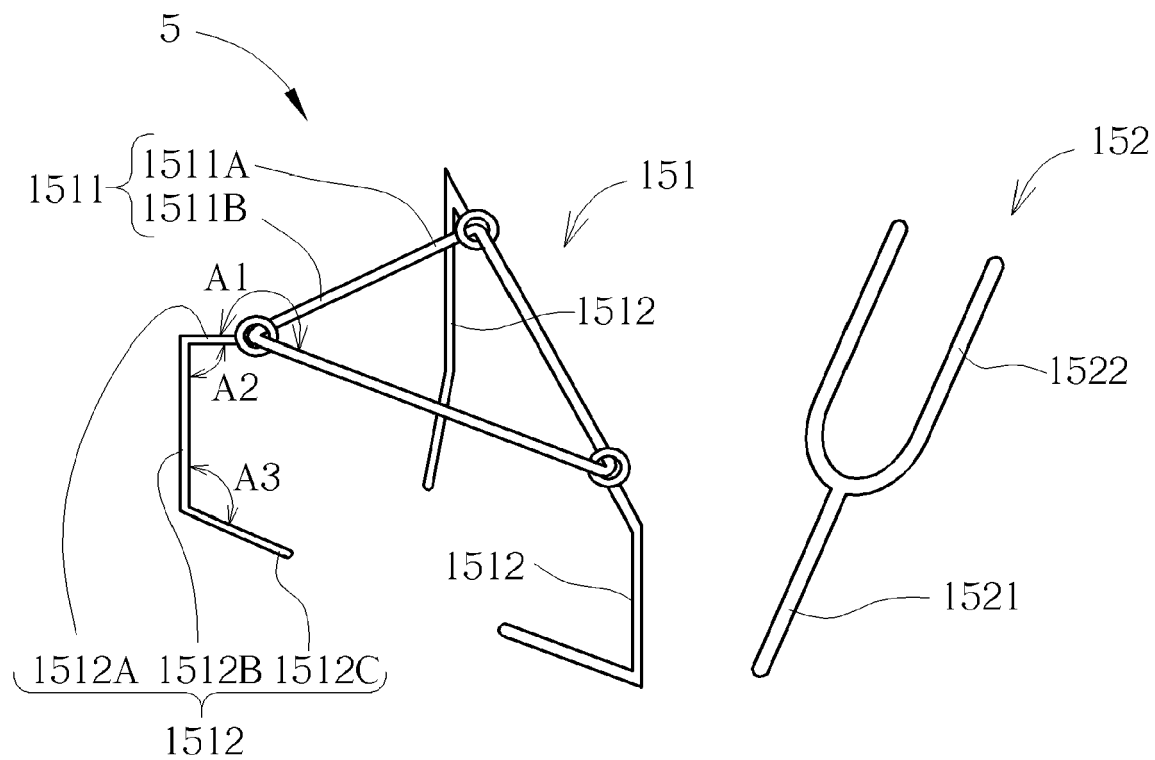


FIG. 5

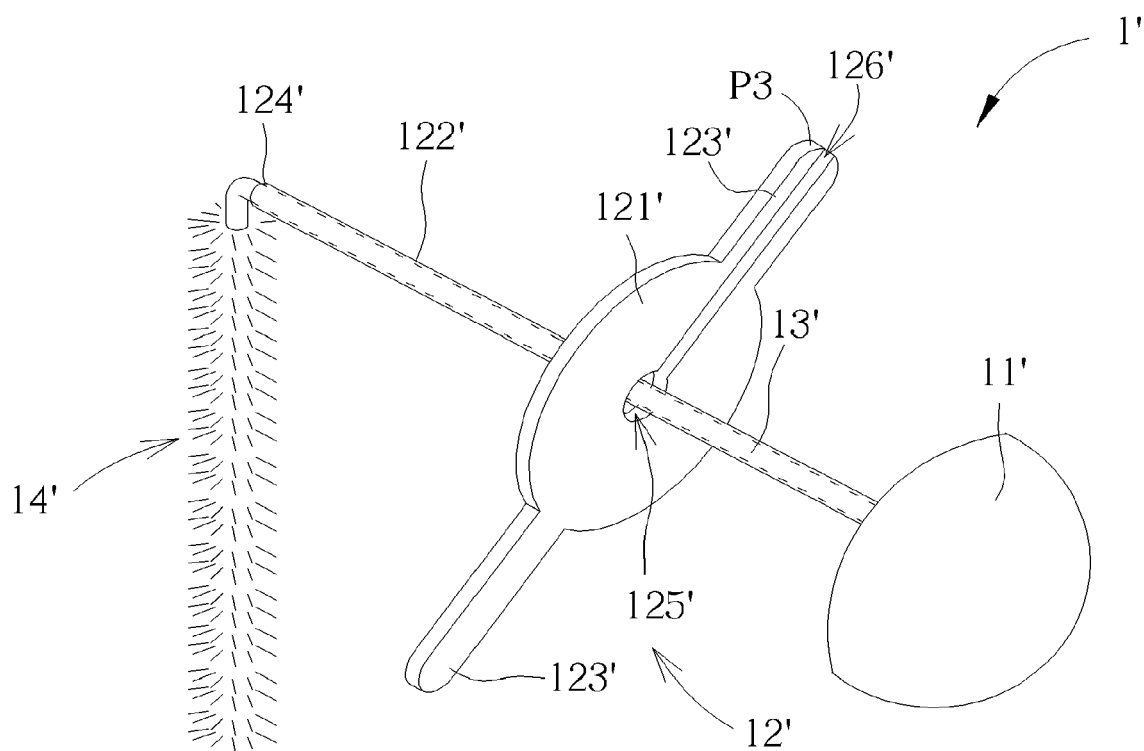


FIG. 6

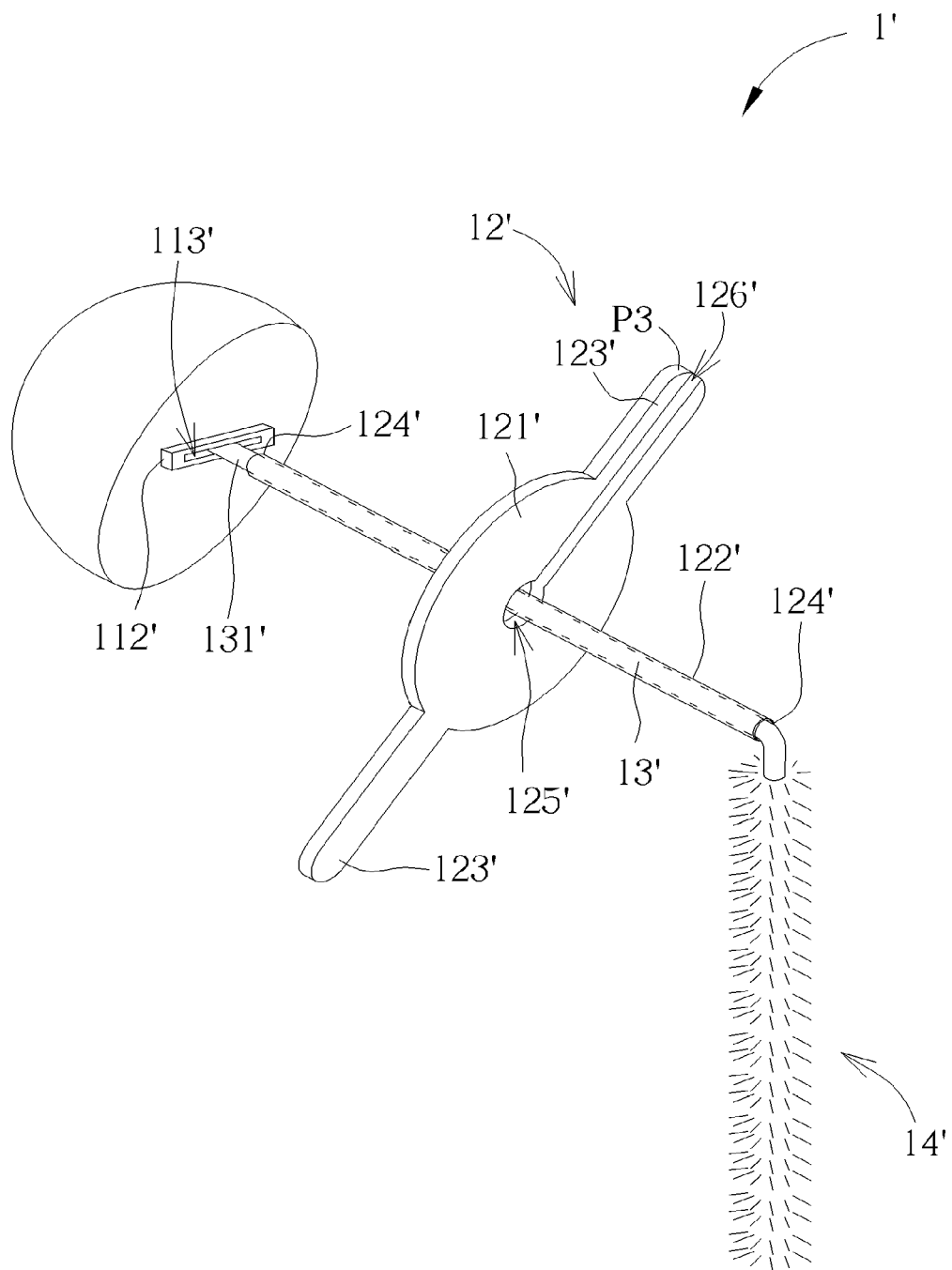


FIG. 7

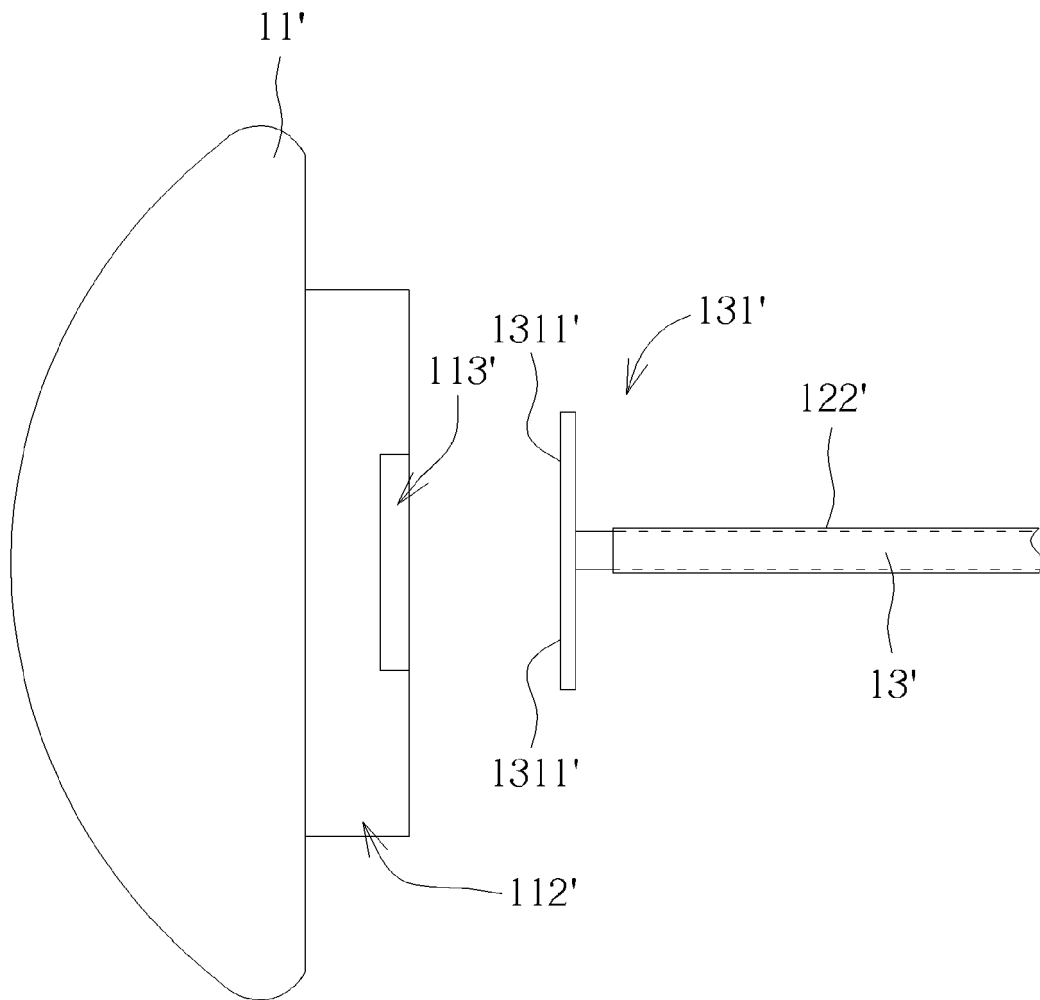


FIG. 8

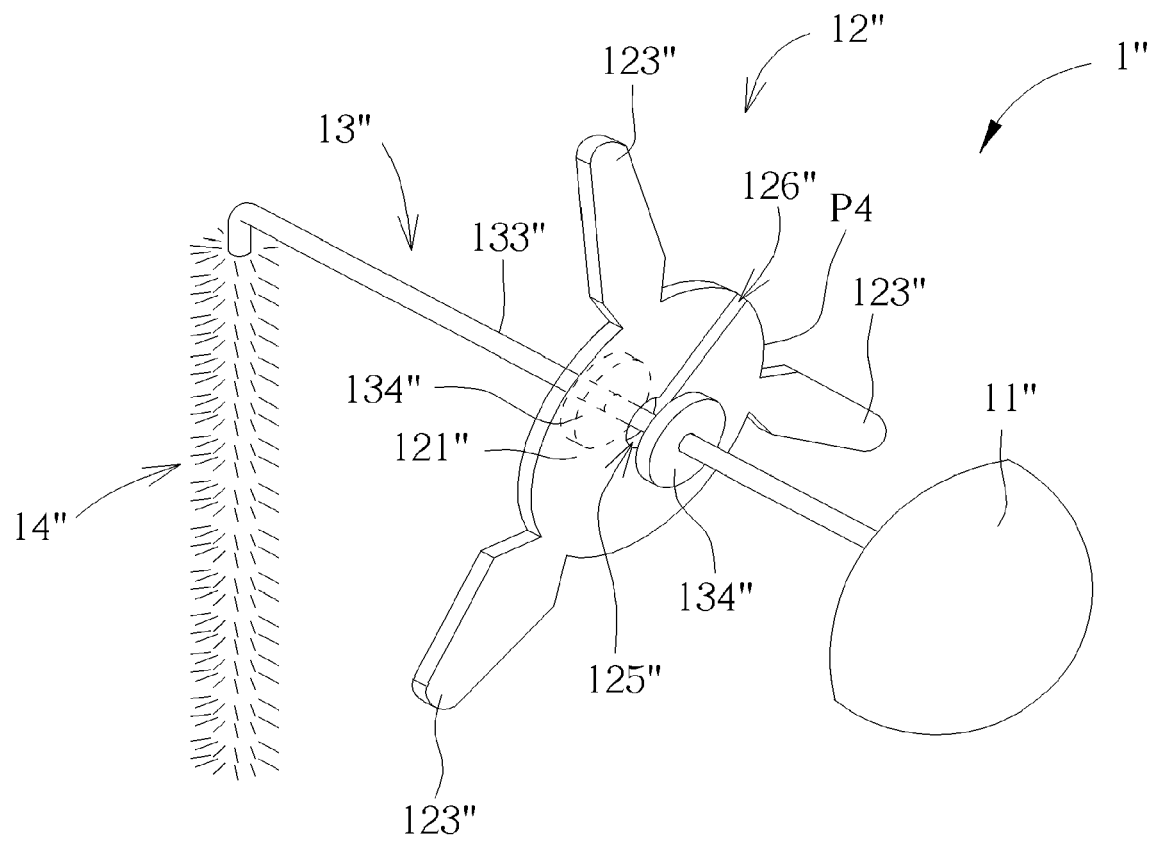


FIG. 9

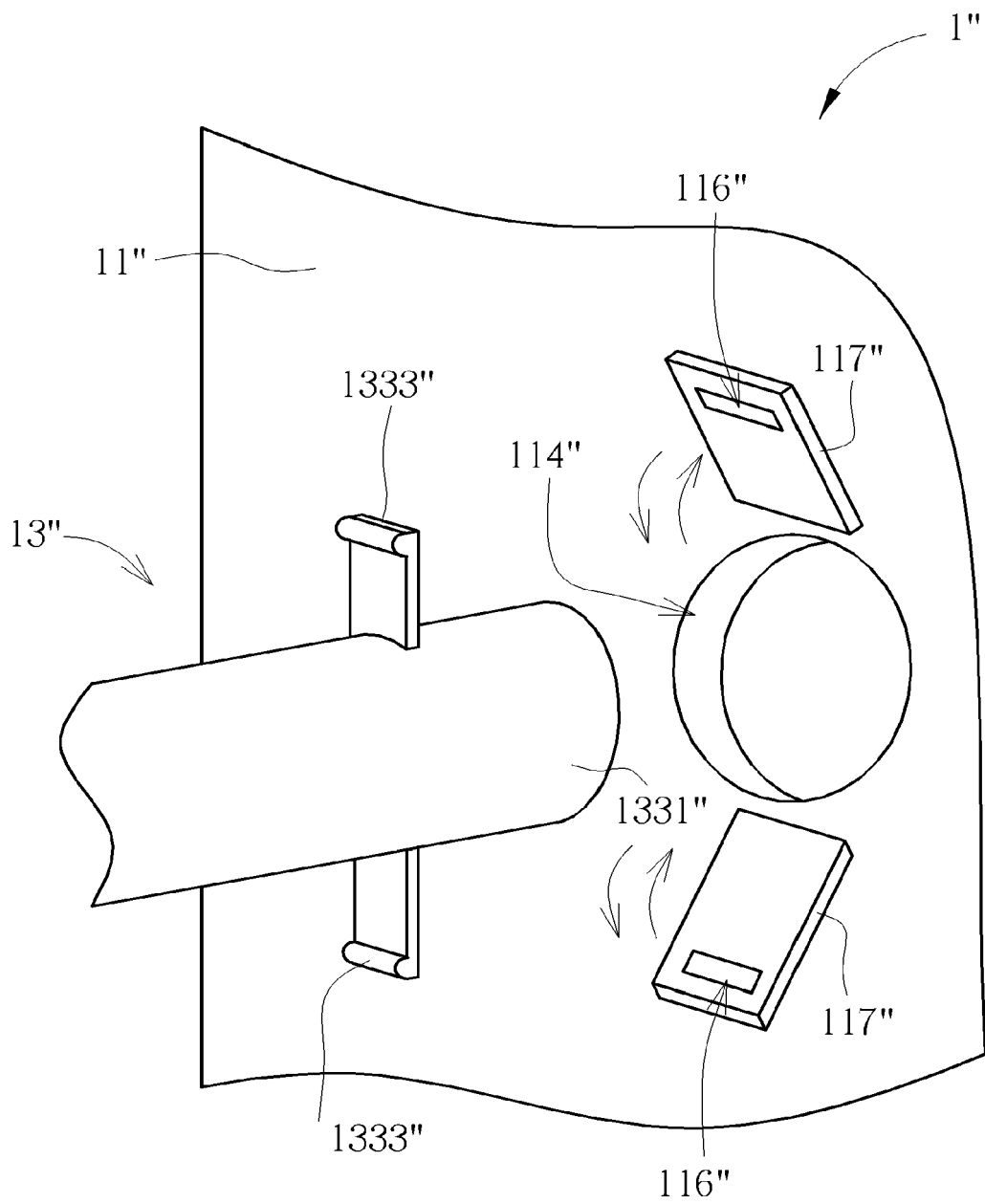


FIG. 10

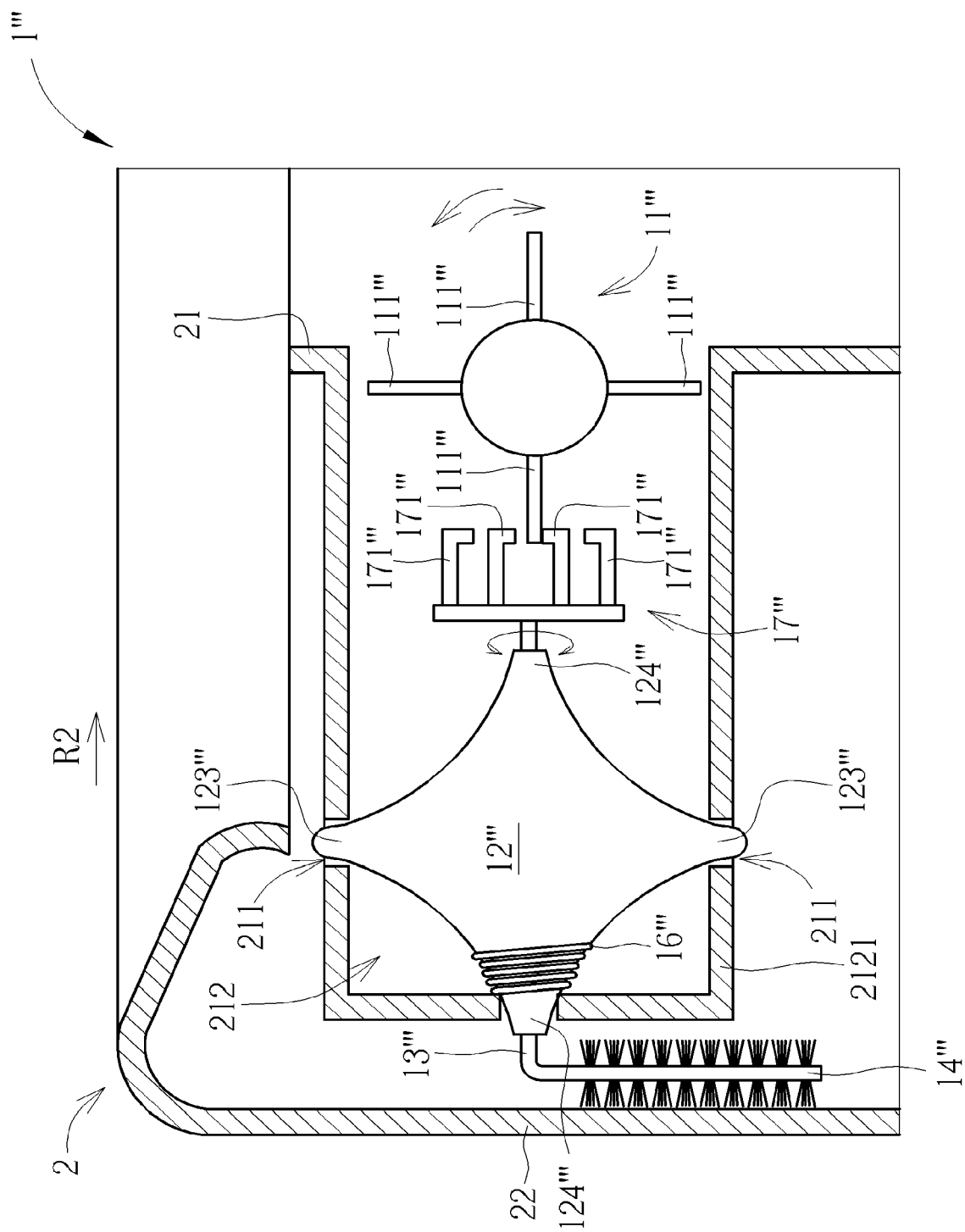


FIG. 11

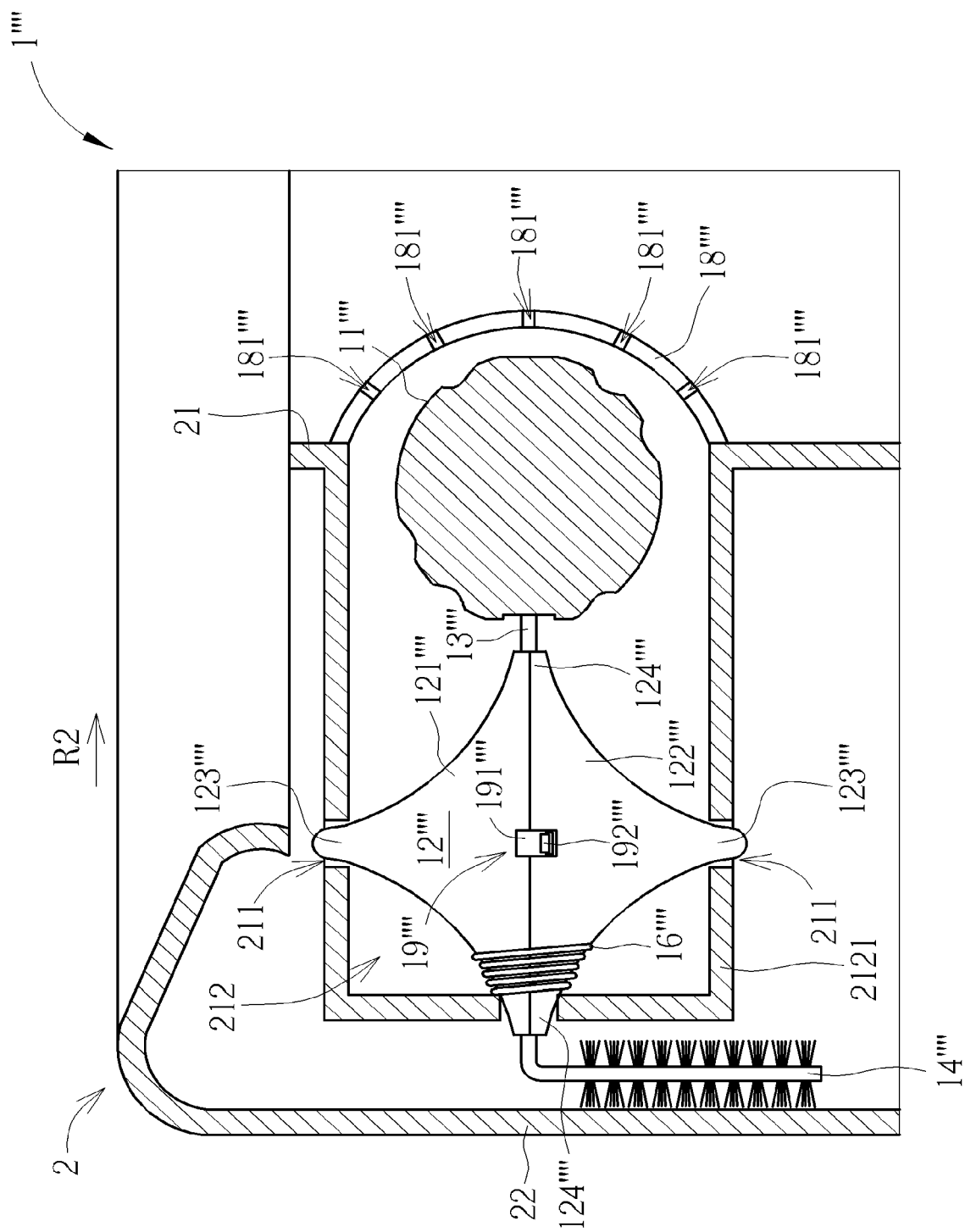


FIG. 12

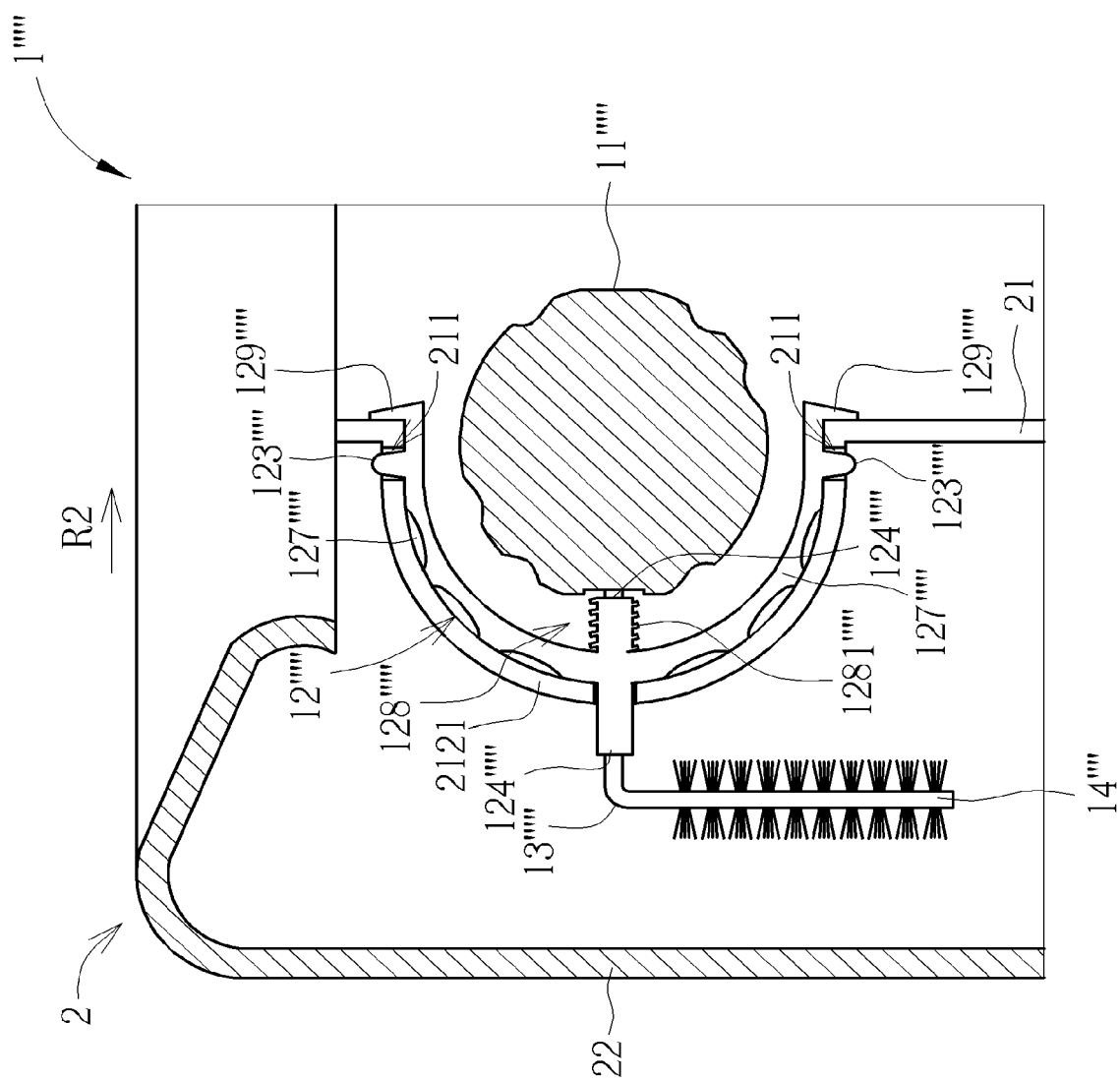


FIG. 13

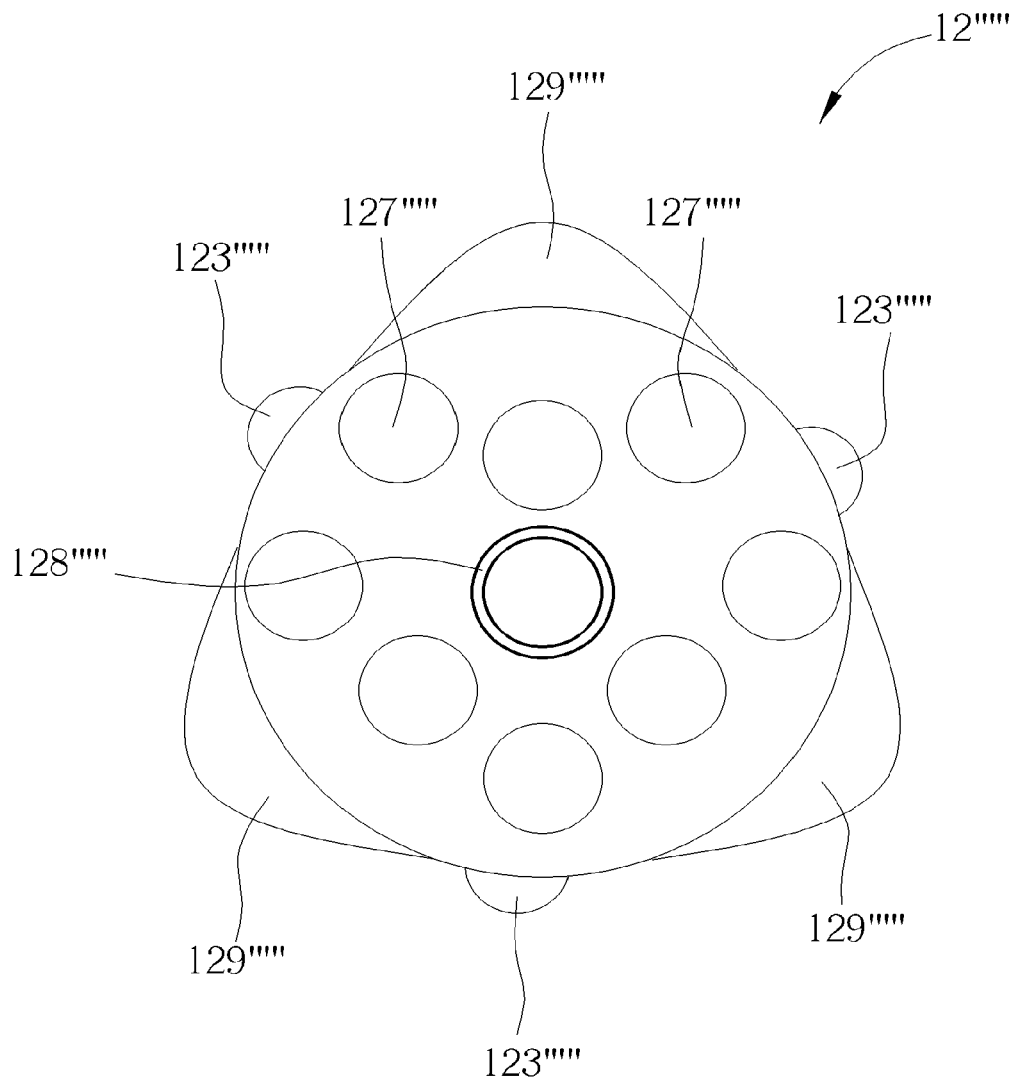


FIG. 14



EUROPEAN SEARCH REPORT

Application Number
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A	US 2017/327987 A1 (LEE MENG-LAN [TW]) 16 November 2017 (2017-11-16) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 May 2020	Examiner Jeziarski, Krzysztof
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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05-05-2020

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