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(54) **WALL-MOUNTED FIXATION DEVICE**

(57) A wall-mounted fixation device comprises a support device (11) and a fixation bracket (13) detachably disposed on the support device (11). The support device (11) comprises a hook (113) disposed on a wall. The fixation bracket (13) comprises two fixation rods (131) and a stop member (139), a hook pressing member (135), and a supported object pressing member (137) disposed on the two fixation rods (131). The hook (113) extends through a via opening formed by the two fixation rods (131), the stop member (139), and the hook pressing member (135). A minimum distance between the hook pressing member (135) and the supported object pressing member (137) is less than the vertical height of the hook (113). At least one of the hook (113), the hook pressing member (135), and the supported object pressing member (137) is elastic. A maximum distance between the hook pressing member (135) and the supported object pressing member (137) is greater than a minimum distance from the top of the hook (113) to the wall and is less than a distance from the top of the hook (113) to a connection portion of the hook (113) and the wall. The wall-mounted fixation device is convenient to use.

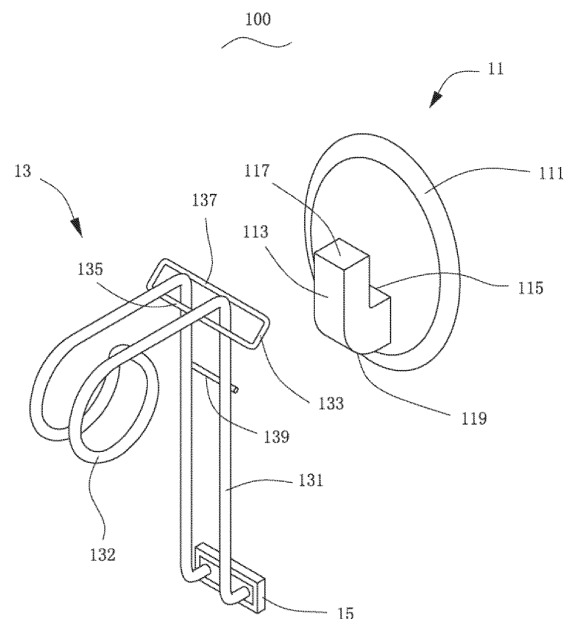


FIG. 1

Description**FIELD OF THE INVENTION**

5 [0001] The present invention relates to furniture accessories, and more particularly to a wall-mounted fixation device.

BACKGROUND OF THE INVENTION

10 [0002] Wall-mounted fixation devices, such as hooks affixed to the wall, are very popular and generally used at home since their small size and convenience to use. In order to make full use of the wall-mounted fixation device and to meet the different using requirements of environments, such as bathroom or bedroom, a wall-mounted fixation device with special function has been developed, such as soapbox or soap bracket affixed to the wall. It includes a base secured to the wall and a box or bracket integrally formed with the base. However, as desiring to change usage after the device is affixed to the wall, the device must be replaced or disassembled completely, thereby causing lots of inconvenience.

15 In addition, each replacement or removal of the device from the wall will reduce the connection robustness between the base and the wall, thus damaging the wall or the fixation device.

SUMMARY OF THE INVENTION

20 [0003] One aspect of the present invention is to provide a wall-mounted fixation device which is capable of facilitating replacement and removal.

[0004] To obtain the above, a wall-mounted fixation device provided by the present invention includes: a support device; and a fixation bracket detachably disposed on the support device; wherein the support device contains a hook disposed on a support, the fixation bracket comprises two fixation rods and a stop member, a hook pressing member, and a support pressing member, which are disposed on the two fixation rods, the hook extends through a via opening formed by the two fixation rods, the stop member, and the hook pressing member; a minimum distance between the stop member and the hook pressing member is less than a vertical height of the hook; at least one of the hook, the hook pressing member, and the support pressing member is elastic; a maximum distance between the hook pressing member and the support pressing member is greater than a minimum distance from a top of the hook to the support, and the maximum distance between the hook pressing member and the support pressing member is less than a distance from the top of the hook to a connection portion of the hook and the support.

[0005] In a preferred embodiment, the support device includes a base as the support, the hook is disposed on the base, the support pressing member abuts against the base. The maximum distance between the hook pressing member and the support pressing member is greater than a minimum distance from the top of the hook to the base, and the maximum distance between the hook pressing member and the support pressing member is less than the distance from the top of the hook to a connection portion of the hook and the base.

[0006] In a preferred embodiment, the hook pressing member and the support pressing member are parallel to each other, both ends of the hook pressing member and the support pressing member are connected to form a rectangular connecting ring.

40 [0007] In a preferred embodiment, the wall-mounted fixation device further includes a friction pad located at a bottom of the two fixation rods, wherein the friction pad abuts against the wall.

[0008] In a preferred embodiment, the friction pad has an uneven pattern formed on the surface thereof.

[0009] In a preferred embodiment, the wall-mounted fixation device further includes a rigid pad located at the bottom of the two fixation rods, wherein the rigid pad is coated with a coating configured to increase the friction.

45 [0010] In a preferred embodiment, the wall-mounted fixation device further includes a rigid pad located at the bottom of the two fixation rods, wherein the rigid pad has an uneven pattern formed on the surface thereof.

[0011] In a preferred embodiment, the top of the two fixation rods extend toward a direction away from a wall and form a support portion for supporting weights.

50 [0012] In a preferred embodiment, the wall-mounted fixation device further includes a friction pad located at the bottom of the two fixation rods, wherein the friction pad abuts against the wall; when a horizontal distance between a force center of the support portion to the hook pressing member is denoted as H , and a vertical distance between the hook pressing member and the friction pad is denoted as V , then $H/V = \mu / (1 + \mu^2)$, wherein μ is a static friction coefficient of the friction pad.

55 [0013] In a preferred embodiment, a force direction of the fixation bracket to the hook forms an angle θ with the fixation rod, and

$$\cos \theta = \frac{1}{\sqrt{\mu^2 + 1}}.$$

5

[0014] In a preferred embodiment, the fixation rods are made of iron or stainless steel.

10 [0015] In a preferred embodiment, the two fixation rods are parallel to each other; the hook pressing member and the support pressing member are parallel to each other, and the hook pressing member and the support pressing member are disposed on both sides of a plane defined by the two fixation rods.

[0016] In a preferred embodiment, the wall-mounted fixation device further includes an elastic member disposed on the hook.

[0017] In a preferred embodiment, the fixation bracket is provided with a support portion for supporting weights, the elastic member is compressed when the support portion is loaded with the weights.

15 [0018] In a preferred embodiment, the elastic member bounces the fixing bracket when the weights are removed.

[0019] In a preferred embodiment, the elastic member includes a plurality of connected elastic rings.

[0020] In a preferred embodiment, the elastic member further includes a first fixing ring and a second fixing ring which are disposed at both ends of the plurality of connected elastic rings, the first fixing ring and the second fixing ring are fitted on the hook.

20 [0021] In a preferred embodiment, both ends of the hook pressing member are bent to form two supporting arms, the support pressing member is a casing fitted on the two supporting arms and is parallel to the hook pressing member.

[0022] In a preferred embodiment, the two supporting arms form a gap between two ends thereof.

25 [0023] In a preferred embodiment, the elastic member is an elastic metal wire, both ends of the metal wire are secured to the two supporting arms, a middle portion of the metal wire abuts against a connecting portion between the hook and the support.

[0024] In a preferred embodiment, both ends of the hook pressing member are bent to form two supporting arms, the support pressing member includes two support pads located at both ends of the two supporting arms.

[0025] In a preferred embodiment, the support pressing member includes two bending portions formed by extending the top of the two fixation rods in a direction away from the wall.

30 [0026] In a preferred embodiment, the support pressing member includes two support pads located at both ends of the two fixation rods.

[0027] In a preferred embodiment, the hook is provided with a latching protrusion on a bottom thereof, the stop member is latched between the latching protrusion and the support.

35 [0028] A wall-mounted fixation device includes: a support device; and a fixation bracket detachably disposed on the support device; wherein the support device includes a hook disposed on a support, the fixation bracket comprises a support plate and a fixing plate bending from an end of the support plate, the fixing plate defines a via opening to allow the hook to extend through, the support plate is provided with an elastic positioning protrusion on a side thereof adjacent to the fixing plate, the positioning protrusion abuts against a top of the hook, a maximum distance between the positioning protrusion and the support is less than a minimum distance from a top of the hook to the support.

40 [0029] In a preferred embodiment, the hook is provided with a latching protrusion on a bottom thereof, the fixing plate is provided with an elastic latching bar adjacent to the via opening, the latching bar is latched between the latching protrusion and the support.

45 [0030] In a preferred embodiment, the fixing plate is made of elastic materials, the fixing plate defines two first deformed holes adjacent to both side edges thereof, the fixing plate further defines a second deformed hole intercommunicated with the two first deformed holes positioned between the via opening and the latching bar, the two first deformed holes are compressed and the second deformed hole is expanded when squeezing both sides of the fixing plate, such that the latching bar is detached from the latching protrusion.

50 [0031] The wall-mounted fixation device has a fixation bracket which is removably mounted to the support device, therefore its use can be changed by simply replacing or removing the fixation bracket, which is more convenient to use, and will not damage or reduce a connection robustness between the base and a wall.

BRIEF DESCRIPTION OF THE DRAWINGS

55 [0032] The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the views.

FIG. 1 is an exploded perspective view of a first embodiment of a wall-mounted fixation device;

FIG. 2 is a schematic perspective view of the wall-mounted fixation device shown in FIG. 1 after assembly;
 FIG. 3 through FIG. 5 are side views showing the operation when the fixation bracket of FIG. 1 is mounted on the support device;
 FIG. 6 is a partial perspective view of a second embodiment of a fixation bracket;
 FIG. 7 is a side view of the fixation bracket of FIG. 6 being mounted on the support device;
 FIG. 8 is a side view of a third-A embodiment of a fixation bracket being mounted on the support device;
 FIG. 9 is a perspective view of a third-B embodiment of a fixation bracket;
 FIG. 10 is a side view of the fixation bracket of FIG. 9 being mounted on the support device;
 FIG. 11 is a perspective view of a fourth embodiment of a fixation bracket;
 FIG. 12 is a side view of the fixation bracket of FIG. 11 being mounted on the support device;
 FIG. 13 is a perspective view of a fifth embodiment of a fixation bracket;
 FIG. 14 is a side view of the fixation bracket of FIG. 12 being mounted on the support device;
 FIG. 15 is an enlarged view corresponding to the portion XV shown in FIG. 14;
 FIG. 16 is a partial perspective view of a sixth embodiment of a fixation bracket;
 FIG. 17 is an enlarged view corresponding to the portion XVII shown in FIG. 16;
 FIG. 18 is a side view of the fixation bracket of FIG. 16 being mounted on the support device;
 FIG. 19 is a partial perspective view of a seventh embodiment of a fixation bracket;
 FIG. 20 is a side view of the fixation bracket of FIG. 19 being mounted on the support device;
 FIG. 21 is a perspective view of an eighth embodiment of a fixation bracket;
 FIG. 22 is a side view of the fixation bracket of FIG. 21 being mounted on the support device;
 FIG. 23 through FIG. 24 are side views showing the operation when a ninth embodiment of the fixation bracket is mounted on the support device;
 FIG. 25 is a top view of the fixing plate shown in FIG. 24; and
 FIG. 26 is a top view of the fixing plate shown in FIG. 24 in another state.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0033] Illustrative embodiments of the invention are described below. The following explanation provides specific details for a thorough understanding of and enabling description for these embodiments. One skilled in the art will understand that the invention may be practiced without such details. In other instances, well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments. Unless the context clearly states otherwise, when a particular feature, structure, or characteristic is described in connection with an embodiment, it is submitted that it is within the knowledge of one skilled in the art to effect such feature, structure, or characteristic in connection with other embodiments whether or not explicitly described.

[0034] Referring to FIG. 1 and FIG. 2, a first embodiment of a wall-mounted fixation device 100 includes a support device 11 and a fixation bracket 13, which is detachably mounted on the support devices 11.

[0035] The support device 11 includes a base 111 secured to a wall and a hook 113 disposed on the base 111. In the illustrated embodiment, the base 111 can be regarded as a support for supporting the hook 113. The base 111 is a substantially a plastic pad in an oval shape, which is secured to a wall W (see FIG. 3) of a toilet or a balcony by means of a film, an adhesive or screws. The hook 113 includes a connection portion 115 located on a surface of the base 111 adjacent to a bottom thereof and a top 117 extending upwardly from the connection portion 115. The hook 113 has a smooth curved surface 119 on an outer surface thereof. The hook 113 can be made of elastic materials, such as plastic or metal.

[0036] The fixation bracket 13 includes two fixation rods 131, which can be made of rigid materials, such as metal wire, flat wire, stainless steel wire and the like. The two fixation rods 131 are extended parallel to each other along a substantially vertical direction. The top of the two fixation rods 131 extend perpendicularly toward a direction away from the base 111 or the wall and form a support portion 132 for supporting weights. In the illustrated embodiment, the support portion 132 is a hook formed by extending the top of the two fixation rods 131 perpendicularly then bending them downwardly along a direction close to the base 111. As shown in FIG. 2, the hook can be used to support a long rod R for drying towel.

[0037] The fixation bracket 13 further includes a hook pressing member 135 and a support pressing member 137, which are disposed to the two fixation rods 131. In the context of the present disclosure, the term "dispose", as used herein, is defined as directly secured or indirectly connected to another object. The hook pressing member 135 and the support pressing member 137 can be made of resilient materials. In the illustrated embodiment, the fixation bracket 13 includes a connection ring 133 located on the two fixation rods 131.

[0038] The connection ring 133, which is in a rectangular shape, includes the hook pressing member 135 and the support pressing member 137, which are parallel to each other. The hook pressing member 135 extends substantially horizontally and is fixed by welding or the like to one side of the two fixation rods 131 adjacent to the support portion

132. Both ends of the support pressing member 137 are connected to corresponding ends of the hook pressing member 135, respectively. Referring to FIG. 3, a maximum distance between the hook pressing member 135 and the support pressing member 137 (the maximum distance between the two most peripheral edge thereof) is denoted as a , a minimum distance (a horizontal distance) from the top 117 of the hook 113 to the base 111 is denoted as b , and a distance from the top 117 of the hook 113 to the connection portion 115 of the hook 113 and the base 111 is denoted as c , then $b < a < c$.

[0039] The two fixation rods 131 are further provided with a stop member 139 positioned below the connection ring 133. The stop member 139 is parallel to the hook pressing member 135 or the support pressing member 137. An area of a via opening formed by the two fixation rods 131, the stop member 139, and the hook pressing member 135 is greater than a cross-sectional area of the hook 113, such that the hook 113 can extend through the via opening. In addition, a minimum distance D between the stop member 139 and the hook pressing member 135 is less than a vertical height L of the hook 113 (shown in FIG. 5). In the illustrated embodiment, the stop member 139 is a bar welded to the two fixation rods 131. In alternative embodiments, the stop member 139 may be integrally formed with the two fixation rods 131, or may be two shorter bars.

[0040] Two bottoms of the two fixation rods 131 are bent towards the wall W . The wall-mounted fixation device 100 further includes a friction pad 15 located at the two bottoms of the two fixation rods 131. The friction pad 15 may abut against the wall W , so as to provide the friction force to prevent the weights and the wall-mounted fixation device 100 from falling. The friction pad 15 is preferably made of silicone with a high coefficient of static friction.

[0041] Since the material based on silicone may have a phenomenon of "creep", i.e. it has a tendency to move slowly under the influence of mechanical stresses, in one embodiment, the friction pad 15 has an uneven pattern formed on a surface thereof which is similar to the pattern on the surface of the automobile tire, such that the phenomenon of creep can be avoided.

[0042] In an alternative embodiment, the wall-mounted fixation device 100 further includes a rigid pad located at the two bottoms of the two fixation rods 131. The rigid pad may abut against the wall W . In a preferably embodiment, the rigid pad is coated with a coating on a surface thereof attached to the wall W to increase the friction. The coating can be made of a high-friction material, e.g. rubber (including silicone), PU or TPR plastic. The rigid pad has an uneven pattern formed on the surface thereof which is similar to the pattern on the surface of the automobile tire.

[0043] FIG. 3 through FIG. 5 show the operation when the fixation bracket 13 is mounted on the support device 11, which will be described in greater details.

[0044] Referring to FIG. 3, when the fixation bracket 13 is about to be mounted on the support device 11, the two fixation rods 131 cannot be attached to the hook 113 along a vertical direction, because the minimum distance D between the stop member 139 and the hook pressing member 135 is less than the vertical height L of the hook 113. Firstly, the connection ring 133 is inclined to a certain angle and then is placed between the hook 113 and the base 111. Since a maximum distance a between the hook pressing member 135 and the support pressing member 137 is less than a distance c from the top 117 of the hook 113 to a connection portion 115, the hook pressing member 135 and the support pressing member 137 can both be placed between the hook 113 and the base 111, and the hook pressing member 135 abuts against the hook 113, and the support pressing member 137 abuts the connection portion 115 of the base 111.

[0045] Referring to FIG. 4, when applying a force along a shown direction to the two bottoms of the two fixation rods 131, the fixation bracket 13 will rotate counterclockwise relative to a portion where the hook pressing member 135 is in contact with the hook 113. The stop member 139 slides along the curved surface 119 of the hook 113. Since an area of the via opening formed by the two fixation rods 131, the stop member 139, and the hook pressing member 135 is greater than a cross-sectional area of the hook 113, the hook 113 can extend through the via opening. Meanwhile, since the maximum distance a between the hook pressing member 135 and the support pressing member 137 is greater than a minimum distance b from the top 117 of the hook 113 to the base 111, a distance between the elastic hook 113 and the base 111 will be expanded by the hook pressing member 135 for a short distance during the rotation, and the distance between the hook pressing member 135 and the support pressing member 137 is compressed for a short distance, such that the distance between the elastic hook 113 and the base 111 is the same as the maximum distance between the hook pressing member 135 and the support pressing member 137, i.e., a plane located by the connection ring 133 is perpendicular to the base 111. At this point, the fixation bracket 13 is in an unstable critical state.

[0046] Referring to FIG. 5, when the fixation bracket 13 continues to rotate counterclockwise relative to a portion where the hook pressing member 135 is in contact with the hook 113, the hook pressing member 135 will accelerate the slide into the bottom of the hook 113 and reach the end of the rotation, because of the elastic force of the hook 113, the hook pressing member 135, and the support pressing member 137. This may give the user a good operation feeling. At this moment, the hook 113 is located between the two fixation rods 131, the hook pressing member 135 resists the hook 113, the support pressing member 137 resists the base 111, and the friction pad 15 resists the wall W . Since the hook 113 restores to its original shape to prevent the fixation bracket 13 from moving along a X-axis direction shown in FIG. 5, while the stop member 139 and the hook pressing member 135 are located on both upper and lower sides of the hook 113, and the minimum distance D between the stop member 139 and the hook pressing member 135 is less than the vertical height L of the hook 113, a movement of the fixation bracket 13 along a Y-axis direction shown in FIG. 5 and a

disengagement the fixation bracket 13 along a direction perpendicular to the wall W can be prevented, such that the fixation bracket 13 is firmly secured to the support device 11.

[0047] When the fixation bracket 13 is about to be removed from the support device 11, the two bottoms of the two fixation rods 131 are applied by a reverse force to rotate the fixation bracket 13 clockwise. At the initial stage of the rotation, a relative larger force is needed to overcome the elastic force of the hook 113, the hook pressing member 135, and the support pressing member 137. However, after the hook pressing member 135 and the support pressing member 137 pass through the critical state shown in FIG. 4, it is very convenient to remove the fixation bracket 13 from the support device 11.

[0048] The stress analysis of the wall-mounted fixation device 100 will be performed. For the sake of convenience, the weight of the fixation bracket 13 and the support device 11 will be ignored in the analysis.

[0049] A horizontal distance between a force center of the support portion 132 and the hook pressing member 135 is defined as H; a vertical distance between the hook pressing member 135 and the friction pad 15 is defined as V; and a coefficient of static friction of the friction pad 15 is defined as μ . Assuming the weight supported by the support portion 132 weighs F_1 ; a support force given by the wall to the friction pad 15 is N; a pressure on the hook 113 (i.e. a support force of the hook 113 to the fixation bracket 13) is F_h ; an angle between the direction of F_h and Y-axis is θ .

[0050] Regarding the hook pressing member 135 as a fulcrum, in accordance with the torque balance, we obtain:

$$F_1 \cdot H = N \cdot V \quad (I)$$

[0051] If regarding the fixation bracket 13 as a whole, it is mainly subject to four forces, which are: a gravity of a weight F_1 , a support force N of the wall to the friction pad 15, a static friction force $N\mu$ of the wall to the friction pad 15, and a support force F_h of the hook 113 to the fixation bracket 13. In accordance with the force balance, we obtain:

$$F_h^2 = N^2 + (F_1 - N\mu)^2 \quad (II),$$

and

$$\cos \theta = \frac{F_1 - N\mu}{F_h} \quad (III);$$

[0052] Associating the equation (I), (II), we obtain:

$$F_h^2 = [S^2 + (S\mu)^2 - 2S\mu + 1] \times F_1^2 \quad (IV);$$

where $S = H/V$.

[0053] According to equation (III), the pressure on the hook 113 is associated with the gravity of the weight supported by the support portion 132, and when the sum of $[S^2 + (S\mu)^2 - 2S\mu + 1]$ is minimum, a pressure on the hook 113 is minimum.

[0054] Accordingly, when $S = \mu(1 + \mu^2)$ (V), the pressure on the hook 113 is minimum.

[0055] At this moment, most of the gravity of the weight is supported by the static friction of the wall to the friction pad 15.

[0056] By applying the equation (V) to equation (III), we obtain:

$$\cos \theta = \frac{1}{\sqrt{\mu^2 + 1}} \quad (VI);$$

[0057] If the support force F_h of the hook 113 to the fixation bracket 13 extends through the hook pressing member 135 and the support pressing member 137, i.e. the force is applied along two short arms connecting the hook pressing

member 135 and the support pressing member 137, the fixation bracket 13 is most stable. Therefore, the angle formed by the plane defined by the hook pressing member 135 and the support pressing member 137 with the fixation rod 131

(i.e. vertical direction) is preferably $\arccos \frac{1}{\sqrt{\mu^2 + 1}}$.

[0058] For example, let the weight be 10 Kg; a horizontal distance between the weight center and the hook pressing member 135 be 5 cm; a vertical distance between the hook pressing member 135 and the friction pad 15 is 15 cm; a silicone pad with a maximum coefficient of static friction to the ceramic wall of 2.5 is used, it is calculated that the pressure on the hook is 3.7kg; and an angle formed by the force direction and the vertical direction is 63.7°.

[0059] Accordingly, only 37% of whole external force is withstood by the hook 113 (the rest of external force is held by the friction pad), and the force direction forms an angle of 63.7° with the wall, which is favorable for the support device 11 adsorbed or adhesive on the wall. If the support device 11 is subject to a force downwardly parallel to the wall, the material of the sucker or the adhesive will be damaged, which makes it difficult to endure and easy to fall off. Such a friction pad with a distance away from the hook as described can not only increase a loading capacity of the support device 11, but also protect the support device 11.

[0060] Furthermore, this friction pad can only effect by a long distance away from the hook, for indoor and outdoor appliances, if the conventional plastic materials are used, the plastic rod should be very wide and thick to withstand the heavy load, which results not only a high cost (materials, manufacturing, packaging, transportation, sales display), but also makes it difficult to deal with the exterior design and the space is wasted. On the contrary, if the fixation bracket is made of iron or stainless steel wire (including the flat iron or steel), the cost is reduced, and because it is slim, the occupied space becomes visually smaller, thus making it easy for appearance design.

[0061] It should be understood that, the base 111 can be omitted, as long as the hook 113 is secured to the wall directly. In this case, the support pressing member 137 abuts against the wall directly. In other words, when the hook 113 is secured to the wall, the wall itself may be regarded as the support; when the hook 113 is secured to the wall via the base 111, the base 111 may be regarded as the support.

[0062] In the illustrated embodiment, the hook 113, the hook pressing member 135, and the support pressing member 137 are elastic, it should be noted that, at least one of the hook 113, the hook pressing member 135, and the support pressing member 13 being elastic is enough to achieve the object of the present invention.

[0063] Alternative embodiments will be further described, it should be noted that, the support devices of the alternative embodiments are the same as that of the first embodiment, the difference lies mainly in the fixation brackets. If there is no deliberate negation, the features and advantages of the first embodiment can also be incorporated to other embodiments, and the features and advantages of the other embodiments can also be incorporated to the first embodiment.

[0064] Referring to FIG. 6, a second embodiment of a wall-mounted fixation device has a similar structure to that of the first embodiment, the difference lies in that: a fixation bracket 23 includes two parallel fixation rods 231 and a hook pressing member 235 and a support pressing member 237, which are parallel to each other.

[0065] The hook pressing member 235 is fixed by welding or the like to one side of the two fixation rods 231 adjacent to the support portion (not shown). The support pressing member 237 is fixed by welding or the like to the other side of the two fixation rods 231 away from the support portion. In other words, the hook pressing member 235 and the support pressing member 237 are secured to both sides of a plane located by the two fixation rods 231.

[0066] Referring also to FIG. 7, a maximum distance between the hook pressing member 235 and the support pressing member 237 (the maximum distance between the two most peripheral edge thereof) is denoted as a, a minimum distance (horizontal distance) from a top 217 of a hook 213 to a base 211 is denoted as b, and a distance from the top 217 of the hook 213 to a connection portion 215 of the hook 213 and the base 211 is denoted as c, then $b < a < c$.

[0067] Compared with the first embodiment, the fixation bracket 23 of the second embodiment uses less material, the structure is simplified, and has a better appearance.

[0068] Referring to FIG. 8, a third-A embodiment of a wall-mounted fixation device has a similar structure to that of the second embodiment, the difference lies in that: the wall-mounted fixation device further includes an elastic member 334 interposed between the hook pressing member 335 and the hook 313.

[0069] The elastic member 334 may be a spring, a metal sheet, a flexible plastic or a rubber and the like. In the illustrated embodiment, the elastic member 334 is a compressible spring having one end resisting the hook pressing member 335 and the other end resisting the hook 313. As previously described, the friction pad 35 may creep when subjected to an external force, however, when the elastic member 334 is employed, the fixation bracket will be pushed by the elastic member 334 to the highest position as no force being applied. When loading the weight, the elastic member 334 can be compressed, such that the friction pad will creep downward for a short distance to provide a greater upward support force. After the weight is removed, the elastic member 334 is able to bounce a fixation bracket 33, and the friction pad 35 moves to the highest position, so that it can be re-started to move when loaded for the next time.

[0070] Let the minimum elastic force of the elastic member 334 be $F_{s_{min}}$, a maximum elastic force be $F_{s_{max}}$; a gravity

of the fixation bracket 33 (without weight) be W_f ; a static friction coefficient be μ ; a horizontal distance between a center of gravity of the fixation bracket 33 and the hook pressing member 335 be H_f ; a vertical distance between the hook pressing member 335 and the friction pad 35 be V ; a gravity of the weight be W_l , we obtain:

$$F_{s_{min}} < W_f + W_l \quad (VII)$$

[0071] Otherwise, the elastic member 334 cannot be compressed, and no distance is allowed for creeping.

[0072] In addition, we obtain:

$$F_{s_{max}} > W_f + \mu \times W_f \times H_f / V \quad (VIII)$$

[0073] Otherwise, when the weight is removed, the elastic member 334 cannot bounce the fixation bracket 33.

[0074] Referring to FIG. 9 and FIG. 10, in a third-B embodiment, the elastic member 334 includes a first fixing ring 3341, and a second fixing ring 3343, and a plurality of elastic rings 3345. The first fixing ring 3341 and the second fixing ring 3343 are rectangular. Each elastic rings 3345 is oval. The plurality of elastic rings 3345 are connected together and are interposed between the first fixing ring 3341 and the second fixing ring 3343. In the illustrated embodiment, the elastic member 334 may be made of an elastic plastic called "HYTREL" of DuPont®. This type of the elastic plastic has a feature that when it is compressed, regardless of the amount of compression, the elastic force can be maintained the same, which is favorable to stability. During use, the first fixing ring 3341 is fitted on the top of the hook 313, while the second fixing ring 3343 is located at the bottom of the hook 313, and the one elastic ring 3345 on the top resists the hook pressing member 335. It is to be understood that, the first fixing ring 3341 and the second fixing ring 3343 may be omitted.

[0075] Referring to FIG. 11, a fourth embodiment of a wall-mounted fixation device has a similar structure to that of the first embodiment, the difference lies in that: a fixation bracket 43 includes two parallel fixation rods 431 and a hook pressing member 435 connected to the two parallel fixation rods 431. Both ends of the hook pressing member 435 are bent to form two supporting arms 436. A support pressing member 437 is a casing fitted on the two supporting arms 436 and is parallel to the hook pressing member 435. Both ends of the two supporting arms 436 are spaced from each other to form a gap for allowing the casing to be fitted on the two supporting arms 436.

[0076] The casing is preferably made of smooth plastic, such as PE (polyethylene) or POM (Polyoxymethylene).

[0077] Referring to FIG. 12, a maximum distance between the hook pressing member 435 and the support pressing member 437 (the maximum distance between the two most peripheral edge thereof) is denoted as a , a minimum distance (horizontal distance) from the top 417 of the hook 413 to the base 411 is denoted as b , and a distance from the top 417 of the hook 413 to the connection portion 415 of the hook 413 and the base 411 is denoted as c , then $b < a < c$.

[0078] In a fourth embodiment, the top of the fixation rods 431 extend perpendicularly in a direction away from the base 411 and are interconnected to form a support portion 432 for supporting the weight. In the illustrated embodiment, the support portion 432 is annular, which is used for supporting circular containers, such as washbasins, etc. It should be understood that, the support portion 432 may have other shapes such as square.

[0079] Referring to FIG. 13 and FIG. 14, a fifth embodiment of a wall-mounted fixation device has a similar structure to that of the first embodiment, the difference lies in that: the wall-mounted fixation device further includes an elastic member 534 located between a hook pressing member 535 and a hook 513.

[0080] Referring also to FIG. 15, the elastic member 534 may be a spring, a metal sheet, an elastic plastic, or a rubber and the like. In the illustrated embodiment, the elastic member 534 is an elastic metal wire. Both ends of the metal wire are secured to the two support arms 536, and a middle portion of the metal wire resists a connection portion between the hook 513 and the base 511. It is to be understood that, the middle portion of the metal wire may resist a connection portion between the hook 513 and the wall, as long as the base 511 is omitted.

[0081] Referring to FIG. 16, a sixth embodiment of a wall-mounted fixation device has a similar structure to that of the first embodiment, the difference lies in that: a fixation bracket 63 of the sixth embodiment includes two parallel fixation rods 631 and a hook pressing member 635 connected to the two fixation rods 631. Both ends of the hook pressing member 635 are bent to form two support arms 636, and the support pressing member 637 are two support pads located at both ends of the supporting arms 636.

[0082] Referring to FIG. 17, a shape of the support pad may be spherical, ellipsoidal or other to achieve a point contact of the support arm 636 and the base 611. In the illustrated embodiment, the support pad is a plastic cap made of PE or POM fitted on one end of the support arm. The support cap has a relatively smooth surface, thereby avoiding the support arm 636 from directly contacting the wall W or the base 611 and the scratch.

[0083] Referring to FIG. 18, a maximum distance between the hook pressing member 635 and the two support pressing members 637 (the maximum distance between the two most peripheral edges thereof) is denoted as a , a minimum distance (a horizontal distance) from the top 617 of the hook 613 to the base 611 is denoted as b , and a distance from the top 617 of the hook 613 to the connection portion 615 of the hook 613 and the base 611 is denoted as c , then $b < a < c$.

[0084] Referring to FIG. 19, a seventh embodiment of a wall-mounted fixation device has a similar structure to that of the first embodiment, the difference lies in that: the hook pressing member 735 has a larger thickness (or a diameter), and the support pressing member are the two bending portions 733 formed by extending the top of the two fixation rods 731 in a direction away from the base 711 (or the wall).

[0085] Referring to FIG. 20, a maximum distance between the hook pressing member 735 and the two bending portions 733 (the maximum distance between the two most peripheral edge thereof) is denoted as a , a minimum distance (a horizontal distance) from the top 717 of the hook 713 to the base 711 is denoted as b , and a distance from the top 717 of the hook 713 to the connection portion 715 of the hook 713 and the base 711 is denoted as c , then $b < a < c$.

[0086] Referring to FIG. 21, an eighth embodiment of a wall-mounted fixation device has a similar structure to that of the first embodiment, the difference lies in that: the support pressing member are two support pads 834 located at both ends of two fixation rods 831.

[0087] A shape of each support pad 834 may be spherical, ellipsoidal or other to achieve a point contact of the support arm 836 and the base 811. In the illustrated embodiment, the support pad 834 is a plastic cap made of PE or POM fitted on the end of the fixation rods 831.

[0088] Referring to FIG. 22, a maximum distance between the hook pressing member 835 and the two support pads 834 (the maximum distance between the two most peripheral edge thereof) is denoted as a , a minimum distance (a horizontal distance) from the top 817 of the hook 813 to the base 811 is denoted as b , and a distance from the top 817 of the hook 813 to the connection portion 815 of the hook 813 and the base 811 is denoted as c , then $b < a < c$.

[0089] The two fixation rods 831 are provided with a clamping member 832 located adjacent to the two support pads 834. The clamping member 832 is annular. The two fixation rods 831 are provided with a support frame 838 located adjacent to the friction pad 85. Cooperated with the clamping member 832, the support frame 838 can be used for fixing bottles, buckets or wastebaskets.

[0090] Referring to FIG. 23 and FIG. 24, a ninth embodiment of a wall-mounted fixation device 200 includes a support device 91 and a fixation bracket 93, which is detachably disposed on the support device 91.

[0091] The support device 91 includes a base 911 located on a wall and a hook 913 secured to the base 911. In the illustrated embodiment, the base 911 can be regarded as a support for supporting the hook 913. The base 911 is a plastic pad with an oval shape, which can be secured to the wall of a toilet or a balcony by means of a film, an adhesive or screws. The hook 913 includes a connection portion (not labeled) located on a surface of the base 911 adjacent to an end thereof and a top portion 9131 bending and extending upwardly. The hook 913 has a smooth curved surface 919 on an outer surface thereof. The hook 913 is further provided with a latching protrusion 9191 at a bottom thereof.

[0092] The fixation bracket 93 includes a rectangular support plate 931 and a fixing plate 933 bending vertically from an end of the support plate 931.

[0093] The support plate 931 is provided with an elastic positioning protrusion 9311 located on a side thereof adjacent to the fixing plate 933. As shown in FIG. 24, a maximum distance between the positioning protrusion 9311 and the support 911 is denoted as J ; a minimum distance from the top 9131 of the hook 913 to the support 911 is denoted as K , then $J \leq K$.

[0094] Referring to FIG. 25, the fixing plate 933 defines a via opening 935 for allowing the hook 913 to extend through. The fixing plate 933 is provided with an elastic latching bar 937 adjacent to an edge of the via opening 935. The fixing plate 933 is made of elastic materials, such as plastic or rubber, etc. The fixing plate 933 defines two elongated first deformed holes 9331 adjacent to both side edges thereof. The fixing plate 933 further defines an elongated second deformed hole 9333 between the via opening 935 and the latching bar 937, the second deformed hole 9333 interconnects both ends of the two first deformed holes 9331.

[0095] FIG. 23 through FIG. 24 show the operation when the fixation bracket 93 is mounted on the support device 91, which will be described in greater details. When the fixation bracket 93 is about to be mounted on the support device 91, the hook 913 firstly extends through the via opening 935 of the fixing plate 933, and the fixing plate 933 is located between the top 9131 of the hook 913 and the base 911. When the latching bar 937 slides along the curved surface 919 to a position abutting against a left side of the latching protrusion 9191, the positioning protrusion 9311 of the support plate 931 abuts against the top 9131 of the hook 913. When applying a force F to the end of the support plate 931 along a direction shown in FIG. 24, the fixing plate 93 will rotate counterclockwise. Since the latching bar 937 is elastic, it can elastically deform and pass through the latching protrusion 9191 and finally be latched between the latching protrusion 9191 and the base 911. Meanwhile, the positioning protrusion 9311 can also be elastically deformed to be located between the hook 913 and the base 911. As the maximum distance J between the positioning protrusion 9311 and the support 911 is less than a minimum distance K from the top 9131 of the hook 913 to the support 911, the positioning protrusion 9311 will eventually abut against the top 9131 of the hook 913, thereby preventing further clockwise and

counterclockwise rotation of the fixation bracket 93, which will then be firmly secured to the support device 91. The fixation bracket 93 can be used to place various items for the toilet use, such as basins, soap, and so on.

[0096] Referring to FIG. 26, when the fixation bracket 93 is about to be removed from the support device 91, both sides of the fixing plate 933 can be squeezed by fingers, such that the two first deformed holes 9331 are compressed, and the second deformed hole 9333 is expanded, i.e. the latching bar 937 moves in a direction away from the hook 913, such that the latching bar 931 is disengaged with the latching protrusion 9191. In the meantime, the fixation bracket 93 can be removed from the support device 91 by rotating the fixation bracket 93 clockwise, hence the operation is simple and convenient.

[0097] It is to be understood that, since the latching bar 931 is elastic, it can be pulled outwardly to pass the latching protrusion 9191, such that the first deformed hole 9331 and the second deformed hole 9333 can be omitted. Furthermore, the latching bar 937 and the latching protrusion 9191 can be omitted, as long as the fixing plate is made of rigid materials.

[0098] It is to be understood that, the latching protrusion 9191 of the ninth embodiment can be equipped to the hook of the first to the eighth embodiment, such that the stop member is latched between the latching protrusion and the support.

[0099] According to the described embodiments, the wall-mounted fixation device of the present invention can use the same support devices to match different type of fixation brackets to achieve various purposes. And the wall-mounted fixation device also has the advantages of simple structure and is easy to use.

[0100] Although the present invention has been described with reference to the embodiments thereof and the best modes for carrying out the present invention, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the present invention, which is intended to be defined by the appended claims.

Claims

1. A wall-mounted fixation device, comprising:

a support device; and

a fixation bracket detachably disposed on the support device;

wherein the support device includes a hook disposed on a support, the fixation bracket includes two fixation rods and a stop member, a hook pressing member, and a support pressing member, which are disposed on the two fixation rods, the hook extends through a via opening formed by the two fixation rods, the stop member, and the hook pressing member; a minimum distance between the stop member and the hook pressing member is less than a vertical height of the hook; at least one of the hook, the hook pressing member, and the support pressing member is elastic; a maximum distance between the hook pressing member and the support pressing member is greater than a minimum distance from a top of the hook to the support, and the maximum distance between the hook pressing member and the support pressing member is less than a distance from the top of the hook to a connection portion of the hook and the support.

2. The wall-mounted fixation device according to claim 1, wherein the support device includes a base as the support, the hook is disposed on the base, the support pressing member abuts against the base.

3. The wall-mounted fixation device according to claim 1, wherein the hook pressing member and the support pressing member are parallel to each other, both ends of the hook pressing member and the support pressing member are connected to form a rectangular connecting ring.

4. The wall-mounted fixation device according to claim 1, further comprising a friction pad located at two bottoms of the two fixation rods, wherein the friction pad abuts against a wall.

5. The wall-mounted fixation device according to claim 4, wherein the friction pad has an uneven pattern formed on a surface thereof.

6. The wall-mounted fixation device according to claim 1, further comprising a rigid pad located at the two bottoms of the two fixation rods, wherein the rigid pad is coated with a coating configured to increase a friction.

7. The wall-mounted fixation device according to claim 1, further comprising a rigid pad located at the two bottoms of the two fixation rods, wherein the rigid pad has an uneven pattern formed on a surface thereof.

8. The wall-mounted fixation device according to claim 1, wherein the top of the two fixation rods extend toward a

direction away from the wall and form a support portion for supporting weights.

9. The wall-mounted fixation device according to claim 8, further comprising a friction pad located at the bottom of the two fixation rods, wherein the friction pad abuts against the wall; when a horizontal distance between a force center of the support portion to the hook pressing member is denoted as H, and a vertical distance between the hook pressing member and the friction pad is denoted as V, then $H/V = \mu/(1+\mu^2)$, wherein μ is a static friction coefficient of the friction pad.

10. The wall-mounted fixation device according to claim 9, wherein a force direction of the fixation bracket to the hook forms an angle θ with each fixation rod, and

$$\cos \theta = \frac{1}{\sqrt{\mu^2 + 1}}.$$

11. The wall-mounted fixation device according to claim 1, wherein the two fixation rods are made of iron or stainless steel.

12. The wall-mounted fixation device according to claim 1, wherein the two fixation rods are parallel to each other; the hook pressing member and the support pressing member are parallel to each other, and the hook pressing member and the support pressing member are disposed on both sides of a plane defined by the two fixation rods.

13. The wall-mounted fixation device according to claim 1, further comprising an elastic member disposed on the hook.

14. The wall-mounted fixation device according to claim 13, wherein the fixation bracket is provided with a support portion for supporting weights, the elastic member is compressed when the support portion is loaded with the weights.

15. The wall-mounted fixation device according to claim 14, wherein the elastic member bounces the fixing bracket when the weights are removed.

16. The wall-mounted fixation device according to claim 13, wherein the elastic member includes a plurality of connected elastic rings.

17. The wall-mounted fixation device according to claim 16, wherein the elastic member further includes a first fixing ring and a second fixing ring which are disposed at both ends of the plurality of connected elastic rings, the first fixing ring and the second fixing ring are fitted on the hook.

18. The wall-mounted fixation device according to claim 1, wherein both ends of the hook pressing member are bent to form two supporting arms, the support pressing member is a casing fitted on the two supporting arms and is parallel to the hook pressing member.

19. The wall-mounted fixation device according to claim 18, wherein the two supporting arms form a gap between two ends thereof.

20. The wall-mounted fixation device according to claim 13, wherein the elastic member is an elastic metal wire, both ends of the metal wire are secured to the two supporting arms, a middle portion of the metal wire abuts against a connecting portion between the hook and the support.

21. The wall-mounted fixation device according to claim 1, wherein both ends of the hook pressing member are bent to form two supporting arms, the support pressing member comprises two support pads located at both ends of the two supporting arms.

22. The wall-mounted fixation device according to claim 1, wherein the support pressing member includes two bending portions formed by extending the top of the two fixation rods in a direction away from the wall.

23. The wall-mounted fixation device according to claim 1, wherein the support pressing member includes two support pads located at both ends of the two fixation rods.

24. The wall-mounted fixation device according to claim 1, wherein the hook is provided with a latching protrusion on a bottom thereof, the stop member is latched between the latching protrusion and the support.

25. A wall-mounted fixation device, comprising:

a support device; and
a fixation bracket detachably disposed on the support device;
wherein the support device includes a hook disposed on a support, the fixation bracket includes a support plate and a fixing plate bending from an end of the support plate, the fixing plate defines a via opening to allow the hook to extend through, the support plate is provided with an elastic positioning protrusion on a side thereof adjacent to the fixing plate, the positioning protrusion abuts against a top of the hook, a maximum distance between the positioning protrusion and the support is less than a minimum distance from the top of the hook to the support.

26. The wall-mounted fixation device according to claim 25, wherein the hook is provided with a latching protrusion on a bottom thereof, the fixing plate is provided with an elastic latching bar adjacent to the via opening, the latching bar is latched between the latching protrusion and the support.

27. The wall-mounted fixation device according to claim 25, wherein the fixing plate is made of elastic materials, the fixing plate defines two first deformed holes adjacent to both side edges thereof, the fixing plate further defines a second deformed hole intercommunicated with the two first deformed holes positioned between the via opening and the latching bar, the two first deformed holes are compressed and the second deformed hole is expanded when squeezing both sides of the fixing plate, such that the latching bar is detached from the latching protrusion.

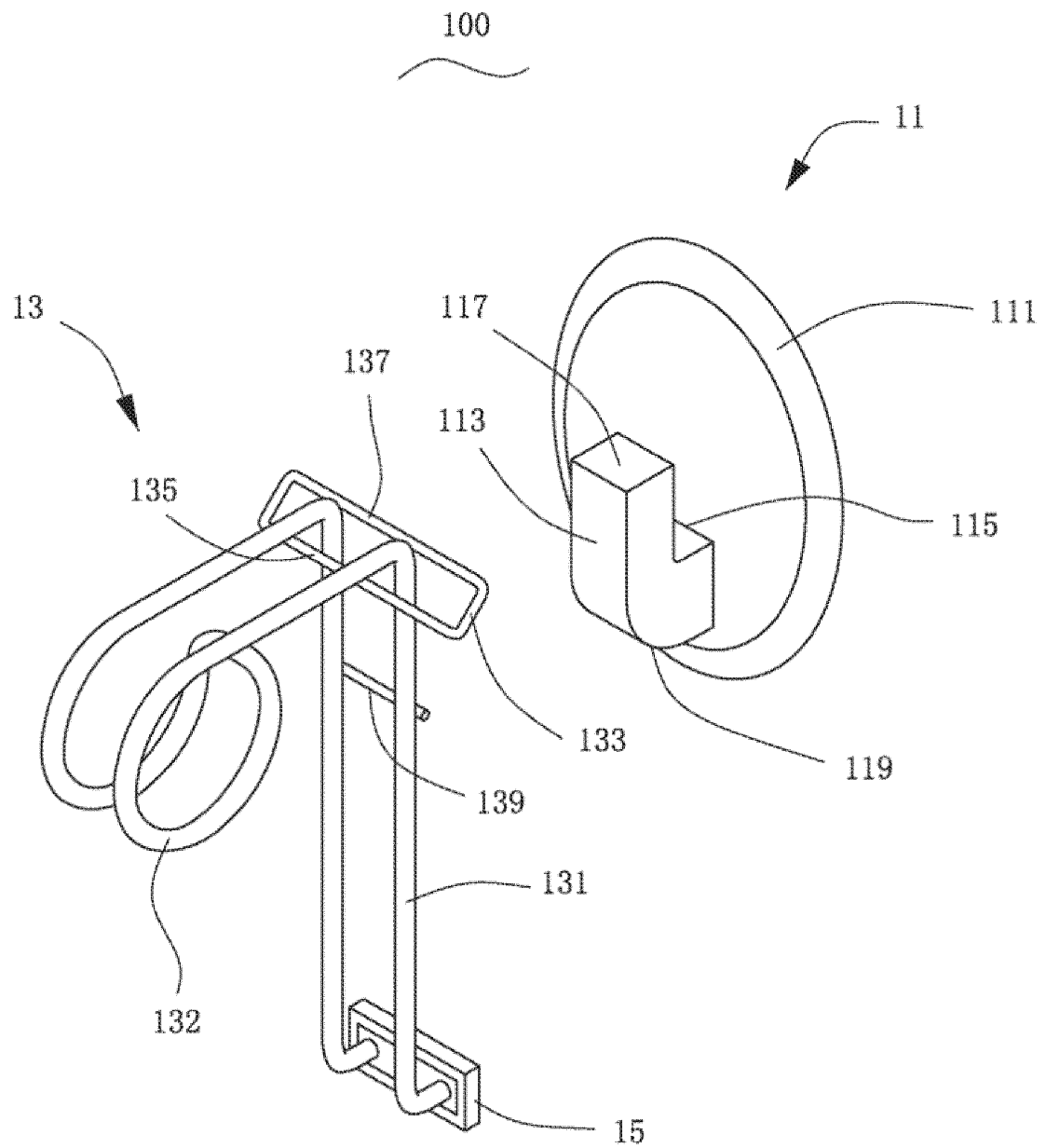


FIG. 1

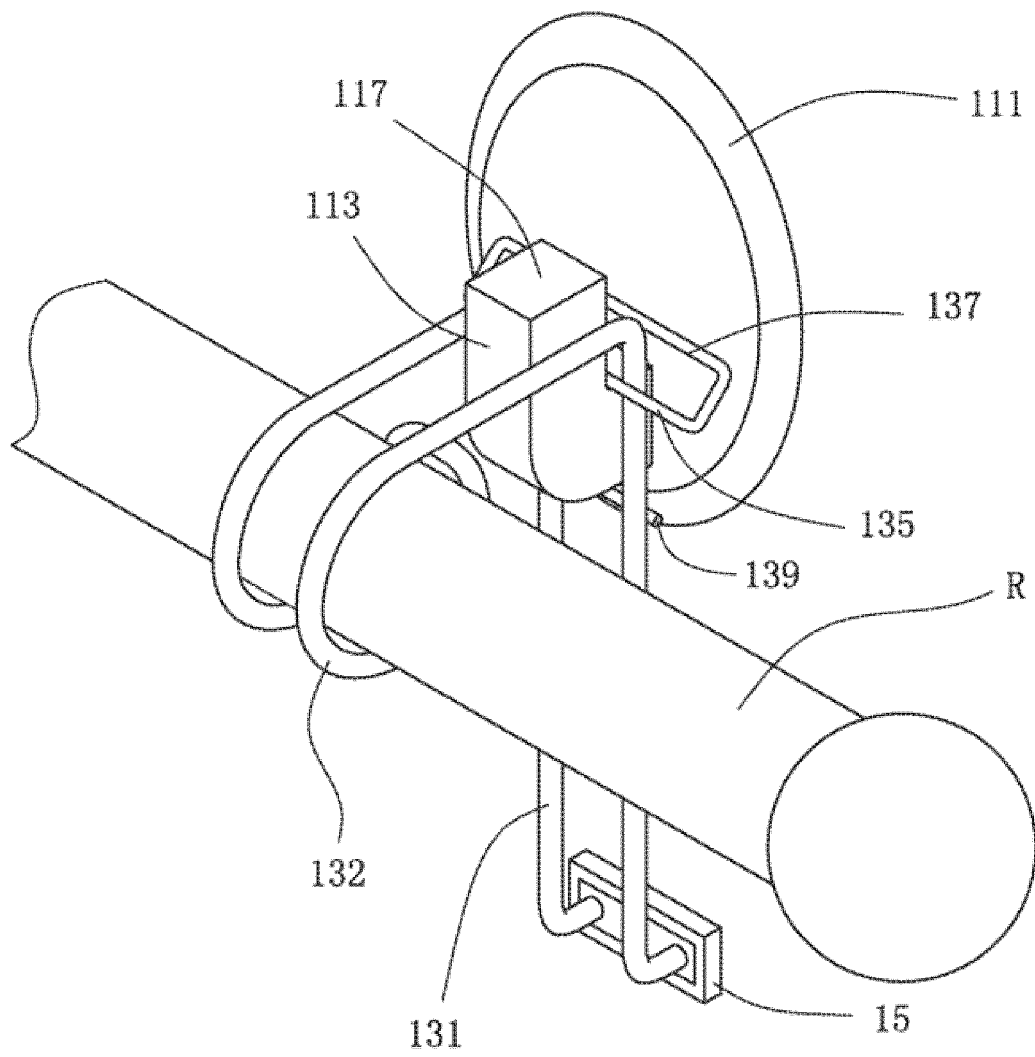


FIG. 2

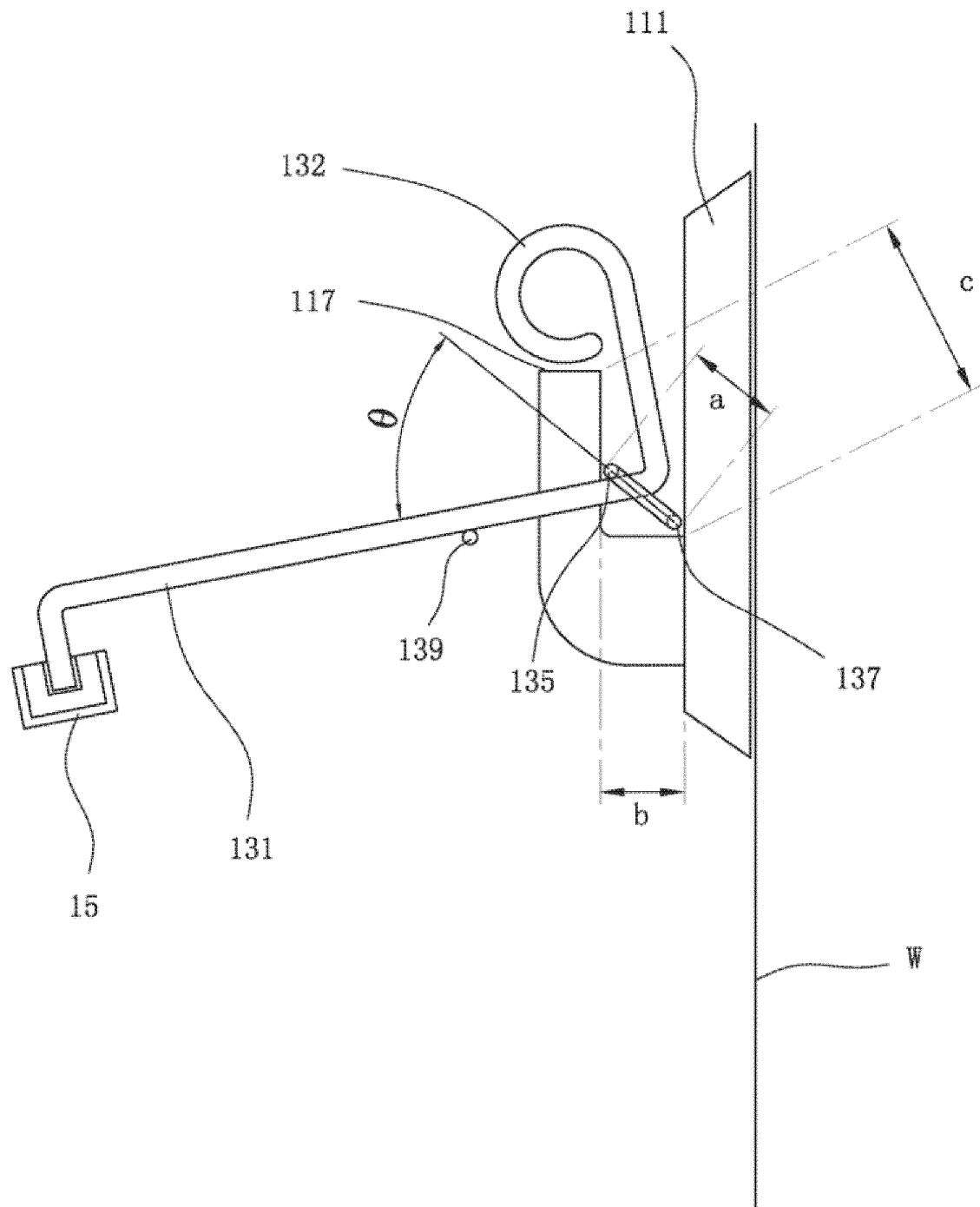


FIG. 3

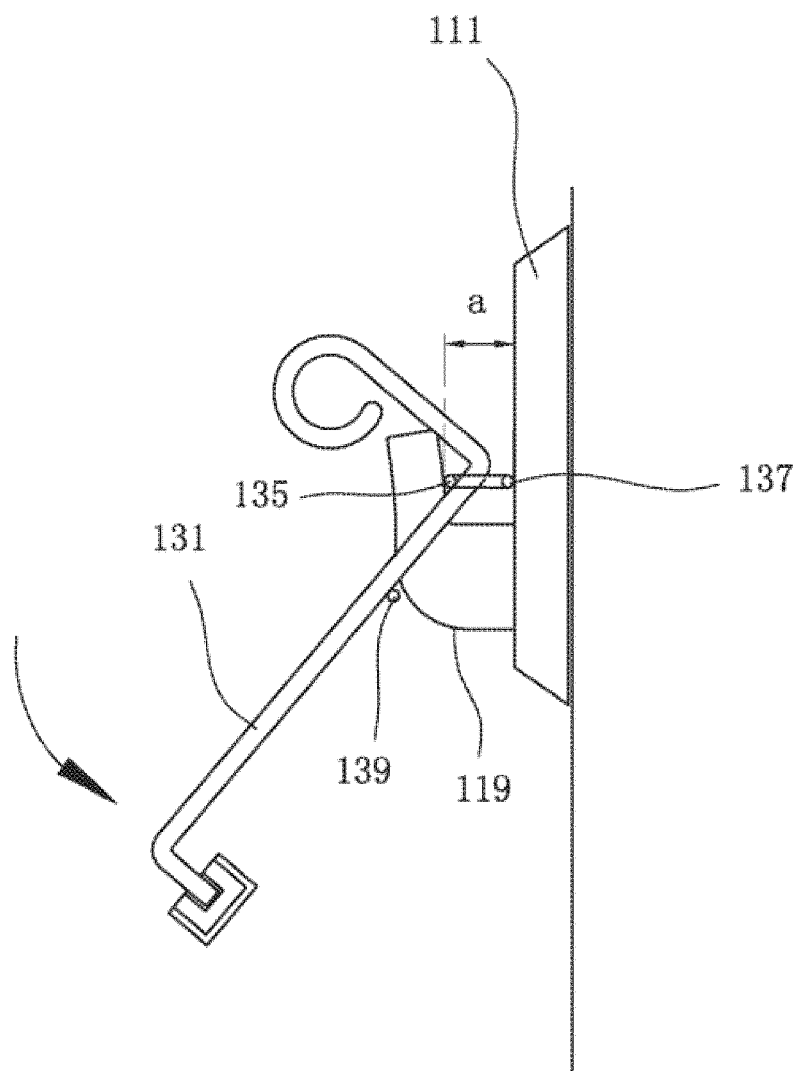


FIG. 4

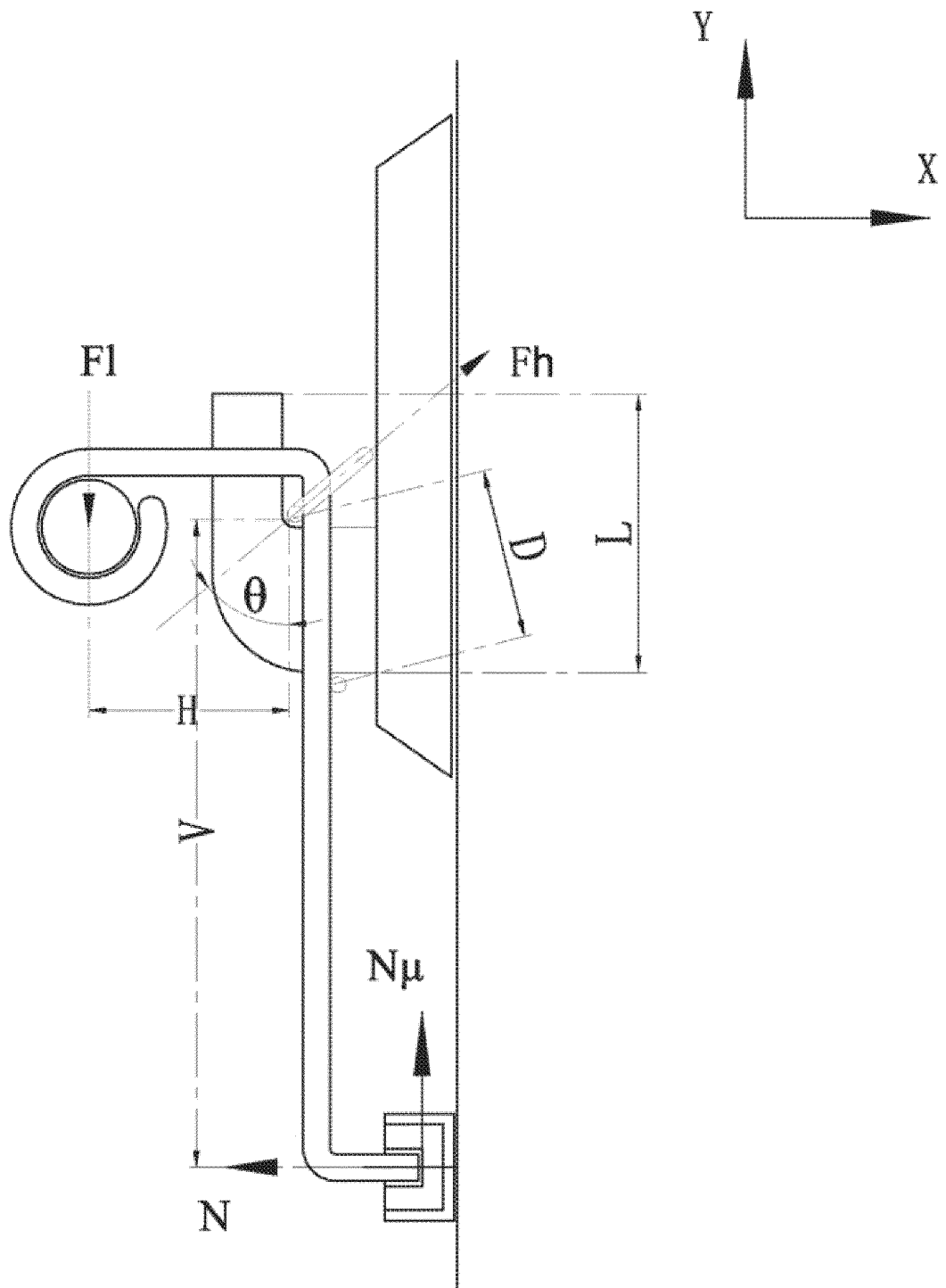


FIG. 5

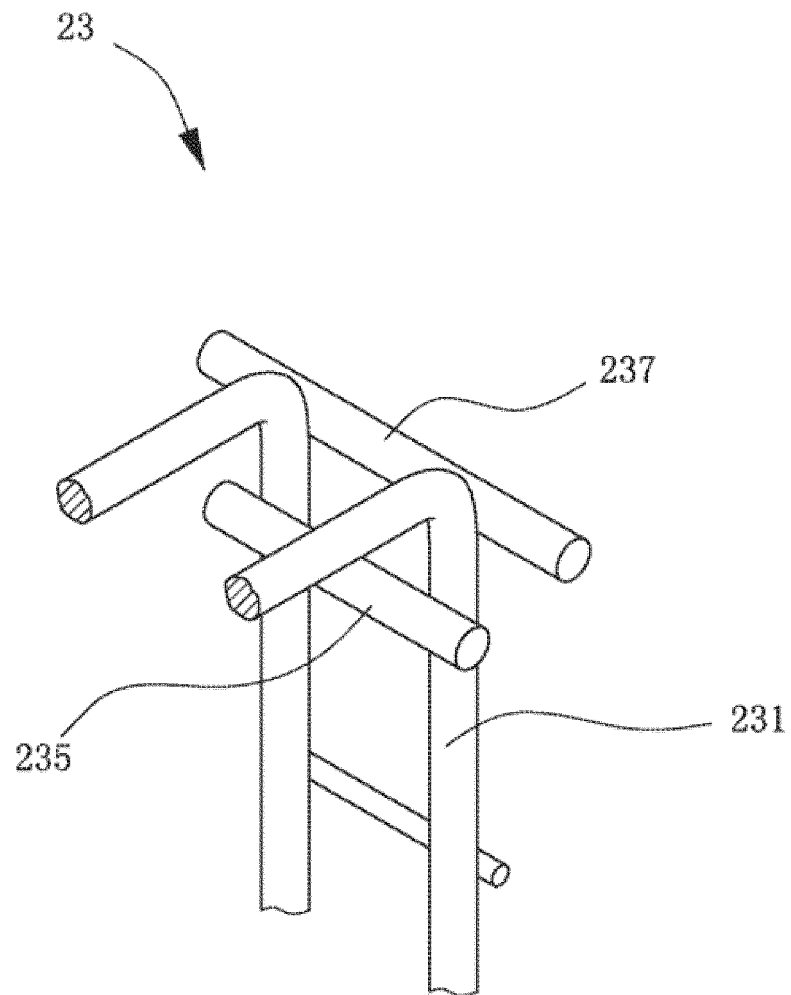


FIG. 6

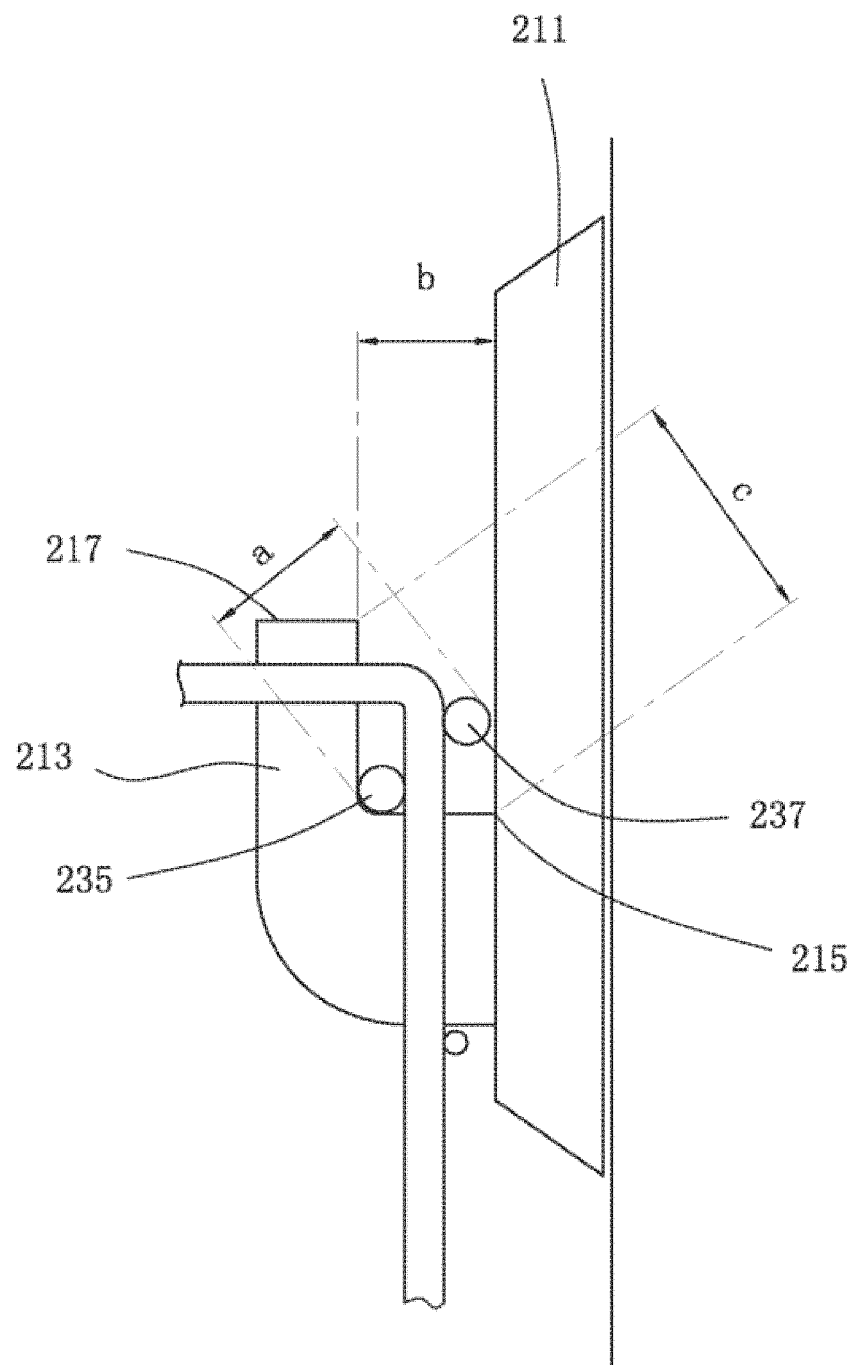


FIG. 7

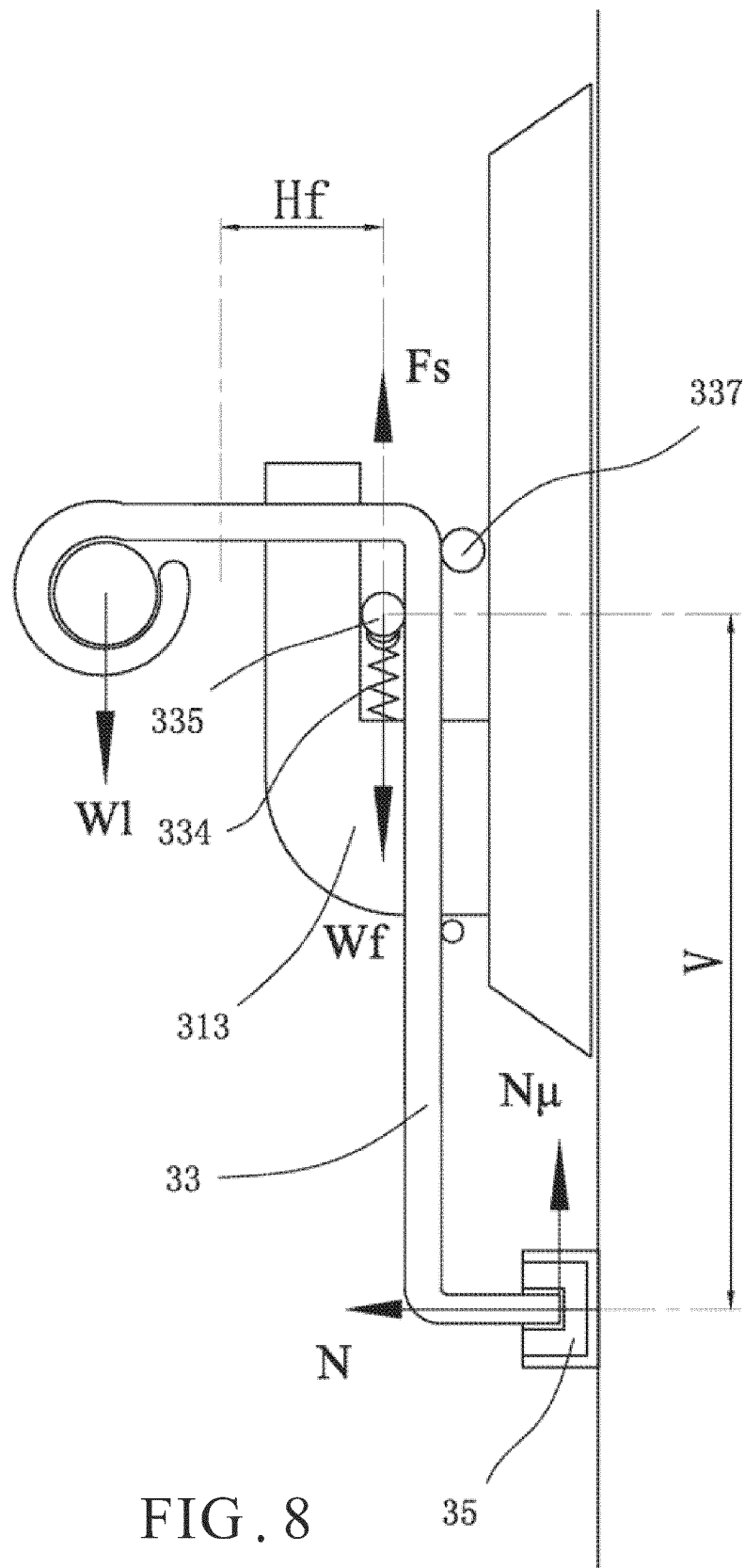


FIG. 8

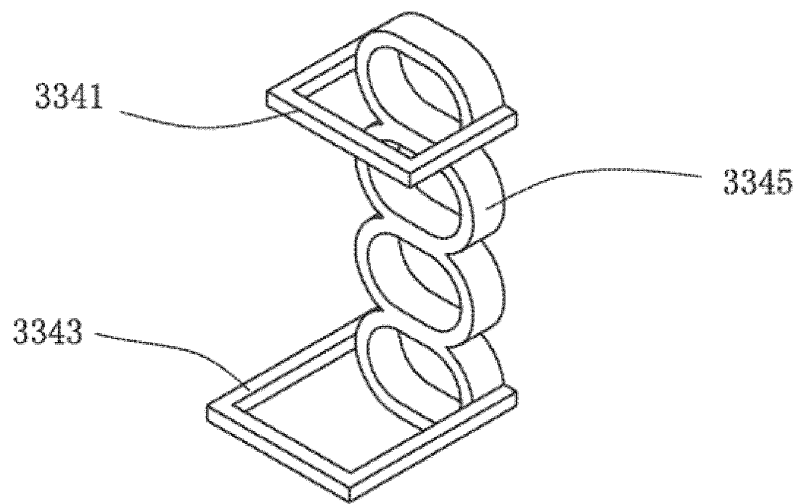


FIG. 9

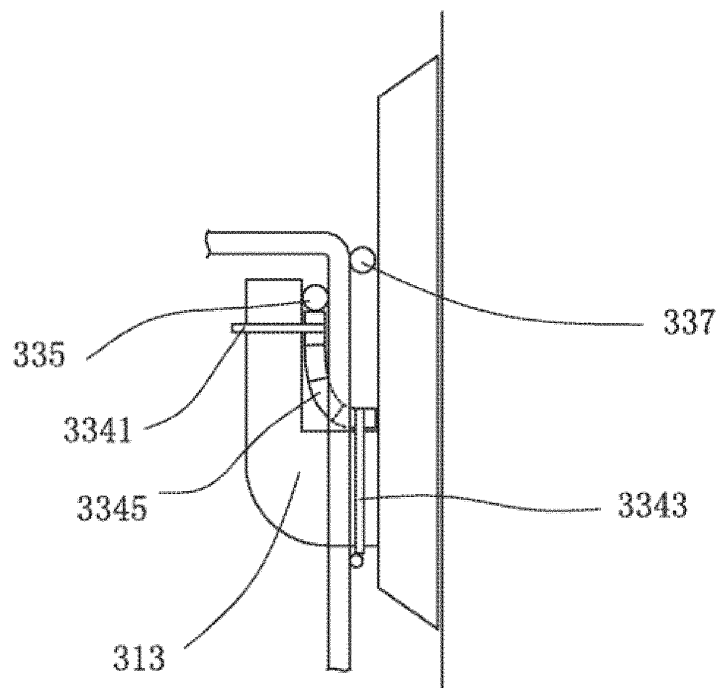


FIG. 10

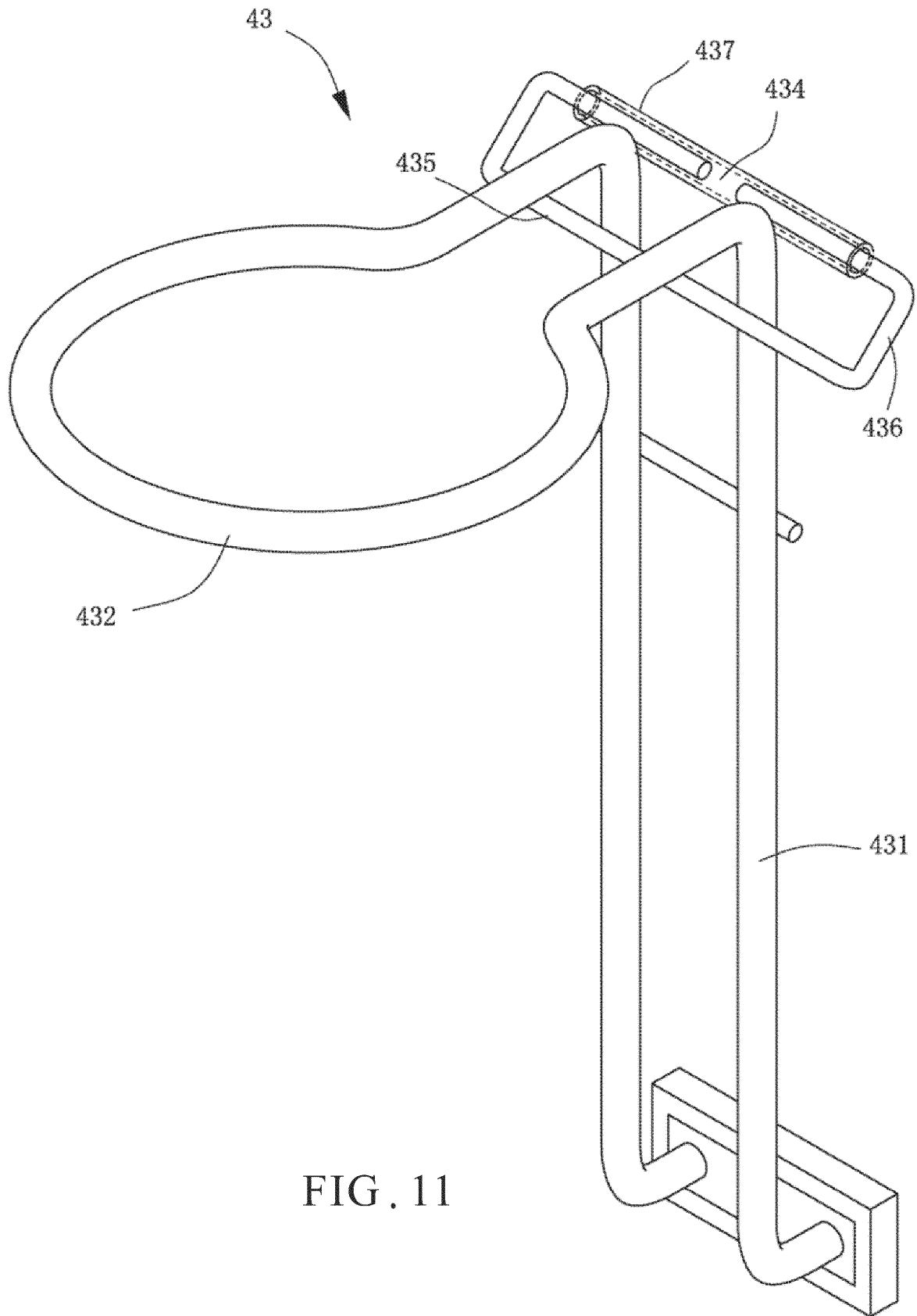


FIG. 11

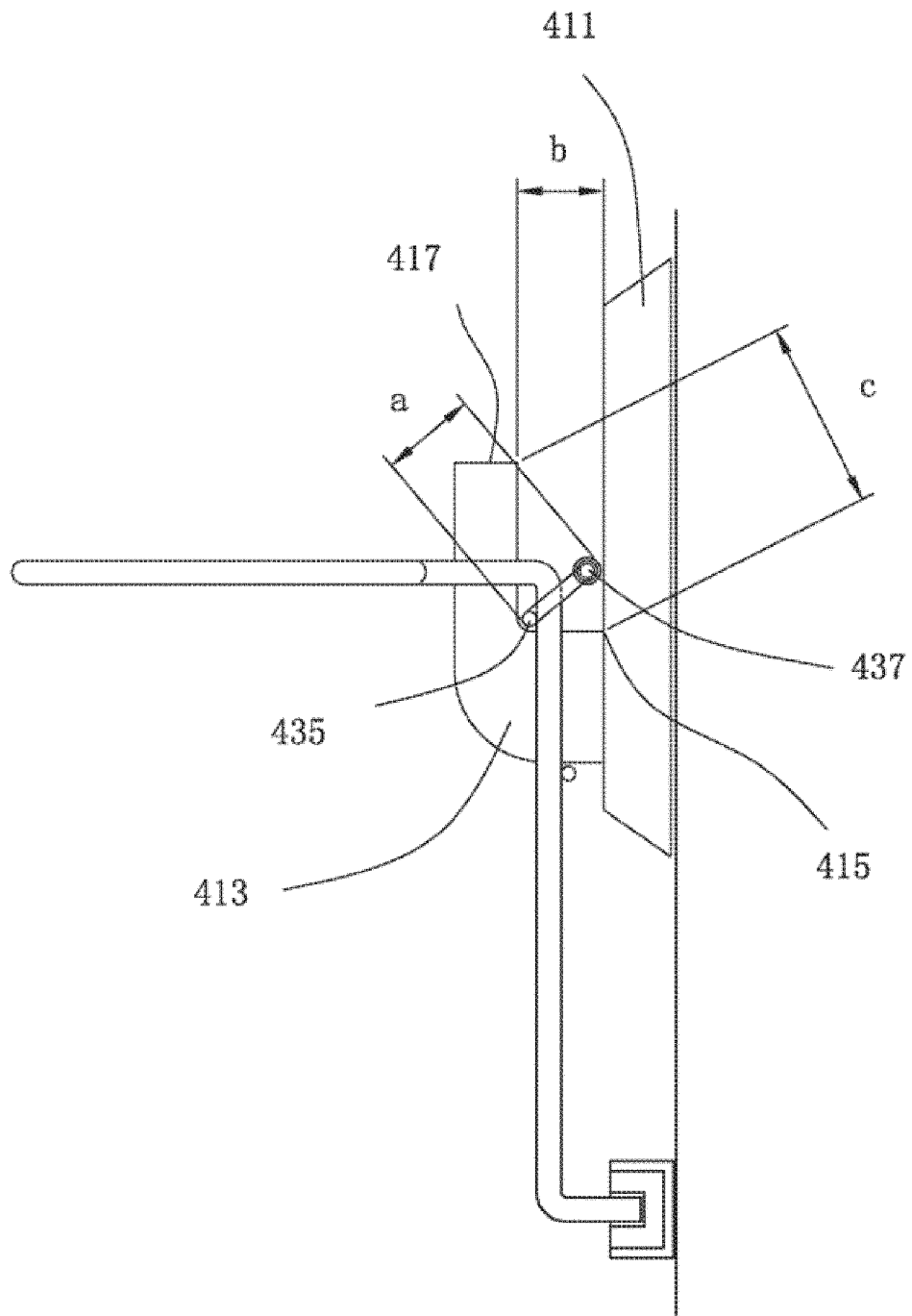


FIG. 12

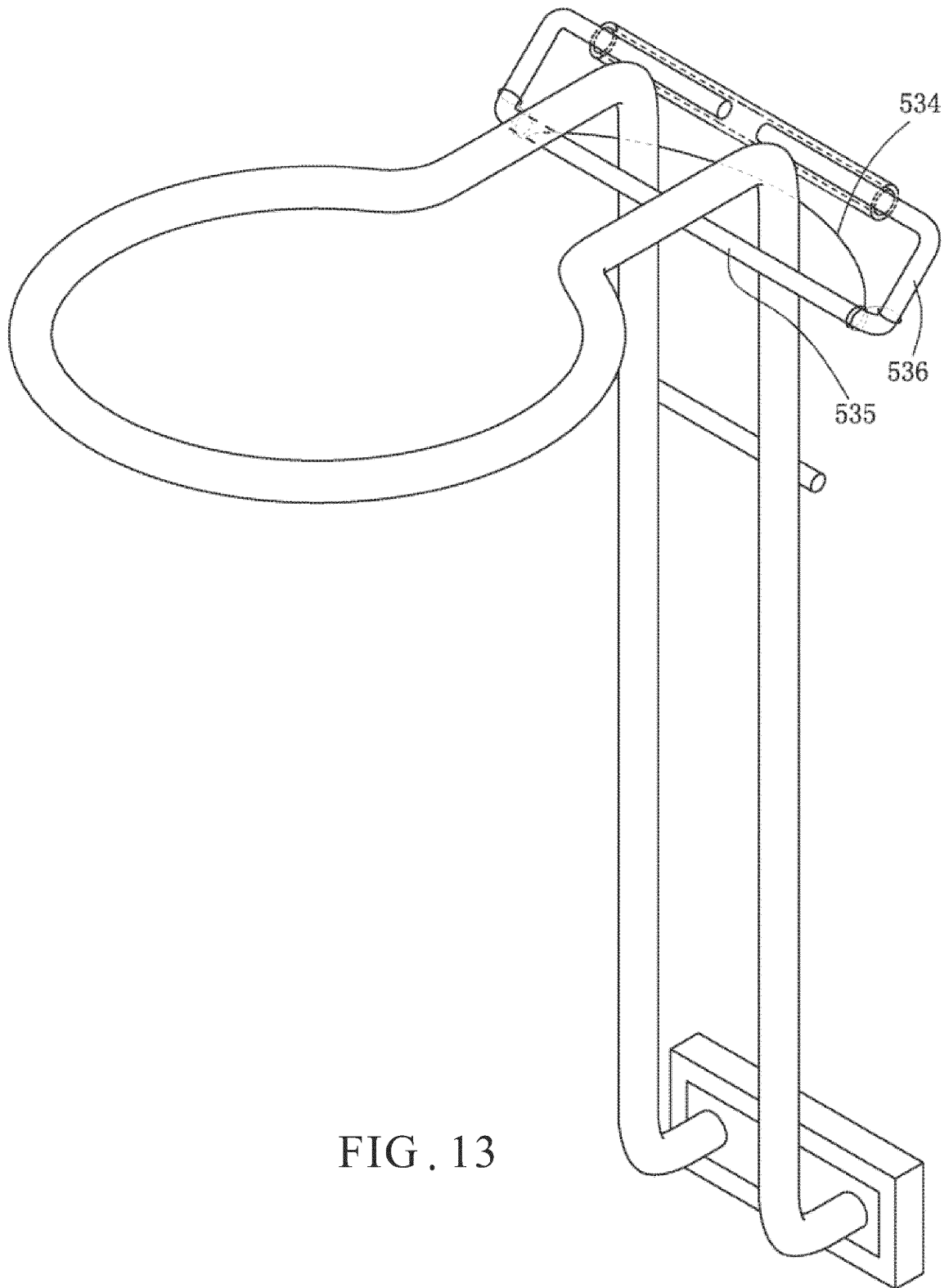


FIG. 13

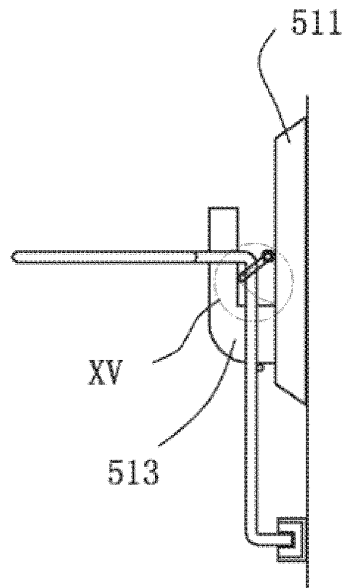


FIG. 14

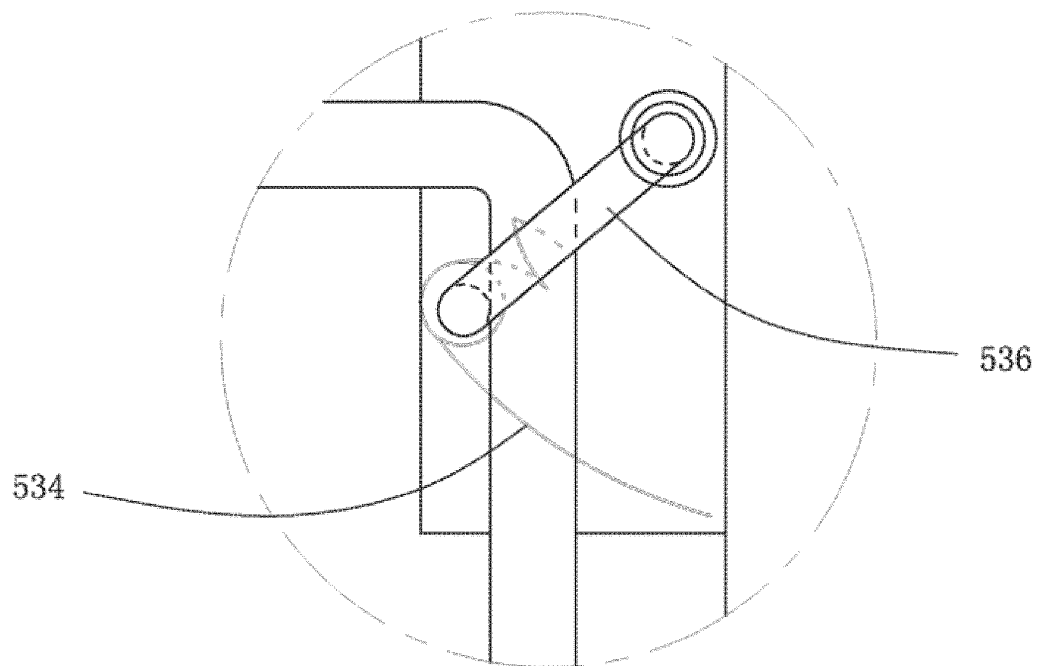


FIG. 15

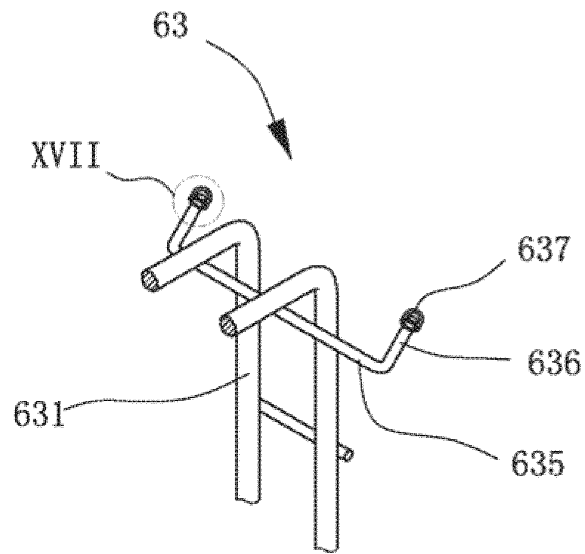


FIG. 16

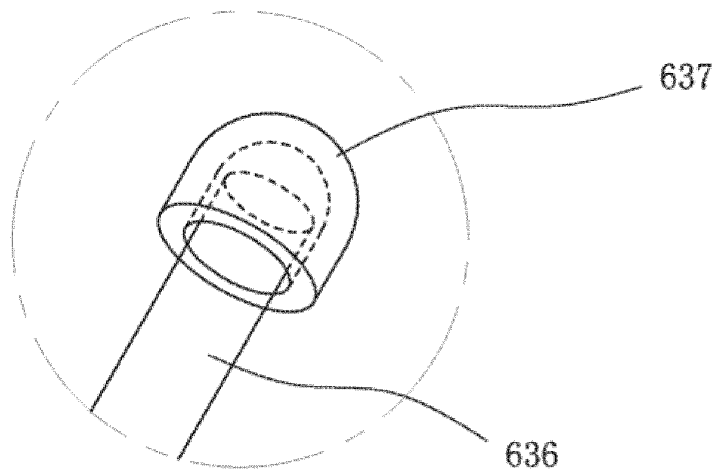


FIG. 17

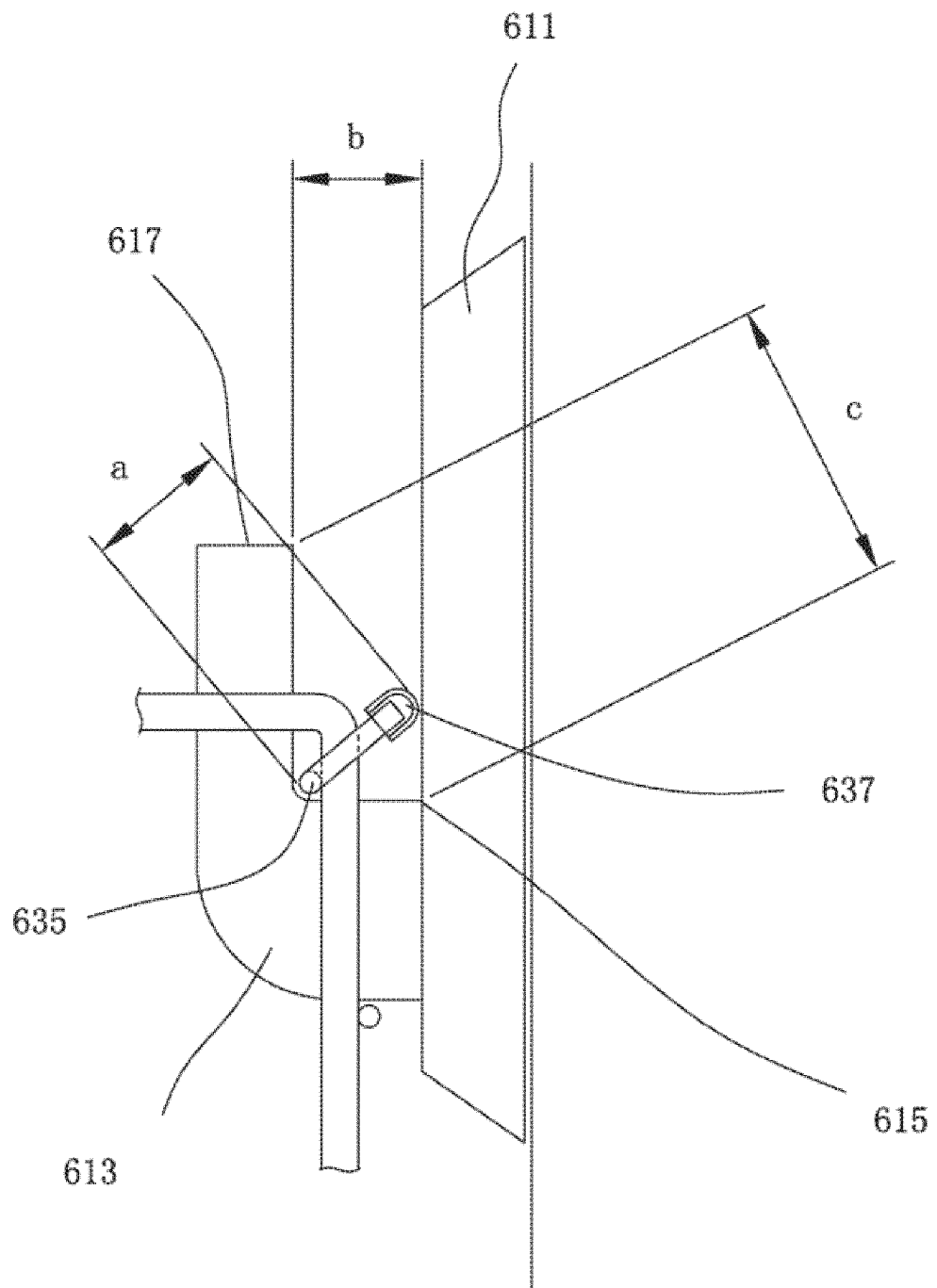


FIG. 18

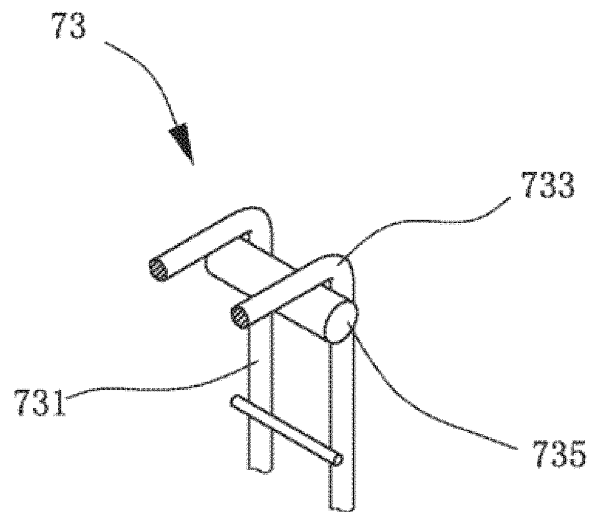


FIG. 19

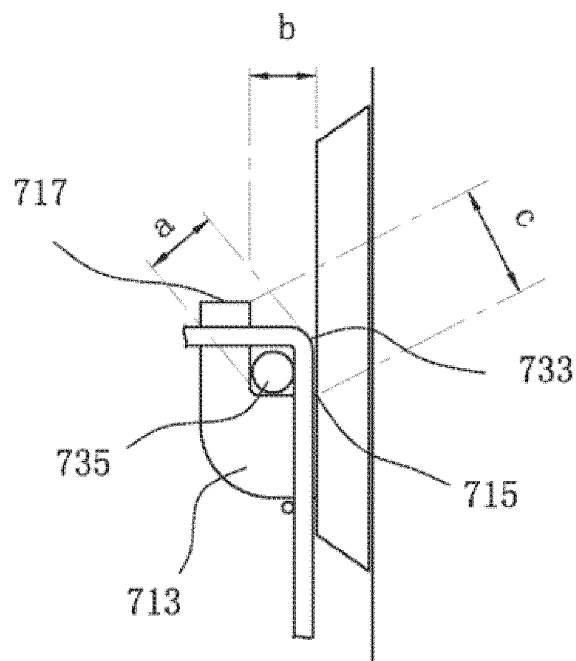


FIG. 20

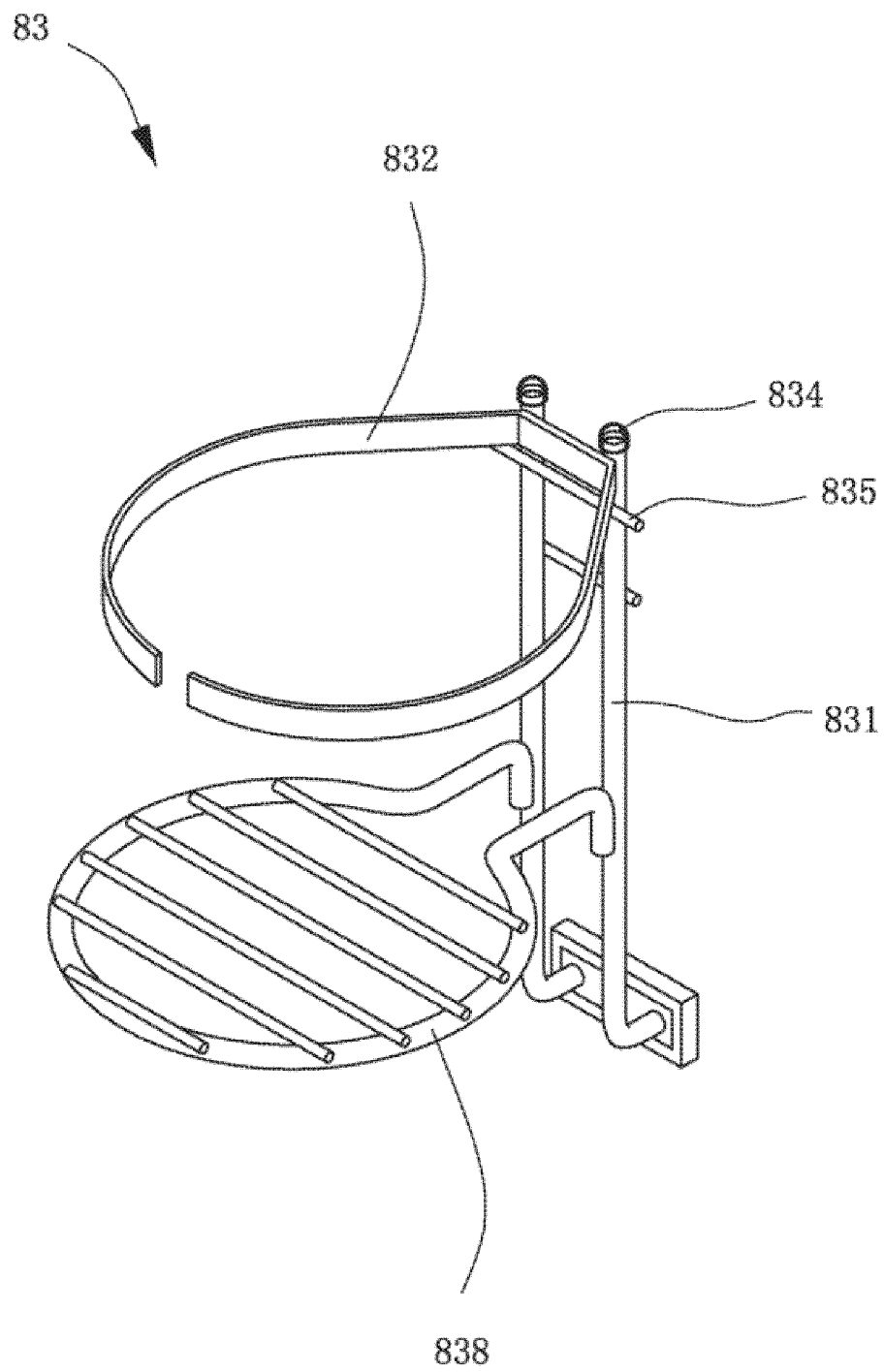


FIG. 21

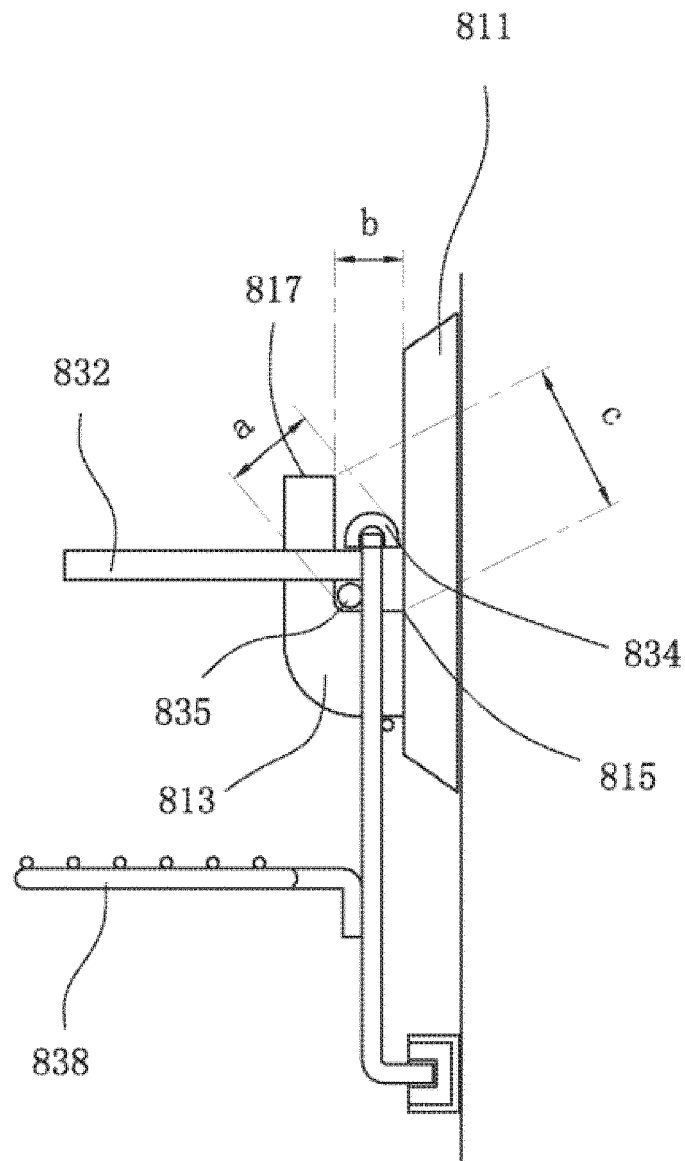


FIG. 22

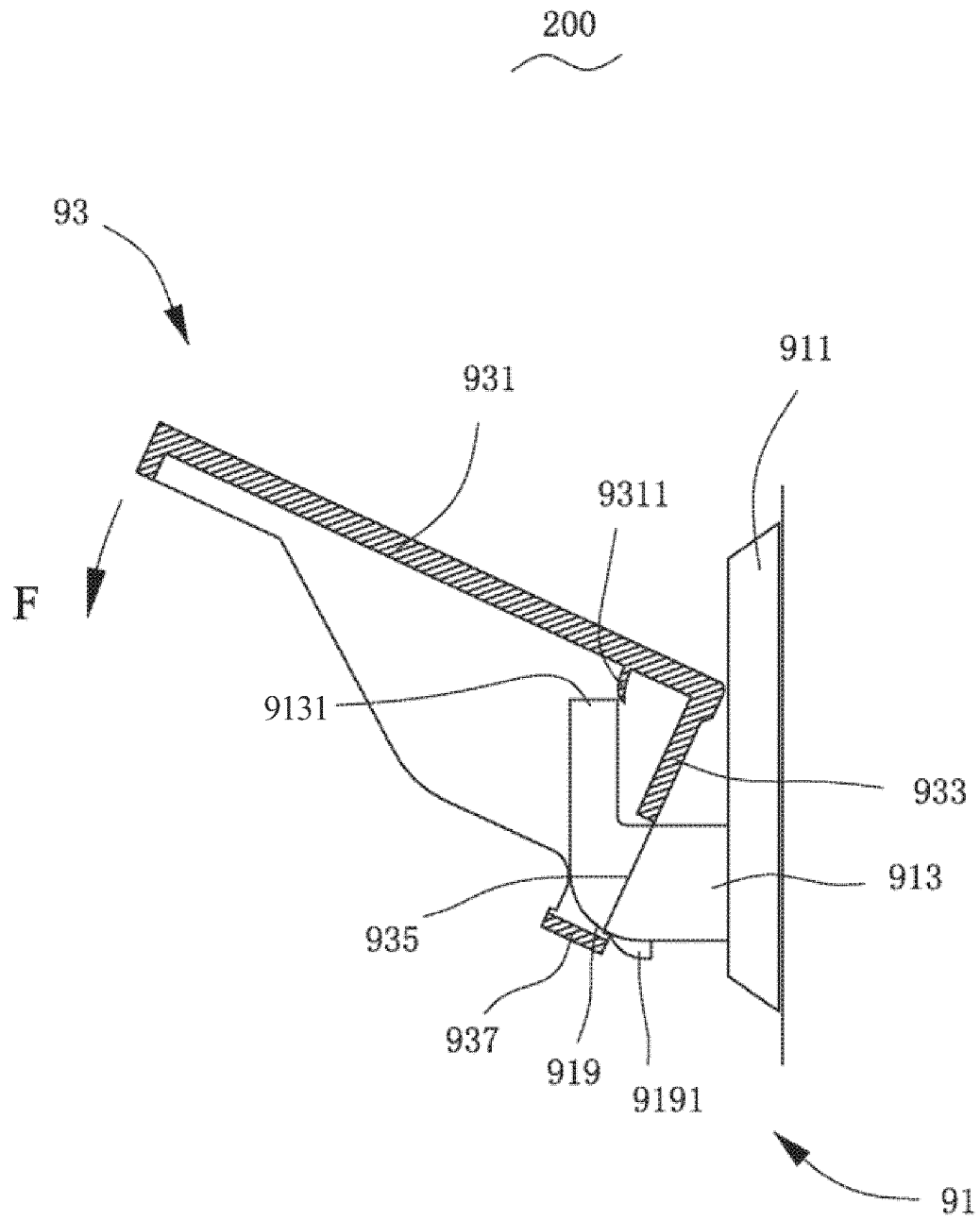


FIG. 23

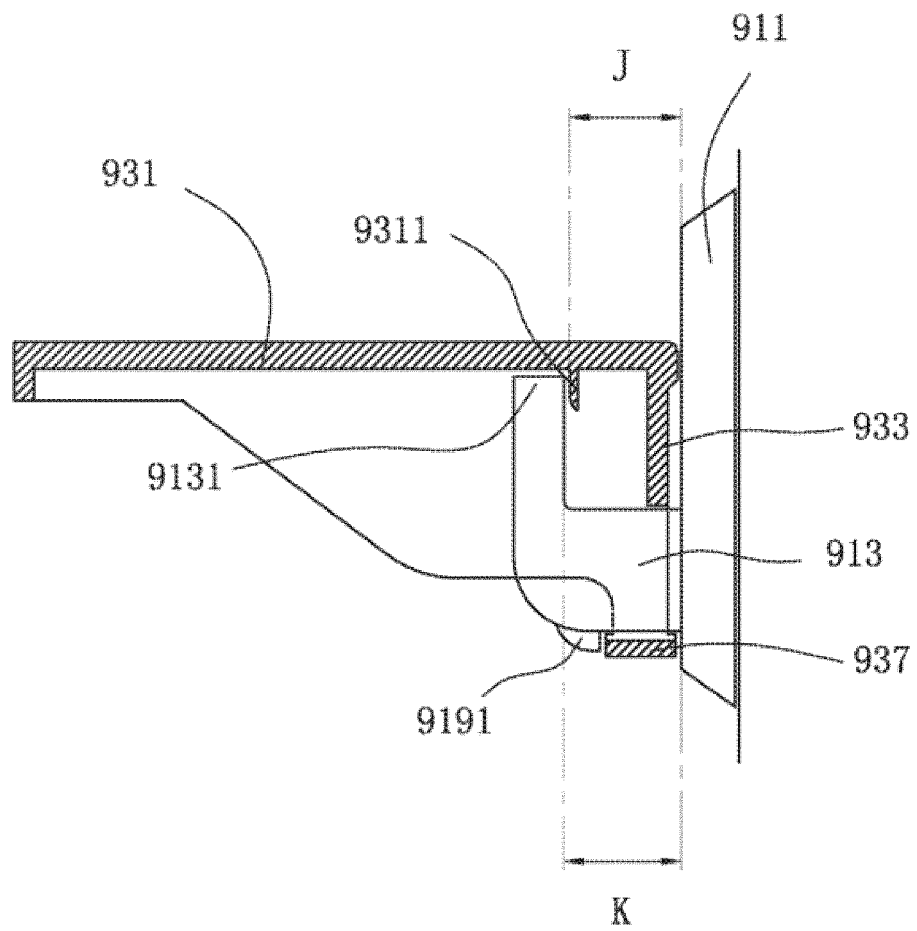


FIG. 24

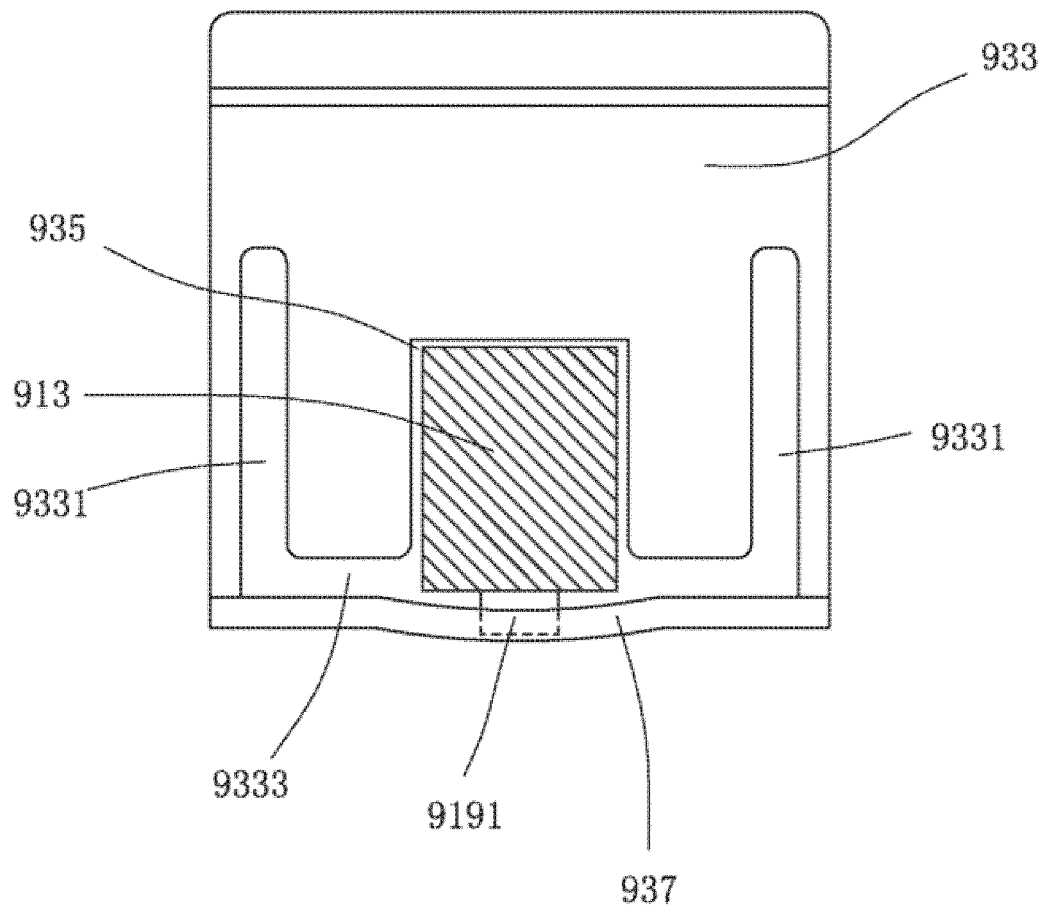


FIG. 25

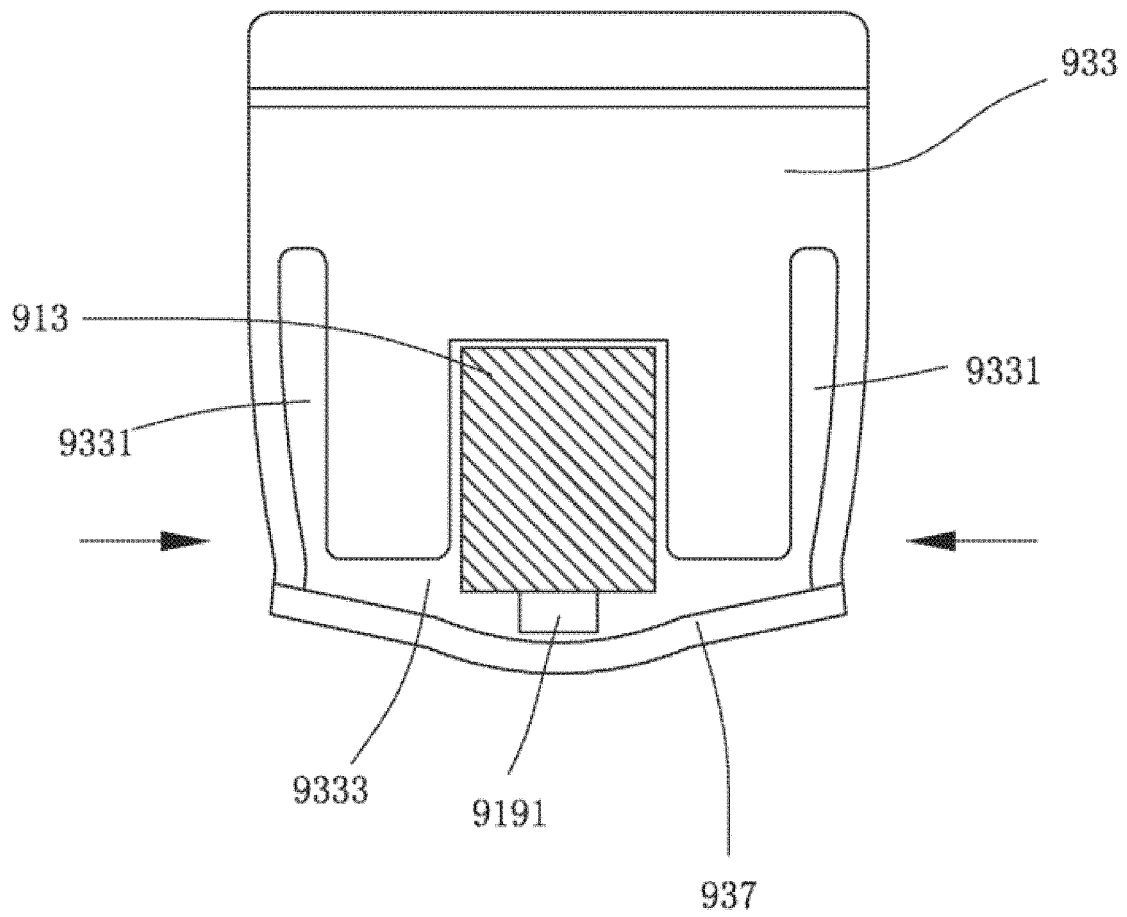


FIG. 26

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/078223

A. CLASSIFICATION OF SUBJECT MATTER

A47G29/00(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47G, F16B, A47K

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

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

DWPI,SIPOABS,CNABS,CNTXT collasible ;detachable ;dismountable ;interchangeable ;take down,hook,hall,separat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN2685627Y(LAN, Yonghui)16 Mar. 2005 (16.03.2005) the whole document	1-27
A	CN102018438A (NINGBO BOSHENG VALVE & FITTING CO LTD) 20 Apr. 2011(20.04.2011) the whole document	1-27
A	JP2004105413A (HIRASAWA M et al)08 Apr. 2004(08.04.2004) the whole document	1-27
A	WO2011016603A1 (KIM S et al)10 Feb. 2011(10.02.2011) the whole document	1-27
A	KR20010067889A (START TELECOM CO LTD)13 Jul. 2001(13.07.2001) the whole document	1-27

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

21 Sept. 2012 (21.09.2012)

Date of mailing of the international search report

18 Oct. 2012 (18.10.2012)

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Telephone No. (86-10) 62085830

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2012/078223

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN2685627Y	16.03.2005	NONE	
CN102018438A	20.04.2011	WO2012065513A	24.05.2012
JP2004105413A	08.04.2004	NONE	
WO2011016603A1	10.02.2011	KR200446870Y	07.12.2009
KR20010067889A	13.07.2001	NONE	

Form PCT/ISA/210 (patent family annex) (July 2009)